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Louise Cummings *Editor*

Research in Clinical Pragmatics

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Preface

Clinical pragmatics is still a relative newcomer to the study of language and communication disorders and is a recent offshoot of linguistic pragmatics. Yet, this field has already produced an abundance of empirical findings. It has also contributed in significant ways to the clinical management of clients with pragmatic disorders and to theoretical developments in disciplines such as linguistics, psychology and cognitive science. So rapid has been the growth of this area of study that it is now the right time to take a step back and assess what has been achieved. An assessment of the state of the art in clinical pragmatics lies at the heart of this volume. But another equally important purpose has motivated the production of this book. That purpose is to chart the road ahead for clinical pragmatic researchers. With so many new findings and ideas to consider, it is easy to overlook what still needs to be achieved. It is important for the many children and adults who have pragmatic disorders that clinicians and researchers also look forward to new areas of exploration.

The five-part structure of this volume reflects the full scope of inquiry that has been conducted within clinical pragmatics. The first two sections on *developmental pragmatic disorders* and *acquired pragmatic disorders* include chapters on the pragmatic features of a range of clinical populations. Some of these populations (e.g. autism spectrum disorder and schizophrenia) have been extensively investigated to date, although there is still much work to be done. Other populations (e.g. cerebral palsy and non-Alzheimer dementias) are only beginning to receive the attention of investigators. The choice of the term 'pragmatic features' is intended to reflect the fact that alongside the often significant pragmatic impairments in these client populations, there are also considerable areas of preserved pragmatic skill. This is often overlooked in the search for deficits. Intact pragmatic abilities can often be harnessed during intervention and are given the prominence they deserve in the chapters in these sections. These chapters also include conversational and other data that illustrate the pragmatic skills and deficits of clients. In order to understand fully pragmatic behaviours, both skills and deficits, readers must 'see' how they manifest in conversation and other forms of discourse as well as read descriptions of these behaviours.

The section on *pragmatic disorders in other populations* recognizes that there is a growing literature on, and awareness of, pragmatic disorders in clients who have not traditionally been in receipt of clinical language services for the remediation of pragmatics. This includes children and adults who have sensory deficits such as hearing loss and visual impairment. Evidence indicates that young children who are deaf or hard of hearing are significantly older than their hearing peers when they demonstrate many complex language skills. There is also a growing body of research that pragmatic language presents a greater challenge for children with visual impairment. Fluency disorders such as stuttering and cluttering create their own challenges for pragmatic language skills. Pragmatic deficits are a feature of several disorders (e.g. ADHD) that co-occur with fluency disorders. Fluency disorders may also have a negative impact on social interaction and pragmatics. Each of these disorders must move from a position of relative obscurity in clinical pragmatics to assume greater prominence in the discussions of clinicians and researchers.

The section on *management of pragmatic disorders* examines the proliferation of techniques and approaches to assessment and intervention that has occurred in recent years. In terms of assessment, pragmatic language skills in children and adults may be evaluated by means of checklists, standardized tests, self-report measures and approaches such as conversation analysis and discourse analysis. The choice of method of assessment must be guided by a range of considerations, only some of which are related to attributes of the client such as chronological age and developmental level. Interventions are equally wide-ranging in nature and may target behaviours of communication partners as well as clients. The chapters in this section guide readers through the complex considerations which clinicians must address in order to manage clients with pragmatic disorders.

The final section in the volume on *recent developments in pragmatic disorders* addresses aspects of pragmatic disorders which do not often appear centre stage. The psychosocial aspects of pragmatic disorders have been largely subordinated to a range of other concerns, even though the mitigation of the psychological distress and impairments of social functioning that are caused by these disorders should be at the forefront of everything clinicians and researchers do. The cognitive and neural aspects of pragmatic disorders are more often addressed in the cognitive and neurosciences even though they have central relevance to an explanation of these disorders. It is hoped that by featuring these aspects of pragmatic disorders in a dedicated section of the volume, some much needed emphasis will be achieved.

Lastly, this volume has only been possible because of the combined efforts of a wide range of expert clinicians, researchers and scholars. Collectively, the authors of these chapters embody a wealth of clinical knowledge and experience in the area of clinical pragmatics. Each is motivated by a concern to better understand, and improve the lives of, children and adults with pragmatic disorders. Their enthusiasm in this quest, I believe, is evident in every page of this volume. I hope readers will agree. For my part, I know I have grown as a clinical pragmatist from the experience of working with these authors.

Nottingham, UK Louise Cummings

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Part I
Developmental Pragmatic Disorders

Chapter 1
Pragmatic Development

Gabriella Airenti

Abstract In this chapter, the development of pragmatic abilities in children is described. Pragmatic abilities are a multifaceted skill. It is argued that using and interpreting language in communication is a demanding task that requires inference abilities and relies on different forms of knowledge. Very often, in everyday use of language, the pragmatic meaning of an utterance is not what is literally said. Consequently, interpreting an utterance requires going beyond what is said in order to identify the speaker's communicative intentions. This kind of interpretation requires an inferential process based on contextual knowledge or a common ground that interlocutors are supposed to share. Children begin to participate in communicative interactions very early in life, although full pragmatic development is only achieved throughout the school years. It is described how children at different stages of development deal with aspects of implied meaning in communication.

Keywords Common ground • Communicative act • Conversation • Development • Nonverbal communication • Pragmatics

1.1 Introduction

In the analysis of different aspects of language, pragmatics has always been considered as the most difficult to define. Many different definitions have been proposed but no single definition has been widely accepted (Levinson 1983). Certainly, we can say that pragmatics is concerned with language in use. However, language use is a substantial part of human intentional action, and humans use language in so wide a range of contexts and situations that any attempt to define limits seems virtually impossible. We use language to interact with others and to influence them in many different ways. It is then rather difficult to define a precise set of pragmatic rules dictating what we can do with language in any real or imagined situation. At the same time, we can identify a certain number of pragmatic phenomena. What is

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the nature of these pragmatic phenomena? This point, too, is controversial. The set of topics, which are treated in the discipline, is fairly disparate. Different theoretical approaches focus on a wide range of phenomena, including speech acts, presuppositions, implicatures, deictics, turn-taking, conversation rules, politeness rules, genres and styles of discourse. In this chapter, I shall focus on acquisition and try to find a path which allows us to situate all these topics within a general cognitive perspective. Let me first spend a few words on a question that is central for the definition of pragmatics, i.e. the relationship between language and communication.

Austin and other philosophers of language have argued that language use is a form of action. Language is then considered mainly to be a communicative tool.[1] In this perspective, the units of pragmatics are speech acts, i.e. intentional communicative actions performed in order to have effects on others (Austin 1962; Searle 1969). We use language to perform requests or promises, give orders, convince, complain, etc. Moreover, a fundamental aspect of pragmatics is that in everyday use of language, the pragmatic meaning of an utterance is often not what is literally said. Then, interpreting an utterance requires going beyond what is said in order to individuate the speaker's 'real' communicative intentions (Grice 1957, 1989). For instance, if a mother tells her child: "If you don't do your homework now, you will skip dessert at dinner, I promise!", her statement is not to be interpreted as a promise but as a threat. "What a gorgeous day!" uttered on a day when it is raining heavily probably is not simply a false statement but is meant to be an ironic way to stress that the weather is poor. If a mother calls her son a couched potato, she is probably criticizing his laziness. We can produce a long list of examples of this kind, which show that, in order to understand language in use, the study of language itself is not sufficient.

Interpreting an utterance is an inferential process based on contextual knowledge or a common ground that the interlocutors are supposed to share (Clark 1996). The contextual knowledge may be of different types. It can refer to what has happened before in the conversation, what the interlocutors may perceive, what they are supposed to know, the kind of relationships they have with each other, and so on. Taking relationships as an example, the potential meaning of an utterance like "I would like to meet you at home at five" is different if this utterance is spoken to a friend or if a parent utters it to a child. In the first case, it may be understood as an invitation, in the second case as an imperative. In this example and in many others, different relationships between speakers and hearers permit different communicative intentions to be attributed to a speaker and then, in the terminology of speech act theory, different illocutionary forces to be assigned to statements.[2]

[1] Against this perspective, Chomsky (1975) and his followers (e.g. Kasher 1991) maintain that language exists *per se* as the expression of thought and that communication is only one of its possible functions and not the fundamental one.

[2] In speech act theory, each utterance is a speech act that may be characterized on three levels of meaning: a locutionary act (the linguistic expression of a given meaning); an illocutionary act (the realization of a certain type of act, such as a promise or an order, i.e. an illocutionary force); and a perlocutionary act (the effects of a particular act on the hearer). Every linguistic utterance thus has

Using and interpreting language in communication appropriately thus requires inference abilities and different forms of knowledge. Note that the notion of appropriateness or felicitousness[3] is fundamental here. We could add this notion to our definition of pragmatics: from a cognitive perspective, pragmatics might be defined as the set of abilities that allow speakers to use language *appropriately* according to different communicative situations. Then, impaired pragmatic abilities that we may find in clients with a range of pathological conditions would amount to an *inappropriate* use of language. In this chapter, we shall describe how children acquire pragmatic language abilities. From the viewpoint of development, it has to be emphasized that the acquisition of pragmatic abilities is intertwined with the acquisition of other aspects of language, namely, the grammatical structure and meaning of language. We will have need to refer to these aspects as we chart the steps that children pass through on their way to becoming competent language users.

1.2 Nonverbal Communication

In the introduction, pragmatics was defined as language in use. But humans may also communicate using nonverbal means: a parent may accept a child's request with a smile, or refuse permission with a scornful look. Are nonverbal communicative actions part of pragmatics? In a developmental perspective this is a question that cannot be ignored. There is no doubt that children start communicating before acquiring language. But what is the import of behaviours in the preverbal stage to the later development of abilities to use language?

Developmental psychologists have proposed that in the preverbal stage children acquire fundamental aspects of pragmatics. Trevarthen (1979, 1998) has argued that infants are quite precocious in their communicative interactions with adults. Bruner (1975, 1983) has maintained that in the preverbal stage children acquire the conditions of the most fundamental speech acts. He focuses in particular on requests. His claim is that the acquisition of language is structured around pragmatic units that a child has already acquired in a preverbal form. For instance, there is continuity between an act of pointing and the formulation of a request in linguistic form. Bates et al. (1975) have distinguished two kinds of pointing, which correspond to different speech acts, the proto-imperative (give me!) and the proto-declarative (look!). Thus, authors who work with infants support the idea that before the acquisition of language, infants have already acquired some fundamental aspects of conversation

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linguistic content, is expressed with a certain illocutionary force, and realizes certain perlocutionary effects (Austin 1962).

[3] In speech act theory (Austin 1962), an act is judged to be felicitous if it abides by certain conditions on its use. These so-called felicity conditions are that the act must be executed by the appropriate people, in the appropriate circumstances, following the appropriate procedure and the people involved must be sincere in carrying out the act. The act of sentencing someone in a court of law is infelicitous if the person carrying out the sentencing is not a judge, or if the judge does not follow certain legal procedures, or if she is not in the correct place, and so forth.

such as turn-taking, and the function of the most basic speech acts. In support of this view, there are observational studies and experimental work which show that in interactions between infants and their caregivers, both partners feel engaged in the interaction and have expectations of the other's behaviour. In fact, a number of studies have shown that experimentally induced perturbations in interactions provoke distress both in children and their mothers (Murray 1998).

One could object that if we compare them to the skills required by adult conversation, the skills required by proto-conversations involving preverbal children are at best rudimentary. In the same spirit, one might ask whether there is any interest in discussing them since pragmatic comprehension, as we saw at the beginning of the chapter, requires a complex set of skills that infants surely do not possess. But it is not possible to ignore what takes place in the preverbal stage if we are interested in atypical development. Recent research has shown that signs of atypical development may be detected early on if we observe how preverbal children approach other people. Let us take as an example the use of deictics. Children with autism have difficulty using deictic expressions. In particular, they may be unable to use personal pronouns correctly, shifting from "I" to "you", and vice versa, when required by conversation (Kanner 1943). It is particularly relevant that these difficulties tend to emerge early in the deictic use of pointing. Questions about young children's possession of these skills are included in Q-CHAT, which is a promising tool for the early diagnosis of autism spectrum disorder (Allison et al. 2008). An examination of nonverbal communication thus allows us to understand the communicative bases of later linguistic utterances and to detect deviations from typical development.

1.3 Communication and Theory of Mind

In recent years, the relationship between the development of communication and theory of mind has been extensively debated. Introduced by Premack and Woodruff (1978) with the aim of understanding if nonhuman primates had representations of others' minds, the concept of theory of mind has been adopted by developmental psychologists as a tool for investigating children's representations of their own and other minds, both in typical and atypical development. The common assumption is that if communication is made possible by the mutual representation of interlocutors' intentions, then it is reasonable to consider the ability to read other minds as a prerequisite for communication. Moreover, impairments in communication such as we find in autism may be ascribed to flawed development of theory of mind (Wimmer and Perner 1983; Baron-Cohen et al. 1985).

Actually, the relationship between communication and theory of mind is more complex than it was conceived at the outset of this research. Communication is a multifaceted phenomenon. Do all aspects of communication depend on the development of theory of mind? If we take a strictly Gricean point of view, this is the case[4] since any communicative act requires second-order representations. However, this is a theoretical stance based on adult communication, and it is rather difficult to adapt it to what we know about early development of pragmatic abilities (Airenti 1998; Breheny 2006; Risjord 1996). Since children are able to communicate well before being able to use language, we have to recognize that there are forms of communication that do not require a full-fledged theory of mind. The results of an impressive amount of experimental work have led investigators to postulate different levels of development of theory of mind, and it is reasonable to hypothesize that these levels may correspond to different degrees of elaboration of communication skills[5]. This hypothesis would explain why young children have "full" communicative interactions even if their abilities to comprehend and produce communicative acts are much simpler than those possessed by adults.

1.4 The Beginning of Conversation and the First Speech Acts

Communication with young children is a kind of paradox. If we observe children in conversation, they show the co-existence of precocity and immaturity (Ninio and Snow 1996). Infants may use very simple behaviours like cooing and babbling and yet adults feel involved in interaction with them. We may explain this fact by taking into consideration one of the fundamental aspects of pragmatics, that is, the structure of conversation itself. In any dialogue, there are contents that have to be communicated and understood and there is a form in which these contents are expressed. Conversation has rules. It is characterized by a number of features at two different levels. At the basic level, there are features that define the format of conversation itself. These features include turn-taking. They are probably universal and we find them already in infants. However, there is another level, which concerns the socially approved management of these rules. This cognitive level changes with age, since the adult way of dealing with a conversation requires planning communicative contents and adapting them to the social rules of conversation. An important part of these rules regards the specific linguistic forms that adults consider to be polite ways to address other people in different circumstances. These rules are acquired later through parents' teaching and are dependent on cultural factors. We shall discuss politeness further in Sect. 1.8. In this section, we discuss the beginning of conversation.

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[4] Grice's theory of *nonnatural* meaning maintains that a communicative act relies on two intentions, the intention to achieve an effect on a recipient and the intention that the previous intention is recognized (Grice 1957).

[5] For further discussion of this work and its implications, the reader is referred to Airenti (2015), Apperly and Butterfill (2009), Baillargeon et al. (2016), Helming et al. (2014), Low and Perner (2012), and San Juan and Astington (2012). Theory of mind is addressed further in Chap. 22, this volume.

The basic level of conversation consists in the rules of dialogue itself. The most fundamental one is turn-taking (Sacks et al. 1978). Cross-cultural research has shown that turn-taking is a universal system in which local variations are only quantitative in nature (Stivers et al. 2009). Moreover, research on different sign languages has shown important similarities between signed and spoken languages (Holler et al. 2015). Turn-taking is the first pragmatic feature that is acquired by infants. The spectrographic analysis of exchanges between neonates and adults shows that newborns participate in interactions by coordinating their rhythm with the rhythm of the adult (Malloch et al. 1997; Trevarthen et al. 1999).[6] It is this ability that makes us perceive infants' behaviours, including sounds and smiles, as communicative acts and has led to the description of first interactions between infants and adults as proto-conversations (Bateson 1975). An interesting point is that dyadic patterns can differ depending on the affective state of the infant. Stern et al. (1975) have shown that in 3–4-month-old infants who are in a state of particular affective excitement, the pattern of alternation is replaced by one of simultaneity, exactly as it happens in adult communication.

Turn-taking is linked to infants' ability to establish joint attention. Joint attention emerges in infants as early as 6 months (Butterworth and Cochran 1980), while infants are able to follow the direction of gaze of an adult toward an object at 2–3 months (D'Entremont et al. 1997; Scaife and Bruner 1975). The ability to respect turn-taking is an early developmental achievement which progresses with age. Until they are school age, children take their turn with a delay that is up to ten times longer than in adults. This is not a difficulty in dyadic conversation with adults but it can be problematic when more than two people are involved in conversation, in particular in conversation among peers (Ervin-Tripp 1979; Garvey and Berninger 1981). This delay has been explained by recent research, which has shown that children acquire turn-timing skills early, but for a certain period of time they have limitations in planning their response (Casillas et al. 2016).

At around 9–12 months the system for sharing attention develops and pointing begins. There is evidence that pointing develops in different cultures at almost the same age and can be considered a universal step in the development of communicative ability (Liszkowski et al. 2012). Pointing is connected with the development of first speech acts. In fact, some authors have considered that the concept of speech act can be useful in explaining the transition from preverbal to verbal communication (Bates et al. 1975; Bruner 1975, 1983). Children learn the communicative features of speech acts in the preverbal stage and later these features are transferred to the corresponding verbal form. The typical example is the act of request, considered as a proto-imperative. In interactions with adults, children acquire the conditions for

[6] It must be noted that all the processes we are examining are supported by the ability that infants display early in development to acknowledge prosodic differences, e.g. the change of rhythm of speech. This ability is present even before birth and provides children with cues to identify the organization of familiar sounds in their native language and then identify boundaries between different units of the speech like words and phrases (Mehler et al. 1988). In later years, prosodic cues are exploited to facilitate reference processing (Grassmann and Tomasello 2010) and the interpretation of complex communicative acts like irony (Bryant 2010).

the act of request when requests are performed by pointing. According to Bruner (1983), this process is modeled by the behaviour of adults who give "speech act lessons", that is to say, lessons on the felicity conditions of speech acts: requests must correspond to a real need; they must be made at the right moment; they must not require excessive effort; they are directed to an interlocutor who is a voluntary agent; and they can be refused for valid reasons. The other basic speech acts that children perform by pointing are proto-declaratives, which are attempts to attract adult attention to a fact or an object.

This position has been criticized for various reasons within the field of developmental psychology. Dore (1978) considers that the linguistic component is essential in the definition of a speech act and does not accept the equation between nonverbal communicative acts and proper illocutionary acts. On this view, the first speech acts would appear at the one-word stage. For instance, a child who says "papa" may intend "Where is papa?" or "Here is papa", thus expressing different communicative intentions, and performing different speech acts that would be recognizable through intonation (Dore 1975). The list of primitive speech acts that are realized by a single word includes naming, repeating, replying, requesting a reply, calling, greeting, and practicing. Dore (1979) also proposed replacing the term 'speech acts' with 'conversational acts' to stress that utterances, even one-word utterances, have to be interpreted against the background of the conversational context.

Ninio and Wheeler (1986) have proposed a coding system for classifying verbal communicative acts in mother-infant interactions. Ninio and Snow (1996) consider that what is in common between preverbal communication and verbal communication is at the level of social interactions where interpersonal intentions are socially constructed. In their study of children at 14, 20 and 32 months, Snow et al. (1996) identify and codify communicative intents at two levels: verbal interchange and utterance. The first is a conversational criterion which goes beyond single speech acts: for instance, directing hearer's attention, negotiating immediate activity, discussing joint focus. Their results are in a way surprising. At 14 months no speech act was used by more than a third of children. The 14-month-old children tried to communicate with their parents relatively infrequently, even when gestures and nonverbal vocalization were included. The authors contended that it was only by introducing the distinction between social/communicative activity or context and the specific speech act expressed that the continuity between children's early and later communicative behaviour was observable.

Other authors have shown that over the years there is a different apprehension of speech acts and that different speech acts require different representational capacities (Astington 1988; Camaioni 1993). According to Astington (1988), young children perform speech acts but they do not understand the social meaning of these acts. She studied promises in particular and showed that it was not until 6 years of age that children had a real understanding of them, i.e. they were able to understand when a promise is kept or broken. Rakoczy and Tomasello (2009) showed that children at 3 years of age understand the direction of fit both of imperatives and assertions, while 2-year-olds understand only the world-to-word direction of fit of imperatives.

The study of the acquisition of speech acts has also shown the limitations of this concept in the analysis of conversation. A major difficulty is the distinction between direct and indirect speech acts (Searle 1975), which has been most debated in the pragmatic literature. In a conversation, the illocutionary force of a speech act often does not correspond to its linguistic form. “I shall be here tomorrow” is an assertion, but may also be intended as a promise or a threat. This is also true for performatives: “I ask you to...” may correspond to different illocutionary forces. Moreover, for politeness reasons requests are almost invariably expressed in conventional indirect form. Since each speech act is potentially indirect, in conversation participants have to reconstruct the speaker’s communicative intention by relying on contextual knowledge (Airenti et al. 1993; Dascal 1992).

Children’s use of indirect speech acts is particularly enlightening on this point. The comprehension of conventional indirect speech acts is not particularly problematic for children who have just acquired language (Shatz 1978). Children can answer requests and directives correctly on the basis of the context before they actually learn to process them as adults do (Sinha and Carabine 1981). A young child has no difficulty in understanding her mother who says: “Will you please be quiet?” or “May I have an answer?” On the contrary, the production of conventional indirect speech acts is acquired only at a later age (Gordon and Ervin-Tripp 1984). Explicit and repeated teaching is necessary in order to encourage a child to use forms like “May I have...”, “Could you please give me...”, “I would like to have...”, etc. These conventional forms of request correspond to social norms of politeness that children do not use spontaneously but have to learn. Yet, some indirect forms of request are among the first speech acts that a young child performs. Think of an utterance of the kind “I want cookie”. In speech act terminology this is an indirect request. For a young child the expression of a desire is a way to initiate the most usual type of interaction that takes place between infants and their caregivers, one in which the infant expresses a desire or a need and the adult satisfies it.

In conclusion, we can say that the concept of speech act has been very useful in understanding how even preverbal children are able to perform and understand communicative acts. However, the research has shown that it is incorrect to say that there is an age at which children acquire specific speech acts. The acquisition of some communicative acts starts early but can extend for years. Children are school age before they acquire proper comprehension of both the linguistic and social aspects of these acts. This is true for complex acts, like promises, but it is not limited to them. Common communicative acts like questions may be interpreted differently depending on inference abilities and the amount of knowledge that children have at their disposal. These abilities develop with age and through interaction with adults (see, for instance, Forrester (2013) for a longitudinal case study from 12 months to 3 years 7 months). As we have seen, the concept of speech act is very useful for classificatory purposes, allowing researchers to identify different illocutionary forces underlying language use. However, in order to appreciate children’s comprehension of communicative acts, it is more useful to think in terms of comprehension of communicative intentions within communicative interactions.

Another fundamental aspect of conversation is repair. Conversation analysts argue that in adult conversation there is a preference organization on the forms of repair that are used. In descending order, preference is given to self-initiated immediate repair, self-initiated repair following some stimulus from another participant, and other-initiated repair (Schegloff et al. 1977).

Repair is an important part of children's interactions with adults. Parents often reformulate children's expressions in order to make them learn the conventional way to express a given meaning. This happens in particular with younger children. Children in turn acknowledge the reformulation, sometimes by repetition, while they reject the reformulation if it does not correspond to the intended meaning (Chouinard and Clark 2003). A number of studies have shown the importance of repetition as a way to verify common ground, with respect to what is given and what is new (Clark and Bernicot 2008).

Children start to repair very early in development. According to Golinkoff (1986), children are already negotiating meaning with their mothers in the preverbal stage. She found that when the mother misunderstood the child's communicative intention, the child used some form of simple repair. The child either repeated the same communicative signal or augmented it by adding a gesture or repeating it more loudly. Sometimes, the child substituted the signal with another one.

Studies with different languages have shown that self-repair starts before the age of 2 years (Laakso 2010; Langford 1981; Morgenstern et al. 2013; Tarplee 1996). With increasing age, self-repair becomes more sophisticated as new skills are developed and more complex resources are involved (Forrester 2008). At the age of 4 years, children's self-repair is not limited to the linguistic structures – phonological, morphological, syntactic and lexical structures – that they are acquiring, but children use self-repair, particularly during pretend play, in order to adapt their talk to different social activities (Salonen and Laakso 2009). Tomasello et al. (1984) found that children in the second year adapted the form of repair to the interlocutor. When they interacted with their mothers, their repair was simply a repetition of their utterance. However, when the interlocutor was not familiar to them, children reformulated their utterance.

1.5 Reference

Reference is the relation that is established between language and objects in the world. In this sense, reference should be part of semantics. However, in real situations, referring is a process that is situated in conversation and requires the collaboration of all participants (Clark and Wilkes-Gibbs 1986). If we consider children's acquisition of referential skills, reference is an interpersonal process in which children acquire knowledge through interpreting other people's communicative intentions. The relation between words and objects is rarely established via direct labeling. In general, children have to discover by themselves the referent of a specific word. The referent may be an object or an action in the case of verbs. Establishing a referent is made more difficult by the fact that a verb, for example, may refer to an action which has not yet been performed, such as when a mother says to her child: “Come on. Give it to me!” (Bloom 2000).

In order to study how children use their ability to make inferences about other people’s communicative intentions during reference, Baldwin (1993) constructed situations in which there was “discrepant labeling”. This situation reproduces in an experimental context, something that frequently happens in everyday life. When children focused their attention on a novel object, the name of which they did not know, an experimenter told them the name of another new object. In this situation, 18-month-old infants checked the direction of the experimenter’s gaze to establish the speaker’s intended referent. When asked comprehension questions, the child correctly attributed the label to the object that the experimenter was looking at. Other research has shown that eye gaze is not the only cue for word learning. Children may also infer the object to which a word refers when the referent is absent (Akhtar and Tomasello 1996). In another study, Akhtar et al. (1996) showed that 2-year-olds understood the speaker’s intended referent from their knowledge about what was new in the context of the conversation, thus showing that young children are also aware of conversational context. In production tasks, at 2 years of age children show sensitivity to adults’ knowledge. They may adapt their communicative acts by taking into account basic factors affecting knowledge such as physical absence and lack of visual experience (O’Neill 1996).

Infants and young children are able to use their knowledge of others in order to establish reference. This explains children’s ability to acquire a lexicon rapidly. Children are also able to adapt their acts of reference by relying on simple forms of knowledge. However, there are also referential difficulties which children must overcome at a later age. Children improve their notions of knowledge and common ground. It is 5–6 years of age when children are sensitive to a partner’s perspective in the production of referring expressions and use common ground in producing and comprehending reference (Nadig and Sedivy 2002). At 6 years, children are able to deal with ambiguity, in particular when they have to evaluate messages that are not directed to themselves (Sodian 1988). Some authors have argued that, as for other skills, preschoolers have implicit sensitivity to ambiguity that does not appear in explicit behaviour (Nilsen et al. 2008). Starting in the school years, children develop the ability to adapt the production of referential communicative acts to their partner. For instance, Sonnenschein (1988) showed that first graders are more likely to give redundant messages to listeners with whom they had no shared experience or to strangers than to listeners with whom they had previous shared experiences.

1.6 The Acquisition of Deixis

There are a number of terms in language whose referent varies according to the context of the utterance in which they appear. So-called indexical expressions include demonstratives like “this” and “that”, personal pronouns like “I”, possessives like “my”, and expressions of time and place like “today” and “here”. As stated by Levinson (2004), deixis “introduces subjective, attentional, intentional and of course context-dependent properties into natural languages”. Deixis is a phenomenon with semantic and pragmatic aspects. Hanks (2005) has argued that to perform an act of deictic reference is to take up a position in a deictic field. The deictic field includes the positions of communicative agents (speaker or addressee), the positions occupied by objects of reference, and the relationship between the former and the latter.

Language has a number of deictic forms and it takes several years before children can use all these forms (Tanz 1980; Clark and Sengul 1978). However, some deictic forms are acquired early in development. We have already discussed the use of deictic pointing by preverbal infants. Spatial deictic words, like “here” and “there”, appear in one-word and two-word utterances, and most children use one or two deictic words by the age of 2.5 years. However, according to Clark and Sengul (1978), it takes some years before children master proximal and non-proximal contrast. Children have to understand that “here” and “this” point to the speaker’s position, while “there” and “that” point to where the speaker is not. Complete acquisition is achieved around 5 years. With respect to “I” and “you”, the contrast between the speaker and the hearer is acquired by 3 years of age. According to Morgenstern (2012), it is at this age that a child is first able to join the grammatical, the semantic and the conversation subject in the personal pronoun. Before this age pronominal reversal, which is observed in autistic children only if rarely, is also possible in typically developing children. Charney (1980) studied how children aged 1.6–2.6 years acquired the ability to identify speech roles. She showed that young children are aware of speech roles only when they occupy these roles. For instance, a child understands “you” when she is the recipient but is not able to use this term correctly in other contexts. A child understands the term “my” when he or she uses it, but does not understand it when other people use it.

1.7 Cooperation, Implicatures and Presuppositions

The notion of a conversational implicature was introduced by Grice who argued that what is said is actually only a part of what the speaker intends to say and of what the hearer understands. The interpretation of an utterance always requires us to infer the speaker’s communicative intention in producing it. This is the premise for Grice’s theory of conversational implicature (Grice 1975, 1978, 1989). The starting point of this theory is that contributions to conversation are not a series of unrelated utterances. Uniting these utterances is an assumption of cooperation between speakers and hearers. In Grice’s view, this assumption amounts to a general principle of language use known as the Cooperative Principle. The Cooperative Principle gives rise to a set of four maxims: Quantity, Quality, Relation and Manner. Quantity concerns the amount of information furnished by a speaker and includes two sub-maxims: “Make your contribution as informative as is required for the current purposes of the exchange" and "Do not make your contribution more informative than is required". Quality includes one super-maxim: "Try to make your contribution one that is true" and two more specific maxims: "Do not say what you believe to be false" and "Do not say that for which you lack adequate evidence". Relation is a single maxim: "Be relevant". Finally, Manner does not deal with what is said but with how it is said. It includes the maxim "Be perspicuous" as well as "Avoid obscurity of expression and ambiguity, be brief (avoid unnecessary prolixity) and orderly". Each time a speaker interprets a linguistic expression she expects the expression to have been formulated in accordance with the maxims and the Cooperative Principle. Any apparent deviation from the maxims and principle causes the hearer to seek an interpretation of the utterance which retains the validity of the Cooperative Principle.

In developmental pragmatics studies have aimed to understand how and when these maxims are acquired by children. Investigators have found that while school-age children are able to understand violations of the maxims, children are usually 8–9 years of age before they have proper comprehension of the speaker's intent (Ackerman 1981; Conti and Camras 1984). Similar results have been obtained with respect to ambiguity that is a violation of the maxim of manner, both in production and comprehension (Ironsmith and Whitehurst 1978). More recently, Eskritt et al. (2008) found that 3-year-olds were able to understand the maxim of relation, while young children had more difficulties with quantity and quality. It appears that young children may be able to use pragmatic skills before they are able to display these skills in utterance evaluation tasks that require meta-linguistic knowledge (Eskritt et al. 2008). Similar results come from a study of over-informativeness (Davies and Katsos 2010). In this study, 5-year-old children did not display over-informativeness. However, they did not reject over-informative utterances when they had to give binary judgments. This was not the case when they were able to give intermediate responses. Davies and Katsos argued that children are pragmatically competent when they speak and comprehend utterances, but that they develop meta-linguistic awareness with increasing age.

In a study of Japanese children, Okanda et al. (2015) found that violations of the maxim of relevance were first to be detected. However, this study also showed that explicit understanding was above chance only in 5-year-olds. Interesting results come from a study of bilingual 3-to-6 year-old children by Siegal et al. (2010). This study showed that bilingual children significantly outperformed monolingual children in a maxim violation detection task. These results are compatible with the higher meta-linguistic awareness typical of bilingual children.

Recently, research in experimental pragmatics has investigated children's comprehension of scalar implicatures (Papafragou and Skordos 2016). Scalar implicatures are interpreted on the basis of the maxim of quantity. If someone says "At the party, some of the children had balloons", adults understand that not all the children at the party had balloons. Otherwise, the speaker should have used the stronger form "all the children had balloons". A number of studies have shown that up until school age, children are not able to interpret scalar implicatures. For instance, they treat "some" as compatible with "all", and "might" as compatible with "to have to". The pragmatic interpretation of weak scalable terms (i.e. that "some" implies "not all") is a later developmental achievement (Noveck 2001; Noveck and Reboul 2008; Papafragou and Musolino 2003; Pouscoulous et al. 2007). Papafragou and Musolino (2003) showed an interesting relation between semantic and pragmatic interpretation. In their study, 5-year-olds had better results in interpreting scalar implicatures if terms like “some” were replaced by numerals, e.g. “Two of the horses jumped over the fence” instead of “Some of the horses jumped over the fence”. Also, the proportional quantifier “half” produced correct responses. A proposed interpretation of these results is that numerals and terms like “half” have an exact semantics unlike quantifiers such as “some”. This is compatible with the fact that number words are mapped onto a specific system, which represents exact and unique numerosities (Gelman and Cordes 2001), while no such system exists for quantifiers like “some”.

Another phenomenon in conversation that situates itself between pragmatics and semantics is presupposition. Traditionally, presuppositions were studied in formal semantics (Frege [1892] 1952). However, since it seems impossible to deal with them without taking context into consideration, they are now considered to be part of the domain of pragmatics. Presuppositions are difficult to define since they are extremely heterogeneous. They constitute propositions, which are assumed implicitly in producing an utterance. If we say “Francis has stopped smoking”, we are implicitly assuming that there was a time when he did smoke. If we say “Julia realizes she put on a poor show”, we are implicitly assuming that Julia did indeed put on a poor show. In general, presuppositions are triggered by specific constructions and lexemes, such as verbs like “stop” (change-of-state verb) and “realize” (factive verb) in the examples above. Presuppositions are part of the mutually shared background between speakers and hearers and are not explicitly expressed in an utterance.

Two presupposition triggers which have been investigated in children are the focus particles “only” and “also”. The utterance “Mary also has a cat” presupposes that there is someone else who has a cat, while “Only John has gone” presupposes that someone else has stayed. Research in different languages has shown that children use these particles early, at around 2 years of age (Höhle et al. 2009). However, comprehension of these same particles occurs later when children are school age. Paterson et al. (2003) have shown that children often do not arrive at correct interpretations of sentences which contain focus particles because they fail to employ pragmatic information to infer explicit contrast sets. Berger and Höhle (2012) have shown that 3-4-year-old German children are able to master the interpretation of these particles when they are used as presupposition triggers. In this study, the experimental task was designed to avoid context ambiguities. Children treated sentences that contained focus particles differently from those without focus particles.

1.8 Politeness

Communication is a form of social interaction which must comply with rules. Independently of content, communication must abide by rules of politeness. Each participant in a conversation, for example, must do their utmost to maintain mutual respect of *face*, that is to say, the public image each individual wishes to give of herself/himself (Brown and Levinson 1987). During communication between adults, several conventional strategies are used to help speakers achieve this goal. One such strategy is the use of indirect forms like indirect speech acts. The existence of these forms shows that conversation is constructed so as to respect politeness criteria. In his version of speech act theory, Searle (1969) proposed an entire category of speech acts, expressives, which are *de facto* politeness formulae.

From a developmental standpoint, there are two noteworthy features about politeness. The first feature is that rules of politeness are acquired late by children. The second feature is that these rules must also be explicitly taught by parents and other adults (Foster 1990). Moreover, acquisition is slow, errors are countless, and development requires continual correction. Everyday experience bears this out. How many times have we seen embarrassed parents utter the words "Say 'Thank you' when someone gives you something", "Say 'Good morning' when you meet someone", and "Say 'Please' when you ask for something"? These formulae, whose function is to teach politeness markers explicitly, have been identified in a number of American studies (Gleason and Weintraub 1976; Greif and Gleason 1980).

Indirect speech acts are an important aspect of linguistic politeness. While the comprehension of indirect speech acts is not problematic for children, the same cannot be said of the production of these acts. Data on this topic are not abundant, but some evidence would appear to indicate that the use of indirect speech acts is a late acquisition. Gordon and Ervin-Tripp (1984) have shown that a child of 4 years passed from the imperative to the use of polite forms of request (i.e. an indirect speech act) depending on whether he was certain or uncertain of obtaining an affirmative reply from his interlocutor. Snow (1989) argues that as regards American society, there is no evidence to show that indirect speech acts are taught explicitly as are rules of politeness. She suggests that the child infers when it is necessary to employ indirect speech acts from the information she possesses on participants' social roles. Other studies have confirmed that children do not formulate polite requests before 4–5 years of age when they start to master social situations (Axia and Baroni 1985; Bates 1976a, 1976b; James 1978).

Aksu-Koç and Slobin (1985) state that Turkish children are explicitly taught how to "speak properly". Between 2 and 4 years of age, they learn progressively more elaborate forms for making requests, as graded by politeness criteria. According to Clancy (1985, 1986), the use of indirect formulae in Japanese is extremely important and mothers explicitly teach their children how to understand the adult indirect style. The mother "reads" what is in the interlocutor's mind in order to make the meaning of an indirect formula explicit. Another typical behaviour pattern is that of attributing words to someone who has not actually spoken in order to allow the child to represent to herself what the other person may be thinking or may desire. According to Schieffelin and Ochs (1983), the Kaluli of New Guinea have conversational norms which are the opposite of Japanese society. Preference here is for directness, and mention of interlocutors' internal states is avoided. The mother says directly what the child must say. To this end, she employs a specific expression *elema* which is placed at the end of the utterance and which means "Say this". This type of teaching is employed to transmit social uses of language: making a request, making fun of someone, making another person feel ashamed, etc. It is not used, however, when requesting objects or food. These types of request, say the Kaluli, are natural for a child, she knows how to make them.

Another topic of research in politeness concerns the use of white lies, that is, lies uttered in situations where sincerity is considered to be socially inappropriate and thus insincerity is prescribed. This is a skill that children acquire rather late. Children tend to be sincere even when being sincere may hurt other people's feelings. In these circumstances, adults would normally consider it more appropriate or polite to tell a lie. A typical case is showing disappointment for an unwanted present. This everyday scenario has been used as an experimental paradigm (Saarni 1984). Results from several studies show that the use of white lies, when it is required by the social situation, is an ability that is not acquired before 4 years of age and that develops with age (Broomfield et al. 2002; Airenti and Angeleri 2011; Walper and Valtin 1992). Studies of Chinese children have shown that the influence of the social context on the evaluation of the use of white lies for politeness reasons increases with age and is particularly strong among 11-year-old children (Ma et al. 2011). Interestingly, it has been shown that adults play an important role in this acquisition, either directly or indirectly (Lewis 1993). Also, prompts from an adult in experimental situations to use white lies, significantly increase children's use of them (Talwar et al. 2007; Airenti and Angeleri 2011; Warneken and Orlins 2015).

1.9 Figurative Language

One aspect of language that is considered to be a late developmental achievement in children is the use and understanding of figurative language. Figurative language includes nonliteral forms of language such as metaphor, irony and idiom. All figurative language violates Grice's maxim of quality. One of the most studied forms of nonliteral language is metaphor. Billow (1981) observed children aged 2–6 years during free play and found that children used spontaneous metaphors deliberately and appropriately. They were sometimes also able to explain their use. Similar results were obtained by Winner (1979) in a case study. Studies of the comprehension of metaphor have revealed a different pattern. At 6 years of age, children understand metaphoric expressions literally. At 8 years of age, they understand that metaphors involve some discrepancy from the truth. However, it is only at 11 years of age that children understand the communicative purpose of metaphors (Demorest et al. 1983).

A number of studies have stressed that the comprehension of metaphors in children involves a close relation between early cognitive and linguistic abilities (Stites and Özçaliskan 2013). The relevance of knowledge in conceptual domains was stressed by Keil (1986), who found that comprehension improved with age but that metaphoric ability develops on a domain-by-domain basis. According to Keil, children may fail to comprehend metaphors in one domain but yet be successful in comprehending them in another domain, showing that the difficulty is linked not only to comprehending a metaphor but also to knowledge of the domain. It has also been argued that typical experimental tasks are very demanding in nature (Vosniadou et al. 1984). Pouscoulous (2014) explains the failure of young children to comprehend metaphors not only by the lack of acquaintance with metaphors used in experimental studies, but also by the fact that the tasks used in these studies require metalinguistic abilities.

Van Herwegen et al. (2013) found that children as young as 3 years of age may be able to understand metaphors. This study demonstrated simultaneous acquisition of metaphor and metonymy by children. This result is somewhat surprising given that in general metonymy is considered to be an easier task for children (Rundblad and Annaz 2010). Falkum et al. (2016) showed that 3-year-olds produce and understand metonymy. They also observed that older children tend instead to arrive at a literal interpretation. To explain these findings, they hypothesized that younger children use metonymy to refer to entities for which they do not know the label. At 5 years of age, results with metonymy are comparable to those with metaphor, showing children's preference for literal interpretations.

The form of figurative language that is generally considered to be most difficult to acquire is irony. The conclusion of most studies is that children's comprehension of irony starts between the age of 5 and 6 years (e.g. Dews and Winner 1997) and continues to develop over time (Filippova and Astington 2008). Several studies have shown that children's inability to grasp the meaning of ironic utterances may be connected to their difficulties in inferring speaker's beliefs and intentions. According to Winner (1988), children comprehend metaphors before irony because to understand metaphors it is not necessary to question the speaker's beliefs, while irony comprehension involves attributing second-order beliefs to the speaker. Recently, some studies have tried to establish when and how children begin to produce irony, examining various forms of irony used during interactions in the family context (Pexman et al. 2009; Recchia et al. 2010). Results showed that even 4-year-old children occasionally used verbal irony, usually hyperbole,[7] even if less frequently than their older siblings. Thus, there is some evidence that children can begin to produce ironic utterances at around 4 years of age.

As with research on metaphor, the failure of young children to comprehend irony can be explained by the difficulty of the experimental tasks that require children to undertake an explicit process of evaluation. In a study by Loukusa and Leinonen

[7] The status of hyperbole is discussed in the literature. While it has been traditionally associated with metaphor and irony, recent work treats hyperbole as a distinct figure of speech (Carston and Wearing 2015).

(2008), some 3- and 4-year-olds showed an emerging ability to recognize the communicative intent of simple ironic utterances. Angeleri and Airenti (2014) showed that even 3- and 4-year-old children might comprehend the actual intent of an ironic communicative act. With respect to production, the use of parent reports, which give access to children's spontaneous utterances in familiar contexts shows that even very young children may sometimes produce irony (Airenti and Angeleri 2016).

1.10 Styles of Conversation

In the previous section, we discussed how children deal with different forms of nonliteral communication. However, there are situations in which the interpretation and use of a specific nonliteral utterance is not at issue. Rather, the issue is more one of the interpretation and use of general contexts in which the rules of serious conversation (namely, Gricean maxims of cooperation) are suspended. These situations include the use of humor, of pretense and of fiction in general. They can be considered to be styles of conversation.

Developmental research shows that precociously children are able to deal with humour and fiction. In adult conversation, humour may take the form of a succession of exchanges that includes jokes, teasing and irony. Young children understand early in their development that communication is not always serious but may take a humorous turn. Even in the preverbal stage children are involved in humorous interactions with adults (Hoicka and Akhtar 2012; Hoicka and Gattis 2012). Reddy (2008) argues that children acquire humorous forms of communication simultaneously with serious forms. Moreover, children may use humorous over serious conversation in order to negotiate more freely with others, secure greater indulgence from adults, and empower themselves by violating rules established in their environment (Cameron et al. 2008; Loizou 2005). If we consider humour to be a modality of communication, it is possible to see continuity between early forms of humour and the use of irony that was examined in the previous section (Airenti 2016).

Another fundamental style of conversation is narration. From an early age, children are involved with adults in narratives and fictional worlds (Bruner 1990; Engel 1995), an activity that seems to be common across cultures (Pellegrini and Bjorklund 2004). Children are often confronted with situations where fantasy, pretense and everyday situations are intermingled. In general, it is adults who create these situations. It is common for parents to tell stories when feeding their children and putting them to bed. Parents use make-believe to present everyday situations as more attractive to their children. Consider, for instance, the following example. For the infant who refuses to open her mouth and eat, the mother offers her the spoon and tells her "Now, open the garage door and let the car go in". As this example shows, talk about actual situations, storytelling and make-believe are frequently co-present. If we observe everyday adult-child interactions, the intuitive impression is that children shift effortlessly from one world to another.

From 18 months onwards, children start to engage in pretend play. In pretense and later in role-playing children actively construct a world of imagination and act within it (Harris 2000). In these situations, they produce narratives. Pretense like story-telling is performed in interaction with others and is manifested through communicative acts. A number of authors have argued that pretend play and story-telling are linked (Nicolopoulou 2007; Paley 1990). Young children are able to make the distinction between reality on the one hand and pretense and fantasy on the other. This distinction is well established in all cases in which there is empirical evidence of reality (Bourchier and Davis 2002). Golomb and Kuersten (1996) studied the effect of the intrusion of reality into pretend play and found that young preschoolers were able to temporarily stop pretending to deal with the experimenter's interruption and then return to playing. With respect to conversation this means that young children are able to distinguish two different styles of conversation that apply in the two different situations. The child uses a narrative style when she personifies a fairy queen in pretend play and another style when she accepts an interruption in play to have her afternoon break.

Children in the second year are able to talk about past events, showing an incipient ability to engage in story-telling that includes an evaluative component (Miller and Sperry 1988). At 3–4 years of age, children are able to produce narrative sequences. Subsequently, they develop their narration skills by organizing chains of events ordered in time and constructing episodes that even at a later stage will be organized into a whole story (Pearson and de Villiers 2005). This process seems to be facilitated by pretense. Social pretense has a positive influence on narrative development. In particular, children who pretend more tell more elaborate stories. This has been attributed to the fact that pretending fosters metalinguistic skills and the ability to take different perspectives. Embodiment in role play has a positive effect on story memory (Lillard et al. 2013).

1.11 Summary

This chapter has described some of the stages that young, typically developing children pass through on their way to acquiring the pragmatics of language. Pragmatic development does not begin with the emergence of language. Already in the preverbal stage, young children are engaged in the dyadic interactions that will become the basis of the turn-taking system of conversation. With the emergence of language, a range of speech acts can be expressed for the first time. Young children are able to use their rudimentary verbal skills at this stage to make requests, reply, and convey refusals. More complex speech acts such as promises, threats and apologies follow as children acquire an increasingly complex understanding of other minds. So-called theory of mind also explains the different rates of acquisition of pragmatic phenomena like metaphor and irony which have been reported in experimental studies. The development of theory of mind and the acquisition of social knowledge foster children's use of rules of politeness that shape all aspects of conversation.

Mastery of reference, presupposition, and conversational implicatures like scalar implicatures are key developmental achievements in a child's emerging pragmatic competence. Experimental studies of the acquisition of each of these aspects of pragmatics are still relatively few in number. Yet, these studies nonetheless represent our best effort to date to shed light on the complex linguistic and cognitive processes that are integral to the acquisition of pragmatics. With further research in this area, it is hoped that increasingly sophisticated methods can be developed to investigate this important aspect of language acquisition.

An interesting issue that emerges from the study of pragmatic development is that the most complex pragmatic aspects of language are acquired by reversing the typical sequence of language acquisition in which comprehension is expected to precede production. Young children may use these linguistic expressions correctly but, when requested, they seem to be incapable of providing correct judgments. Several factors may explain this phenomenon. The experimental tasks used in studies may be too demanding for children to fully understand them. Another factor is that explicitly evaluating the correct use of an expression requires metalinguistic knowledge that children do not acquire before school years. The importance of metalinguistic knowledge is also shown by the fact that bilingual children, who have developed more metalinguistic knowledge, generally display better performance. It is also possible that younger children have an implicit comprehension that does not appear in experimental settings.

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Chapter 2
Pragmatic Language Impairment

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Abstract Pragmatic Language Impairment (PLI) has a long history of differing terms and definitions. Currently, it is known under the diagnostic label Social Communication Disorder in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, *Diagnostic and statistical manual of mental disorders*. Fifth edition. American Psychiatric Publishing, Arlington, 2013). Its main symptoms are deficits in using communication for social purposes, an impaired ability to change communication to match context or the needs of the listener, difficulty following rules of conversation and storytelling, and difficulty understanding what is not explicitly stated. Due to a lack of clarity around the terminology and diagnostic criteria for PLI, there is still debate whether it is in fact a language disorder or an autism spectrum disorder, and whether PLI should be a separate diagnostic entity. As such, our understanding of PLI on the level of etiology, clinical profile, prognosis and treatment is limited. In addition, the absence of reliable, ecologically valid instruments to assess pragmatic functioning hampers progress in this regard, although recently there has been an increase in research into both diagnostic tools and potential interventions.

Keywords Autism spectrum disorder • Context • Conversation • Implicit language • Narrative • Pragmatic language impairment • Presupposition • Social communication disorder • Social skills • Storytelling

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2.1 Introduction

The term Pragmatic Language Impairment (PLI) has a rich history in terms of both name and definition. Labels such as Semantic Pragmatic Syndrome, Semantic Pragmatic Language Disorder, and Pragmatic Language Impairment have preceded the latest term Social Communication Disorder, in an attempt to characterize the main symptoms of children with difficulties in the social use of language. Although these labels all have validity, we choose to adopt the label Pragmatic Language Impairment in this chapter. We believe this label captures the symptoms of the disorder best, and does not imply a categorical choice such as the approach taken in DSM-5 (American Psychiatric Association 2013). In this chapter, we will briefly outline the historic development of PLI, provide examples of the specific pragmatic problems individuals with PLI experience, delineate PLI from other disorders that it closely resembles, and provide some indications as to its etiology and prognosis. We will end the chapter with information regarding diagnostic assessment and treatment. Although we will try to give a comprehensive view of PLI throughout development, it should be noted that research has largely ignored the manifestation of PLI in adolescents and adults. As such, the majority of the information provided here will be based on research with children.

2.2 Historic Developments

Rapin and Allen (1983) were among the first to introduce the existence of a pragmatic language impairment in their descriptive taxonomy of developmental language disorders. Under the term Semantic Pragmatic Syndrome, they defined an impairment in the use of language. In addition, they suggested that this pragmatic impairment occurred in the presence of (relatively) intact structural language skills. This set PLI apart from most other language disorders in their taxonomy. Table 2.1 provides a list of the symptoms of this syndrome as described by Rapin and Allen.

Table 2.1 List of symptoms of Semantic Pragmatic Syndrome according to Rapin and Allen (1983)

comprehension deficits in connected discourse
verboseness
word-finding deficits as evidenced by circumlocutions, semantic paraphasias and lack of semantic specificity
stereotyped conversational responses
literal interpretations
responses limited to one or two words
impairment in the ability to take turns and to maintain a topic in discourse unimpaired syntax and articulation

In this early description of PLI, Rapin and Allen emphasized that Semantic Pragmatic Syndrome was not reserved solely for individuals with a developmental language disorder. Rather, the label could also be applied to individuals with autistic features and known etiologies.

Around the same time, Bishop and Rosenbloom (1987) introduced an alternative taxonomy of language disorders, including a description of an impairment of pragmatic language skills. Coining the term Semantic Pragmatic Disorder, Bishop and Rosenbloom tried to acknowledge the idea of a set of associated symptoms rather than a set of strictly defined symptoms. An important difference between Bishop and Rosenbloom's description and that of Rapin and Allen was that the former investigators reserved the term Semantic Pragmatic Disorder for those individuals with a specific deficit in pragmatic language (and thus a Specific Language Impairment). The term excluded individuals with an autism spectrum disorder (ASD), or any form of disorder with a known etiology.

After a decade of research trying to pinpoint the clinical features of the disorder, Bishop (1998) concluded that semantic problems did not constitute a core symptom of PLI. This led to the removal of the affix 'semantic', and the introduction of the term Pragmatic Language Impairment that will be used throughout this chapter. However, Bishop did note that pragmatic language problems could still co-occur with structural language problems. In fact, she suggested that individuals with PLI fall along a continuum between individuals with Specific Language Impairment (SLI) and individuals with ASD (Bishop and Norbury 2002), although evidence in support of this claim has been somewhat mixed. For example, Ryder et al. (2008) concluded that PLI cannot be equated with other language disorders, as individuals with PLI experience deficits in language use rather than language structure.

2.3 Social Communication Disorder

The most recent development in PLI is its inclusion in DSM-5 (American Psychiatric Association 2013) under the term Social Communication Disorder (SCD). SCD is one of the communication disorders and is described in the Neurodevelopmental Disorders section of the manual. The main symptom of SCD is an impairment of the social use of verbal and nonverbal communication. This is a slight extension from the original descriptions by Rapin and Allen (1983) and Bishop and Rosenbloom (1987), which restricted pragmatic deficits to the verbal realm. Table 2.2 summarizes the diagnostic criteria of SCD.

As can be gathered from this table, the symptoms of SCD vary and cover a wide variety of skills, ranging from difficulties in using language for social purposes, to difficulties adapting communication to the social context, applying rules for conversation and understanding nonliteral language. As children should have sufficient language skills in order to assess pragmatic functioning, a diagnosis of SCD cannot be made until 4 or 5 years of age, although some evidence of limitations can already be seen at an earlier age. Also, as with many other disorders, DSM-5 states that SCD

Table 2.2 Diagnostic criteria of Social Communication Disorder in DSM-5 (American Psychiatric Association 2013)

A	Persistent difficulties in the social use of verbal and nonverbal communication as manifested by all of the following:
	1. Deficits in using communication for social purposes, such as greeting and sharing information, in a manner that is appropriate for the social context.
	2. Impairment of the ability to change communication to match context or the needs of the listener, such as speaking differently in a classroom than on a playground, talking differently to a child than to an adult, and avoiding use of overly formal language.
	3. Difficulties following rules for conversation and storytelling, such as taking turns in conversation, rephrasing when misunderstood, and knowing how to use verbal and nonverbal signals to regulate interaction.
	4. Difficulties understanding what is not explicitly stated (e.g., making inferences) and nonliteral or ambiguous language (e.g., idioms, humor, metaphors, multiple meanings that depend on the context for interpretation).
B	The deficits result in functional limitations in effective communication, social participation, social relationships, academic achievement, or occupational performance, individually or in combination.
C	The onset of symptoms is in the early developmental period (but deficits may not become fully manifest until social communication demands exceed limited capacities).
D	The symptoms are not attributable to another medical or neurological condition or to low abilities in the domains of word structure and grammar, and are not better explained by autism spectrum disorder, intellectual disability (intellectual developmental disorder), global developmental delay, or another mental disorder.

can co-occur with other communication disorders, although the symptoms should not be explained by the comorbid disorder. Moreover, SCD should not be diagnosed in the presence of an ASD.

Although the inclusion of SCD in DSM-5 provides a framework for the symptoms associated with it, systematic research on the exact manifestation of symptoms is lacking. In the following sections, we will give an overview of the symptoms that have been discussed in research on individuals with PLI and that are captured in SCD in DSM-5. Since PLI has thus far only been seen as a verbal impairment, and research on nonverbal communicative deficits in PLI is lacking, we will limit our discussion to the verbal realm.

2.3.1 Using Communication for Social Purposes

As children age, they gain mastery over a variety of communicative intents. These intents refer to the purposes or the expected effects of the communicative act (Adams 2002). Three primary purposes can be identified that are increasingly difficult to master (Schuler et al. 1997):

- Behavioral regulation, consisting of functions such a requesting or protesting in order to satisfy ones needs;

- Social interaction, consisting of initiating, responding, maintaining or ending social interactions (i.e. greeting, calling attention to oneself);
- Joint attention, consisting of speech acts such as commenting on something that is happening as well as requesting or providing information to others.

Most of the basic communicative intents are in place when children are three or four years old (Dore 1979). These basic intents not only enable children to communicate effectively in most settings, but also provide the basis for developing more subtle and complex communicative intents such as the use of sarcasm later in life (McTear and Conti-Ramsden 1992).

Although DSM-5 criteria mention a restricted range of communicative functions as a criterion for SCD, there is a lack of systematic studies focusing on these functions in children with PLI (Adams and Lloyd 2005). It has been suggested that children with PLI actually show a variety of communicative acts. For example, in their case study of a child with PLI, Willcox and Mogford-Bevan (1995) found communicative intents such as requesting. However, the form of the request may be unusual and less explicit. Consider, for example, the following request:

C: I am asking to be apologized due to my failure to bring my books.

The example shows an elaborate expression of an ordinary request, which can be interpreted as being overly formal depending on the context.

Related to an impairment of communicative intent is the notion that children with PLI frequently initiate conversation by producing a myriad of questions and unsolicited statements, as the next example shows.

C: Do you have a highchair at home?

A: Yes.

C: What brand is it?

C: For how long have you had it?

C: What date did you get it?

As the transcript exemplifies, the frequent initiations may in fact give the impression of talkativeness and verbosity, although there is evidence that children with PLI actually do not produce longer utterances or more utterances per turn (Bishop et al. 1994). In addition, the frequent initiations do not seem to consist of sharing information. This observation is supported by a study by Murphy et al. (2014a) who found that children with lower pragmatic abilities share less information with their peers, indicating a lack of joint attention skills.

Unfortunately, most of the symptoms mentioned above stem from single case studies. As such, the breadth of the impairment of communicative intent is yet unknown. Moreover, there is some evidence that children with PLI may gradually overcome their limited communicative functions over time. For example, Adams and Lloyd (2005) showed that adolescents with PLI may overcome some of their limitations or even exhibit the full range of communicative functions. This developmental growth may be the result of maturational factors or of extended opportunities to learn from peers. However, as it is difficult to assess the range of communicative functions used by individuals with PLI in a valid way, our understanding is still limited.

2.3.2 Contextual Awareness

The ability to judge contextual factors such as characteristics of the interlocutor and setting needs to be taken into account when assessing an individual's communicative competence (Perkins et al. 1999). In order to communicate effectively in any given setting, it is necessary to understand the interlocutor and setting and to adjust one's speech acts accordingly.

As with communicative functions, there is limited research into the contextual awareness of children with PLI. However, there are several indications that children with PLI fail to take contextual cues into account when using and understanding language. Consider, for example, the following reaction from a child to a therapist during first contact.

A: What is a metamorphosis?

C: Something you need!

Clearly, a reaction such as the one provided is not appropriate in the situation. First contact with an unfamiliar adult typically requires a minimal level of distance and politeness, and a joke such as this may very well be interpreted as insulting.

A lack of awareness of situational rules governing communication may have detrimental effects on social functioning, as conversational partners may be offended. Alternatively, a child with PLI may not understand that it needs to communicate on a different level to younger children compared to adults, creating an environment in which the conversational partner may not understand the communicated message.

Children with PLI may also adopt formal language or learned scripts that seem misplaced in a particular context (Bishop and Norbury 2002). A script is a prestored message, a memorized phrase that is appropriate in a specific situation, e.g. as a beginning or ending of a conversation. An overreliance on scripts can signify underlying language impairments such as word-finding difficulties, specific conversational difficulties, or difficulties in sentence organization. Take, for example, the following excerpt from a 6-year-old child with PLI who has difficulty in greeting his teacher and who always enters the classroom with the same question:

C: Mrs. Patricia, did you have nice dreams last night?

Although this greeting does not necessarily indicate the presence of impairment, the failure to be flexible in the use of language does.

2.3.3 Storytelling and Conversation

By far, the most compelling evidence for a PLI phenotype comes from research on narrative and conversation. As both types of discourse require different skill sets, we will discuss them separately. Narrative discourse abilities are a demonstration of maturation of both syntax and narrative skills of the child. Narrative production requires semantic skills as well as syntactic skills, but also the ability to organize information in a logical order, and the ability to adapt one's story to the needs of the listener (Losh and Capps 2003). As such, it is a rich source of information for clinicians. Moreover, as the ability to narrate is interwoven in every culture, narrative assessment has high ecological validity.

Children with PLI struggle on several levels of narrative discourse. A major issue is the amount of information produced in narratives. For instance, children with PLI may contribute less information, resulting in difficulties for the listener in understanding the gist of the story. Consider the following transcript of the Renfrew Bus Story (Renfrew 1997):

C: The bus came

C: And it had the tire loose

C: And then it had stop!

C: And then it didn't want anymore

C: He laughed

C: And then the little bussie came

C: That is the train

C: It was calling names

C: And then it went to the tunnel

C: It said stop!

C: But he didn't want to

C: And it said haaaa!

C: And then it went: I had enough of driving on the road

C: And then it jumped over the fence

C: And the cow said: huh, what is that?

C: That's where he looks real lazy

C: And that was it

For a listener who is unaware of the actual story, the above narrative will be hard if not impossible to follow, as the child omits vital information on the storyline, e.g. setting and causality between events.

In addition to the overall poverty of relevant information, children with PLI tend to offer information that is either irrelevant or unintelligible, making them even more prone to be misunderstood. Consider the following example:

C: Well, the bus drove with the man in it.

C: And...<and> the bus broke down.

C: And the man got a repair thing

C: And he was gonna repair the bus with it

C: Also called a double-decker

C: Because that's what it is I think

C: They have 'em in <Eng> in London

C: I think there are many in London

As with the previous example, this narrative offers too little relevant information. However, much of the information that *is* provided is also irrelevant to the story. Although the child initially provides key information regarding the setting (the bus, the man and the fact that the bus broke down), it goes off topic upon mentioning the type of bus (a double-decker, the fact that they can generally be found in London). As such, a listener will have difficulty understanding the storyline.

In addition to impairments in story content, many children with PLI show other narrative deficits. Their stories are often shorter and less complex in terms of use of subordinate clauses. In addition, sentence length may be shorter (Botting 2002; Ketelaars et al. 2012, 2016).

Combining these difficulties, narrative discourse skills seem to be particularly impaired in children with PLI. Despite this, there are indications that narrative skills may improve over time, although some impairments are persistent in nature (Ketelaars et al. 2016). The main issue with the narrative impairments of children with PLI is that they do not seem to be specific to children with PLI. For instance, Norbury and Bishop (2002) found a high degree of overlap between the discourse skills of children with high functioning autism, SLI and PLI. Moreover, there is wide variation in narrative performance in children with PLI, with some children displaying average narrative skills, whereas others are severely impaired. This may very well be the result of differences in their pragmatic profiles. For example, word-finding difficulties may affect narrative performance on a different level compared to difficulties understanding the needs of a listener.

As conversation requires many of the skills mentioned in relation to narrative performance, similar impairments can be found in that realm. However, unlike narrative tasks, conversation includes an active partner. As such, conversation taps into other skills as well, such as the ability to initiate, react and sustain the flow, take turns, manage topics, and repair conversation if necessary. There are many indications that children with PLI struggle with these skills. The common denominator in this is the notion that the initiations and reactions of these children often seem inappropriate. For instance, similar to narrative discourse, a child with PLI may give too little or too much information during conversation (Bishop and Adams 1989). The following transcript of a chat between a therapist (A) and an 18-year-old with PLI (C) exemplifies this form of inappropriateness. Instead of answering the question, the child provides very specific geographical, historical and architectural information.

A: Did you have a nice weekend?

C: Yes. We went to (...). There is a summer house with a triangle, A-model. (…) is close to Enschede, Zutphen and Winterswijk. Those are in the province Gelderland. And the twelfth province is Flevoland. Flevoland only joined when The Netherlands started. In history, The Netherlands only had eleven provinces. And there are also castles.

The inappropriateness of conversation may of course be the result of limitations of language expression or comprehension. However, Bishop et al. (2000) showed that trained raters are able to distinguish inappropriate responses that are the result of these limitations from those that cannot be explained by limitations of language expression or comprehension and may be considered to be more pragmatic in nature. Closely related to this is the lack of appropriate reactions to the initiations of others. Children with PLI often fail to produce appropriate turns during conversation. Consider, for example, the following transcript:

> A: *Our cat caught a frog near the pond.*
>
> C: *What color dress did you wear?*

Although the child recognizes the need to produce a turn in this exchange, his utterance is completely inappropriate as a response to the adult's statement. Similar impairments can be seen in topic management, with children either failing to keep on track with a specific topic or refusing to change topics despite initiations by conversational partners.

More evidence for a specific conversational impairment concerns the violation of turn-taking during conversation. Whereas conversation is usually an interchange of initiations and reactions to those initiations, an individual with PLI may have difficulty understanding and providing cues for turn-taking. As a result, conversation may frequently experience verbal overlaps between both conversational partners.

In addition to the limited or inappropriate informational content of initiations and reactions, individuals with PLI may also use stereotyped utterances in their conversation. These may take the form of proverbs and expressions that seem scripted and misplaced. Unfortunately, the evidence for this largely stems from anecdotal data.

All of the above issues lead to frequent conversational glitches, moments where the conversational partner will have difficulty understanding the child, or will actually misunderstand what is stated. Unfortunately, children with PLI often fail to repair these glitches, instead ignoring requests for clarification. Consider the following example:

> A: *How big was the dog?*
>
> C: *Black.*
>
> A: *But how big was it?*
>
> C: *A little smaller than S.*
>
> A: *And how big is S?*
>
> C: *A little smaller than a big dog.*

The repeated request of the adult does not lead to full clarification by the child, although in this instance an attempt is made.

2.3.4 Understanding Implicit Language

One of the most important skills in communication is the ability to understand what is not said. Like reading between the lines in conversation, one has to extract what is meant by using cues such as intonation, mimicry and contextual features. For instance, an utterance such as *'I'm really hungry'* could be a simple statement of fact, i.e. the speaker is in a state of hunger. At the same time, it could be a suggestion to the interlocutor to grab a bite to eat together, or an indirect request for food. The communicative intent that motivates the utterance cannot simply be derived from the utterance itself, as linguistic meaning alone does not determine the speaker's message (Horn 2004).

Although an inability to understand implicit language or problems with inferencing is a hallmark of children with ASD, anecdotal evidence has suggested that a similar impairment exists in children with PLI (Bishop and Adams 1989). Clinical anecdotes aside, systematic studies have failed to find evidence of a specific inferencing impairment in children with PLI. The ability to make inferences seems to depend on other factors such as overall language ability. As a result, many children with SLI also show inferencing impairments, and attempts to distinguish children with PLI and SLI on the basis of inferencing impairments have so far failed (Bishop and Adams 1992; Adams et al. 2009).

Understanding implicit language also hinges on the ability to comprehend idioms. Consider the following exchange between a therapist (A) and a teenager with PLI (C):

C: (Looking at the book) But there's nothing there!

A: In this case, you need to read between the lines.

In this case, the lack of understanding is relatively harmless and may, in retrospect, even be considered funny. However, misunderstanding expressions such as "the night is falling" may instead provoke feelings of confusion and even fear.

Although research is scarce, it does seem to be the case that children with PLI have more serious impairments in idiom comprehension compared to children with SLI (Grunwell 1998; Kerbel and Grunwell 1998). The extent of the impairment may, however, vary as a result of the type of task employed. For instance, idiom comprehension in children with PLI but also in children with SLI tends to be more negatively affected during an idiom defining task compared to when children can reenact the idiom using props (Grunwell 1998). Moreover, the reactions of children with PLI often reveal some understanding that the literal meaning is inappropriate, and despite differences between groups, children with PLI generally show a high rate of appropriate interpretations. Overall then, care should be taken not to underestimate children with PLI in regard to idiom comprehension. At the same time other factors such as language ability, memory skills and theory of mind should be taken into account when judging idiom comprehension.

Finally, children with PLI may experience difficulty understanding words with multiple meanings (Bishop 2000), such as the word 'break'. This can be the result of reduced ability to analyze and deduce meaning from contextual cues. However, a specific deficit has not been proven in individuals with PLI.

2.4 Delineating PLI from Language Disorders

As reflected by its categorization as a communication disorder in DSM-5, PLI is first and foremost a language disorder. The fact that it is considered an impairment of pragmatics also suggests that other linguistic skills are (relatively) unimpaired. This view has been a matter of discussion, though, as Rapin and Allen (1983) considered pragmatic problems in the presence of normal structural language abilities to be a hallmark of PLI, whereas Bishop and Rosenbloom (1987) suggested PLI could be present in children with varying structural language abilities.

The presence of impaired structural language abilities may affect pragmatic performance in a negative way. For instance, children with a limited vocabulary (a semantic skill) may have difficulties adapting their language according to the context due to a lack of differentiation in their vocabulary. Alternatively, children with limited receptive language skills may need to ask questions frequently to achieve comprehension or may be inclined to ask fewer questions as a result of past failures to communicate effectively. Thus, since the expression of pragmatic competence depends on other linguistic skills, pragmatic language problems can be a secondary consequence of limited structural language skills (Brinton and Fujiki 1993; Sahlén and Nettelbladt 1993). The question then becomes whether there is a group of individuals whose pragmatic impairments are not the result of limited structural language skills as is suggested by DSM-5. Although the answer to this question is not easily found, there are several reasons why we can conclude that PLI exists separately from other language impairments.

The first reason why PLI should be considered a separate entity is the fact that individuals with PLI show disproportionate pragmatic problems compared to their structural language abilities. Although individuals with PLI may show some structural language impairments, their pragmatic difficulties are greater than is to be expected given these impairments. Related to this is the fact that there are individuals with PLI who do not show any structural language impairments, but whose pragmatic impairments are significant. More important, though, is the fact that some of the pragmatic difficulties manifested by individuals with PLI cannot be easily explained by structural language impairments. For instance, impairments in contextual awareness do not seem to be related to semantic or syntactic problems.

In conclusion, structural language impairments do not seem to offer a total explanation of the profile of PLI. There are still, however, some unresolved issues regarding the linguistic profile of individuals with PLI. For instance, it is still uncertain to what degree semantic problems are part of the PLI profile. Although the affix 'semantic' has been eliminated from the term (Bishop 2000), and word-finding difficulties are no longer considered essential for a PLI diagnosis, many individuals with PLI are known to experience word-finding difficulties. Consider the following choice of words:

Plantwatergiver – watering can

The use of 'plantwatergiver' for watering can is striking as there are substitutions that the child could have used which would be more logical (e.g. bucket, container for water). Interestingly, semantic substitutions, such as the one described above, could actually be considered a pragmatic impairment. Instead of choosing a more generic term, children with PLI tend to use atypical words that may actually reveal their underlying pragmatic impairment (Ketelaars et al. 2010).

Regardless of the presence of any structural language impairments, DSM-5 clearly states that pragmatic language problems should be disproportionate to any structural language problems. Unfortunately, distinguishing children with language disorders from those with PLI on pragmatic language tasks has been unsuccessful to a large extent, as children with SLI often perform poorly on pragmatic tasks too. This is because both receptive and expressive pragmatic language diagnostics require information processing and receptive capacities. Moreover, several longitudinal studies of children with different language disorders have revealed shifts in linguistic profiles (Conti-Ramsden and Botting 1999). As such, the profiles of children change over the course of time, with many children getting stronger in some linguistic areas, but worse in others.

2.5 Delineating PLI from Autism Spectrum Disorder

Many clinicians and researchers have suggested that PLI should be considered an Autism Spectrum Disorder (ASD). Indeed, there is considerable symptom overlap between PLI and ASD, as the examples in the previous sections have shown. This overlap is not surprising given that impairments of the ability to initiate or sustain a conversation, the use of stereotyped and repetitive language and a marked impairment of the use of several nonverbal behaviors are all pragmatic symptoms included in the diagnostic criteria for ASD (American Psychiatric Association 2013). This overlap is confirmed by Botting and Conti-Ramsden (1999) who found that roughly half of their group of children with PLI met criteria for an ASD (based on DSM-IV). However, according to DSM-5, an ASD is diagnosed when pragmatic deficits are present in the context of other ASD symptoms such as an impairment of social reciprocity and the presence of restricted interests and repetitive behavior. Children with PLI exhibit normal social reciprocity and no indications of restricted interests and repetitive behavior.

Evidence that there is indeed a distinction between both disorders comes from Bishop (2000) and Bishop and Norbury (2002) who found that many children with PLI do not show the triad of impairments in communication, social interaction and restricted interests that occurs in ASD. In accordance with DSM-5, children with PLI do not seem to show restricted interests and repetitive behavior in the wide sense. However, most children with PLI *do* show evidence of stereotyped language, a symptom that has been reclassified as a repetitive behavior in DSM-5. As the required number of symptoms within this domain is two, many of the children with PLI in the samples used by Bishop and Bishop and Norbury may actually be considered to have an ASD, according to the new criteria (Norbury 2014).

More recently, there is also some evidence that the distinction between ASD and PLI may not be so clear cut. Reisinger et al. (2011) found similar levels of restricted interests and repetitive behavior in children with PLI and children with ASD, although the ASD group displayed more severe social and communication deficits. In addition, the context surrounding the inclusion of the SCD classification in DSM-5 muddles the boundaries between SCD and ASD. To improve the validity and reliability of the ASD diagnosis, the American Psychiatric Association (2013) has opted for a continuum in DSM-5 rather than the use of subcategories (see chapter 3). In order for an ASD to be diagnosed according to DSM-5, both socio-communicative deficits and stereotyped behavior and interests are required. This contrasts with DSM-IV-R which included pervasive developmental disorder, not otherwise specified (PDD-NOS), a diagnosis reserved for individuals with mild ASD. In DSM-IV, PDD-NOS was diagnosed in the presence of an impairment in reciprocal social interaction as well as an impairment in (non)verbal communication *or* stereotyped behaviors and interests. This change may very well result in a loss of diagnosis for many individuals on the less severe end of the spectrum, which can be forestalled by the SCD diagnosis for those with pragmatic deficits. First studies on the possibility of diagnostic substitution (lowering prevalence rate of ASD combined with an increase in prevalence of SCD) (Kim et al. 2014; Regier et al. 2013) indeed show that many individuals who were diagnosed with PDD-NOS according to DSM-IV may currently lose their ASD diagnosis, but be eligible for an SCD diagnosis.

Regardless of its newly found status in DSM-5, PLI is currently considered to be a condition that is intermediate between SLI and ASD. The structural language abilities of individuals with PLI surpass those of individuals with SLI, although children with PLI do tend to show some structural language impairments. However, their peer interaction skills are more impaired than those of individuals with SLI (Gibson et al. 2013) but are less impaired than those of individuals with ASD. Clinical levels of restricted interests and repetitive behavior are generally thought to be absent in individuals with PLI.

2.6 Prevalence of PLI

To date, there are no clear prevalence rates of PLI. This stems mainly from the fact that PLI has only acquired the status of a formal diagnosis since the introduction of DSM-5. Prevalence rates of SLI and ASD (mostly PDD-NOS) are often used as a point of reference. The prevalence rate of SLI is generally thought to lie around 7 percent (Tomblin et al. 1997), whereas the prevalence rate of ASD is 2.6 percent (Kim et al. 2011). Concerning PDD-NOS specifically, the prevalence rate seems to lie around 1 percent, although estimates are less clear (Kim et al. 2014). Since the symptomatology of PLI overlaps with that of SLI and ASD, it is to be expected that individuals with PLI are currently often included in the estimates of both SLI and ASD. For example, Botting and Conti-Ramsden (1999) found that 22 percent of their SLI sample could be classified with PLI, a figure that largely coincides with Ketelaars et al. (2009).

To the present time, only two studies have investigated the prevalence of PLI. Ketelaars et al. (2009) found a prevalence rate of 7.5 percent in a community sample of four year olds. Since many children gradually received a diagnosis of language disorder or ASD, their results may have been an overestimate of the actual PLI prevalence rate. A much lower prevalence rate of less than one percent was obtained by Kim et al. (2014) in their community sample of school-aged children. However, as screening for SCD was conducted using a screening questionnaire designed for ASD, this estimate should be interpreted with caution. Moreover, as PLI often goes undetected in standardized assessments (Conti-Ramsden et al. 1997), both studies should be regarded as a first attempt to shed more light on the prevalence of PLI.

A complicating factor is the finding that the (linguistic) profile of children with a diagnosed language/communication disorder as well as the profile of children with ASD changes with age (Conti-Ramsden and Botting 1999; Bishop and Norbury 2002; Howlin et al. 2000; Geurts and Embrechts 2008). This implies that children who initially fall within one diagnostic category may later be diagnosed with another disorder. Concerning PLI, the developmental blurring may lead some children to fit the profile of children with SLI later in life. Instead, if repetitive behavior increases, they may fit the profile of children with ASD. Unfortunately, longitudinal research on the profiles of children with PLI is scarce.

2.7 Etiology, Prognosis and Impact of PLI

As with the prevalence of PLI, knowledge of the etiology of this disorder is hampered by the lack of clarity surrounding the demarcation between PLI and other disorders. Overall, research tends to show a hereditary factor in social communication difficulties, although most of the studies have been performed in ASD samples. For example, in the broader ASD phenotype, pragmatic language problems seem to be prevalent, with siblings of children with ASD showing an increased rate of pragmatic difficulties (Taylor et al. 2013). While this indicates the likelihood of a genetic factor, research is still in its infancy. Moreover, candidate genes that have been studied do not seem to be specific to PLI as they have also been identified in intellectual disability, ASD, SLI and other disorders (Vernes et al. 2008). However, there has been some progress in distinguishing between genetic markers for structural language problems and pragmatic language difficulties (Lee et al. 2012).

Although hard evidence is lacking surrounding the prognosis of children with PLI, there are clear indications that pragmatic language problems typically persist into adulthood (Whitehouse et al. 2009). As for the impact of PLI, it seems that pragmatic difficulties are a risk factor for emotional and behavioral difficulties (Ketelaars et al. 2010). Many children with pragmatic language problems experience problematic peer relationships (Ellis Weismer 2013) and are at risk of bullying (Conti-Ramsden and Botting 2004). This is not surprising given the fact that pragmatic impairments affect social participation in a negative way. The resulting social isolation may ultimately lead to a higher risk of mental health problems (Goodyer 2000). Further research is needed to establish the long-term impact of PLI on individuals who receive a childhood diagnosis of the disorder.

2.8 Cognitive Profiles in PLI

There is a dearth of research on cognitive profiles of individuals with PLI. Some findings point to deficits in theory of mind (ToM) or social cognition (Shields et al. 1996). This is the knowledge that people may have intentions and ideas that differ from one's own mental states. This socio-cognitive impairment can also be seen in individuals with ASD, making it even more difficult to achieve a differential diagnosis of SCD. However, ToM is closely related to linguistic skills and most ToM tasks require relatively high competence in language (Bloom and German 2000). So, the presence of ToM deficits may be related ultimately to language deficits in children with PLI. In addition, ToM deficits are seen in other diagnosed samples, including individuals with hearing impairments and individuals with SLI, and are by no means specific to the PLI population.

2.9 Diagnostic Assessment

Due to lack of uniformity in terminology and specificity of diagnostic criteria, there are no guidelines for the diagnostic assessment of PLI. A further complicating factor is the finding that standardized tests generally fail to tap into the main difficulties of individuals with PLI (Botting et al. 1997). These difficulties tend to become visible during dyadic exchanges with others, whereas standardized assessments usually consist of pen-and-paper assessments conducted within a specific set of rules with little engagement of the clinician (Adams 2002; Volden et al. 2009). Typically, individuals with PLI tend to perform better in standardized assessments, resulting in an overestimation of pragmatic skills (Adams and Lloyd 2005). Explicit instruction and behavioral tasks differ from everyday communication in which language comprehension mostly involves ‘reading between the lines’ and follows implicit rather than explicit rules. As is the case in individuals with ASD (Tesink et al. 2009), individuals with PLI may in fact be capable of using context during language processing when explicitly instructed to do so. It has been found, for example, that only a minority of children with pragmatic impairments identified through questionnaires yield poor scores on tasks designed to assess pragmatic skills (Conti-Ramsden et al. 1997). For this reason, clinicians should adopt an approach that is wide in scope and includes standardized assessments as well as informal conversational analyses.

In the next sections, we will provide some examples of questionnaires and tasks that are often used in diagnostic assessment. For a comprehensive review of diagnostic tools, we refer the reader to Adams (2002), Norbury (2014), and Russell and Grizzle (2008).

2.9.1 Questionnaires and Checklists

In terms of screening, the Children’s Communication Checklist (CCC; Bishop 1998) and its successor the Children’s Communication Checklist-2 (CCC-2; Bishop 2003) are probably the most widely used questionnaires in the linguistic field. The CCC-2 is specifically designed to check for pragmatic language problems in children with an identified SLI. It consists of 70 items categorized into ten scales. Eight of these scales measure structural and pragmatic language skills, while the other two address issues that are typical of an ASD. Through the use of the Social Interaction Deviance Composite (SIDC), pragmatic impairments can be weighed against possible structural language impairments. Whereas a positive score would indicate relatively intact pragmatic language relative to impairments of structural language skills, a negative score would point to pragmatic impairments in the presence of normal structural language skills. Although the CCC-2 provides an opportunity to check whether pragmatic skills are in line with structural language skills, it has had limited success in finding specific profiles for specific disorders (Norbury et al. 2004).

A universal problem with questionnaires is low inter-rater reliability. Pragmatic language ratings for the same child typically yield different results depending on the person who completes the questionnaire, for instance, the parents or teacher of a child (Bishop and Baird 2001). This discrepancy might be the result of the different contexts in which the informants normally interact with the child. Therefore, care should be taken to collect data in all relevant contexts.

Relatively new are self-reports on pragmatics like the CC-Self Report (Bishop et al. 2009), a 70-item questionnaire that is suitable for older children, adolescents and adults who speak in sentences and have a reading age of at least ten years. In line with the CCC-2, fifty behavioral statements focus on communicative weaknesses and twenty statements focus on communicative strengths. The scores result in three composites: Language Structure; Pragmatic Skills; and Social Engagement. As a lack of self-awareness may result in overestimation of one's communicative competence, some items are rated on the feedback the informant has received from other people (e.g. "People tell me that I talk too much"). Although it may be questioned whether this solves all the self-awareness issues, the results do provide information on the experiences of the individuals themselves, thereby increasing therapy adherence.

2.9.2 Structured Observations and Standardized Assessments

When screening suggests the presence of a pragmatic problem, more in-depth assessment is necessary. In this regard, structured observations are a useful option to assess pragmatic skills in a naturalistic environment. These observations include, but are not limited to, the Communication and Symbolic Behavior Scales (Wetherby and Prizant 2002), the Early Social Communication Scales for younger children (Mundy et al. 2003), and the Yale Pragmatic Profile (Schoen and Paul 2009) for older children.

Additionally, standardized assessments can provide a speech and language therapist with important information regarding pragmatic impairments. For instance, the Test of Pragmatic Language-Second edition (TOPL-2; Phelps-Terasaki and Phelps-Gunn 2007) assesses a wide variety of pragmatic skills. However, as stated earlier, the problems of children with PLI are typically hard to detect in standardized assessments. As such, it is recommended that the results of standardized assessment should be supplemented with informal assessments in the form of narrative analysis and conversational analysis. Both narrative assessment and conversational analysis are generally considered to be ecologically valid due to the high demands of the task. As such, they do tend to detect the impairments of children with PLI.

Regarding narrative analysis, there are several instruments available, including the Renfrew Bus Story (Renfrew 1997) and the Expression, Reception and Recall of Narrative Instrument (ERRNI; Bishop 2004). Regarding conversational analysis, diagnosticians generally depend on qualitative data from unstructured conversations. While these provide a rich source of information from both a diagnostic and therapeutic standpoint, they are also very time consuming and have had variable success with regard to inter-rater reliability. Moreover, there are no norms, and results may vary depending on the context in which the conversation takes place. Despite these issues, informal assessments generally provide a more comprehensive and realistic view of everyday language, which is important for both diagnostic assessment and for setting therapeutic goals.

Although both narrative analysis and conversational analysis offer more in-depth information on the pragmatic abilities and impairments of children, analyses so far have failed to find a specific profile by means of which children with PLI can be identified. This may be caused by the complexity of the tasks, as narrative tasks as well as conversation tap into linguistic, cognitive and pragmatic abilities (e.g. the ability to convey a coherent sequence of events, the use of cohesive devices, the ability to give key information, the ability to understand the listener's needs), as well as semantic and syntactic abilities.

An alternative option for diagnostic assessment is planned elicitation techniques (Adams 2002). Typically, these techniques collect language samples through the use of toys or pictures as prompts. However, once again there has been limited success in finding specific profiles in children with PLI and research on the reliability of these techniques is scarce.

Other assessments designed to assess pragmatic skills examine idiomatic comprehension, inferencing, the use and comprehension of figurative language and referential communication. Several instruments are available for use in a wide range of ages, such as the Understanding Ambiguity test (Rinaldi 1996), the Understanding Metaphoric Expressions subtest of the Test of Language Competence (Wiig and Secord 1989), and the Non-literal Comprehension subtest of ACE (6–11) (Adams et al. 2001).

For the adult population, the Social Skills Performance Assessment (SSPA; Patterson et al. 2001) may prove useful. The SSPA consists of three role plays containing a social issue and clients are rated on their level of facial expressions, clarity, focus, fluency and social appropriateness. The SSPA has been proven to be a reliable instrument and is able to distinguish between adults with and without schizophrenia (Patterson et al. 2001) and with and without ASD (Verhoeven et al. 2013), but not much is known about the potential of the SSPA to distinguish adults with PLI from typical individuals or individuals with other impairments. In order to enhance therapeutic motivation, it might be useful to ask the client to judge themselves as well. This may also serve as an indicator of the client's level of insight into their difficulties.

2.9.3 Differential Diagnosis

With the exception of the CCC-2, diagnostic assessment tools are not specifically designed for individuals with PLI. In addition, because they tap into pragmatic skills, they are generally not able to differentiate between individuals with PLI and individuals with ASD. Since there is little evidence that the pragmatic language impairments of both groups can be differentiated, diagnostic assessment will need to focus on the one defining difference between the two disorders, that is, repetitive behavior and restricted interests. Assessment will thus typically include ASD measures such as the Autism Diagnostic Observation Schedule (ADOS; Rutter et al. 2002) and/or the Autism Diagnostic Interview Revised (ADI-R; Rutter et al. 2005). The ADOS has the added benefit that it is designed to assess social communicative deficits in individuals with ASD in the diagnostic assessment protocol using elicitation procedures. Moreover, it assesses most of the skills that relate to the symptoms of SCD as described in DSM-5: breadth of communicative purposes, conversational skills and narrative skills. It also includes a rough measure of repetitive behavior and restricted interests. Unfortunately, the reliability of the repetitive behavior and restricted interests subscale is low, and depends on observation during the test administration. As such, in order to exclude ASD as a diagnosis, a comprehensive assessment of developmental milestones needs to be undertaken.

As well as discounting ASD, the possibility of a language disorder should be excluded. To this end, a comprehensive language assessment should be undertaken, including measures of phonology, vocabulary (receptive and expressive) and syntax. This will make it possible to establish whether pragmatic language skills are in fact disproportionally affected, or whether they are in line with structural language skills. When these skills are affected too, therapy should focus on both sets of language skills: the structural skills to build a stronger basis for the use of language, and the pragmatic skills to ameliorate the pragmatic impairments.

2.9.4 Cultural Diversity in Diagnostic Assessment

To date, there has been little research into cultural aspects of PLI. As with other disorders, it is to be expected that the disorder will be present in all cultures. However, pragmatic customs vary as a function of culture. For instance, an individual's role in society and customs surrounding the use and interpretation of sarcasm, directness or formality affect the communicative style of any given person (Enfield 2009). As such, PLI may very well manifest itself differently in different cultures. As a diagnosis of PLI is made solely on the basis of pragmatic functioning, clinicians should be especially sensitive to the notion that culture permeates all communication. For instance, whereas making eye contact during communication is considered normal in Western society, children in rural Kenya are taught not to make eye contact with adults in an authoritative position (Carter et al. 2005). But even in Western society it is difficult to quantify eye contact in terms of what is normal and abnormal. Both the amount of experience children have in different cultures (e.g. contact with adults) as well as differences in what is considered good communicative practice in different cultures (e.g. the amount of speech which is considered appropriate) should be taken into consideration. Also, one should be aware that there is a paucity of culture-fair assessment in general, but especially when it comes to pragmatic language skills. An exception to this is the Diagnostic Evaluation of Language Variation (Seymour et al. 2003) which offers norms for native speakers of African American English.

There are also indications that language impairments in general are underdiagnosed in children with a low socio-economic status (Bishop and McDonald 2009). It remains unknown whether this is caused by a reluctance of parents to seek help, a lack of concern, or whether clinical services are lacking in rural regions.

2.10 Treatment

Currently, there is little hard evidence that pragmatic skills of individuals with PLI can be improved through therapeutic intervention, even though speech-language therapy is often used with these clients. It should be stated that systematic research on effective treatments for individuals with PLI is still in its infancy. This is due in part to limited knowledge of symptom manifestation in this group. Most studies investigating therapeutic effects on pragmatic skills have been conducted on other populations. Although they have found beneficial effects, it may be questioned whether similar results can be achieved with individuals with PLI. With the inclusion of SCD in DSM-5, it will become easier to develop treatment protocols tailored to the specific needs of these individuals, although it will remain difficult to develop protocols that are ecologically sound and foster generalization to daily life. A complicating factor is the fact that individuals with PLI form a heterogeneous group, with many different clinical profiles falling under PLI. It is questionable whether all individuals with PLI will benefit equally from standardized treatment protocols (Gerber et al. 2012).

The main issue in the treatment of PLI is the limited availability of diagnostic assessment tools which are sufficiently sensitive to measure (meaningful) change in social communicative skills (Gerber et al. 2012). Most current diagnostic tools are designed to assess problems in a categorical fashion, i.e. they determine whether there is indeed an impairment. In order to evaluate the effectiveness of a treatment, we need more diagnostic tools that offer fine-grained assessment of pragmatic skills and that document changes in these skills across different contexts (classroom, playground, at home).

Despite the difficulties mentioned above, several single case studies as well as small group studies suggest the possibility of ameliorating the impairments of children with PLI (Adams et al. 2005; Adams et al. 2006; Merrison and Merrison 2005). Most of these studies report on interventions which have been developed by experienced speech and language practitioners in the field. These practitioners combine a direct approach (fostering remediation of impairment within the child) with an indirect approach (adaptation of the context in order to match the needs of the child). Although the implementation of these interventions is often based on the individual profile of the children, they typically address a mixture of skills related to social interaction, social cognition and linguistic functioning (Adams et al. 2006). This framework is based on the notion that pragmatics encompasses the ability to adapt language according to the social setting, which requires socio-cognitive understanding as well as linguistic skills.

In order to promote social skills and socio-cognitive understanding, individuals with PLI can be taught social rules, and behavior that is typical for a certain situation. For younger children, social behavior can be fostered through play, whereas older children or adults may benefit more from role play, social stories and games on topics of interests, such as a hobby or a favorite game or TV show. Social stories describe a specific activity and the behavior expectations that are associated with that activity. Moreover, (socio)cognitive intervention can also focus on understanding inference, using cartoon stories to introduce metaphors and hidden meanings in language.

Unfortunately, in the past, training focused on social skills has received limited success, at least in individuals with ASD, although some studies have shown that children may feel more social support from classmates at school (Barry et al. 2003). In addition, results with regard to social stories are equally doubtful, even though they are widely used in intervention (Sansosti et al. 2004).

The main issue with treatments aimed at social interaction and social cognition is that they typically fail to focus on the description of linguistic behavior and the dynamic, reciprocal nature of interaction (McTear and Conti-Ramsden 1992). Interventions at the linguistic level include, but are not limited to, turn-taking skills, topic management, conversational skills and narrative skills. Verbal coaching may prove effective to prompt and demonstrate a conversational principle, such as turn-taking or teaching politeness. Interventions relating to conversational skills have been shown to have modest success (e.g. Adams et al. 2006; Timler et al. 2005; Merrison and Merrison 2005; Willcox and Mogford-Bevan 1995). Training of narrative skills can take the form of explicitly teaching the structure of narratives using Wh-questions (who-what-when-where-how/why). This structure facilitates story comprehension as well as storytelling, but can also be useful during conversation in order to stay on topic. Intervention at the linguistic level can be extended to a wider area including linguistic processing. For example, if word-finding difficulties are present, therapeutic principles based on a combination of elaboration (i.e. activating semantic networks that are associated with a word) and retrieval facilitation can be embedded in the intervention. This has been proven effective in children with PLI (McGregor and Leonard 1995). In addition, training compensatory strategies such as describing the word, using a different word from the same semantic network, pointing, or drawing is useful. Using these strategies, the flow of conversation can be maintained, and the child will experience feelings of control instead of frustration.

Interventions such as the ones described above typically apply a variety of techniques including direct instruction, modeling, role-playing and scripting. Although a blend of techniques is necessary in order to maximize treatment outcome, this makes it difficult to draw any conclusions as to the pivotal elements that foster improvement in individuals with PLI.

Recently, there has been an increase in intervention studies on individuals with PLI. A promising treatment protocol specific to the PLI population is the Social Communication Intervention Project (SCIP; Adams et al. 2012). SCIP is an individualized treatment focusing on linguistic, pragmatic and social skills that are based on parent/teacher information. A first randomized controlled trial shows that SCIP yields changes in conversational skills. Moreover, both parents and teachers reported improvements in socio-communicative skills even at a six month follow up, although this could also be attributed to bias, since parents and teachers were not blind as to the treatment the children were receiving. An additional benefit of SCIP is that both parents and teachers perceived the contact with speech-language therapists to be valuable and beneficial to their own interactions with the children (Baxendale et al. 2013). Moreover, the contact may foster generalization of treatment principles to other environments, benefiting treatment outcome.

A second promising line of investigation is computerized treatments for specific social communicative skills. With technological advances on the rise, we will see more of these in the near future. Already a study by Murphy et al. (2014b) has demonstrated the success of these treatments in fostering perspective-taking and pragmatic skills such as the use of complex information-seeking questions. Interestingly, Murphy's study also showed a positive outcome for children who were coupled with a more communicatively-skilled peer, indicating the possibility of peer-mediated therapy. As computerized treatments are generally attractive and fun for children, these could prove to be a valuable extension to other forms of therapy. The advancement of apps, blended treatment and speaking robots can also be seen in this light. Although there is limited data available on the actual benefits, they all provide the person with PLI ways in which to practice their limited skills in a safe environment which resembles everyday life.

2.11 Summary

As PLI has only recently been added to DSM-5 under the term Social Communication Disorder (SCD), we know little of its exact symptom manifestation, its relation to other language disorders and to ASD, good diagnostic practices and effective treatments. DSM-5 states that SCD is diagnosed if individuals show deficits in the use of communication for social purposes, the ability to change communication according to context, the ability to adhere to conversational and narrative rules and the ability to understand implicit language. Although there are studies showing specific impairments in these areas for individuals with PLI, systematic research is largely lacking. As such, discussion of the validity of PLI as a separate entity is not yet resolved. Future research should be aimed at identifying the exact symptoms of individuals with PLI, and uncovering the underlying cognitive mechanisms involved, as this may enhance our understanding of etiological factors. In addition, there is need for more longitudinal studies which are aimed at the developmental aspects and prognosis of PLI, especially in adolescents and adults.

Concerning diagnostic assessment of PLI, a broad approach is advised in order to exclude the possibility of an underlying language disorder or an autism spectrum disorder. Unfortunately, although there are several instruments available, none of the instruments are tailored to individuals with PLI. In addition, many tests fail to detect the problems individuals with PLI struggle with. There is a need for more valid and reliable instruments with specific norms for individuals with PLI. Moreover, in order to be able to monitor outcome, these instruments will need to be sensitive to measure change. The development of observational assessments may be especially useful in this regard as they provide us with the opportunity to collect ecologically valid data without losing the benefit of standardization. These observational assessments may include parent-child interaction, but also peer-peer interaction and play interaction (Cordier et al. 2013), as children with PLI are known to experience specific difficulties within the realm of social interaction.

With regard to interventions, there is some evidence that intervention may indeed ameliorate impairments of individuals with PLI. In order to optimize treatment outcome, interventions need to be tailored to the individual and should ideally include several techniques to demonstrate, explain and generalize pragmatic skills. Unfortunately, we are sorely lacking in systematic research on effective interventions. With that in mind, treatment recommendations are tentative at best. After establishing sensitive instruments that can measure change, more rigorous research should be undertaken, focused on the magnitude of treatment effects, the key ingredients responsible and on the ability to foster generalization. As a starting point, it may be beneficial to learn from evidence-based interventions for individuals with ASD and SLI, although care needs to be taken to ensure that these interventions are tailored to the needs of the SCD population. As far as technological devices are concerned, they are in an experimental phase and it is too early to arrive at recommendations for clinical practice.

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Chapter 3
Autism Spectrum Disorder

Joanne Volden

Abstract Pragmatic language impairments are universal in autism spectrum disorder (ASD) but specifying their exact nature has proven to be difficult. This chapter briefly traces the history of investigation into pragmatic skills in ASD, and reviews current research in three major areas: the development of communicative speech acts, the management of conversations, and the ability to adjust one's language to meet the needs of listeners and situations. More sophisticated discourse such as generating narratives is briefly discussed. In general, speakers with ASD are likely to display problems in all of these areas, but pragmatic profiles vary tremendously from one person to the next. At present, no single constellation of skills or impairments can be considered to be characteristic of ASD. The chapter concludes by mentioning some of the issues that should be targeted in future research.

Keywords Autism spectrum disorder • Context • Conversation • Conversational repair • Pragmatics • Register • Speech act • Topic management • Turn-taking

3.1 Introduction

Autism Spectrum Disorder (ASD) includes a range of neurodevelopmental conditions that are characterized by impairments in social communication and social interaction and by the presence of repetitive and stereotyped interests and behaviors (American Psychiatric Association 2013). The prevalence of ASD is currently estimated at one in 68 children, making it one of the most common developmental disorders (Centers for Disease Control 2015). The above definition reflects the most recent refinement of diagnostic criteria and emphasizes that the universal communicative impairment in ASD lies in the area of social, rather than structural communication. In other words, the central communication impairment in ASD is in the use of communication skills to navigate social situations, an area known as pragmatics,

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rather than in a person's ability to articulate sounds or form words and grammatically correct sentences. The emphasis on pragmatic dysfunction should not be interpreted to mean that speakers with ASD will not have concomitant linguistic problems. Many will also display difficulties in formulating syntactically correct sentences and in academic skills that rely on language competence. Rather, the focus on pragmatics highlights that even in those who have no apparent problems in sentence structure or vocabulary, impairments in the socially appropriate use and understanding of language remain.

This chapter aims to describe our current state of knowledge about pragmatic dysfunction in ASD. First, though, it is important to outline the scope of communicative behaviour that is encompassed by 'pragmatics'. The American Speech-Language-Hearing Association (2015) describes pragmatics as involving three major skills: (1) using language for different specific purposes such as greeting, requesting, commenting, protesting, etc.; (2) following implicit conversational rules, such as taking turns in a conversation; introducing, developing, switching and terminating topics; and repairing conversational breakdown; and (3) changing one's language to suit the needs of a listener or the situation. Examples of switching language to meet situational needs include speaking differently to a baby than to an adult and including only new information in an utterance rather than information that the speaker knows to be shared with the listener. This chapter is organized around the above three skill areas. Research in ASD that focuses on one or more of these areas will be reviewed, with the aim of providing the reader with a current description of what we know about pragmatic skill in speakers with ASD.

3.2 Speech Acts

Speakers use language for a number of specific purposes such as greeting, requesting, commenting, protesting, persuading, and so on. These specific purposes or functions are known as speech acts. Wetherby and Prutting (1984) provided evidence of impairment in speech act development in four children with ASD. Detailed analysis of child-initiated utterances in a language sample revealed that the children with ASD were never observed to request information, to show off, to acknowledge others or to comment. In contrast, the language-matched typically developing children displayed all of those intentions and several more, including labelling referents and accompanying actions with sound effects. Spurred to investigate further, Wetherby (1986) proposed that children with ASD developed early speech acts in a sequence that was different from that displayed in typical development.

In early development, speech acts can be broadly classified into three categories: (1) behaviour regulation – communicative acts intended to direct another person's behaviour such as requesting an object, (2) social interaction – acts designed to draw attention to oneself so as to get a person to look at, notice or comfort the speaker, and (3) joint attention – acts that direct attention to an object so that the person will look at or notice something of interest (Wetherby 1986). Instead of emerging simultaneously, as they do in typical development, Wetherby (1986) suggested that these types of communicative acts emerged sequentially in children with ASD. The easiest speech act, and the earliest one to emerge, is behaviour regulation and the most difficult and latest to emerge is joint attention. This sequence of development was supported for children with autism aged 2–4 years (Wetherby et al. 1998) and more recently for younger children aged between 12 and 18 months (Wetherby et al. 2007). In Wetherby et al.'s (2007) prospective longitudinal study, semi-structured language samples were collected at 18 months. When rigorous and reliable diagnoses were made at age three, 50 children with ASD were compared to 23 developmentally delayed children for whom ASD had been ruled out, but who were matched on age and cognitive developmental level. The children with ASD were comparable on the number of behavioural regulation acts, slightly lower on acts for social interaction and significantly lower on acts for joint attention.

Stone and Caro-Martinez (1990) also supported this sequence of development. They observed spontaneous communication of 30 children with ASD, aged 4–13 years, in school settings and found that utterances directed to social functions were less sophisticated than those directed to regulating behaviour. For example, in this age group, basic social functions like getting attention and social routines were well established, but more sophisticated acts like 'commenting' were less well established. Stone and Caro-Martinez (1990) suggested that the ability to comment might be a pivotal communicative act, the achievement of which would facilitate acquisition of other, more sophisticated communicative functions.

Ziatas et al. (2003) also examined speech acts in children with ASD. They investigated whether the language of 6–8-year-old speakers with ASD would refer to abstract mental states as frequently as the language of children with specific language impairment (SLI) or the language of typically developing (TD) children. Language samples were collected from 24 children in each group, using a common set of toys in a gently structured interaction with the examiner. Children with ASD were less likely to refer to abstract mental phenomena, such as thoughts and beliefs, than their language-matched controls with SLI or their age-matched TD controls.

Overall, children with ASD appear to be selectively delayed in speech act development when compared to language-matched controls. The ability to express social functions has been shown to develop more slowly than the ability to direct others' behaviour. Because the negative impact of asynchronous development of early pivotal social skills is likely to escalate over time, Wetherby et al. (2007) suggest that five core social communication impairments – gaze shift, gaze/point follow, rate of communication, acts for joint attention and inventory of gestures – typically present in the last half of the second year of life, be considered as crucial targets for early intervention.

3.3 Conversational Management

A typical conversation involves at least two people sharing ideas about one or more topics. Generally, conversations are characterized by an overall balance of reciprocal turns and seamless topic shifts. For example, two friends could easily begin a conversation by talking about cooking dinner and end up discussing a recent movie, and only on reflection be able to identify how one topic had led to the next. Until one consciously traces how the topics changed, the movement from one topic to the next is smooth, causing no disruption in the flow of conversation. Also, consider how you know when it is your turn to speak and when to listen. What prompts you to realize that your conversational partner has finished his or her turn and is ready for you to contribute? Occasionally, conversations break down and need to be repaired. For example, think about the last time you tried to understand someone's directions for locating their residence while noisy cars drove by. It is not unusual to need to ask for a clarification of portions of what the speaker said. All of these skills are second nature to competent communicators, but each requires substantial social and communication skill.

Conversational language impairments in children with ASD have been noted since the earliest descriptions of the condition. For example, communication of children with ASD has been described in clinical case reports as 'peculiar and out of place in ordinary conversation, irrelevant' (Kanner 1946: 243), 'formal, demonstrating a lack of ease in the use of words' (Rutter 1965: 41), 'stereotypic, inappropriate' (Bartak et al. 1975: 137), and 'metaphorical' (Cantwell et al. 1978: 347). These descriptions resonate with families who have members with ASD and with clinicians who work with this population, but are too vague to identify the source or specify the nature of conversational impairment. Despite widespread recognition that effective conversation presented substantial challenges to speakers with ASD (Frith 1989; Paul 1987; Tager-Flusberg 1989), empirical research to investigate those challenges lagged behind (Capps et al. 1998). Early studies that were empirical were often characterized by small sample sizes, and composed of participants with widely varying chronological and mental ages. Such wide variability may mask important developmental differences because the sample covers such a large range of developmental levels. Many studies also suffered from a failure to use a control group. When comparison samples were used, they were often matched only on mental age which does not control for potential differences in expressive language development.

The following sections summarize the research conducted with speakers with ASD in three major areas of pragmatic conversational management: taking turns; topic maintenance and development; and conversational breakdown and repair.

3.3.1 Taking Turns

Difficulties with taking turns in conversation have been documented in speakers with ASD. Early reports remarked that children with autism either failed to respond to a conversational initiation or responded in a non-topically related way (Ball 1978; Curcio and Paccia 1987; Tager-Flusberg 1982). Research on the failure of children with ASD to take conversational turns will be discussed in this section. The tendency of these children to respond in a non-topical way will be addressed in Sect. 3.3.2.

Capps et al. (1998) collected semi-structured language samples, in a school setting, from fifteen 11- to 12-year -old children with ASD and 15 developmentally delayed control children matched on language skill. They found that the children with ASD responded to questions less often than their language-matched controls. Eales (1993) reported a similar finding in adults. A significantly greater number of 'empty turns' was found for adults with ASD as compared to control adults matched on verbal IQ (VIQ), nonverbal IQ (NVIQ), chronological age (CA) and receptive vocabulary. Eigsti et al. (2007) collected language samples from young children aged 3–6 years during free play with the investigator. They found that verbal children with ASD were significantly more likely to ignore an adult's conversational overture than groups of control children matched on receptive vocabulary and NVIQ.

In none of these reports, however, was the proportion of 'empty turns' or 'ignoring' an overture studied. The highest ratio of failing to respond was approximately 20 % of the utterances (Capps et al. 1998), while other investigations revealed proportions in the 3–5 % range (Eales 1993; Eigsti et al. 2007). While the impact on a conversational partner of a relatively small amount of atypical behaviour can still be substantial (Paul et al. 2009; Mitchell and Volden 2015), these proportions also indicate that speakers with ASD do participate in conversation and take their conversational turn, a majority of the time.

3.3.2 Topic Management

As noted above, participants in a conversation expect that conversational topics will be maintained and developed and that conversational flow will not be disrupted. One particularly disruptive phenomenon is the use of neologisms. Neologisms are words that are understood only by the speaker. They are 'non-words' or words that are obviously 'peculiar' (Le Couteur et al. 1989). Kanner (1946) included the use of neologisms in his description of the language of speakers with ASD, and Rutter (1965) noted that some children 'made up their own words for things' (41). For example, one young man in our clinic described a particular stretch of winding road as the 'kellogs nahavities'. The young man's mother noted that her son always volunteered that they were driving on the 'kellogs nahavities' when they were on that stretch of road, and that no-one else in her family had ever heard or used that particular term.

Volden and Lord (1991) investigated the occurrence of neologisms in the language of speakers with ASD. Forty children with ASD aged 6–18 years were matched with control children on the basis of verbal skill and CA. Language samples were collected and transcribed. Neologisms and instances of 'idiosyncratic language' (defined as conventional words and sentences used in an idiosyncratic or highly individualized way) were identified. The speakers with ASD (both intellectually able and those with an intellectual disability) used significantly more utterances which contained either a neologism (e.g. 'bloosers' to denote 'bruises') or an

English word used in an unusual way (e.g. ‘*siding* the table’ vs. ‘*clearing* the table’). Surprisingly, there were very few true neologisms, given the attention they had drawn in early anecdotal accounts. In fact, in all the groups, the proportions of participants’ utterances containing either of these types of error were small, with the highest proportion of error (.016 or 1.6 %) found in the intellectually able group with ASD. This serves as another illustration of a small amount of atypical behaviour having a substantial impact. One additional noteworthy finding was that the amount of unusual word use increased in speakers with ASD with greater language proficiency, while it decreased in typically developing and children with intellectual disability as their language skills increased (Volden and Lord 1991).

Taking a somewhat broader look at the notion of topic management, Bishop and Adams (1989) found that children with pragmatic language impairment could be distinguished from children with conventional syntactic language impairment by the rate of inappropriate utterances. They defined these as utterances that disrupted the normal conversational flow, striking the listener as odd, unusual, unexpected, or out of keeping with the context in some way (Bishop and Adams 1989). Instead of relying on vague descriptions, Bishop and Adams (1989) applied detailed empirical analysis to language samples and documented the above result. Their pioneering efforts led to many similar investigations in the population with ASD.

Volden (2002) employed conversational analysis methods based on Bishop and Adams (1989) to investigate the language of nine school-aged children with ASD. Nine typically developing children, selected to be similar to the children with ASD on NVIQ, CA and language level, served as the comparison group. As part of another study, children were asked to describe how to go to a grocery store, a restaurant, and a movie. On average, 19 % of the utterances produced by children with ASD were judged to be inappropriate in some way, compared to 2 % of the utterances produced by members of the comparison group. An example of an utterance which was judged to be inappropriate is the following:

Adult: So, you watch the movie. Then what do you do?
Child: A cabbage keeps rolling up in my head.

Capps et al. (1998) also studied the conversations of a small group (n=15) of school-aged children with ASD and found significantly more ‘bizarre’ and ‘idiosyncratic’ utterances in the group with ASD versus their language- and mental-age-matched, developmentally delayed controls. In a short conversation about after school activities, for example, one child offered ‘Sabre-toothed tigers can’t fly’, and another asked the examiner, ‘What colour is your brother’s house?’, even though the child and the examiner were unacquainted (Capps et al. 1998). Eigsti et al. (2007) also found that 5-year-old children with ASD used more ‘discourse interrupting’ utterances than developmentally delayed children matched on intellectual skill and typically developing children matched on CA.

Eales (1993) applied Bishop and Adams’ (1989) conversational analysis methods to 15 adults with ASD and found that they too produced significantly more inappropriate utterances than a matched sample of adults who had a receptive language disorder. More recently, Mitchell and Volden (2015) reported on a sample of

20 young adults with ASD who, when simulated job interviews were analysed using the Pragmatic Rating Scale (Landa et al. 1992; Paul et al. 2009), were shown to exhibit more difficulties in topic maintenance than a group of matched typically developing young adults.

Another way to study topic maintenance has been to examine contingent responses to a conversational partner's utterances. In typically developing children, the ability to respond contingently to a mother's utterance and to add new information to develop the topic grows with the child's advances in linguistic skill (Bloom et al. 1976). Tager-Flusberg and Anderson (1991) investigated this skill in children with ASD, comparing the contingency of responses of six preschoolers with ASD to an equal number of children with Down syndrome, matched on CA and language level (in this case, mean length of utterance). Language samples of each child playing with his or her mother were collected at four-month intervals over the course of a year. Samples were coded for whether a child's responses maintained the topic of the mother's previous utterance. An example of a contingent response is 'Right, he's running' to a mother's utterance of 'That cat is running'. An example of a non-contingent response from a child with ASD follows (Tager-Flusberg and Anderson 1991: 1327):

Mother: See the horse running!
Child: Look at the Susan.

On average, children with ASD were significantly more non-contingent than children with Down syndrome. However, both groups were more contingent than non-contingent at all times, illustrating again that atypical performance occurred less frequently than one might think. A follow-up study by Hale and Tager-Flusberg (2005) of a larger sample (n=57) of older children (average CA = 7.3 years) also showed that children with ASD were more contingent in their responses than non-contingent, and that the proportion of contingent responses grew over the course of a year.

Adams et al. (2002) reported on conversational characteristics of 19 adolescents with ASD as compared to 19 adolescents with conduct disorder. Their analysis focused on how well conversational responses 'meshed' with the preceding utterance. Utterances that were tangential to the topic or that ignored the context of the conversation were coded as pragmatic problems resulting in poorly 'meshed' conversations. The adolescents with ASD exhibited significantly more pragmatic 'meshing' problems than the adolescents with conduct disorder. A similar finding was reported by Fine et al. (1994). Paul et al. (2009) also evaluated the conversations of 29 adolescents with ASD and 26 age- and gender-matched typically developing adolescents using the Pragmatic Rating Scale. Their results confirmed the presence of topic management difficulties in the group with ASD, such as providing irrelevant details and using irrelevant utterances.

Collectively, these studies revealed consistent and significant difficulties with the skills required for successful topic maintenance and development in children, adolescents and adults with ASD. It is important to keep in mind, though, that ASD is also characterized by profound variability in the expression of symptoms. Some individuals with ASD are likely to be more skilled in this domain than others.

3.3.3 Conversational Breakdown and Repair

Conversational breakdown and the need to engage in conversational repair can occur in any interaction. For example, background noise might render a portion of the speaker's message unintelligible. Alternatively, the listener might be momentarily distracted and fail to attend to all or part of an utterance. In some cases, the speaker may misjudge the listener's prior knowledge, leading to formulation of a message that provides too little information for the listener's optimal comprehension. For example, a child might say 'I have Digger and he can get out of a lot of trouble', assuming that every adult is familiar with the names and roles of characters in a popular video game, as well as the structure of the game itself. Whatever the reason, when a breakdown occurs, the listener will often signal difficulty in comprehension by asking for clarification. Following a request for clarification (RQCL), the speaker needs to repair the breakdown in order for effective communication to proceed.

In typically developing children, Alexander et al. (1997) demonstrated that the ability to engage in conversational repair emerged early. When adults, who were interacting with children in the pre-linguistic stage of development, deliberately caused a breakdown by failing to satisfy the children's requests for objects or assistance, the children persisted in their attempts to communicate by engaging in repair. Gallagher (1977, 1981) demonstrated that children as young as 2 years of age were able to respond to adult verbal requests for clarification by modifying their vocabulary or adding words or phrases to their original utterance. As one would expect, repair behaviours grow in variety, flexibility and sophistication as language develops (Gallagher 1981).

Brinton et al. (1986) extended the examination of repair behaviours in typically developing children to an investigation of how persistent breakdowns are managed. They examined 'stacked' RQCLs. A 'stacked' request occurs when a response to a request for clarification is met by at least one additional request. For example:

Speaker 1: There's a yellow fish in the sink.
Speaker 2: What? (RQCL)
Speaker 1: There's this little yellow fish swimming around in the sink.
Speaker 2: I don't understand (RQCL)
Speaker 1: Somebody has put a little yellow fish in our sink. It's swimming around like it belonged there.
Speaker 2: Yikes!

'Stacked' RQCLs require speaker persistence and also illustrate the successive approximations that are produced in attempts to reach mutual understanding. Brinton et al. (1986) found that 5- to 9-year-old children responded to the majority of stacked RQCLs by providing some type of conversational repair. Older speakers demonstrated a wider variety of repair strategies and generated additional information as the stacked progression unfolded.

In the first study of RQCLs in speakers with ASD, Baltaxe (1977) reported that adolescents with ASD (n=5) failed to revise their speech when faced with communicative breakdown. Paul and Cohen (1984) compared responses to RQCLs of eight adults with ASD to the responses of mentally handicapped adults matched on nonverbal mental age. They found that adults with ASD were similar to the comparison group in their ability to provide a response, but appeared to be less specific in their responses and less able to go beyond the minimum queried. Unfortunately, the participants with ASD had language skills that were poorer than those of the mentally handicapped group, so reduced language abilities may have had some influence on their ability to generate sophisticated and flexible responses.

Alexander et al. (1997) analysed the repair attempts of six children with ASD as part of their larger investigation into the emergence of repair strategies. Four of the children with ASD were in the pre-linguistic stage of communicative development and two were in the early single-word stage. Communication breakdowns were engineered by adults who deliberately failed to satisfy the children's requests for objects or assistance. Even at the pre-linguistic stage, children with ASD were able to attempt repairs of these breakdowns, using strategies that appeared comparable to those exhibited by typically developing children. The small sample size (only six children, across two different language development levels) limits the generalizability of these findings. However, Alexander et al.'s results support Paul and Cohen's (1984) notion that subjects with ASD recognized communicative breakdown and the need for repair. Geller (1998) also found that school-aged children with ASD were able to respond to RQCLs and used a variety of strategies to do so.

Despite varying levels of language development, participants with ASD across all three investigations recognized the need to engage in conversational repair and employed various strategies for repair of the breakdown. Most of these studies, however, were weakened by the absence of an appropriate control group. In addition, none of these investigations investigated how children with ASD would fare when faced with persistent communicative breakdown as indicated by repeated RQCLs. Volden (2004) aimed to fill this gap by examining repairs in nine school-aged, intellectually able children with ASD matched to nine control group children on the basis of language level. During conversation, an unfamiliar examiner engineered episodes of communicative breakdown. Each consisted of a stacked series of three requests for clarification ('What?', 'I don't understand', 'Tell me another way'). Children with ASD were similar to control children matched on language age (LA) in responding to requests for clarification and employing a variety of repair strategies. In addition, their pattern of responding over the series of RQCLs was very similar to the controls. They too varied the repair strategy by adding more and more information as the breakdown persisted, i.e. as the sequence of RQCLs progressed. Children with ASD were, however, significantly more likely than LA-matched controls to respond to a RQCL with a response that was inappropriate.

Volden's study (2004) was limited by its very small sample size. In addition, the participants with ASD were all intellectually able, so it is difficult to determine whether younger or more intellectually impaired participants would demonstrate the same skills. So far, though, the research in ASD suggests that the ability to repair conversations is relatively preserved, at least for those who are intellectually able.

3.4 Tailoring Language to Suit the Context

A third major area of pragmatic skill involves adjusting one's communication to meet the needs of a listener or to fit the situation. In expressive language, these adjustments are seen in efficient referential communication, that is, the ability to refer to things in such a way that the listener will know what the speaker is describing (Holdgrafer and Campbell 1986). An integral part of competence in effective referential communication is the successful foregrounding of new information that is seen as important to communicate and that likely builds upon previously shared or known 'old' information. A related skill is the use and comprehension of cohesive ties, that is, structural linguistic devices that are used to create connections within and between utterances in discourse or text (Halliday and Hasan 1976). For example, the question 'Did he put it over there?' can only be understood if the listener already knows who 'he' refers to, what 'it' is and where 'there' is. The use of 'he' to refer to an earlier mention of a male actor such as John is known as anaphoric reference, which is one form of cohesive tie. The referents of the deictic terms 'he', 'it' and 'there' are determined by the context in which these expressions are used. Mastery of deixis also depends on the mutual understanding that the speaker's 'there' may be the listener's 'here'. Another aspect of expressive language that is included in the broad domain of tailoring language to suit the context is adjusting one's language register or style. Different language registers reflect who the speaker is addressing, where he or she is, what the social event is, what topics are appropriate and the social relationship between the conversational partners (Ervin-Tripp in Andersen 1996). All of these specific skills fall into the broad pragmatic domain of tailoring one's language to suit the context.

Skills that underpin such expressive language abilities include use of presupposition and comprehension of implicature. Appropriate use of presupposition requires the ability to make judgements about information which needs to be communicated (new information) and information which the listener already knows (given or old information). Based upon what a speaker knows about the listener's state of knowledge, some words and grammatical constructions will be chosen in preference to others. As noted above, if someone says 'Did he put it over there?' and expects the listener to understand the message, the speaker is presupposing that the listener knows who 'he' is, what 'it' is and where 'there' is. If the speaker judged that the listener did not already possess that knowledge, he or she would have said something like 'Is there a book on the table?' or 'Did John leave a book on the table over there?'

The notion of conversational implicature has been extensively investigated in clinical pragmatics (Cummings 2009). Implicature relies on the listener's ability to successfully infer from a speaker's message a meaning that is implied rather than directly stated. For example, if John says to Mary 'Are you going to the party tonight?', and Mary replies 'I need to work', John will conclude that Mary is not attending the party, even though she did not say so directly. In linguistic terms, John has recovered a conversational implicature (that Mary is not attending the party) and made an inference about her intended meaning. Conversational use of figurative language such as metaphor and idiom relies on similar processes. If, following a strenuous objection in a business meeting, a colleague tells the speaker 'You're skating on thin ice', the colleague does not mean that the person who made the objection is literally skating, but rather that the objector's behaviour is risky.

These areas of pragmatic skill have all been suggested to be impaired in speakers with ASD. Pragmatic impairments in ASD have been explained in terms of a deficient 'theory of mind' (ToM) (Baron-Cohen et al. 1985). Simply put, the ToM hypothesis states that individuals with ASD are unable to attribute mental states to their own minds and to the minds of others. To the extent that this hypothesis is correct, it would naturally follow that people with ASD are not able to take another person's perspective in order to tailor communication to a listener's needs or to recover a speaker's intended meaning. A flurry of research has been directed towards the testing of this hypothesis. The upshot of this work is that the strong version of the hypothesis, that is, that those with ASD have no theory of mind, no longer obtains as it has been shown that at least some intellectually-able people with ASD can, indeed, take another person's perspective (Bowler 1992; Ozonoff et al. 1991). Nonetheless, weaker versions of the ToM hypothesis, as well as other influential cognitive theories, are still a matter of active debate (for a review, see Rajendran and Mitchell 2007). It is beyond the scope of this chapter to evaluate cognitive theories of ASD. However, it is worth noting that these theories are often addressed in research on pragmatic skills in ASD (see Chap. 22, this volume). Indeed, some of the research reviewed below, which investigates the skills of speakers with ASD in adjusting language to suit the listener and/or the situation, has had a dual focus of testing the ToM hypothesis as well as pragmatic language skills.

3.4.1 Referential Communication

Baltaxe (1977) was first to note that autistic adolescents appeared to have difficulty in distinguishing old from new information in referential communication. McCaleb and Prizant (1985) explored the ability to mark new information in four children with ASD in the early stages of language development. They examined language samples collected in play situations to determine if verbal children with ASD used strategies such as lexicalization, i.e. choosing a word to denote an entity, and contrastive stress, i.e. emphasizing specific information by a louder voice. They found that their participants used each of the strategies appropriately, but that they also encoded old information almost as much as new information using the same strategies. Normative information, while limited, suggests that the ability to selectively encode and highlight new information develops early, so McCaleb and Prizant's results have been interpreted as indicating an inefficiency of pragmatic function in this area. Still, all participants demonstrated intellectual disability as well as ASD, and no comparison group was employed, making interpretation of the results difficult.

Loveland et al. (1989) investigated referential communication skills in 13 adolescents with ASD whose verbal skills were, on average, those of a 6- to 7-year-old child. A comparison group of 14 adolescents with Down syndrome and comparable verbal skills was also used. Participants learned to play a simple board game and were then asked to teach it to a confederate examiner. All participants learned to play the game and almost all communicated the ten targeted pieces of information in teaching it to the confederate. The participants with ASD, however, required increasingly specific prompts in order to do so. As the demand to take the listener's perspective was reduced by more directive prompts (e.g. 'Tell me where to start' vs. 'Tell me how to play the game'), participants with ASD became more successful. Loveland et al. (1989) interpreted their results as supporting the ToM hypothesis, because as the need to take another person's point of view was removed, performance improved.

Volden et al. (1997) followed up on this work by evaluating the referential communication and perspective-taking skills of 10 intellectually-able young adults with ASD as compared to 10 typically developing young adults, matched on language level. Participants were asked to communicate to a listener which of two shapes, identical except for a single distinguishing feature, was the 'secret' shape on a stimulus card. The listener had access to an identical stimulus card but was not privy to which of the two shapes was designated 'secret'. A second task using the same stimulus cards assessed the perspective-taking skills that were specifically relevant to the task. Participants with ASD were less efficient than their matched controls on communicating only the distinguishing feature between the two shapes on the card, but performed almost perfectly on the perspective-taking measure. This study showed that the expressive referential communication problems exhibited in intellectually-able young adults with ASD could not be solely attributed to difficulties in taking the listener's perspective because the perspective-taking skills necessary for successful communication in this particular situation had been tested and found to be intact. Nonetheless, these young adults with ASD were less efficient in the referential communication task than their matched controls.

More recently, Nadig et al. (2009) studied the referential communication abilities of school-aged children with ASD by examining whether they were able to adapt their descriptions of objects in situations with increasingly complex demands. Participants with ASD were matched to typically developing children and all were asked to engage in referential communication tasks where the amount of shared information between the speaker and the listener was systematically manipulated. In addition, all participants were involved in a guessing game about what information would need to be provided in order that a listener would be able to identify an object. This is essentially a perspective-taking task. Across both tasks, three levels of complexity were evaluated: (1) the ability to provide an adequate description from one's own perspective; (2) the ability to adjust a description to the listener's perspective when it was different from one's own; and (3) the ability to provide implicit directions for identification of an object when explicit direction was inappropriate. Participants with ASD were less efficient than members of the comparison group in all three levels of complexity. Of those who were able to adapt to all levels, higher structural language ability rather than symptom severity or social skills differentiated the participants with HFA from the typically developing controls.

In conversation, problems with effective referential communication might arise on account of difficulties in using cohesive ties. As noted above, cohesive ties are structural linguistic devices which are used to establish connections within or between utterances. Examples include the use of a pronoun when the referent has previously been established (e.g. 'John is out. *He* will be back by 5'). Baltaxe and D'Angiola (1992) studied the use of cohesive ties in ten 8-year-old children with ASD as compared to eight language-matched, typically developing children and eight children with specific language impairment. They found that members of all three groups used cohesive ties correctly, but that the group with ASD made the most errors. While there were no statistically significant group differences in mean length of utterance (MLU), receptive vocabulary or receptive grammar, the MLU of 2.7 of the group with ASD put them in Stage III of Brown's stages of early language development (Owens 2014)**,** compared to the Stage IV functioning of the younger typically developing controls. It is possible that cohesive skills were simply less well integrated in the group with ASD rather than selectively delayed.

Fine et al. (1994) also studied the use of cohesive devices, but with a larger sample (n=41) of generally older speakers (most were adolescents). Analysis of language samples in this study revealed that speakers with ASD were more likely than the comparison group to make references to the external world rather than to preceding utterances in order to anchor their utterances. As a result, their conversation was less cohesive than the language of the comparison sample of out-patient psychiatric controls, in this case 34 adolescents with diagnoses such as attention deficit hyperactivity disorder and conduct disorder. In both studies, participants with ASD used cohesive devices correctly a large proportion of the time, but were less efficient than the speakers to whom they were compared. Nonetheless, both of the previous studies serve as another example of the pattern which has already been observed, namely, that skills are not necessarily absent in the population with ASD. Rather, they are used atypically at least some of the time.

3.4.2 Deixis

Despite early comments that speakers with ASD appeared to have difficulty with deictic terms (Fay 1979; Landry and Loveland 1989; Ricks and Wing 1975), that is, terms that derive their full meaning from the vantage points of the speaker who utters them and the listener who interprets them, there has been limited systematic investigation of this area. Recently, Hobson et al. (2010) examined production of spatial deictic terms, specifically 'here/there', 'this/that' and 'come/go'. Twenty participants with ASD were matched to 20 participants without ASD on the basis of CA, and verbal mental age derived from a vocabulary test. Participants watched as an experimenter demonstrated where a toy animal should be placed, in one of two identical fields where the only difference was the location relative to the participant. In other words, one field would be best described as 'this field' or 'here' and the other as 'that field' or 'there'. Following the demonstration, a confederate examiner followed the child's instruction of where to put the toy animal. Contrary to expectations, performance across the two groups was remarkably similar with at least half the participants in each group using appropriate deictic terms in five of the six trials. On more detailed analysis, Hobson et al. identified differences in the quality of task performance that may have been masked by the broader analysis directed to level of successful performance. In particular, only members of the group with ASD ever referred to a location that was distal to themselves with the term 'this' or 'here'. Thus, although speakers with ASD used the terms appropriately the majority of the time, they also exhibited occasional instances of strikingly atypical utterances.

3.4.3 Register

The ability to alter one's language in order to fit the needs of different listeners and situations is known as language register and is an integral part of communicative competence. Still, this area of pragmatics has been little studied in ASD. McHale et al. (1980) investigated the language of eleven 4- to 9-year-old children with ASD during free play, both when the teacher was present in the classroom and when the teacher was absent. They found that both the quantity and quality of children's communication was better when the teacher was present. Bernard-Opitz (1982) reported a case study of an 8-year-old child with ASD whose language varied from situation to situation and with different conversational partners. Both of these studies indicated that the speakers with ASD had some sensitivity to the differences among situations and interlocutors.

Volden et al. (2007) directly examined registral adjustment skills in 38 intellectually-able children with ASD (average CA=11 years) as compared to typically developing children matched on nonverbal mental age and language age. Participants were asked to explain the process of going to a restaurant (e.g. be seated, look at the menu, order and eat food, pay the bill, etc.) to several different puppet listeners. Two of the puppets portrayed listeners that would ordinarily evoke a simplified language register, i.e. one was an infant and one was introduced as a recent immigrant who did not speak English well. Following the initial explanation, the participants were asked to explain the process again on the basis that the puppet had not understood. At this point, a general prompt was given, directing the participant to take the listener's perspective (e.g. 'Remember to *talk so that he/she can understand*'). A third explanation was asked for at the conclusion of the second explanation, including a more specific prompt ('He/she *still* didn't understand. Make it *really simple*'). Volden et al. (2007) found that participants with ASD were able to adjust their language register, and continued to simplify their explanations following each of the prompts. They were, however, not as adept at that adjustment as their matched controls. Once again, these results demonstrate that pragmatic communication skills in the population with ASD are not an all-or-none phenomenon. Speakers with ASD showed some sensitivity to the needs of different listeners and were able to adjust their language in the desired direction even with only a general prompt directing them to think about what the listener needed. Nonetheless, they were not as skilled as participants in the comparison groups who had similar levels of nonverbal ability and language.

More recently, Bauminger-Zviely et al. (2014) investigated how preschoolers with ASD talked to their peers in comparison with typically developing peers who were matched on socioeconomic status, verbal/nonverbal mental age, IQ and CA. Conversations with two different partners were compared. One conversational partner was a friend of the child while the other was more appropriately described as an acquaintance. As expected, the children with ASD were less skilled than the children of the comparison group. For the speakers with ASD in particular, pragmatic and conversational characteristics of the interactions with friends were significantly better than those of conversations with acquaintances. In conversation with a friend, children with ASD were more reciprocal, more responsive to the partner's queries and emotional state and less overly talkative. Discourse with a friend was less stereotypic and characterized by better eye contact and facial expressions. Overall, it appears that interactions with friends are more socially complex and attuned to the conversational partner. This study also supports the notion that speakers with ASD are sensitive to some degree to differing social conditions. Bauminger-Zviely et al. (2014) suggest that peer interactions, particularly with friends, in early intervention may assist in mitigating pragmatic communicative deficits by facilitating the emergence of more sophisticated behaviour.

3.5 Can Speakers with ASD Use Context Appropriately?

Frith (1989) proposed that the 'neurotypical' drive for overall coherence or integration of information is weak or less preferred in people with ASD, a theory that has become known as the Weak Central Coherence (WCC) account of ASD. On this view, people with ASD process information in a piecemeal fashion at the expense of global meaning (Happé 1994; Jolliffe and Baron-Cohen 1999, 2000). In the verbal domain, WCC predicts that speakers with ASD should have difficulty with tasks that depend on extracting global meaning from context and that they would not benefit to the same extent as typically developing speakers from the provision of contextual support (Norbury 2004).

In its predictions about verbal tasks, WCC has received support from several studies showing that high-functioning listeners with ASD – those with both nonverbal and verbal IQ scores in the normal or near normal range – were significantly impaired relative to age- and IQ-matched controls in three key areas where appropriate use of context was required. These areas include (a) disambiguating homographs (i.e. words that are spelled the same but have different meanings and pronunciations such as 'tear' meaning a rip in cloth, and 'tear' as in watery discharge from the eye) in contextually relevant sentences (Happé 1997; Jolliffe and Baron-Cohen 1999; Frith and Snowling 1983; López and Leekam 2003); (b) drawing appropriate inferences between antecedent and outcome events that only cohere if an appropriate 'bridging' inference is drawn, e.g. 'George left the bathtub tap running. George cleaned up the mess in the bathroom' (Jolliffe and Baron-Cohen 1999; Norbury and Bishop 2002); and (c) disambiguating lexically and syntactically ambiguous sentences when they are paired with a sentence that biases interpretation toward a specific resolution (Jolliffe and Baron-Cohen 2000; Norbury 2005a). However, despite statistically significant findings, in most studies the magnitude of the critical differences was rather small, ranging from 3 out of 20 items (15 %) to 1.71 out of 8 items (21 %). This suggests that a relative inefficiency in extracting global meaning rather than a major impairment might more accurately describe children with ASD (Jolliffe and Baron-Cohen 1999; Loukusa et al. 2007; Loukusa and Moilanen 2009). It has also been suggested that constraints in structural language processing may influence how well an individual can extract global meaning from context (López and Leekam 2003; Norbury 2004, 2005a).

3.5.1 Figurative Language: Idiom and Metaphor

The study of figurative language comprehension provides another opportunity to examine how context influences a listener's ability to assign meaning to an utterance and to test the WCC account of ASD. An idiom is an expression whose meaning is not predictable from the meaning of its constituent elements. 'Skating on thin ice', 'kick the bucket', and 'hang one's head' are just a few examples.

Descriptions of speakers with ASD suggest the presence of difficulties with idiom comprehension. Clinical examples of an 'over-literal' interpretation of language are frequent (Tager-Flusberg et al. 2005; Landa 2000). One example is a child who, when asked if he could stand to do more work, stood up. Despite these clinical case reports, only a few studies have investigated idiomatic language in speakers with ASD. Both Minshew et al. (1995) and Dennis et al. (2001) reported significantly lower scores for high-functioning speakers with ASD than for age- and IQ-matched controls on the Test of Language Competence (Wiig and Secord 1989), which assesses complex language skills such as making inferences, and understanding metaphor and ambiguity. Conversely, Happé (1994) found no statistically significant difference between high-functioning speakers with ASD and age- and IQ-matched controls in comprehending two stories involving idioms. None of these studies included a comprehensive evaluation of structural language skills, so the potential influence of language ability was not evaluated. In addition, idioms were not a specific focus so reports of difficulty or competence were generated from a limited number of items, making the nature of the problem, when present, unclear.

In the most comprehensive study conducted to date, Norbury (2004) examined idiom comprehension in four groups of age-matched children (average age of 11 years), all with nonverbal abilities in the normal range. The four groups were: Autism Spectrum Only (ASO, i.e. without structural language impairment; n=29), Autism Spectrum plus Language Impairment (ALI; n=29), Language Impaired Only (LI; n=29), and typically developing controls (Con; n=39). Nonverbal IQ did not differ significantly between the ASO (mean=108) and Con (mean=109) groups or between the ALI (mean=99) and LI (mean=98) groups, but did differ between the ASO/Con and the ALI/LI groups. Participants were evaluated on a battery of structural and semantic language measures and were asked to explain the meaning of idioms that had been previously established as unfamiliar. Participants were first asked to explain the idiom when it was presented in isolation (e.g. "Pete said, 'Tom carries a torch for Mary'. What does it mean to 'carry a torch'?"). Following a delay, they were asked to explain the same idiom presented at the end of a short story.

All groups performed better when the short story context was provided. In addition, there was no significant difference between the ASO and Con groups in terms of how much performance improved. These findings run contrary to the prediction of the WCC hypothesis. Not only did the children with ASD spontaneously benefit from context to assist comprehension, but they benefitted to the same degree as did controls. In addition, groups with language impairment (ALI and LI) performed similarly to each other, and worse than those without language impairment. This suggests that language skills, more than diagnostic status, influenced accuracy in idiom comprehension. This finding was confirmed when the data were analyzed using hierarchical multiple regression analyses: only age, answers to factual questions, and sentence processing variables remained significant predictors of idiom accuracy in the final model.

Norbury (2005b) also investigated the role of language competence, particularly semantic knowledge, in the comprehension of metaphor. Understanding a metaphor requires finding similarities and salient differences between entities that are usually considered distinct. For example, saying 'Some surgeons are butchers' directs a listener's attention to the similarities between a surgeon and a butcher, that is, that both cut animal tissue in their occupation. At the same time, the listener must also understand salient differences which include the notion that surgeons operate on living human tissue with finesse and precision, while butchers cut dead animal tissue with considerably more margin for error. Instead of accepting the conventional notion that people with ASD cannot understand the figurative meaning of metaphors, Norbury proposed that one's semantic knowledge was a more important factor than factors related to an ASD diagnosis, such as deficits in theory of mind.

To test her hypothesis, Norbury (2005b) grouped 94 children with communication impairments, aged 8–15 years, into three groups: participants with language impairment only (LI); participants with ASD only and no language impairment (ASO); and participants with ASD plus language impairment (ASL). She compared their performance on a metaphor comprehension task to a group of 34 similarly aged, typically developing (TD) children. All participants were also evaluated as to their skill at completing theory of mind tasks. Norbury (2005b) found that the LI and ALI children performed similarly to each other and more poorly than the ASO and TD children, demonstrating that only language impaired children, with or without ASD diagnoses, performed poorly on the metaphor comprehension task. In addition, semantic ability was a stronger predictor of metaphor performance than theory of mind skill. Along with an investigation into idiom (Norbury 2004), this study succeeded in demonstrating that difficulties in understanding figurative language should not be automatically assumed to exist in those who have a diagnosis of ASD. Perhaps more importantly, these studies highlight the necessity of stringent controls for language competence in investigations that attempt to illuminate the origins of the pragmatic deficit in ASD and other clinical populations (Gernsbacher and Pripas-Kapit 2012; Norbury 2005a; Norbury and Bishop 2003).

3.6 Narrative

So far, this chapter has concentrated on pragmatic skills in conversation. Narratives represent a different level of pragmatic skill. The ability to narrate, or tell a story, involves relating a sequence of events in which an agent's plans are likely to be foiled but the conflict is ultimately resolved (Stein and Glenn 1979), or in which a series of events builds to a 'high point' followed by an evaluation of events and then a conclusion (Johnston 2008). In addition to the sophisticated syntax needed to establish causal and temporal relationships, children must learn how to introduce characters and how to manage shifts in reference so that the listener is able to understand the main events (Karmiloff-Smith 1985). Telling a story also entails understanding and following a cognitive story schema governing overall story organization (Mandler 1984; Peterson and McCabe 1983), and having appropriate social-cognitive knowledge to guide interpretation of the story characters' intentions and motivations (Astington 1990; Bamberg and Damrad-Frye 1991). Overall, understanding and telling stories engages a speaker in a complex cognitive-linguistic task embedded in a social context and thus probes more complex communication skills than in conversation.

In persons with ASD, research on narratives has largely focused on detailed analysis of narrative productions in small samples of children and adolescents (Losh and Capps 2003; Norbury and Bishop 2003; Tager-Flusberg and Sullivan 1995). Overall, these studies found that when participants with ASD were matched rigorously on language abilities (Norbury and Bishop 2003; Tager-Flusberg and Sullivan 1995), very few quantitative differences were evident in narrative length, structure, or complexity (Capps et al. 2000; Norbury and Bishop 2003; Tager-Flusberg and Sullivan 1995), what Norbury and Bishop (2003) called the 'local structure' level.

Despite the lack of significant differences in 'local structure', most studies reported global, qualitative differences in the narratives of speakers with ASD. The precise nature of these differences has been unclear and in many cases, evaluation of qualitative differences has taken the form of anecdotal reports (Loveland et al. 1990). In empirical work, Capps et al. (2000) and Losh and Capps (2003) found that participants with ASD included fewer causal connections than controls in their narratives and used a restricted range of 'evaluative devices' such as character speech or sound effects, which engage an audience and build interest in a story. Diehl et al. (2006) reported that children with ASD had difficulty in communicating the 'gist' of the story, and documented a significantly poorer overall coherence in the narratives of speakers with ASD. Loveland et al. (1990) revealed that children with ASD were more likely to produce bizarre, inappropriate and irrelevant information when compared to controls. Recently, Norbury et al. (2014) found an inverse correlation between language skill and semantically-pragmatically relevant utterances. As language level increased, the number of pragmatically relevant remarks decreased. Overall, one finding that has consistently emerged is that the narratives of speakers with ASD tend to focus on minor details and descriptions, rather than telling the story in a coherent way (Capps et al. 2000; Diehl et al. 2006; Losh and Capps 2003; Loveland et al. 1990; Norbury et al. 2014).

3.7 Summary

Pragmatic impairments are defining deficits in ASD. However, as this chapter has shown, the exact nature of these difficulties remains elusive. On most measures of pragmatics, speakers with ASD perform more poorly on average than a comparison group that is appropriately matched on structural language skill. Unfortunately, there is so much variation within the population with ASD that it is difficult to identify any feature that is characteristic. The pragmatic profile of one individual may not be the profile displayed by the next individual. If there is a specific pragmatic deficit that applies across all speakers, research has yet to identify it. In addition, although several theories of the potential cognitive deficits that underpin pragmatic performance have been advanced, there is still no widespread consensus on the source of pragmatic dysfunction.

Much of the research on pragmatics in ASD has been conducted on intellectually-able participants with ASD. There are two primary reasons for this practice. One reason is that those speakers who function in the intellectually typical range are more likely to possess the linguistic skills to participate in social situations in which the relatively sophisticated demands of conversational management and discourse come into play. The other reason is the desire to determine what aspects of pragmatic impairment are specific to ASD. Researchers reasoned that if participants are free of intellectual impairment, pragmatic difficulties must then be attributable to ASD. Average or above average intellectual performance, however, does not guarantee structural language competence. As research in figurative language has demonstrated (Norbury 2004, 2005a, 2005b), subtle impairments in structural language are important drivers of social communication problems and must be accounted for in attempting to delineate the characteristics of any clinical population. In addition, we do not know whether speakers with both ASD and intellectual disability have the same pragmatic dysfunctions or whether the interaction of both conditions exacerbates pragmatic problems. Another avenue that deserves consideration is the overlap in pragmatic impairments across clinical groups. The pragmatic impairments discussed in this chapter may not be specific to ASD, but because other clinical groups are not often included in comparison, a superficial reading of the research leads one to assume that such dysfunction does not occur elsewhere.

There are many issues that remain unresolved about pragmatic dysfunction in ASD. One is whether our current measurement tools and techniques are sufficiently targeted or sensitive to isolate affected skills. Alternatively, perhaps there is no single pragmatic impairment that is identifiable, but rather a number of errors that build to a critical level, constituting a threshold over which the speaker is judged to be inappropriate. Another factor that may be relevant here is the jarring contrast between a person's appearance, their apparent language skill and their pragmatic communication errors. When typically developing young children make errors in language, they are regarded as playful experimentation with language and become the subject of endearing family anecdotes. However, when an older, bigger person without observable disabilities and speaking in appropriately constructed sentences makes errors, the playful, endearing quality is lost and the error becomes more salient and ultimately more dysfunctional (Volden and Lord 1991). Finally, it is important to remember that research exploring pragmatic skills and documenting better than expected performance in participants with ASD has often been conducted in highly structured settings and rigorously designed experimental tasks. It is not clear what the impact on performance would be when the person with ASD is expected to function in the real world with all of its competing demands and complex stimuli.

Even when a person displays a particular pragmatic dysfunction, he or she may not display it consistently (Paul et al. 2009). As many studies reviewed in this chapter have demonstrated, it may be a relatively small proportion of the time that utterances exhibit the atypical feature. The rest of the time, speakers with ASD demonstrate appropriate language, suggesting that the difficulty is not in an absence of skill but rather in inefficient deployment of skills. Nevertheless, that small proportion is enough to distance the language of the person with ASD from their peers and to spark a negative listener judgment about the quality of that communication (Mitchell and Volden 2015). Research exploring the reasons why this occurs is only beginning, but promising directions include exploring the executive function of metapragmatics. Metapragmatics refers to the ability to explicitly reflect on pragmatic skills (Collins et al. 2014). Investigations in this area may provide some clues about what governs inconsistent pragmatic performance and assist in generating more effective strategies for intervention.

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Chapter 4
Attention Deficit Hyperactivity Disorder

Soile Loukusa

Abstract Attention deficit hyperactivity disorder is a common neuropsychiatric disorder diagnosed on the basis of inattention as well as hyperactivity and impulsivity symptoms. These symptoms include and cause many kinds of pragmatic difficulties. These difficulties are manifested both in terms of understanding and expressing verbal and nonverbal language. Reported difficulties include, for example, excessive talking, poor conversational turn-taking, problems in topic maintenance, lack of coherence in narratives, difficulties in paying attention to relevant factors in communication and difficulties in understanding irony. Individuals with ADHD also often have difficulties with social perception (e.g. advanced theory of mind), language and other neuropsychiatric skills that, for their part, weaken the pragmatic language skills. Pragmatic and social language difficulties may increase social and societal difficulties of individuals with ADHD.

Keywords Attention deficit hyperactivity disorder (ADHD) • Communication • Hyperactivity • Impulsivity • Inattention • Pragmatics • Social perception

4.1 Introduction

Attention deficit hyperactivity disorder (ADHD) is a neuropsychiatric disorder characterised by many kinds of symptoms caused by inattention as well as hyperactivity and impulsivity. These symptoms must present in multiple settings, such as at school and at home. The prevalence of ADHD has increased over time due to increased awareness and better access to services (Polanczyk et al. 2014). Based on a meta-analysis of 175 studies using diagnostic criteria from DSM (DSM-III, DSM-III-R or DSM-IV), researchers have found that ADHD occurs in approximately 7.2% of people (Thomas et al. 2015). Thus, it is obvious that ADHD affects the lives

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of a large number of children, adolescents and adults. In community samples it has been found that ADHD is about 2.3 times more common in males than in females (Ramtekkar et al. 2010; Bauermeister et al. 2007). In clinical samples the male-to-female ratio is found to be much higher than in community samples, suggesting that females with ADHD may be underdiagnosed (Skounti et al. 2007; see also Chandler 2010; Bauermeister et al. 2007).

The etiology of ADHD is complex and not yet totally understood. However, it is known that both genetic and environmental factors play a role in the etiology of ADHD. Even if there are no single risk factors that could explain ADHD, it is commonly recognized that ADHD is heritable (Thapar et al. 2013; Biederman 2005). It is suggested that in many cases there is a complex combination of genetic and environmental factors (e.g. maternal smoking during pregnancy, prematurity, environmental toxins) at work in ADHD (Thapar et al. 2013; Laucht et al. 2007; Neuman et al. 2007; Biederman 2005). Although a pathophysiologic profile of ADHD has not been fully characterized, studies have reported deficits in the dopaminergic and noradrenergic systems (Scassellati and Bonvicini 2015; Sharma and Couture 2014) and abnormalities in the inferior prefrontal cortical networks and in their connections to striatal, cerebellar and parietal regions (Arnsten and Rubia 2012).

4.2 ADHD and Pragmatics

In this chapter, pragmatic skills in individuals with ADHD are construed broadly to include a wide range of verbal and nonverbal skills. Communicating successfully calls for an ability to go beyond the information given linguistically, since our interpretation and use of language are continuously influenced by many simultaneous, contextual factors (see Sperber and Wilson 1995, for example). The use of language involves cognitive processes and takes place in a social world where many cultural factors affect interaction between individuals (Verschueren 1995).

Even if there is a consensus that treating language use in context belongs to the field of pragmatics, the definitions in the field vary based on framework, and there are no existing theories that can wholly explain the processes of expressing and interpreting pragmatic language (see Gibbs and Colston 2012). From a clinical standpoint, different theories build on one another. Thus, when investigating the disordered pragmatic functions of individuals with ADHD, it is good to connect the perspectives of different theories to understand the pragmatic difficulties and skills of each individual in the best manner possible. According to Gibbs (2011), pragmatics arises from multiple interacting constraints that involve the mind, body and world, and pragmatic action and understanding is a continuously unfolding temporal process whereby each person adapts and orients himself or herself to the world. Thus, when considering the complexity of pragmatic processing, it is not surprising that inattention as well as impulsivity and hyperactivity symptoms cause pragmatic difficulties.

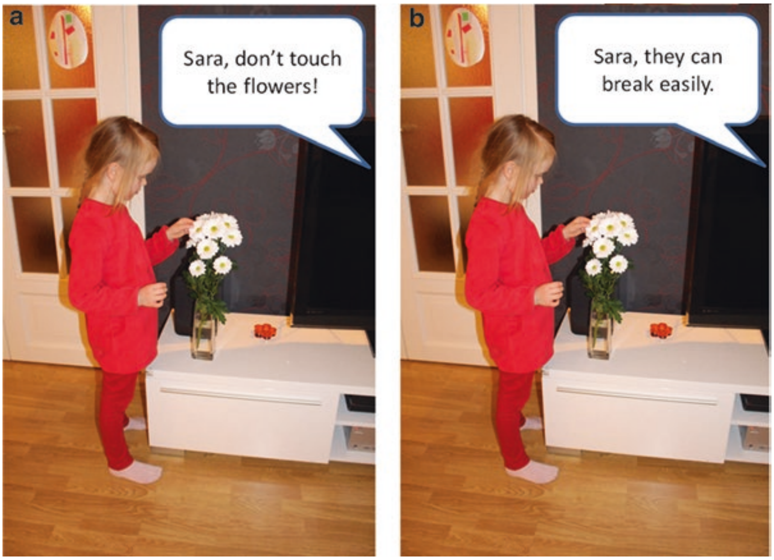
When examining pragmatic skills in ADHD, one fruitful and flexible framework might be Perkins's (2007) emergentist model of pragmatic ability and disability.

According to Perkins (2007), pragmatics is emergent, i.e. it is not a discrete entity but a product of many interacting linguistic, cognitive, social, sensory and motor variables. This may help us to see how ADHD symptoms cause many kinds of pragmatic difficulties and why they vary between individuals. In addition, it will help explain why many factors affect a person's ability to use language. A person's language use also affects how others respond to her or him and other social interaction factors (Staikova et al. 2013; Gibbs 2011). Thus, the pragmatic challenges faced by individuals with ADHD are also reflected in how others communicate with them.

When looking at the symptoms upon which an ADHD diagnosis is based (DSM-5; American Psychiatric Association 2013; ICD-10; World Health Organization 1993), it is obvious that some of them are directly connected with pragmatic language, such as 'talks excessively', 'does not appear to listen', 'blurts out answers before questions have been completed', 'difficulty waiting or taking turns' and 'interrupts or intrudes upon others'. Additionally, many of the other symptoms may also affect pragmatic functions. For example, the symptoms 'is easily distracted' and 'has difficulty sustaining attention' may lead to difficulties in conversational situations and everyday pragmatic inference, while 'has difficulty with organization' may become evident in narration episodes. On the basis of current knowledge, it is evident that pragmatic language difficulties are connected with ADHD (e.g. Green et al. 2014; Staikova et al. 2013). Such difficulties hamper an individual's social functions during different phases of life. For example, they may cause problems for individuals with ADHD in relationships with peers and school performance as well as problems in family life and employment (Chandler 2010; Taanila et al. 2009).

Some researchers have suggested that attention difficulties might affect language use between the child and the parent from the beginning of a child's development. This may have an effect on children's language development since the directive style of interaction does not facilitate language acquisition (Camarata and Gibson 1999; see also Paul and Norbury 2012; Armstrong and Nettleton 2004). Because of attention difficulties, parents may use less language expansions and they may prefer to talk using short and concrete utterances, which may affect, for example, the development of pragmatic inference skills (see Fig. 4.1). In this way, even if the development of pragmatic language in children with ADHD is mostly affected by ADHD symptoms, a child's personal experiences may also have an effect on these skills (see Milosky 1992), since the experiences of language use in children with ADHD may be simplified compared to those of their typically developing peers.

There is also an increasing amount of knowledge that in addition to inattention and impulsivity, individuals with ADHD also have many other kinds of neuropsychological problems such as language difficulties (Sciberras et al. 2014; Rizzutti et al. 2008; Rucklidge and Tannock 2002). Experts are still unsure as to whether these problems can primarily be attributed to impulsivity and inattention or whether the primary mechanism underpinning these problems is somehow independent. Thus, pragmatic skills in individuals with ADHD are probably affected by inattention and impulsivity/hyperactivity symptoms, other neuropsychological difficulties as well as experiences and world knowledge (i.e. general conception of the world



A. Sara, don't touch the flowers! (Typically used with children with ADHD.)
→The child has to understand linguistic meaning of the utterance.

B. Sara, they can break easily. (Typically used with children with typical development.)
→The child has to understand what 'they' refers to. By utilising her world knowledge, she will know that if something breaks easily, then it is better not to touch it. By utilising physical context, Sara will know that in this case the fragile objects are the flowers. By connecting this information via a process of deduction, she knows that her parent means: Don't touch the flowers.

Fig. 4.1 Parent's language use affects child's experiences of contextual inference[1]

and extra-linguistic knowledge). These factors interact with each other in multiple ways (Fig. 4.2).

Another area of neuropsychological difficulty in ADHD is executive function. Many studies of ADHD have focused on executive dysfunction to explain the symptoms of ADHD. Executive dysfunction refers to difficulties in higher-level cognitive skills which are used to control and coordinate other cognitive abilities and behaviours. Executive function (EF) theory suggests that ADHD symptoms stem from deficits in neurocognitive processes that, for example, maintain an appropriate problem-solving set in order to attain a later goal. To examine the role of EF in ADHD, Willcutt et al. (2005) conducted a meta-analysis of 83 studies that administered EF measures to groups with ADHD and without ADHD. Groups with ADHD exhibited impairment in all EF tasks, but the most consistent effects had to do with measures of response inhibition, vigilance, working memory and planning. On the

[1] Photographs: Author's own.

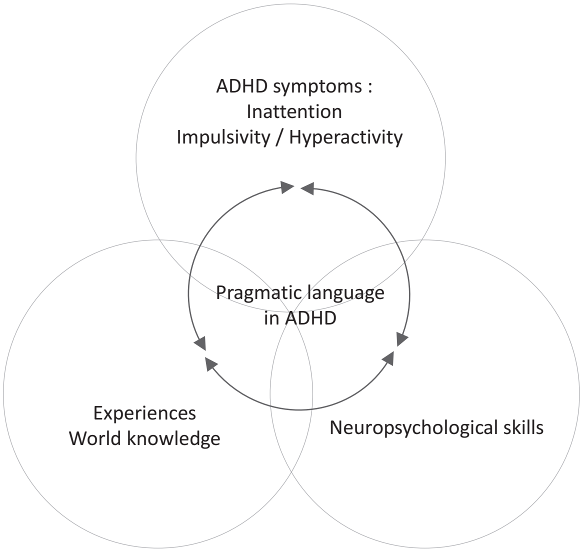


Fig. 4.2 Interaction between ADHD symptoms (inattention as well as hyperactivity and impulsivity), experiences and world knowledge and neuropsychological functioning in terms of pragmatic skills among children with ADHD

basis of the meta-analysis, Willcutt et al. concluded that although difficulties with EF are one important component in the complex neuropsychology of ADHD, the EF weaknesses are neither necessary nor sufficient to explain all cases of ADHD.

To date, the role of EF in different kinds of pragmatic difficulties experienced by children with ADHD is still unclear. For example, a study by Caillies et al. (2014) investigated the connection between understanding of irony and executive functioning (working memory, inhibitory control and verbal reasoning). The results showed that in children with ADHD, understanding irony correlated only with verbal reasoning and not with inhibitory control or with working memory scores. Even though Caillies et al. found that understanding irony did not correlate with inhibitory control, it is possible that inhibitory control might have correlated with other pragmatic factors. Blain-Brière et al. (2014) studied the effect of EF on the pragmatic skills of seventy typically developing children aged four to 5 years and found that higher inhibition skills correlated with a decrease in talkativeness and assertiveness. EF also affected a child's quality of speech by promoting his or her ability to produce fluent utterances, free of unnecessary repetition or hesitation. In addition, typically developing children with a high working memory capacity were more likely to formulate contingent answers and produce understandable utterances.

Later sections will review empirical findings on pragmatic and social communication skills in individuals with ADHD, focusing primarily on children. They will also present some recent findings on social perception, mostly regarding theory of mind, which are closely connected with pragmatic skills. Finally, the results of pragmatic and social perception assessments of six children with ADHD and nine normally developing children will be discussed.

4.3 Pragmatic Skills in Children with ADHD as Assessed by Parents

To date, many studies of pragmatic language skills in children with ADHD have used the Children's Communication Checklist (CCC; Bishop 1998) or its second edition (CCC-2; Bishop 2003) as a method of assessment (Väisänen et al. 2014; Staikova et al. 2013; Helland et al. 2012; Geurts and Embrechts 2008; Helland and Heimann 2007; Geurts et al. 2004; Bishop and Baird 2001). The CCC-2 consists of multiple-choice items that are divided into ten scales: (A) Speech; (B) Syntax; (C) Semantics; (D) Coherence; (E) Inappropriate Initiation; (F) Stereotyped Language; (G) Use of Context; (H) Nonverbal Communication; (I) Social Relations; and (J) Interests. The General Communication Composite (GCC) is based on the scaled scores for the first eight CCC-2 scales (A–H) and is used to identify children who are likely to have clinically significant communication problems. It is also possible to derive the Social Interaction Deviance Composite (SIDC), which reflects the mismatch between the sum of scales (E), (H), (I) and (J) and the sum of scales (A), (B), (C), and (D). The SIDC can be used to identify children who have communication difficulties typical of autism spectrum disorders.

All studies that have used CCC or CCC-2 as a method of assessment have found that, compared to typically developing children, children with ADHD have difficulties in pragmatic language. These difficulties can be demonstrated when a parent completes either the CCC or CCC-2 (Väisänen et al. 2014; Staikova et al. 2013; Helland et al. 2012; Geurts and Embrechts 2008; Geurts et al. 2004; Bishop and Baird 2001). Some studies have shown that communication difficulties in children with ADHD are similar to, but not as severe as, communication difficulties detected in children with high-functioning autism spectrum disorder (Helland et al. 2012; Geurts and Embrechts 2008; Bishop and Baird 2001). Helland et al. (2012) found that communication impairments detected when using the CCC-2 were almost as common in a group of children with ADHD (82.1%) as in a group of children with Asperger syndrome (90.5%). Likewise, the GCC did not differ between children with Asperger syndrome and children with ADHD. With respect to the SIDC, 69.6% of children with ADHD and 84.7% of children with Asperger syndrome who were identified as communication impaired obtained a score indicating more difficulties with pragmatic language aspects relative to language structure. The SIDC distinguished children with AS and ADHD from each other. When researchers compared the CCC-2 communication profiles of these children further, they noticed that children with ADHD could only be distinguished from children with Asperger syndrome on two scales: (F) Stereotyped Language, and (H) Nonverbal Communication.

Studies using the CCC-2 have shown that communication difficulties in children with ADHD are multifaceted in nature (e.g. Väisänen et al. 2014; Helland et al. 2012). However, these difficulties are not always detected in general clinical practice. For example, in a study by Väisänen et al. (2014) none of the participants with ADHD had any language diagnoses. However, the CCC-2 detected wide-ranging communication difficulties. The GCC for children with ADHD was lower compared to children with typical development, and there were significant differences in the total scores of all the subscales between children with ADHD and those with typical development. In addition, 11 of 19 children with ADHD had an atypical relationship between the GCC and SIDC, suggesting difficulties that are usually characteristic of autism spectrum disorder. When comparing how children with ADHD and those with typical development performed on separate items[2], there were group differences in all items pertaining to subscale (E) Inappropriate Initiation:

- *Talks repetitively about things that no-one is interested in*
- *Talks to people too readily*
- *It is difficult to stop him/her from talking*
- *Tells people things they know already*
- *Asks a question although he/she has been given the answer*
- *Keeps quiet in situations where someone else is trying to talk or concentrate*
- *Talks to others about their interests, rather than his/her own*

These problems in items measuring inappropriate initiations are easy to understand on the basis of the core problems (inattention and impulsivity and hyperactivity) faced by children with ADHD. Differences were also found in three items in subscale (G) Use of Context:

- *Gets confused when a word is used with a different meaning than usual*
- *Takes in just 1–2 words in a sentence, and so misinterprets what has been said*
- *Realizes the need to be polite*

This reflects the fact that in real life, children with ADHD sometimes have difficulties using contextual information in terms of comprehension and expression. There were also three items in subscale (I) Social Relations where children with ADHD differed from typically developing children in terms of having difficulties in everyday communication and interplay with peers and adults:

- *Seems anxious with other children*
- *With familiar adults seems inattentive, distant, or preoccupied*
- *Hurts or upsets other children without meaning to*

In addition, two items in subscale (D) Coherence showed that children with ADHD also had discourse-related difficulties:

- *Doesn't explain what she/he is talking about to someone who doesn't share his/her experiences*
- *Explains a past event clearly*

Children with ADHD also differed from typically developing children on one item in subscale (C) Semantics, showing that in addition to pragmatic and social aspects, children with ADHD also had difficulties with linguistic concepts:

[2] In some questions a high score means weaknesses while in others it means strengths.

- *Uses words that refer to whole classes of objects rather than a specific item. For example, refers to apples, bananas, and pears as 'fruit'*

Even if there were differences between groups in the total scores for subscales (A) Speech and (B) Syntax, analysis did not reveal any specific item distinguishing the groups.

In addition to studies that use the CCC or CCC-2, the parent questionnaire 'Five to Fifteen' (FTF) has been used to investigate language and communication difficulties in children with ADHD (Bruce et al. 2006). The FTF was developed to elicit symptoms and problems typical of ADHD and its comorbidities (Kadesjö et al. 2004). The results from Bruce et al.'s study were in line with those from studies using either CCC or CCC-2, demonstrating that the majority of children with ADHD had difficulties with language comprehension, communication and pragmatic skills. On the basis of all of the above questionnaire-based studies, it is clear that children with ADHD suffer many kinds of pragmatic difficulties, affecting both their language expression and interpretation abilities in different kinds of communication situations.

4.4 Narrative and Conversational Abilities of Children with ADHD

Narration is a multidimensional task that draws on both linguistic and pragmatic abilities (Mäkinen et al. 2014). To date, there have been few studies that focus on the narrative abilities of individuals with ADHD. Those studies that have been conducted have employed either the story generation method (Staikova et al. 2013; Rumpf et al. 2012; Luo and Timler 2008; Renz et al. 2003) or the story retelling method (Purvis and Tannock 1997; Tannock et al. 1993). The results of these studies vary. When interpreting the results of narrative assessment, it should be remembered that different methods for assessing narrative require somewhat different kinds of underlying abilities. From the perspective of ADHD, it is good to at least consider the role of attention in narrative tasks since attention demands vary depending on the assessment method. For example, in Duinmeijer et al. (2012) study of children with specific language impairment, it was found that there was a moderate correlation between attention and story content in a story generation task whereas there was no correlation between attention and story content in a retelling task.

A study by Luo and Timler (2008) discusses the extent to which different methods of assessment affect results. In their study, a picture-sequence task and a single-picture task from the Test of Narrative Language (Gillam and Pearson 2004) were used in small groups consisting of children with language impairment (n = 5), children with language impairment and ADHD (n = 6), children with ADHD (n = 6) and typically developing children (n = 13). In order to analyse how the children organised their narrations, Luo and Timler used the causal network model (Trabasso et al. 1989) to identify complete and incomplete Goal-Attempt-Outcome (GAO) units which are the core story grammar elements of fictional stories. The results showed that compared to typically developing children, language impaired children with ADHD produced less organised narratives in a single-picture task, whereas there were no differences in the picture-sequence task. This suggested that the elicitation method influences children's ability to organise narratives. The picture-sequence task provided sufficient story structure to the child, which helped him or her organise the narratives, whereas only a limited story structure was present in the single-picture task.

A study by Rumpf et al. (2012) compared narratives elicited by a story generation task between children with typical development, children with ADHD and children with Asperger syndrome. Included in the analysis were story length, sentence structure, sentence complexity, coherence and cohesion of the stories, the verbalisation of the narrator's perspective and internal state language (i.e. verbalisation of mental states). The results demonstrated that in many aspects, children with ADHD performed similarly to the children with Asperger syndrome. The narratives of children with ADHD and Asperger syndrome were shorter than the narratives of typically developing children. Also, children with ADHD and children with Asperger syndrome did not point out the main aspects of the story. Compared to typically developing children, children with ADHD did not show any differences in their ability to refer to cognitive states and use pronominal references, whereas children with Asperger syndrome also had difficulties in these aspects.

When interacting with their peers, children with ADHD have difficulties in adapting their communication strategies according to the context. In cooperative communication tasks with their peers, boys with ADHD traits tend to make more irrelevant comments, interrupt and argue when they should be listening. In addition, they have difficulties in maintaining appropriate communication to achieve joint goals (see Green et al. 2014). In addition to peer communication, children with ADHD also have difficulties when talking to adults. Kim and Kaiser (2000) found that during free play, children with ADHD produced more inappropriate pragmatic behaviours in conversational interactions with an adult, as assessed using the Pragmatic Protocol (Prutting and Kirchner 1987). The main problematic features were a lack of responses to the partner and interruptions. When looking at these symptoms from a social perspective, it is easy to understand how difficulty using language appropriately causes a great number of problems for children with ADHD in many kinds of conversational situations.

4.5 Pragmatic Inference and Social Perception

Social perception refers to the ability to take other people's needs into account and interpret their emotions, intentions and wishes. These abilities are needed, for example, when interpreting utterances in different kinds of communication situations. Social perception plays an important role in pragmatic inference, since in order to communicate successfully, a person needs to take other people's emotions, wishes and intentions into account. According to the current view, communication and social perception, especially theory of mind, interact with each other from the start in typical development (Miller 2006; Lohmann et al. 2005). There is also strong evidence that in many disorders, theory of mind is connected with pragmatic language abilities (e.g. Martin and McDonald 2003). Since communication is always social, it may even be artificial to try to separate social and pragmatic inference from each other. Thus, when investigating pragmatic difficulties in children with ADHD, it is also necessary to keep in mind the social perception difficulties connected with ADHD.

There is strong evidence of social perception difficulties in ADHD (Caillies et al. 2014; Pina et al. 2013; Petersen and Grahe 2012; Semrud-Clikeman 2010). The tests used to measure social perception skills often demand good pragmatic inference abilities, so sometimes it is merely the theoretical framework that defines whether researchers are talking about pragmatic or social inference difficulties (see also Loukusa and Moilanen 2009). A study by Petersen and Grahe (2012) demonstrated that adults with ADHD have certain types of pragmatic or social inference difficulties. Their study examined the social perception of adults with ADHD when viewing videotaped stimuli of truthful and deceptive targets in order to assess their ability to use numerous potential cues to deception. The results suggested that adults with ADHD focus on too many cues in social interactions, especially on irrelevant ones. This finding is supported by many studies that used the CCC-2 questionnaire, i.e. collected information from parents (see Sect. 4.3). Caillies et al. (2014) studied second-order false belief reasoning and understanding of irony in children with ADHD and typically developing children. The results showed that children with ADHD performed worse in terms of providing explanations for ironic comments and inferring the speakers' belief compared to controls. No differences were found between groups in terms of understanding speakers' attitudes, which was difficult for both groups. Explaining ironic comments and inferring a speaker's belief from irony correlated with the theory of mind in children with ADHD but not in children in the control group.

Even if many studies have found differences between ADHD and control groups in pragmatic or social language, the study by Kim and Kaiser (2000) did not find any differences. This may be on account of the method that was used. In their study, Kim and Kaiser used the Test of Pragmatic Language (Phelps-Terasaki and Phelps-Gunn 1992) to measure pragmatic knowledge and inference. They did not find any differences between children with ADHD (n = 11) and typically developing controls (n = 11). It may be that pragmatic inference problems are not always detected in a structured test situation, even if difficulties are evident in real-life situations. This may present challenges for the clinicians investigating the pragmatic inference skills of individuals with ADHD. It also highlights the fact that when assessing pragmatic inference, it is important to collect information using many kinds of methods and not just structured tests before drawing conclusions about a person's skills. In addition, when drawing conclusions about the person's pragmatic inference abilities in real-life situations, social perception abilities should be taken into account also.

4.6 Effect of Inattention as well as Hyperactivity and Impulsivity Symptoms on Pragmatic Skills

There is growing knowledge that pragmatic language difficulties in ADHD may be the result of inattentive and/or hyperactive and impulsivity traits (Rints et al. 2015; Paul and Norbury 2012; Petersen and Grahe 2012). The results of current studies vary slightly, which may have to do with the methods used to assess pragmatic language skills and inattention and hyperactive/impulsive traits. A study by Rints et al. (2015) found that hyperactive and impulsive symptoms mediated an association between inhibitory control and the application of pragmatic rules. On the basis of their findings, Rints et al. provided a speculative explanation of why an underlying deficit in inhibitory control is predictive of a poorer ability to apply pragmatic rules. It suggested that children who lack the ability to avoid engaging in inappropriate behaviours are more likely to have difficulties in waiting for their turn, inhibiting urges to interrupt or intrude upon others, and/or behaving in ways that are not in the best interest of their own desires. These hyperactive and impulsive symptoms may then interfere with learning how to behave in a correct manner in communicative settings, making it difficult to maintain a topic of conversation that is interesting to others or engaging in appropriate turn-taking during conversations.

In addition to the study by Rints et al., several other studies have also shown that hyperactivity and impulsivity may affect at least certain aspects of pragmatic behaviours that lead to verbal impulsiveness, such as excessive and irrelevant talking (Camarata and Gibson 1999; Zentall 1988; Zentall et al. 1983). It may be that impulsivity and hyperactivity mostly cause difficulties in conversational language, whereas inattention may be reflected mostly in a lack of pragmatic understanding. In Semrud-Clikeman's (2010) study of children with ADHD, they found that inattentive symptoms were related to poor performance in interpreting emotional and nonverbal cues, suggesting a link between inattention and social perception, whereas they did not find a similar link between hyperactivity and impulsivity symptoms and social perception. When looking at the connection between inattention and social perception, for example with respect to the framework provided by relevance theory (Sperber and Wilson 1995), it is possible to understand how attention difficulties weaken a person's ability to extract relevant information in terms of pragmatic inference. Figure 4.3 summarises pragmatic and social language difficulties that may be connected with inattention as well as impulsivity and hyperactivity.

4.7 Short Report on Six Children with ADHD and Nine Typically Developing Controls

Background An earlier literature review has shown that children with ADHD have many kinds of pragmatic language and social communication difficulties. However, this review also showed that not all aspects of pragmatic language are necessarily

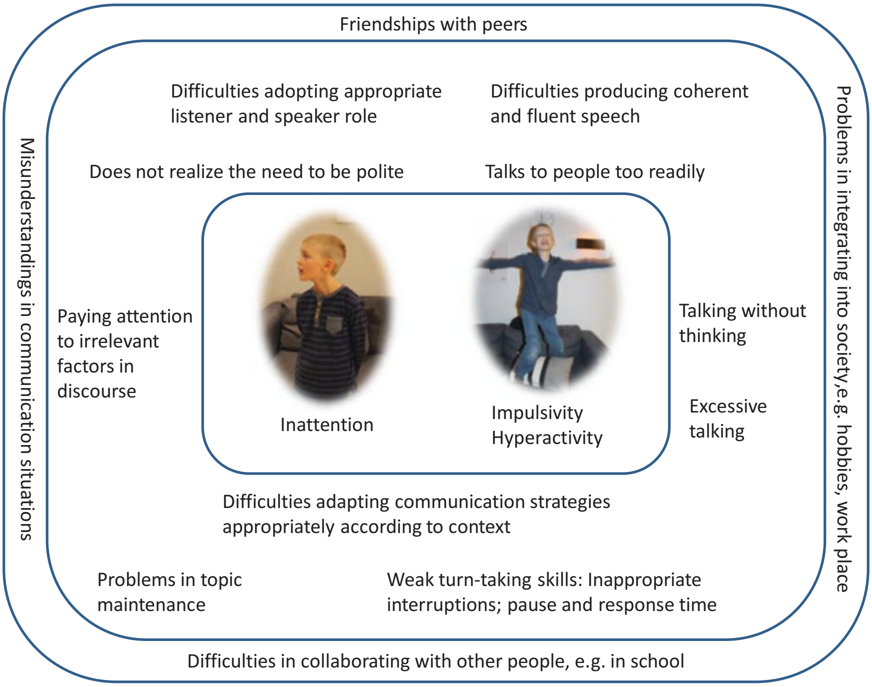


Fig. 4.3 Pragmatic symptoms caused by impulsivity and hyperactivity as well as inattention (modified on the basis of Rints et al. 2015; Paul and Norbury 2012; Petersen and Grahe 2012; Semrud-Clikeman 2010; Camarata and Gibson 1999). The outermost layer reflects social and societal effects of pragmatic difficulties[1]

weakened, and that pragmatic skills vary a great deal within the group of children with ADHD. In order to apply some of the findings to real-life cases of ADHD, this section presents the results of pragmatic and social perception measurements of six children with ADHD and nine typically developing controls.

In this study, the aim was to investigate the pragmatic communication skills and social perception abilities of six children with ADHD and nine typically developing children using a parent-rated questionnaire and a structured clinical assessment. By using information collected from the parents and the clinical assessment, it was possible to perceive multiple levels of information about children's pragmatic and social communication skills.

Methods Participants: Six children with ADHD (mean age 8;5 years, age range 7;9–9;5 years) were diagnosed at the Clinic of Child Neurology or Child Psychiatry at Oulu University Hospital in Finland by an experienced specialist in co-operation with a multi-professional team using criteria from the ICD-10. Nine typically developing (TD) children (mean age 8;0 years, age range 6;5–9;5 years) were recruited from local preschools and mainstream schools (in Finland children start school at the age of seven). The typical development of children was verified by a parent-reported developmental history questionnaire.

Measures: The Children's Communication Checklist, Second Edition (CCC-2) was used to investigate children's communication skills in everyday life. The CCC-2 has been developed to assist with identifying language and pragmatic impairments in children with communication problems. It is completed by an adult who has regular contact with the child. In this study, the person who completed the CCC-2 was a parent. The CCC-2 consists of 70 multiple-choice items that are divided into ten scales (see Sect. 4.3). This study used the Finnish version of the CCC-2 (Bishop 2015). Although the CCC-2 has been officially translated into Finnish, it has not been standardised yet in Finnish, and thus, English norms were used when converting the sums to scaled scores to obtain the GCC score. High-scaled scores reflect strengths, whereas low scores reflect weaknesses. If a child has GCC scores below 55, it means that the child scored among the lowest 10% of children (Bishop 2003). After calculating the GCC, the SIDC score was calculated. According to Bishop (2003), the SIDC score can be used to identify children who have communication difficulties typical of autism spectrum disorders.

The Pragma test (Loukusa et al. submitted) was used to measure context utilisation, social language use and understanding of intentions, thoughts, beliefs and feelings. The material contains 39 questions. Correctly answering the questions requires an ability to understand the implied meaning of the utterance. The questions aim to study how children manage to derive conclusions by retrieving and integrating contextual information, such as world knowledge, physical context and prior verbal information. In the Pragma test material, the given context consists of short verbal scenarios that are presented together with pictures, small characters, plastic animals or a story, which is presented in short sections to minimise memory requirements. In addition to these questions, the children were asked to provide explanations for the correct answers to 13 questions ("How do you know that?") to see if they were aware of how they had derived the answers based on the context.

Children's emotion recognition and theory of mind were investigated using subtests from the Social Perception domain of the Developmental Neuropsychological Assessment, Second Edition, NEPSY-II (Korkman et al. 2008). Currently, NEPSY-II is the only standardised test in Finnish that measures social perception skills. Raw scores can be converted into standard scores, reflecting the child's ability in relation to his/her own age group. The Social Perception domain includes two subtests: (1) Affect Recognition and (2) Theory of Mind, which is in turn divided into two parts: Verbal tasks and Contextual tasks. The *Affect Recognition* subtest examines a child's ability to match basic emotions (happy, sad, angry, afraid and disgusted) and neutral expressions to photos of children's faces. The *Theory of Mind* subtest measures a child's understanding of mental functions and other people's perspectives. The total score is a sum score of the 17 Verbal tasks and eight Contextual tasks. The questions pertaining to *Verbal tasks* are based on verbal scenarios with or without pictorial support. They measure a child's understanding of beliefs, intentions, others' thoughts, ideas, comprehension of figurative language and gestural imitation abilities (imitation abilities are thought to be a background factor for theory of mind). The *Contextual tasks* of the Theory of Mind subtest measure a child's ability to relate emotions to social context. The child is shown drawings consisting of children in various social contexts. Each drawing contains a target girl whose face is not shown. The child is asked to select from one of four photos of the same girl's face showing different emotions. The child is supposed to correctly identify the same emotion as the girl in the drawing is feeling by inferring the girl's emotion on the basis of the social context.

Results The GCC score of the CCC-2 was lower in children with ADHD compared to typically developing children (U = 52.50, p < 0.001). All typically developing children had GCC scores above 55 (Fig. 4.4), which is a clinically significant border for communication difficulties (Bishop 2003). In the ADHD group, two children had GCC scores below 55. These children also had negative SIDC values (-27 and -7), indicating possible pragmatic or social communication problems, especially in the case where the SIDC value was extremely low (-27). The CCC-2 manual advises only observing the SIDC values of those children who have GCC scores lower than 55 or in cases where the GCC score is at or above 55 and the SIDC score is -15 or less. In this study, in addition to the two children who had GCC scores lower than 55, there was also a child with ADHD who had a GCC score above 55 and an extremely low SIDC value of -17, indicating possible pragmatic or social communication difficulties. Therefore, in this study three of the six children with ADHD exhibited an atypical relationship between the GCC and SIDC, whereas an atypical relationship was not found in any of the typically developing children.

The Pragma scores for the correct answers given by children with ADHD were lower than those of the typically developing children (U = 52.50, p = 0.012; see Fig. 4.5). This showed that children with ADHD had more difficulties when deriving the correct answer based on context.

Children with ADHD produced many kinds of pragmatic errors in their answers, as the following examples demonstrate:

Example 4.1. Children were shown two characters (Tina and mother) and were read the following verbal scenario. They were then asked a question:

Tina knew that it was her turn to perform a song in front of the class today. When she woke up in the morning Tina told her mother, "I don't feel good. Can I stay home?" Why does Tina say that?

The answer provided by a child with ADHD: S*he is sick*.

→The incorrect answer reflects the child's inability to connect information from the verbal context (performing song in front of the class) and social world knowledge (it may be frightening to perform in front of the class) via inference in order to understand why, in truth, Tina wants to stay home.

Example 4.2. Children were shown a picture and were read the following verbal scenario about Daniel's birthday present. They were then asked a question:

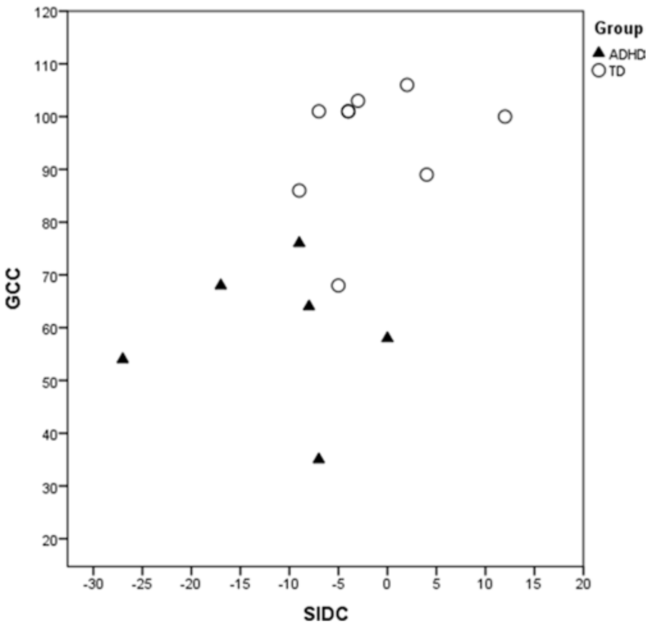


Fig. 4.4 The General Communication Composite (GCC) and Social Interaction Deviance Composite (SIDC) of children with ADHD and the typically developing children (TD). *Note:* In the typically developing group there were two children who got the same scores: GCC = 101 and SIDC = -4

Daniel has been looking forward to his birthday. He has wished for a steerable sledge. When his birthday finally comes, Daniel's parents come to wake him in the morning with a present. The parcel is big, and Daniel is sure that it's a new sledge. His parents watch as he opens the present. But when Daniel opens it, it's a chair for his desk instead of a sledge. Daniel definitely did not wish for a chair. When his parents ask him what he thinks of the present, Daniel says, "Thank you. It's very nice." Why does he say that?

The answer provided by a child with ADHD: *Because he wanted to get it.*

→The incorrect answer reflects the child's inability to use the verbally given context (Daniel was hoping to get a sledge as a present) and/or to understand the polite use of language based on social norms (it is polite to thank someone for the present even if it is not what you wanted in order to avoid hurting their feelings).

Example 4.3. Children were shown a picture and were read the following verbal scenario about birthday candles. They were then asked a question:

Peter tells May that she can't blow out all of the birthday candles at once. Then Peter starts to blow and all of the candles go out at once. May says to him, "Well, you really are terrible at blowing out candles (with positive irony)." What does she mean?

The answer provided by a child with ADHD: *That's bad.*

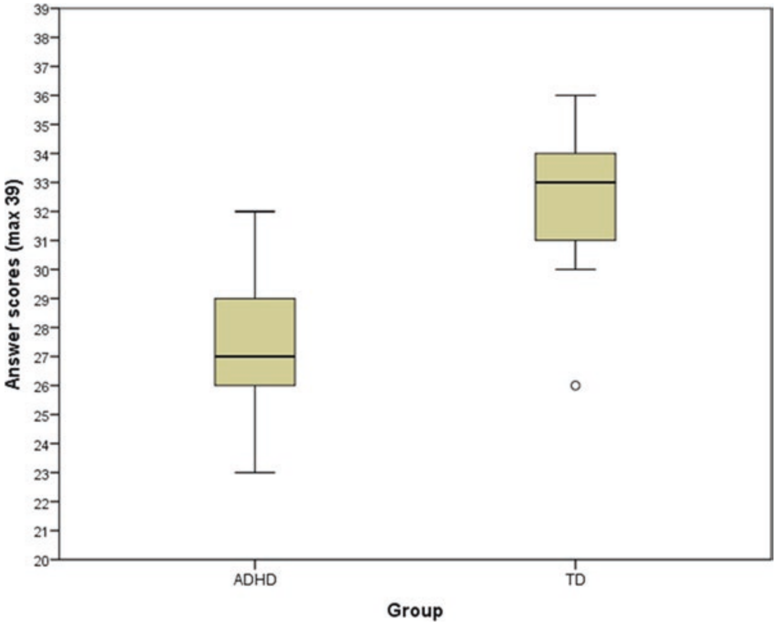


Fig. 4.5 Box and whisker plots for the group of children with ADHD and for typically developing (TD) children showing the answer scores

→The incorrect answer reflects the fact that the child cannot understand the proper meaning of ironical utterances on the basis of the contradiction between the verbally given context and an expression and prosody.

Thirteen of the questions contained a follow-up question demanding explanation if the child gave the correct answer to the initial question. Because an explanation question was only asked if the correct answer was given, the number of correct answers (*f*) had to be taken into account. The analysis of the relative frequency (number of correct explanations/*f* x 100%) showed that children with ADHD were able to successfully explain 55% of their correct answers, whereas typically developing children could successfully explain 82% of their correct answers. This demonstrated that compared to typically developing children, children with ADHD had more difficulties in explaining how they had used context to arrive at the correct answer.

The Theory of Mind subtest of the NEPSY-II consisted of Verbal tasks and Contextual tasks. In general, when looking at the standard scores of children, it was evident that most of the children in both groups performed within at expected level, even if the range was quite large in both groups (see Table 4.1). In the group of typically developing children, the large range was caused by one seven-year-old child, who received low scores on both the Affect Recognition and Theory of Mind subtest. The same child also received the lowest scores on the Pragma (outlier) and CCC-2 (GCC was 68) in the group of typically developing children. However, because the preliminary information did not provide any reason for suspecting any communication difficulties, the child was not excluded.

When comparing the total standard scores of the Theory of Mind subtest between the groups, the results just reached a significant effect (U = 44.00, p = .050). However, when interpreting this result, it is good to bear in mind that although there was a group difference in the standard values, the average standard values of children with ADHD were also within normal limits (Table 4.1). Because it was possible to calculate standard scores by separating Verbal and Contextual tasks in the Theory of Mind subtest, these different tasks were also analysed separately. The analysis revealed that the group had a significant effect on the Verbal tasks (U = 45.00, p = .036), but not on the Contextual tasks (U = 34.50, p = .388). The group did not significantly affect the standard scores for the Affect Recognition subtest (U = 25.50, p = .864).

4.8 Summary

This chapter has highlighted the numerous pragmatic difficulties that can occur in ADHD. Such difficulties are evident both in pragmatic expression and comprehension. Given that ADHD is a common disorder and its diagnosis is based on symptoms of inattention and impulsivity/hyperactivity, some of which manifest

Table 4.1 Standard scores of the social perception subtests of the NEPSY-II in children with ADHD (n = 6) and typical development (n = 9). Standard scores: 13–19 above expected level; 8–12 at expected level; 6–7 borderline; 4–5 below expected level; 1–3 well below expected level

Subtest	ADHD group	TD group
Affect recognition		
Median	10.0	10.0
Mean	10.2	9.8
Standard deviation	1.7	2.9
Range	8–13	4–13
Theory of mind: Total		
Median	9.0	11.3
Mean	9.0	11.3
Standard deviation	1.6	2.1
Range	7–11	8–14
Theory of mind: Verbal		
Median	8.3	11.3
Mean	7.8	11.0
Standard deviation	2.4	2.7
Range	5–11	6–14
Theory of mind: Contextual		
Median	11.0	11.3
Mean	9.8	11.3
Standard deviation	2.8	2.1
Range	5–12	8–14

themselves as pragmatic language difficulties, it is surprising how seldom the pragmatic language features of individuals with ADHD have been studied in ways other than using parental questionnaires. It is obvious that in individuals with ADHD, excessive talking, topic drifts and interrupting other's speech, to name a few features, may cause communication to fail, especially when communicating with peers who are unlikely to accept such examples of inappropriate language use.

In this chapter, results of a study of pragmatic skills in a small group of children with ADHD and typically developing children were presented. According to the scoring of parents on the CCC-2, children with ADHD had more communication difficulties than typically developing children. These results were identical to those presented in earlier studies (e.g. Väisänen et al. 2014; Staikova et al. 2013; Helland et al. 2012; Geurts and Embrechts 2008), demonstrating that parents can recognise the communication difficulties of individuals with ADHD. For many of the children with ADHD, these communication difficulties were especially evident in the pragmatic aspects of language, although typically there were also difficulties in other aspects of language.

In this study, the Pragma test and the Verbal tasks of the Theory of Mind subtest from the NEPSY-II demonstrated that children with ADHD performed worst in terms of contextual comprehension and verbal social perception tasks that were based on verbal scenarios (often supported by pictures or characters). These questions demanded an understanding of, and ability to connect, relevant contextual information in order to derive the implied meaning of an utterance and an understanding of mental functions and other people's perspectives. Although this study demonstrated that children with ADHD have difficulties in pragmatic inference, it is important to remember that there are also studies that have presented contrary findings (e.g. Pina et al. 2013; Kim and Kaiser 2000), so more research using sensitive materials is needed in order to study the pragmatic inference skills of individuals with ADHD. Even if there is no consensus about the pragmatic inference skills of individuals with ADHD, it is known that social perception difficulties are common among children with ADHD (Caillies et al. 2014; Pina et al. 2013; Petersen and Grahe 2012; Semrud-Clikeman 2010). However, it may be the case that not all aspects of social perception are disrupted. For example, in this study children with ADHD performed as well as typically developing children on the Affect Recognition subtest, which assesses a child's ability to match emotions to photos of children's faces. The Affect Recognition subtest previously proved to be difficult for children with autism spectrum disorders, but not for the children with specific language impairment (Loukusa et al. 2014). However, because of the small number of participants with ADHD, the results of this study cannot be generalised.

Currently, there are several studies that demonstrate a link between inattention and/or impulsivity and hyperactivity and pragmatic language in people with ADHD (Semrud-Clikeman 2010; Rints et al. 2015; Petersen and Grahe 2012). This link should be studied in more depth in the future. There are also studies that compare the pragmatic language skills of children with ADHD to the skills of children with ASD (e.g. Helland et al. 2012; Bishop and Baird 2001). These studies have demonstrated that there are a number of similarities in the language use of both groups of children. However, the same pragmatic difficulty (e.g. difficulty inferring meaning from context or irrelevant speech) may be caused by different kinds of factors. To date, there is little knowledge of what background factors affect these difficulties (see e.g. Perkins 2007; Martin and McDonald 2003) or which factors should be reflected in intervention practices.

Executive dysfunction is the theory most commonly used to explain the symptoms of ADHD. Although it can explain many of the core problems experienced by people with ADHD, it cannot explain all of the difficulties in all cases (Willcutt et al. 2005). Since pragmatics probably arises from multiple interacting constraints (Gibbs 2011), and since it is probably a product of many interacting linguistic, cognitive, social, sensory and motor variables (Perkins 2007), it is possible that multiple interacting sources (e.g. many kinds of neuropsychological factors) lie behind the pragmatic difficulties experienced by people with ADHD. Together with experiences of language use, these sources form the foundation of an individual's pragmatic language profile.

In the future, there will be a need for additional studies that explore the pragmatic skills of individuals with ADHD. These studies will make use of information collected from parents and teachers as well as tests and more natural methods to obtain a more complete picture of the pragmatic skills and features of ADHD. Since language is used in real-life situations, the language use of children and adults with ADHD should also be studied more in natural environments, even if it is time-consuming and restricts the control variables. However, it could help us find the core pragmatic challenges of individuals with ADHD and help in developing intervention strategies that address these challenges. It is known that ADHD symptoms impact psychosocial well-being (Taanila et al. 2009). In the future, it will be important to investigate the role of pragmatic weaknesses in social exclusion and marginalization in adolescents and adults with ADHD. In addition, there is a need for longitudinal studies that follow up developmental changes in pragmatic language, since the symptoms of ADHD vary from childhood to adulthood (Hurtig et al. 2007).

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Chapter 5
Intellectual Disability

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Abstract Pragmatic language skills are often impacted in individuals with intellectual disability, a developmental condition defined by deficits in intellectual and adaptive skills. In this chapter, we review the literature on pragmatic language in three genetically-based causes of intellectual disability – Down syndrome, fragile X syndrome, and Williams syndrome. We focus on group-comparison studies of young verbal individuals and cover a range of critical pragmatic skills (e.g. speech acts, topic initiation and maintenance, management of communication breakdowns, and narrative). We draw special attention to matching strategies utilized in the design of these studies which have critical implications for interpreting existing literature and guiding future studies. We conclude with discussions of theoretical implications, research directions, and clinical applications based on our review.

Keywords Communication • Down syndrome • Fragile X syndrome • Genetic disorder • Intellectual disability • Language • Neurodevelopmental disorder • Pragmatics • Williams syndrome

5.1 Introduction

Intellectual disability (ID), previously referred to as mental retardation, is a developmental condition defined by deficits in intellectual functioning (e.g. an IQ score below 70) and adaptive skills, such as self-management, social behavior, and language and communication (American Psychiatric Association 2013). Historically, little consideration was afforded to understanding the symptom

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profiles of ID, and few if any intervention efforts existed, with individuals with ID commonly placed in institutions along with patients suffering from a variety of psychiatric conditions (Braddock and Parish 2002). It is now recognized that individuals with ID represent a considerably heterogeneous population, and detailed clinical assessment of skills across different cognitive, social, and linguistic domains is of paramount importance in developing and implementing effective interventions. Because pragmatic competence relies on a complex integration of skills across these domains, pragmatic abilities are frequently impacted in ID (Abbeduto 2003; Abbeduto et al. 2007; Abbeduto and Hesketh 1997; Rice et al. 2005; Roberts et al. 2008). Pragmatic impairment affects communication and social interaction, with potential to impact relationships with family members, peers, and other community members. Thus, the pragmatic skills of individuals with ID warrant special consideration in research and intervention efforts.

In this chapter, we review the research literature on pragmatic language in three genetically-based causes of ID – Down syndrome (DS), fragile X syndrome (FXS), and Williams syndrome (WS). As well as discussing our own findings, we include a few original examples of discourse from our data. We focus on these conditions of genetic origin because of our own expertise and the available research literature. However, we acknowledge that other etiologies, including environmental conditions such as fetal alcohol syndrome, are frequently implicated in ID as well. For each syndrome, we begin with a description of general characteristics. Literature permitting, we then report findings from standardized tests and rating systems, and consider what is known about speech acts (functions), conversational topic initiation and maintenance, communication breakdowns, and pragmatic (macrostructural) aspects of narrative (storytelling). We focus this literature review on verbal children, adolescents, and young adults, and include only group comparison studies. Many group comparison studies matched research participants on, or controlled for, general cognitive ability to determine whether pragmatic competence is below nonverbal mental age expectations in individuals with ID. According to the autism literature, where studies of pragmatics abound, accounting for structural language (vocabulary and syntax) skills is a more appropriate and relatively more recent approach to matching (Capps et al. 1998; Ozonoff et al. 1990; Tager-Flusberg 2004). Because pragmatics refers to the *use* of language for social interaction, making sure that linguistic 'building blocks' are equated across groups is especially important. Therefore, we draw attention to these details in our review of the literature below, and revisit this issue in considering theoretical implications. The chapter concludes with research directions and some clinical applications.

5.2 Down Syndrome

DS occurs in about 1 in 700-800 live births. It has a population prevalence of about 1 in 1,000 for children and adolescents and 1 in 1,200 overall, making it the most common known genetic cause of ID (Centers for Disease Control 2006; Parker et al.

2010; Presson et al. 2013; Shin et al. 2009). The vast majority of cases are caused by an extra copy of chromosome 21, with translocation (when part of this chromosome attaches to another chromosome) and mosaicism (when only some cells include an extra copy of chromosome 21) representing less frequent causes. Intellectual ability in DS varies from average intelligence to severe disability, with most individuals having ID in the moderate range (Pueschel 1995; Roizen 2007). Verbal short-term memory may be particularly impaired (Jarrold and Baddeley 2001; Laws 2002), whereas visuo-spatial processing and perception may represent a relative cognitive strength (Fidler et al. 2006; Jarrold et al. 1999). Individuals with DS have been described as affectionate, very social, and engaging (Moore et al. 2002; Wishart and Johnston 1990). The pragmatic language profile of DS is notable for its blend of strengths and weaknesses, as described below.

Most studies of pragmatic language in DS have focused on discrete pragmatic skills (i.e. specific skills such as signaling noncomprehension of a message or contributing novel information to a topic of conversation). However, one longitudinal study using the Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk 1999) found that typically developing boys showed more skill at baseline (controlling for structural language and mental age) and developed pragmatic skills more quickly over time than boys with DS (Martin et al. 2013b). Similarly, on the Children's Communication Checklist (CCC; Bishop 1998), a questionnaire for measuring pragmatic skills (along with speech and structural language) that is rated by parents or teachers, individuals with DS showed lower overall pragmatic skills than younger typically developing controls (Laws and Bishop 2004). Using the second edition of the CCC (Bishop 2003), Losh et al. (2012) found that boys with DS performed more poorly overall (and on subscales of initiation, coherence, scripted language, and context in particular) than typically developing boys after controlling for nonverbal mental age as well as structural language skills, but did not differ from boys with FXS.

Except for requesting, children with DS display a similar range of communicative functions (i.e. answers, comments, and protests) as typically developing children matched on language age or developmental level (Beeghly et al. 1990; Coggins et al. 1983). Weakness in requesting may begin early and be less amenable to intervention. This is confirmed in one study of young children with DS (Yoder and Warren 2002), in which parent education and prelinguistic skills training improved prelinguistic commenting and lexical density but not requesting.

Contingent language use, or the ability to stay on topic, appears to be an additional strength. Children with DS appear able to stay on topic for as many turns as mental or developmental age-matched children (Beeghly et al. 1990; Tannock 1988) and for even more turns than children matched on mean length of utterance (MLU, a measure of syntactic complexity) (Beeghly et al. 1990). Moreover, evidence suggests that children with DS are more contingent during conversation than both children with FXS and children with autism (Roberts et al. 2007; Tager-Flusberg and Anderson 1991). However, as Abbeduto and Hesketh (1997) have argued, measuring topic maintenance ability by contingency alone overlooks the quality of topic-maintaining turns. In fact, Roberts et al. (2007) found that boys with DS elaborated on topics less often, and produced more turns that maintained a topic by adding minimal or no new information (e.g. acknowledgments, simple responses) compared with younger, typically developing boys of similar mental age. Of note, most questions were coded as elaborate topic maintenance, and so findings of reduced requesting in DS referenced previously (Beeghly et al. 1990; Yoder and Warren 2002), along with structural language deficits, may also help to explain these differences. Children with DS also initiate fewer new topics than mental age-matched typically developing children (Tannock 1988).

Pragmatic difficulties continue as children with DS grow older. For instance, when describing novel shapes for a naïve listener during a structured referential communication task, youth with DS expressed messages that were less clear (e.g. more ambiguous) than those of mental age-matched, typically developing children (Abbeduto et al. 2006). Performance on this task was related to the expressive language ability of individuals with DS. In another structured task, Abbeduto et al. (2008) found that young individuals with DS signaled noncomprehension of confusing messages less often than mental age-matched typically developing children. In this same study, individuals with DS did not differ from those with FXS. In work from our own group (Martin et al. 2015), after controlling for mental age and receptive vocabulary skills, we also found that children and adolescents with DS signaled noncomprehension less often than younger, typically developing controls (comparisons with the FXS group are reported in Sect. 5.3). Note that one typical way of signaling noncomprehension is to make a request for clarification, suggesting that requesting in particular may continue to be an area of weakness for children with DS as they become older.

Narrative, or storytelling, abilities appear to represent a relative strength in DS. Children and adolescents with DS have been found to include a similar number of plot elements as mental age-matched, typically developing children (Boudreau and Chapman 2000), and more references to plot and theme than language-matched controls (Boudreau and Chapman 2000; Miles and Chapman 2002). Even when matched on mental age alone, adolescents and young adults with DS used more evaluation (e.g. references to characters' mental states) in their narratives than typically developing controls in another study (Keller-Bell and Abbeduto 2007). More recently, Finestack et al. (2012) reported that adolescents and young adults with DS performed similarly to younger, MLU-matched typically developing children across all macrostructural elements studied (e.g. character development, references to character's thoughts and feelings, linguistic cohesion through complex syntax). In another recent study, children and adolescents with DS included fewer episodic elements in their narratives than typically developing children matched on nonverbal cognitive skills (Channell et al. 2015). However, MLU accounted for these group differences, suggesting that structural language may be a key limiting factor in narrative skills for children with DS. Of note, less narrative content is recalled when stories are presented in audio only (Kay-Raining Bird et al. 2004). This may be explained by the visual processing strengths and verbal short-term memory deficits described at the beginning of this section.

Together, existing findings suggest that narrative abilities may be a relative strength in the pragmatic profile of DS, at least when visual supports are present.

Critical skills such as narrative evaluation, the use of complex syntax to cohere narrative elements, and integration of local episodes within overarching narrative themes are all comparable to comparison groups matched on structural language abilities. To illustrate these crucial skills, the following narrative is produced by a 9.8 year-old boy with DS and is based on a wordless picture book. This boy has a nonverbal mental age of 5.6 years and a nonverbal IQ of 62:

> There was one, um, there was a boy named Bed. Name Christin. She was, he was sleeping in his bed. But he woked up. Because there was one cat on his bed. And he slept and slept and slept. He woked up. He tried to look for his cat. He tried to look under his bed. There's no cat. He was so sad because he doesn't have his cat. A ball. He looked behind the window. She looked behind the plants. He looked in in the toy bag. Toy box. He looked on the tree. He looked on the tree. He looked under here. But there was a spider. And he was crying crying crying. He slept and slept and slept and slept. And he woked up. That's what he looked like. He turned on the lights. And there was cats on his bed. That's how the story ended. And he snuggled. They, he kissed them. And they hugged him. He hugged them.

In spite of some grammatical errors (e.g. overregularizations such as 'woked'), this excerpt illustrates a number of strengths in narrative skill. Complex syntax, though not extensively employed, is used to link episodes causally, as with the adverbial clause in 'he was sad *because* he doesn't have his cat'. Protagonists' internal states, goals, and motivations are also described and elaborated in a manner that advances the story. And importantly, the narrative is imbued with an overarching structure with a clear beginning, middle, and end. In line with existing literature on pragmatics in DS more generally, this language sample illustrates how the pragmatic profile of individuals with DS is marked by both strengths and weaknesses. Strengths include contingent language use and picture-supported narrative skills, whereas challenges include requesting, initiation of topics and communicative repairs, and topic elaboration. This profile may be described as somewhat passive in nature, potentially requiring a good amount of scaffolding but lacking in features that would likely frustrate a communication partner (as opposed to noncontingent language and perseveration, as described in Sect. 5.3 below).

Finally, while this review has focused on pragmatic language, children with DS also have poorer speech intelligibility, or understandability, than younger, typically developing children (Barnes et al. 2009; Chapman et al. 1998). Although studies of pragmatic language have typically accounted for these difficulties by evaluating only intelligible utterances from language samples, poor speech intelligibility can clearly impact pragmatic competence by limiting communicative effectiveness.

5.3 Fragile X Syndrome

Although less prevalent than DS, FXS is the most common known inherited cause of ID (Dykens et al. 2000; Hagerman and Hagerman 2002), with the full mutation of the Fragile X Mental Retardation-1 gene (*FMR1*) present in approximately 1 in 2,500 to 1 in 5,000 individuals (Coffee et al. 2009; Fernandez-Carvajal et al. 2009;

Hagerman 2008; Pesso et al. 2000). In individuals with the full mutation of this gene, *FMR1* shuts down (becomes methylated). This causes a deficiency in production of the Fragile X Mental Retardation Protein (FMRP), which is thought to be essential for normal cognitive functioning (Devys et al. 1993; Jin and Warren 2003). Because females have two X chromosomes, females affected with FXS still have one functioning copy of *FMR1*. This copy is able to produce FMRP so that females are nearly always less affected than males.

Whereas females tend to exhibit mild ID or intellectual abilities within the normal range, ID in males with FXS typically ranges in severity from moderate to severe (Hagerman and Hagerman 2002; Loesch et al. 2003; Reiss and Dant 2003). Social anxiety (Bregman et al. 1988; Cordeiro et al. 2011; Hagerman 2002) and deficits in attention (Hooper et al. 2000; Wilding et al. 2002) are also common. FXS is also the leading, identified single-gene condition associated with autism spectrum disorder (ASD), with about 40%-75% of males with FXS meeting criteria for ASD in a research setting (Clifford et al. 2007; Hall et al. 2008; Kaufmann et al. 2004; Klusek et al. 2014a; Philofsky et al. 2004; Rogers et al. 2001). Autism status often affects the severity and quality of language impairments in FXS and is associated with increased likelihood of both males and females receiving speech-language therapy (Martin et al. 2013a).

Because females are generally less affected than males, most research has focused on males with FXS. Accordingly, the following review will focus on males only. That said, results of case studies and a few mixed-age group studies suggest that pragmatic impairment, including difficulties in initiating social interactions, may be present in females as well (Hagerman et al. 1999; Lesniak-Karpiak et al. 2003; Mazzocco et al. 1997; Spinelli et al. 1995).

Several studies of overall pragmatic skills in males with FXS have utilized a standardized measure or comprehensive rating system. In the same longitudinal study reviewed in Sect. 5.2 (Martin et al. 2013b), typically developing boys outperformed boys with FXS (with and without ASD) on the CASL at the first time-point and also developed pragmatic skills more quickly over time. Boys with both FXS and ASD performed more poorly than those with FXS only. Losh et al. (2012) found that boys with comorbid FXS and ASD, but not those without ASD, performed more poorly than typically developing boys on the CASL after controlling for nonverbal mental age, receptive and expressive lexical skills, and MLU. Regardless of ASD status, boys with FXS performed more poorly overall on the CCC-2 (and on subscales of initiation, coherence, scripted language, context, and nonverbal communication in particular) than controls in this same study. Boys with FXS and ASD also did not differ significantly from boys with FXS only on any subscale, suggesting that the CCC-2 is not sensitive to pragmatic language differences in FXS based on ASD status.

Most recently, Klusek et al. (2014b) applied the Pragmatic Rating Scale-School Age (Landa 2011) to seminaturalistic interactions. They reported that boys with FXS (regardless of ASD status) showed greater impairment than younger typically developing boys after controlling for mental age and structural language. Further, boys with both FXS and ASD showed greater deficits than boys with FXS without

ASD and boys with DS. In both of these studies (Klusek et al. 2014b; Losh et al. 2012), boys with comorbid FXS and ASD showed pragmatic impairment that was similar in severity to an additional comparison group of boys with idiopathic ASD.

As is the case for DS, most studies of pragmatic language in males with FXS have focused on discrete pragmatic skills. Males with FXS have been reported to contribute more off-topic or tangential turns (i.e. noncontingent language) to a conversation than males with ID without FXS, including those with DS (Sudhalter and Belser 2001; Wolf-Schein et al. 1987). Of note, autism status of participants with FXS was not specified in these early studies. More recently, Roberts et al. (2007) found this pattern to be specific to boys with FXS who also met criteria for ASD. These boys were additionally found to be more noncontingent than boys with FXS without ASD even after controlling for nonverbal mental age. Roberts and colleagues also found that boys with FXS with and without ASD, like boys with DS, were less likely to add new information in conversational turns (i.e. they were less elaborative) than younger typically developing boys. The following example illustrates the use of noncontingent language during a semistructured interaction. It is from a 12.2 year-old boy with FXS and ASD who has a nonverbal mental age of 5.3 years and a nonverbal IQ of 42:

Examiner:	How do we get in the airplane?
Child:	Through the door. That's really small.
Examiner:	Mhm.
Child:	And you want gummy bear?
Examiner:	Let's play a little more.

Another behavior that can affect the flow of conversation is perseveration, or excessive self-repetition. Boys and adult males with FXS (autism status sometimes not specified) have been found to produce more perseveration than males with DS or typical development of similar cognitive or language level (Levy et al. 2006; Roberts et al. 2007; Sudhalter et al. 1990; Wolf-Schein et al. 1987). In more recent work, boys with comorbid FXS and ASD were found to use more perseveration, controlling for mental age, than those with FXS only, DS, and typical development, whereas the group with FXS without ASD did not differ significantly from the DS or typically developing groups (Martin et al. 2012). The following conversational sample illustrates the tendency of this group to perseverate on both a local, utterance level as well as more globally with repetitive themes across utterances. It is from a 10.4 year-old boy with FXS and ASD who has a nonverbal mental age of 5.8 years and a nonverbal IQ of 63:

Child:	What is this? What is it? What is this? What is this?
Examiner:	Hmm.
Child:	What is it?
Examiner:	I think (interrupted)
Child:	What is it?
Examiner:	It's something that twirls.
	…

Child: What is this? What is this guy? What is, what is this?
Examiner: He's a fireman.
Child: No. He's a fireman. What is this guy?

Like young individuals with DS, those with FXS may also have difficulty either expressing comprehensible and unambiguous messages, which could lead to a communication breakdown, or repairing communication breakdowns once they occur. In the same study reviewed earlier on referential communication (Abbeduto et al. 2006), adolescents and young adults with FXS were less successful at describing novel shapes for a listener during a structured task than were mental age-matched controls. In a second study by Abbeduto and colleagues using a structured task (Abbeduto et al. 2008), also reviewed earlier, adolescents and young adults with FXS signaled noncomprehension of unclear messages less often than younger typically developing controls but did not differ from those with DS. Neither of these studies included a separate group of participants with FXS and comorbid ASD. Moreover, investigators excluded from the FXS group only those who met DSM-IV criteria for autistic disorder (American Psychiatric Association 1994), making it likely that those who would meet DSM-5 criteria for ASD (American Psychiatric Association 2013) remained in the sample. Therefore, it is not clear, as in other studies reviewed previously, whether these pragmatic difficulties may be specific to or more pronounced in those with comorbid ASD. Work from our group suggests that this may be the case. We found that children and adolescents with comorbid FXS and ASD were less likely than typically developing controls to signal noncomprehension, whereas youth with FXS without ASD did not differ from controls and signaled noncomprehension more often than those with DS (Martin et al. 2015).

Compared with conversational discourse skills, less research has focused on narration in FXS and findings are mixed. In one study of recalled narratives, after controlling for nonverbal mental age, short-term memory, and expressive syntax, boys with FXS with and without ASD did not differ from boys with DS but included fewer references to a protagonist's goal-motivated actions than younger typically developing boys (Estigarribia et al. 2011). This finding mirrors those in the ASD literature, where causal explanations for protagonist behaviors, thoughts, and feelings tend to be impaired (Capps et al. 2000; Losh and Capps 2003; Tager-Flusberg and Sullivan 1995). Further, in this study, boys with both FXS and ASD, but not boys with FXS only, also scored lower than the typically developing group in story grammar overall, suggesting that ASD in FXS further undermines narrative ability. Conversely, in another study (Hogan-Brown et al. 2013), no group differences in macrostructural skills (e.g. thematic maintenance) emerged for language age-matched boys with FXS with and without ASD, DS, idiopathic ASD, and typical development. Similarly, no differences were found in the use of evaluation devices between adolescents and young adults with FXS and mental age-matched controls in one other study (Keller-Bell and Abbeduto 2007).

In the study by Finestack et al. (2012) reviewed in Sect. 5.2, adolescents and young adults with FXS without autistic disorder did not differ from those with DS but were more adept than MLU-matched typically developing controls in their use of story introductions (i.e. opening character and setting details). Participants in this study were more verbal than those in other work, with the FXS sample having an average MLU of 6.1 relative to a mental age of just 4.4 years. In sum, the few studies of narrative macrostructure in FXS have resulted in inconsistent findings. Of note, the only study to report impaired performance relative to controls (Estigarribia et al. 2011) used the Bus Story Language Test (Crowley and Glasgow 1994). In this story, the bus is highly anthropomorphized, making relation of character intentions potentially more difficult. Other studies that reported no evidence of narrative macrostructure impairments relied on more basic picture-description story tasks (e.g. Frog Goes to Dinner; Mayer 1977) that may require less proficiency in adopting the perspective of a character.

In summary, pragmatic language is generally impaired in males with FXS. Like males with DS, challenges for males with FXS include initiation of communicative repairs and topic elaboration. Unlike individuals with DS, pragmatic characteristics of males with FXS also include noncontingent language and perseveration. Pragmatic impairment may be pronounced in, and in some cases specific to, boys with comorbid FXS and ASD. More limited research has been conducted on narrative and with females. Finally, as is the case for DS, males with FXS have less intelligible speech than younger, typically developing controls (Barnes et al. 2009), which can impact pragmatic ability and communicative effectiveness.

5.4 Williams Syndrome

WS is caused by a microdeletion of approximately 25 genes on chromosome 7 (region 7q11.23). It affects 1 in 10,000 individuals (Strømme et al. 2002). A prominent characteristic of WS is a hyper-sociable personality, with a strong desire to seek out and initiate conversations with both familiar and unfamiliar individuals (Martens et al. 2008; Riby and Porter 2010). ID in WS is typically mild to moderate, although ability level ranges from severe ID to average intelligence (Donnai and Karmiloff-Smith 2000; Martens et al. 2008; Mervis et al. 2012; Riby and Porter 2010). Of note, individuals with WS demonstrate an uneven cognitive-linguistic profile where verbal skills typically exceed nonverbal abilities. Although this profile and characteristic loquaciousness initially led to hypotheses about the modularity of language and cognitive skills (Bellugi et al. 1990; Donnai and Karmiloff-Smith 2000; Pinker 1994), the advantage in verbal abilities has since been shown to be more complex than initially understood, with selective strengths and weaknesses in language ability relative to typically developing controls (Jones et al. 2000; Karmiloff-Smith 2007; Losh et al. 2001; Reilly et al. 1990, 2004). Similarly, despite their sociability, more recent research suggests that individuals with WS present with a unique profile of pragmatic challenges, described below.

Two studies have characterized the pragmatic profile of individuals with WS using the CCC, a measure described in Sect. 5.2. Laws and Bishop (2004) found that individuals with WS showed relatively weaker pragmatic skills overall than younger typically developing controls (matching criteria not specified). Also included in this study were DS and specific language impairment (SLI) groups. However, individuals with WS were the only clinical group to differ from controls in inappropriate initiation of conversation. This likely reflects the hypersociability that is characteristic of this group. Individuals with WS also used more stereotyped conversation than those with DS or SLI. Controlling for parent-reported expressive language skills, Philofsky et al. (2007) reported that children with WS showed greater pragmatic skills overall on the CCC-2 than similarly aged children with ASD, but demonstrated similar rates of impairment as the ASD group on other subscales, including inappropriate initiation.

Other studies have directly examined conversational skills in individuals with WS. Lacroix et al. (2007) examined parent-child interactions in French-speaking children and adolescents with WS. The WS group spoke less and took fewer conversational turns than typically developing controls, similar to IQ-matched children with DS. However, they used more utterances that express their own mental states than chronological age-matched typically developing peers and individuals with DS, and at a rate similar to mental age-matched typically developing (i.e. chronologically younger) controls. Children and adolescents with WS have been found to have difficulty interpreting questions, as evidenced by noncontingent responding, relative to typically developing chronological age-matched peers (Stojanovik 2006). However, this ability has not been examined relative to mental age- or language-matched typically developing control groups, and thus may be attributed to more general delays in language and cognition. Children with WS also included fewer continuations (i.e. utterances adding new information, similar to what was termed elaborative topic maintenance in the DS and FXS literatures) relative to both typically developing individuals of a similar chronological age and individuals with SLI with similar receptive language abilities (Stojanovik 2006; Stojanovik et al. 2001). It is important to note that these studies are limited by small sample size (n=4-12 individuals with WS).

Communicative repair also represents an area of vulnerability for children with WS. In an experimental task where an examiner incorrectly responded to a child's request for one of two objects, children with WS were less likely than mental age-matched typically developing controls to vary requests or rejections in response to the communication breakdown (Asada et al. 2010). During conversation, children with WS also provided less information in response to an examiner's request for clarification relative to typically developing chronological age-matched peers in the study of French-speaking children with WS by Lacroix et al. (2007) described earlier.

The aspect of pragmatic language that has been explored most extensively in WS is narrative ability. Individuals with WS have been found to produce narratives similar in length to typically developing controls (accounting for mental or chronological age) or chronological age-matched children with SLI (Lacroix et al. 2007; Marini et al. 2010; Stojanovik et al. 2004). They include greater rates of key narrative plot points relative to mental age-matched typically developing controls and individuals with DS (Lacroix et al. 2007). However, individuals with WS produce less cohesive narratives than mental age-matched typically developing controls (Marini et al. 2010). Further, Reilly et al. (2004) asked individuals with WS to narrate a wordless picture book and noted a tendency for individuals with WS to describe individual scenes in great detail at the expense of an integrated, thematic whole. Indeed, in a later study, individuals with WS were found to include fewer reiterations of story theme relative to both chronological and mental age-matched controls (although more than individuals with DS) (Lacroix et al. 2007).

Perhaps the most notable feature of narrative in individuals with WS is their frequent employment of narrative evaluation (e.g. mention of characters' thoughts and emotions, explaining causal motivation for protagonist behavior), and more frequent attempts to engage the listener during their narrative relative to typically developing *chronological age-matched* children, as well as clinical groups including DS, traumatic brain injury, and SLI (Lacroix et al. 2007; Losh et al. 2001; Reilly et al. 2004). Evaluation is a critical narrative device for engaging one's interlocutor, for example, through use of engagement devices such as character speech and emphatic statements. Indeed, effective narration hinges on the ability to explain the psychological content of events, such as explaining protagonists' motivations for actions driving the plotline, as well as the ability to infer and express causal relationships across narrated events. Therefore, despite clear structural language and cognitive difficulties in WS, narrative evaluation appears to be a key strength, consistent with the hypersociability noted repeatedly in this population. However, it is important to note that the over-use of this device may ultimately detract from narrative competence in real-world settings, as frequent use of these devices may become distracting or even overwhelming to the listener.

In summary, like individuals with DS and FXS, young individuals with WS may have difficulty elaborating conversational topics (relative to chronological age-matched controls) and repairing communication breakdowns. In addition, they may have difficulty initiating conversation appropriately and telling cohesive narratives. However, individuals with WS also demonstrate a notable strength in the use of evaluation during narration and conversation, even exceeding their chronological age-matched peers.

5.5 Methodological Considerations and Theoretical Implications

The influence of theory on language research in ID and the contribution of this research to theory have been discussed at length by other authors. These authors have argued in support of approaches that consider language problems in the broader framework of genetics, cognition and behavior as defined by a particular syndrome's phenotype and environment (Abbeduto and Boudreau 2004; Abbeduto et al. 2001), as well as the limitations of group-matching designs in developmental disabilities research (Mervis and Klein-Tasman 2004; Mervis and Robinson 2003). We will not repeat these issues here, but will briefly comment on how our review of the literature on pragmatics in DS, FXS, and WS underscores several theoretical and related methodological issues. The vast majority of investigations in this area presume at the outset a strong link between pragmatic language and cognition. However, studies reporting differences between clinical groups and mental age-matched typically developing controls indicate that some pragmatic difficulties (e.g. the ineffective handling of communication breakdowns which was observed across groups) cannot be attributed to cognitive level alone.

One factor that may be critical to pragmatic language development beyond the effects of general cognition is structural language ability. While the strategy of matching on mental age makes much sense for most domains of speech and language, it is not sufficient for studies of pragmatic language. As mentioned in the introduction of this chapter, pragmatics by definition refers to the *use* of language for social interaction. Thus, making sure that this linguistic foundation is similar across groups is key in order to make meaningful conclusions regarding pragmatic competence specifically. In some instances, as indicated in the preceding review, individuals with ID outperform controls when structural language skills are taken into account. This suggests that studies controlling for mental age alone may be conflating pragmatic and structural language difficulties in these groups and, more central to the discussion of theory, that structural and pragmatic aspects of language are closely related.

Neither general cognition nor structural language, however, sufficiently explains all pragmatic difficulties evident in existing literature. For example, even after accounting for language ability, individuals with DS and FXS were reported to perform more poorly on global measures of pragmatic ability, and males with FXS produced more perseveration than controls. The pragmatic language profile in WS also showed marked divergences from mental-age matched controls, although studies that account for structural language level are largely lacking in the WS literature. Strong links between social cognition, or theory of mind, and pragmatic language have been found for individuals with idiopathic ASD (Capps et al. 1998, 2000; Losh and Capps 2003; Loveland and Tunali 1993; Surian et al. 1996; Tager-Flusberg 2000; Tager-Flusberg and Sullivan 1995), and could inform potential underpinnings of pragmatic language profiles in some instances of ID. Indeed, our review revealed that children with comorbid FXS and ASD showed more pragmatic difficulties than children with only FXS in a few studies that controlled for both nonverbal mental age and structural language skills. Moreover, Losh et al. (2012) reported that children with idiopathic and FXS-associated ASD showed similar deficits in theory of mind, and that these skills related to pragmatic ability across ASD, FXS, DS, and typically developing groups.

Surprisingly, in two studies reviewed previously, Abbeduto and colleagues did not find a significant relationship between social cognition and referential communication (Abbeduto et al. 2006) or noncomprehension signaling (Abbeduto et al. 2008) in DS or FXS. In both cases this was unexpected by the authors and was attributed partly to limitations in measurement and sample size as well as the developmental level of participants. Whereas participants' mental ages were comparable across studies, the sample size of the FXS group differed considerably – 57 in Losh et al. (2012) which also included more participants with ASD, versus 18 in the studies by Abbeduto et al. (2006, 2008). Moreover, Abbeduto and colleagues used a single false belief task to assess theory of mind in both studies, whereas Losh et al. employed a battery of tasks including false belief as well as more basic tests of intentionality and desires. These were designed to decrease verbal and cognitive load and better capture a range of theory of mind abilities in the participants with ID. Social cognition and other influences, such as executive function and environmental factors, may indeed play important roles in the pragmatic competence of individuals with DS, FXS, and WS, although further research is needed.

5.6 Research Directions

Review of the literature suggests several important areas for future research. First, studies should continue to elucidate the pragmatic profile of individuals with ID, matching on structural language abilities (for the reasons outlined in Sect. 5.5), and directly compare pragmatic profiles across clinical groups. Second, studies that examine predictors of individual differences in pragmatic skills, beyond general cognition and structural language abilities, are largely lacking in the literature. Although Losh et al. (2012) did report links with theory of mind for boys with FXS and DS and with *FMR1*-related genetic variation in boys with FXS, other hypotheses have been proposed. For example, researchers have commonly ascribed pragmatic difficulties in FXS, and perseveration in particular, to excessive arousal and/or anxiety (e.g. Belser and Sudhalter 1995; Cornish et al. 2004; Klusek et al. 2015; Murphy and Abbeduto 2007). Heightened arousal was related to increased perseveration and noncontingent language in a preliminary study of two males with FXS (Belser and Sudhalter 1995). In more recent work, Klusek et al. (2013) reported that arousal dysregulation was related to poorer vocabulary skills, and marginally to poorer pragmatic language, in a larger sample of boys with FXS. In FXS, a recently developed quantitative method for measuring reduced FMRP expression via Luminex technology (LaFauci et al. 2013) presents a valuable opportunity for examining molecular-genetic correlates of pragmatic language in future investigations. Studies focused on these and other potential underlying mechanisms of pragmatic impairment, and whether they differ by syndrome group or from typical development, could inform general knowledge and theory, as well as intervention.

Third, girls with FXS should be the focus of future investigations, and girls and boys should be examined separately across syndrome groups to determine whether any sex differences exist which could inform understanding of underlying physiological processes or social influences, as well as clinical approaches. Fourth, future studies should continue to examine the impact of ASD status on pragmatic language in individuals with FXS, using valid and well-characterized groups (with and without comorbid ASD) so that findings are more comparable across studies. Future investigations should also include an idiopathic ASD group in order to better understand the overlap in FXS-associated and idiopathic cases of ASD, which could help to identify specific ASD traits that are linked to the *FMR1* gene involved in FXS (see Chap. 3, this volume for a review of pragmatic language in idiopathic ASD). Similarly, ASD is more common in DS and WS than in the general population (Hepburn et al. 2008; Richards et al. 2015), making the co-occurrence of ASD and its impact on pragmatic language an area of future research for all groups. Fifth, many of the studies reviewed here utilized mixed-age groups, spanning from childhood through adulthood, with relatively small sample sizes. Future studies should focus on discrete age groups and also examine pragmatic language longitudinally in order to determine changes over time as well as predictors of change. Finally, intervention research that targets the phenotypic characteristics described above for children with DS, FXS, and WS is critically needed. These studies should measure outcomes in pragmatic language specifically and related social development, such as peer relationships, more generally.

5.7 Clinical Applications

A few clinical implications of the preceding review of pragmatics in ID for assessment and intervention are worth mentioning (for more detailed discussion, readers are referred to Chap. 19, this volume). Although individualized assessment and intervention that takes into account the developmental level and needs of a particular child and family is recommended, knowledge of phenotypic characteristics common to each syndrome could also help a clinician to focus or tailor assessment and intervention. Assessment approaches may also be informed by the research literature. For instance, in the Klusek et al. (2014b) study reviewed in Sect. 5.3, group differences for the seminaturalistic context were more robust than those based on a standardized measure of pragmatics. Thus, clinical assessment should utilize a multi-method approach, including results of standardized assessments but also direct observation of more naturalistic interaction in multiple contexts and with various communication partners.

Ultimately, the goals of language intervention for individuals with ID should include improved functioning in communicative, social, academic and vocational domains (American Speech-Language-Hearing Association 2005). While this chapter has necessarily focused on pragmatic language, there is a vast literature documenting relative strengths and weaknesses of all three groups for speech and language more broadly that should be considered (Abbeduto et al. 2007; Mervis and Becerra 2007; Rice et al. 2005; Roberts et al. 2008). Assessment and intervention for children with ID should of course also focus on speech intelligibility and structural language to ensure that children with ID have the necessary tools for pragmatic language. Finally, intervention studies and research that uncovers the underlying mechanisms of pragmatic difficulties in each group will clearly have important implications for clinical management.

5.8 Summary

Pragmatic competence is frequently impacted, to varying degrees, in young individuals with DS, FXS, and WS. Future studies should continue to compare syndrome groups to each other and to typically developing controls appropriately matched on structural language ability. Knowledge of the phenotypic characteristics of each syndrome group may inform clinical efforts to some extent, though well-designed intervention studies are critically needed for all three groups. These studies, and intervention in general, will be guided by research that further elucidates the pragmatic language profile of each group, as well as the underlying mechanisms of pragmatic impairment in ID and whether they differ by etiological category.

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Chapter 6
Childhood Brain Tumour

Kimberley Docking, Philippe Paquier, and Angela Morgan

Abstract Children who survive brain tumour are a growing population, and are increasingly seen in clinical caseloads worldwide. However, cure often comes at a cost, with devastating neurocognitive and communicative sequelae commonly seen in children across the course of development. The impact of tumour and treatment-related variables on the development and acquisition of neurocognitive and communicative skills is considerable, and includes the direct effect of a tumour located in the supratentorial and infratentorial regions, raised intracranial pressure, treatment effects from surgical intervention, radiotherapy, and/or chemotherapy, and other risk factors. Pragmatic abilities and social competence are commonly disrupted in childhood brain tumour (CBT), with devastating effects on quality of life. This chapter addresses the key social skills and constructs of social ability associated with CBT in addition to the primary mechanisms underpinning pragmatic deficits in CBT. Management of pragmatic deficits associated with CBT requires an integrated approach to assessment, treatment, and long-term surveillance. It is also important that these children are not 'lost' to services considered essential to ensuring improvements in social functioning and pragmatic competence. These approaches to assessment and intervention are outlined.

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6.1 Introduction

With advances in medical care, more children with brain tumour are able to live full and complete lives. They are not only reaching adulthood, but participating in and enjoying life with family and friends, aspiring to careers and financial independence, establishing interpersonal relationships, and achieving overall fulfilment in life (Askins et al. 2015; Vinchon et al. 2011; Ullrich and Embry 2012). Thus, improving quality of life for survivors from this disease now shares attention with the vital work that is dedicated to improving cure rates in childhood brain tumour (CBT) research. In fact, cure is now considered to include optimisation of quality of life (Mulhern and Palmer 2003).

Over recent decades, it has been documented that childhood brain tumour survivors (CBTS) often experience a number of tumour- and treatment-related sequelae. These range from mild to profound impairments of cognition, communication and pragmatics and can significantly affect quality of survival. Such deficits can have devastating effects on children surviving brain tumour, who live a longer portion of their lives with these morbidities compared to adults (Janzen et al. 2015). In this chapter, we outline the intricately complex presentation characteristics that are commonly associated with CBT. We then discuss the known implications of CBT on pragmatics, as well as the targeted assessments and interventions that are currently available.

6.2 Incidence and Types of Childhood Brain Tumour

Brain tumours account for a significant proportion of paediatric oncology practice and are responsible for the highest morbidity rates related to cancer in childhood. They are the most common solid form of cancer in children with an incidence rate of 25 % of all cancers, compared to approximately 3 % in adults (Diamandis et al. 2015; Imbach 2014). CBT has been consistently ranked as the second most frequent cancer type in children under 15 years after leukaemia for several decades in Europe, North America, Australia, Japan, and the United Kingdom (Siegel et al. 2013; Dolecek et al. 2012; Fleming and Chi 2012; Australian Institute of Health and Welfare 2015; Scheurer et al. 2011).

CBTs are categorised according to the main compartments of the brain: the supratentorial region, and the infratentorial region or posterior cranial fossa. The supratentorial region consists of structures that lie above the tentorium cerebelli, including the cerebral hemispheres, thalami, basal ganglia, diencephalon, third and lateral ventricles, optic tracts/chiasmatic region, and the pituitary fossa. The posterior fossa includes the cerebellum, fourth ventricle, and the brainstem. While there are some similarities across locations, clinical presentation often differs based on the region in which the tumour arises (Amid et al. 2015). The most common location of CBT is consistently reported to be the posterior fossa (Lanzkowsky 2011; Imbach 2014; Dolecek et al. 2012). Up to 60 % of CBTs are reported to be located in the posterior fossa, and approximately 40 % are located in the supratentorial region (Imbach 2014; Dolecek et al. 2012).

The most common type of central nervous system (CNS) tumour type in childhood is widely agreed to be the astrocytoma, with reported rates ranging from 30 to 50 % (Lanzkowsky 2011; Keene and Johnston 2015; Imbach 2014; Dolecek et al. 2012; Fleming and Chi 2012). This type of tumour is most commonly located in the posterior fossa and accounts for the higher rates of incidence in this location in children. The gender ratio for astrocytomas is higher for males (Imbach 2014). The second most prevalent paediatric brain tumour is the medulloblastoma. It occurs at a rate of approximately 15–20 %, and is the most common of all malignant brain tumours (Diamandis et al. 2015; Imbach 2014; Keene and Johnston 2015). The gender ratio indicates a slight male predominance at approximately 1.4:1 (Chan et al. 2015). Ependymomas are the third most common tumour type, encompassing 5–15 % of all CNS tumours in childhood, and forming the second most common type of malignant tumour in children. These tumours are also considered to have a slight male predominance (Keene and Johnston 2015; Imbach 2014). Craniopharyngiomas account for 4–7 % of all brain and spinal cord tumours in children (Imbach 2014; Keene and Johnston 2015). Other common tumour types include supratentorial primitive neuroectodermal tumours (PNETs), visual pathway gliomas, choroid plexus tumours, pineal area tumours, and brainstem tumours.

According to region, common tumours of the posterior fossa in children include astrocytomas (low-grade more frequent than high-grade glioma), medulloblastomas, ependymomas, and brainstem tumours (commonly low- and high-grade gliomas, and PNET) (Lanzkowsky 2011). In the supratentorial region of the brain, astrocytomas also rank as the most common cerebral tumour (65 %), followed by ependymomas (15 %), PNETs and other varieties such as choroid plexus papillomas (Amid et al. 2015; Imbach 2014; Lanzkowsky 2011). Common tumours found in the midline region of the supratentorial fossa include chiasmal gliomas (optic glioma), suprasellar craniopharyngiomas, pineal tumours (such as pinealomas and pinealblastomas), and germ cell tumours (such as germinoma, teratoma, and embryonal carcinoma) (Lanzkowsky 2011; Imbach 2014). With each type of tumour, differences exist in presentation and diagnostic signs. Treatment approaches also vary according to malignancy, location, accompanying symptomotology and clinical presentation.

6.3 Non-treatment Effects of Childhood Brain Tumour

A brain tumour may cause neurologic compromise in children in two ways: indirectly, by causing obstruction of cerebrospinal fluid (CSF) flow and increased intracranial pressure (ICP); or directly, by infiltrating or compressing normal CNS structures due to the mass effect of the tumour (Amid et al. 2015; Obaid et al. 2015; Imbach 2014; Blaney et al. 2011). In children diagnosed with brain tumour, language and cognitive sequelae occur due to the impact of the tumour on the brain and by compromising structures that subserve the neural pathways involved in language and cognition.

6.3.1 Indirect Effects of CBT on Language and Cognition

Normal ICP is the result of equilibrium between brain tissue, blood and CSF, and so the presence of a tumour mass disturbs this equilibrium (Amid et al. 2015). Within a fixed space such as the cranial vault, increased volume from the mass effect of the tumour creates an increase in volume which results in a rise in pressure (Amid et al. 2015; Corns and Martin 2012; Neil et al. 2016). This increase in ICP is most commonly caused when poor flow or obstruction of CSF occurs due to blockage from the tumour or compression of the ventricles and surrounding structures, resulting in hydrocephalus (Ullrich 2009; Obaid et al. 2015; Amid et al. 2015; Blaney et al. 2011; Neil et al. 2016). Increased ICP can also occur as a result of increased production of CSF in the CSF space (e.g. such as associated with choroid plexus tumour), or due to deceased absorption (e.g. as a result of infection or subarachnoid haemorrhage) (Ullrich 2009; McWhirter and Masel 1987). In most children, an increase in ICP also occurs due to cerebral oedema, resulting from the growing tumour (van Eys 1991). This cerebral oedema can often have greater implications than the tumour itself, with rapid onset causing sudden clinical deterioration. Oedema compounds the mass effect of the tumour and exacerbates, both locally and globally, the neurological deficits caused by the tumour as a result of generalised increased ICP (Stephenson and Finlay 1990).

Whether increased ICP is caused by the tumour mass, or by obstruction of CSF pathways, the clinical manifestations are similar. Increased ICP is responsible for some of the earliest and most common clinical manifestations of CNS tumours, which are often quite nonspecific and nonlocalising in nature (Blaney et al. 2011). The most commonly reported presentation is a triad of headaches, vomiting, and lethargy (Amid et al. 2015; Obaid et al. 2015; Imbach 2014; Ullrich 2009). In the first few years of life, irritability, failure to thrive or weight loss, personality changes, and developmental delay are considered frequent early signs of increased ICP, later followed by regression of cognitive and motor skills (Blaney et al. 2011; Ullrich 2009). School-aged children, however, commonly present with declining academic performance, fatigue, personality changes, as well as vague intermittent headaches

(Blaney et al. 2011). Visual disturbances resulting from increased ICP is largely due to a sixth nerve palsy, which includes diplopia or double vision, papilloedema (optic disc swelling), strabismus (eye misalignment), visual loss or visual field loss, and head tilting to the side (Imbach 2014; Ullrich 2009; Blaney et al. 2011).

In addition to neurological impairments, many of the neurocognitive and language impairments evident in CBTS are attributed to an increase in ICP or hydrocephalus (Blaney et al. 2011; Obaid et al. 2015; Duffner 2010). As a tumour may exist for many years in some children prior to diagnosis, with slow growth and gradual appearance of symptomatology, increased ICP can often be present some time before diagnosis, exerting prolonged effects (McWhirter and Masel 1987). In some cases even a short period of increased ICP may cause damage (McWhirter and Masel 1987). Recent investigations have found that language and cognitive difficulties are associated with persistent raised ICP and/or hydrocephalus (Aarsen et al. 2014; Rashid et al. 2012; Duffner 2010; Ullrich 2009). Pre-operative hydrocephalus has been associated with significantly lower IQ, both verbal and performance (Duffner 2010). Significant language impairments have been reported in children presenting with severe hydrocephalus, with severity of hydrocephalus specifically responsible for language impairments evident in children with brain tumour (Aarsen et al. 2014).

In addition to language, specific areas of cognitive impairment have also been noted across memory, attention, executive function skills, visual-spatial skills, and behaviour (Aarsen et al. 2014). In fact, up to 60 % of children with severe persisting hydrocephalus are reported to require special support services at school. Cognitive outcomes have also been found to be particularly unfavourable in children diagnosed with hydrocephalus under 12 months of age (Rashid et al. 2012). The functional outcomes and impact of such difficulties on the long-term quality of life for children with brain tumour, however, are often more significant than would be anticipated from the neurocognitive deficits (Vinchon et al. 2012). However, it is suggested that adequate treatment of hydrocephalus may improve outcomes (Duffner 2010; Aarsen et al. 2014).

6.3.2 *Direct Effects of CBT on Language and Cognition*

Children with brain tumours are particularly vulnerable to neurocognitive impairments which may be induced by the tumour itself or by the different therapeutic interventions (Margelisch et al. 2015). The mode of presentation depends on the child's age and the tumour location. In older children, symptoms usually progress insidiously with benign tumours (e.g. low-grade gliomas, gangliogliomas) or rapidly with aggressive tumours (e.g. malignant gliomas, ependymomas) (Pollack 1999). Given the low incidence of CNS tumours in children younger than age 20 (4.58/100.000 persons/year) (Gururangan 2011), and the urgency of life-saving surgery, only scarce information is available on the direct effects of CBT on language and cognition. For instance, in a systematic review of 87 well-documented case studies of acquired childhood aphasia published between 1978 and 2005, Baillieux et al. (2006) found only 10 instances of tumoural aphasia, of which only two had been assessed before surgery. As CNS maturation is an ongoing process during childhood, neurocognitive findings obtained in adult brain tumour patients cannot straightforwardly be extrapolated to CBTS. Although the impact of a brain tumour is considered to be different in children than in adults, it nevertheless seems that as in adults, the location of the tumour is the principal determinant of neurocognitive disturbances (Iuvone et al. 2011). We therefore describe the direct effects of CBT on language and cognition in supratentorial and infratentorial neoplasms separately.

6.3.2.1 Supratentorial Tumours

De Agostini and Kremin (1986) had the opportunity of prospectively following the progressive dissolution of language over a 3-year-period in a boy who suffered from a slowly growing left temporal tumour. At initial assessment, the spontaneous language of this patient was fluent with rare phonemic paraphasias. One year later, his spontaneous productions were less fluent, mainly because of word-finding difficulties. Phonemic errors had also notably increased. Still 1 year later, his verbal output had become aspontaneous, and mainly consisted of brief responses only uttered when he was spoken to. However, oral repetition and auditory comprehension remained well-preserved. The authors proposed a diagnosis of transcortical motor aphasia.

In a study of an 8-year-old, right-handed girl with a left frontal tumour, and her neurologically normal monozygotic twin sister, Anderson et al. (2002) documented aphasic seizures in the affected girl. However, as the study was directed towards the assessment of lesion-induced changes in the pattern of fMRI language activation in order to allow comparison with the normal pattern in a genetically similar child, no detailed information was given on the aphasia characteristics. The fMRI language activations differed between the twin sisters despite morphological brain similarities. The unaffected girl displayed a typical pattern of left-lateralised language, whereas the patient first showed bilateral frontal activation that shifted towards the right hemisphere as the tumour grew. Anderson et al. (2002) assumed that the right frontal activation in the patient reflected the pathophysiological effects of the tumour in the prototypical language cortex.

More recently, in 83 children with brain tumours examined prior to treatment, Iuvone et al. (2011) observed cognitive difficulties at diagnosis in 50 % of patients. In a subgroup of 59 patients with supratentorial tumour location, children with hemispheric tumours (n = 38) showed worse performance on IQ measures, visuomotor integration, phonological working memory, and planning compared to children with midline tumours (n = 21). Children with left hemisphere tumour (n = 20) performed worse on phonological working memory than children with right hemisphere involvement (n = 18). A strong correlation was found between linguistic measures and left cortical tumour location. However, Iuvone et al. (2011) could not demonstrate a significant correlation between radiological tumour-related variables and neurocognitive performance. In a study comparing children with brain tumours before the start of medical treatment to children with an oncological diagnosis not involving the CNS, Margelisch et al. (2015) confirmed Iuvone et al.'s (2011) findings by demonstrating significant deficits of working memory, verbal memory, and attention in children with brain tumours. Of note, verbal comprehension, along with perceptual reasoning and processing speed, were preserved in the group of children with brain tumours.

6.3.2.2 Infratentorial Tumours

The posterior fossa contains the brainstem and cerebellum. Recent advances in the role of these anatomical structures in cognition and behaviour suggest that damage to either of them may cause symptom constellations that are closely alike. Given the life-threatening impact of brainstem tumours and the pursuant urgency to initiate treatment, it is not clear to what extent the cognitive and behavioural disorders listed below can be attributed to the tumour characteristics only. In a review of the literature, D'Aes and Mariën (2015) only identified seven well-described paediatric cases with brainstem neoplasms published between 1950 and 2012. All patients presented with dysarthria, but no clear-cut linguistic deficits were reported pre- or post-operatively. The cases reviewed by D'Aes and Mariën (2015) displayed cognitive disturbances consisting of dysexecutive functioning, memory impairments, and attentional deficits. They also exhibited a wide range of behavioural and affective disturbances such as irritability, obstinacy, apathy, lack of initiative or cooperation, aggressiveness, anxiety, impulsivity, loss of interest, confusion, and fidgetiness.

D'Aes and Mariën (2015) postulated that being an intrinsic part of the cerebello-cerebral circuitry that controls cognition and affect, the brainstem is also implicated in cognitive and affective functioning through (a) its reciprocal connections with the cerebral hemispheres, and (b) its close connections with the cerebellum. Despite predictions of the potential for language dysfunction based on this neuroanatomical circuitry, Docking et al. (2005) could not demonstrate overt language disturbances subsequent to treatment in six children with brainstem tumour. Unfortunately, no information was available regarding their pre-treatment neurocognitive presentation. However, given the impact of treatment combinations on cognition, these authors rightly called for close long-term monitoring of children treated for brainstem tumour.

Advances in the understanding of the neuroanatomy of the cerebellum have demonstrated its role in cognition, behaviour, and affect (De Smet et al. 2013), and have substantially readjusted the conventional view of the cerebellum as an exclusive coordinator of sensorimotor function (Beaton and Mariën 2010). Preoperative cognitive, behavioural, and affective cerebellar tumour-related symptoms have been studied in children. In two recent studies by Di Rocco et al. (2011) and Turkel et al. (2012), approximately one-third of the patients showed preoperative signs of anxiety, depression, irritability, and apathy. A similar amount presented with pre-surgical memory and attentional difficulties, and problems with planning and visuo-spatial skills. In addition to dysarthria, Di Rocco et al. (2011) identified pre-surgical language impairments, consisting of reduced verbal fluency, along with naming and comprehension deficits. Walker et al. (2014) rightly underscored the importance of obtaining data from pre-surgical assessments in order to gain insight into the patients' preoperative functioning.

In children, cerebellar tumour surgery is prone to cause a broad range of speech, language, cognitive, and behavioural-affective disturbances, the combination of which has long been known as Posterior Fossa Syndrome (PFS) (Gudrunardottir et al. 2016a) but has recently been renamed Cerebellar Mutism Syndrome (CMS) (Gudrunardottir et al. 2016b). The incidence of CMS in children who have undergone cerebellar tumour surgery is estimated to be between 8 and 31 % (Mariën et al. 2013). The core symptom of CMS is total speechlessness (cerebellar mutism) which typically develops after a short period of relatively normal functioning in the immediate postoperative phase. Cerebellar mutism is generally accompanied by a wide spectrum of postoperative, often frontal-like neurobehavioral deficits that may include mood lability and irritability; apathy; unconcern; lack of bowel and bladder control without apparent gastroenterological, urological or pharmacological reason; compulsive pre-sleep behaviour; autistic-like behavior; decreased initiation of a wide range of voluntary activities including disrupted language dynamics, impaired voluntary eye opening (eye-lid apraxia), and inhibited mastication and swallowing in the absence of neurological dysphagia (Catsman-Berrevoets and Aarsen 2010; Mariën et al. 2013). After the alleviation of the postoperative mutism, the presence of dysarthria appears to be the rule (De Smet et al. 2007). Surprisingly, motor speech deficits often do not display the typical ataxic speech symptoms one would expect in cerebellar damage (De Smet et al. 2007, 2012). A possible explanation might be that because of the close vicinity of the cerebellum and brainstem, the effects of the surgical intervention (e.g. postoperative spasm of the vessels supplying the cerebellum and the brainstem, causing ischemia or oedema in brainstem structures) might be responsible for the occurrence of paretic rather than ataxic postoperative speech symptoms.

Not all patients with CMS become completely mute after cerebellar surgery. According to Catsman-Berrevoets and Aarsen (2010), a minority of paediatric patients do not develop cerebellar mutism postoperatively, but display severely reduced speech production limited to single words or short sentences that can only be elicited after vigorous stimulation. This adynamic verbal behavior is often part of a wide spectrum of postoperative behavioral-affective disturbances which may be accompanied by executive, visuo-spatial, and language-related problems. The combination of these symptoms in the absence of cerebellar mutism is known as the Cerebellar Cognitive-Affective Syndrome (CCAS) which Schmahmann and Sherman (1998) described first in adult cerebellar patients. Children in whom this constellation of cognitive, affective, and linguistic symptoms remains permanent after cerebellar tumour surgery are considered to match a diagnosis of paediatric CCAS (Levisohn et al. 2000). Based upon scant information, it appears that language-related problems in children with CMS and CCAS mainly concern impaired verbal fluency, word-finding difficulties, and grammatical disturbances (De Smet et al. 2009; Levisohn et al. 2000; Di Rocco et al. 2011).

Cerebellar-induced language, behavioural, and affective disorders are thought to result from a functional disruption of the reciprocal pathways that connect the cerebellum with supratentorial cortical regions. These pathways are crucially involved in the regulation of cognitive, behavioural, and affective processes (De Smet et al. 2013).

6.4 Treatment Effects Associated with Childhood Brain Tumour

The three main methods of treatment for CBT are surgery, radiotherapy, and chemotherapy. The treatment approach for any individual child may range from careful monitoring of a low-grade tumour through to maximal surgical removal of a highly malignant tumour that is followed by a combination of high-dose radiotherapy and aggressive chemotherapy (Imbach 2014; Walter and Hilden 2004). The diversity of approaches highlights the vital importance of not only attempting to cure the tumour, but also moderating the effects of treatment and ensuring acceptable quality of life for the child, by limiting neurotoxicities associated with treatment where possible (Walter and Hilden 2004; Janzen et al. 2015). The focus here will be on neurocognitive and communication effects related to treatment which are considered to be particularly devastating (e.g. Janzen et al. 2015; Bouffet et al. 2010; Vinchon et al. 2011; Mulhern and Palmer 2003).

6.4.1 Effects of Surgical Treatment for CBT

Paediatric neurosurgical oncology has advanced significantly in recent decades, and continues to play a primary role in the treatment of CBT (Walter and Hilden 2004; Ullrich 2009; Castellino et al. 2014). Surgery is often the initial treatment method for most tumour types, with maximal surgical resection important for survival and the best long-term outcomes (Bouffet et al. 2010). For some tumour types, such as low-grade cerebellar astrocytoma or choroid plexus papilloma, surgery provides a cure, whereas for others, such as medulloblastoma or ependymoma, maximal resection is employed in order to improve a child's chance of survival in combination with adjuvant treatments (Bouffet et al. 2010; Duffner 2010).

Peri- and post-operative complications following surgery for CBT include seizures, infections, haemorrhages, and oedema. These complications are reported to be increasingly less common due to the refinement of neurosurgical procedures in recent years, although they are now considered to be linked to neurocognitive outcomes following surgery (Obaid et al. 2015; De Luca et al. 2009). It has been recently reported that it is more commonly the effects of these complications and not the surgery that correlate with neurocognitive deficits (Duffner 2010). Kao et al. (1994) reported that perioperative factors, such as neurological deficits, meningitis, subdural fluid collections, and repeat craniotomy were strongly associated with declines in intelligence quotient (IQ) scores and were more predictive of IQ performance than even age at treatment.

As surgical treatment of supratentorial tumours aims to minimise the risk of postoperative deficits, tumours within the sensorimotor or language cortex of a child's brain were not treated aggressively in the past for fear of inducing severe postoperative functional sequelae. The necessity of developing new techniques arose to allow the preservation or restoration of sensorimotor and cognitive functions. Next to preoperative brain mapping and neuronavigation, awake craniotomy is a novel procedure that permits intra-operative electrical stimulation mapping to identify critical sensorimotor and language areas, thus allowing for maximal tumour resection with substantial minimisation of postoperative functional sequelae. Intra-operative direct electrical stimulation (DES) during awake surgery is currently considered to be the gold standard for identifying crucial cortical zones (De Benedictis et al. 2010).

To the best of our knowledge, in children, only case reports describing the technical aspects of the intervention are available (e.g. Soriano et al. 2000; Ard et al. 2003; Hagberg et al. 2004; Welling and Donegan 1989; Tobias and Jimenez 1997; Klimek et al. 2004), along with scant publications reporting small series (Ojemann et al. 2003; Balogun et al. 2014; Delion et al. 2015). From these series, it appears that awake craniotomy with DES in children is a safe and reliable procedure permitting maximal tumour resection without significant neurological and neurocognitive sequelae. However, given the paucity of information on the long-term language and neurocognitive outcome in children who have undergone the procedure, further validations and follow-up in a larger paediatric population are needed.

Given the small number of brainstem surgery candidates and the high mortality rate in brainstem tumour patients (Nejat et al. 2008; Klimo et al. 2016; Pollack 1999), only scant information is available on the neurocognitive and language sequelae of brainstem surgery. Moreover, as most surgical interventions in this group also often require adjuvant radio- and/or chemotherapy, the sole effects of surgical treatment can rarely be analysed at group level. In a small series of six children, Docking et al. (2005) reported only one patient, with low-grade pontine astrocytoma, who was treated by surgery alone. This 14-year-old girl performed well within normal limits on all language tests administered. In a large series of 61 children treated for supra- or infratentorial pilocytic astrocytoma, Aarsen et al. (2009) found only six patients with brainstem tumour. In this subgroup, deficits were recorded in verbal intelligence, verbal memory, naming, and behavior. No significant language disturbances were observed, though two children displayed mild lexical generation or phonological awareness difficulties. Unfortunately, brainstem patients in this study were not identifiable among the 35 patients constituting the infratentorial group, in which four patients received adjuvant radio- or chemotherapy.

A distinct subgroup of brainstem tumours are low-grade tectal tumours. They are relatively benign, tend to have an indolent course, and are associated with a good long-term survival (Aarsen et al. 2014). They become symptomatic when obliterating the Sylvian aqueduct and causing obstructive hydrocephalus, thus requiring ventriculo-peritoneal shunting or endoscopic third ventriculostomy (Aarsen et al. 2014). Aarsen et al. (2014) identified debilitating neuropsychological impairments at long-term, and suggested that the language difficulties they observed were not entirely attributed to the tumour location but also to the severity of hydrocephalus.

As surgery alone is the first-choice treatment in children with low-grade astrocytoma, it can be assumed that the postoperative neurocognitive outcome is primarily determined by the surgical act along with the tumour characteristics themselves (Hanzlik et al. 2015). Aarsen et al. (2004) described the following long-term neurocognitive sequelae in children surgically treated for low-grade astrocytoma without adjuvant therapies: apraxia, motor neglect, dysarthria, language problems (adynamic output, word-finding difficulties, semantic-pragmatic difficulties, cocktail party speech) and impairments of visuo-spatial skills, memory, and behaviour.

Given the different treatment regimens for the histological type of a tumour, any characterization of the sole effects of surgery in cases of malignant posterior fossa tumour remains challenging (Lewis and Murdoch 2011). A combination of several factors such as the type, site and size of the tumour, hydrocephalus, surgery, and adjuvant therapeutic options contributes to the physical, neurocognitive, and quality of life outcome (Lassaletta et al. 2015).

6.4.2 Effects of Radiotherapy Treatment for CBT

Radiotherapy is considered to be an effective treatment approach for CBT and is the most commonly employed treatment modality following surgery (Bouffet et al. 2010; Charpentier et al. 2015). The brain and CNS, however, has a finite tolerance for radiation, with poorer outcomes associated with increased dosage and/or volume (Janzen et al. 2015). Radiotherapy is associated with significant neurotoxicity and often long-term deficits in children with brain tumour (e.g. Janzen et al. 2015; Monje and Fisher 2011; Walsh and Paltin 2015; Schmidt et al. 2010; Duffner 2010; De Luca et al. 2009; Ullrich 2009; Castellino et al. 2014; Bouffet et al. 2010).

Due to the known devastating neurocognitive consequences for young children under 3 years of age who receive radiotherapy treatment (e.g. Padovani et al. 2012; Duffner 2010; Ullrich and Embry 2012), even in some cases up to 7 years of age (e.g. Walsh and Paltin 2015; Monje and Fisher 2011), this method is employed only in special cases in young children due to the increased vulnerability of the brain during the early rapid stages of development (Imbach 2014). Adverse effects resulting from radiotherapy treatment for CBT most commonly have a long-term impact, often increasing in appearance over time (e.g. Walsh and Paltin 2015; Ullrich 2009; Duffner 2010; Ris et al. 2013). In addition to these late-presenting but more long-term treatment effects, a number of earlier acute effects (e.g. brain oedema) can occur during and shortly after radiation treatment completion.

Neurocognitive deficits following radiotherapy for CBT are largely attributed to structural damage to brain tissue and damage of white matter specifically by radiation (Neil et al. 2016; Bouffet et al. 2010; Ullrich 2009; Hoppe-Hirsch 1993; Padovani et al. 2012; Castellino et al. 2014; Mulhern and Palmer 2003; Palmer et al. 2012; Liu et al. 2015; Law et al. 2011; Monje and Fisher 2011). White matter damage resulting from radiation treatment is reportedly progressive and does not resolve (Askins and Moore 2008; Schmidt et al. 2010). Other neuropathological changes include necrosis, calcification, cerebral atrophy, endocrine dysfunction, and vascular injury (Askins and Moore 2008). In a study of 40 children treated with radiotherapy for posterior fossa tumour, Palmer et al. (2012) reported damage to the white matter tracts in the brain and lower processing speed during neuropsychological testing, particularly in children under 3 years of age. Damage to the corpus callosum was also noted to be associated with reductions in cognitive processing.

Damage to particular structures or regions in the brain following radiation for CBT have also been implicated in specific long-term cognitive impairments, such as memory performance (Riggs et al. 2014; Padovani et al. 2012). Riggs et al. (2014) studied 20 children treated with radiation for medulloblastoma. These children exhibited poor performance on a memory measure and showed significantly reduced white matter volume, damage to the uncinate fasciculus, as well as a reduced hippocampal volume. Not only were the structural findings considered significantly associated with the reduced memory abilities, but Riggs et al. (2014) noted that the hippocampus appeared particularly vulnerable to treatment effects in this study. However, delivery of radiation to either the cerebral hemispheres or the posterior fossa has been reported to result in reduced neurocognitive outcomes and intellectual declines regardless of site (Docking et al. 2003a, b; Murdoch et al. 2004; Jannoun and Bloom 1990; Duffner et al. 1983).

A longitudinal study following 18 children with CBT over a 10-year period reported particular reductions in nonverbal cognitive ability, visual perceptual skills, information processing speed, and attention (Brière et al. 2008). Schmidt et al. (2010) followed an adolescent treated for an ependymoma and a normally developing control at three time points for over 2 years from the commencement of radiotherapy through to 27 months post-treatment. The adolescent initially underwent surgical removal of the metastatic ependymoma followed by focal external beam radiotherapy. Compared to baseline, the adolescent with a brain tumour exhibited decreases in raw scores on language skills involving phonological awareness and oral fluency, indicating an actual decrease in ability. However, it is likely that the decreases seen in raw score performance over time in this case may be attributed to the numerous tumour recurrences after baseline in both the temporal lobe, bilateral cerebellar hemispheres, and spinal cord, and the subsequent aggressive treatment regimes over the longitudinal testing period (including subtotal removal of the temporal lobe tumour, additional radiation, radio-surgery for bilateral cerebellar lesions). In addition, the adolescent with brain tumour sustained a major haemorrhage in the left temporal lobe that also required emergency surgery.

Mabbott et al. (2008) documented that children treated with radiation for posterior fossa tumour demonstrated reductions in information processing speed and IQ compared to children who received surgery alone. A meta-analysis completed by De Ruiter et al. (2012) also determined that treatment for paediatric brain tumour inclusive of radiotherapy significantly impacted intellectual functioning and attentiveness. Docking and colleagues consistently demonstrated the impact of radiotherapy treatment on the general language and cognitive-communicative abilities of children who had undergone radiotherapy treatment for posterior fossa tumour (Murdoch et al. 2004), supratentorial tumour (Docking et al. 2003a, b), and brainstem tumour (Docking et al. 2005). Cognitive-communication was noted to be significantly impacted in children who received radiotherapy treatment for posterior fossa tumour, particularly in problem-solving, in which profoundly severe reductions in performance were also noted over a 12-month period post treatment (Docking under review; Docking et al. 2007; Murdoch et al. 2004). This finding is of particular note in regard to its role in social competence and pragmatic ability.

Reductions in neurocognitive and language skills following radiotherapy in turn impact outcomes measuring academic achievement, overall intellectual ability and social competence (Askins and Moore 2008; Mabbott et al. 2008; Reimers et al. 2007; Wolfe et al. 2013). Quality of life related to CBT has also been reported to be significantly lower in children receiving radiotherapy treatment (Pogorzala et al. 2010; Vinchon et al. 2011). A study by Pogorzala et al. (2010) reported lower health-related quality of life for survivors of both brain tumour and acute lymphoblastic leukemia (ALL) compared to their healthy normally developing peers. Health-related quality of life measures included total, physical, psychosocial, emotional, social and school functioning. Further, children who received radiotherapy were noted to present with significantly lower scores on evaluation of quality of life. Additionally, it was noted that children who were treated for brain tumour exhibited lower scores compared to their ALL counterparts (Pogorzala et al. 2010).

A number of studies have also demonstrated that impact of radiotherapy in combination with chemotherapy exerts more severe effects in children compared to chemotherapy alone (Watanabe et al. 2011; Bouffet et al. 2010; Duffner 2010). A study by Watanabe et al. (2011) compared the cognitive abilities of 26 children who received chemotherapy for ALL with a group of 12 children with brain tumour who received both radiotherapy and chemotherapy. Significant declines in IQ were noted in the brain tumour group only, with continued reductions in intellectual performance up to 5 years later. The potential direct effects of the brain tumour in this group also cannot be overlooked.

6.4.3 Effects of Chemotherapy Treatment for CBT

Chemotherapy is an important part of multimodality treatment planning for children with CNS tumours (Cohen et al. 1982; Packer et al. 1993). The inclusion or use of chemotherapy treatment for CBT is dependent on tumour type, age of the child and tumour location (Imbach 2014). Chemotherapy is also used as a palliative agent in order to induce temporary remission and increase quality of life (Imbach 2014).

In general, children are reported to tolerate chemotherapy better than adults. More than in any other region of the body, the accessibility of the tumour to the chemotherapeutic agent is most limited in the brain. The amount of drug that can cross the capillary wall (the blood-brain barrier) or the blood-tumour barrier is dependent on the permeability of the capillaries to that drug, the surface area of the capillaries available for drug exchange, the blood flow to the tumour, the concentration of drug in the plasma, and the length of time that the drug circulates through the capillaries (Packer et al. 1993). There is no doubt that the barrier, which usually protects the brain from certain biomolecules that can upset its function, restricts the delivery of anticancer agents (Packer et al. 1993). Although chemotherapy is not considered appropriate for all types of brain tumour, high-grade tumours such as medulloblastoma, supratentorial PNET, ependymoma, as well as glioblastoma, are intrinsically chemosensitive (Tait et al. 1992). Unfortunately, distribution of the drug to the brain adjacent to the tumour can also occur (Packer et al. 1993).

Neurocognitive outcomes associated with chemotherapy treatment for CBT are less well documented or understood than the effects of radiotherapy (Castellino et al. 2014). Significant improvements in the management of CBT using chemotherapy have recently occurred, allowing improved outcomes in these children (Bouffet et al. 2010; Watanabe et al. 2011). However, despite chemotherapy often being used as a method of delaying or avoiding radiation-induced outcomes in children, emerging evidence is highlighting the existence of neurocognitive toxicities associated with chemotherapy treatment for CBT (Monje and Fisher 2011; De Luca et al. 2009; Duffner 2010). To date, long-term neurocognitive effects from chemotherapy have not been considered to be as deleterious as morbidity resulting from radiotherapy, and chemotherapy is commonly used to delay radiotherapy treatment in children who are younger in age (Cohen et al. 1982; Bouffet et al. 2010). Outlining the impact of chemotherapy on neurocognitive function in children with brain tumour is nonetheless complicated, as treatment protocols utilising chemotherapy alone to treat CBT are limited (Duffner 2010; De Luca et al. 2009; Walsh and Paltin 2015). Additionally, multiple chemotherapeutic agents are often used in combination (Duffner 2010). Exploration of these effects has largely occurred though examination of children who have been treated with chemotherapy for leukaemia, as there is very little evidence documenting outcomes of chemotherapy-only treatment for children with brain tumour.

A study conducted by Sands et al. (1998) documented neuropsychological findings in ten children who had received conventional induction chemotherapy (vincristine, cisplatin, cyclophosphamide, and etoposide) repeated every 3 weeks for five cycles, followed by myeloblative consolidation chemotherapy with autologous bone marrow reconstitution, subsequent to maximal surgical resection. As a group, subjects performed in the low average range of overall intelligence, verbal IQ/verbal reasoning and performance IQ/abstract visual reasoning. Performance was, however, in the average range in areas of reading, spelling and numerics, verbal learning and memory, visual memory, and visuospatial, social-emotional and behavioural functioning. In the area of fine motor skills, Sands et al. (1998) reported performance that occurred within the low average range on tasks using the dominant hand,

and within the borderline range with the use of the non-dominant hand. A group of 31 children treated under the age of 3 years with surgery and/or chemotherapy for brain tumour were examined by Ward et al. (2009). While most children reportedly exhibited intact IQ and memory 4–11 years post treatment, significant difficulties were noted in executive functioning. A comprehensive neuropsychological examination by O'Neil et al. (2011) of 20 children treated with chemotherapy followed by reduced volume and dose radiation treatment for CNS germinoma revealed stable performance within the normal range across measures of verbal and nonverbal IQ, working memory, executive functioning, processing speed, memory, as well as social and emotional functioning.

Language effects in children who have received either chemotherapy alone, or chemotherapy in combination with low-dose radiotherapy, have been reported. In their study of 10 children treated with chemotherapy only for brain tumour, Sands et al. (1998) reported significant deficits on language tasks investigating expressive naming and receptive vocabulary. A case analysis by Murdoch et al. (2004) described two children who had undergone chemotherapy following surgery for posterior fossa tumour. Both cases were under 3 years of age at the time of treatment (1 year 8 months and 2 years 5 months, respectively) and were diagnosed with an ependymoma in the fourth ventricle. Following surgical removal and shunt insertion for severe hydrocephalus, chemotherapy was commenced. At the age of 7 years 4 months, Case 1 exhibited significant difficulties across all general level expressive language skills and semantic comprehension, and significant deficits across higher-level cognitive-communication tasks, and phonological awareness. Two months following chemotherapy completion, Case 2 exhibited deficits in general level expressive and receptive skills. There was also particular difficulty understanding verbs in context, spatial concepts, pronouns, quantity concepts and recognising actions in pictures and using pronouns, naming, responding to what/where and yes/no questions, as well as the use of morphemes. At the age of 3 years 9 months, Case 2 had severe naming difficulties, and some expressive syntax difficulties, although other areas of general language were deemed to be intact. However, one month later evidence of a recurrent ependymoma in the right cerebellum was discovered on follow-up MRI. It is acknowledged that in considering these findings in the context of chemotherapy treatment, other variables that are also related to poor outcomes in cognition and language are noted. That is, both cases also underwent surgical treatment and treatment for significant hydrocephalus, with one case also experiencing a tumour recurrence at the time of language testing.

Language deficits have also been documented to occur following CNS-targeted chemotherapy for ALL. As this population often only receives low doses of radiation treatment if at all, without neurosurgical intervention, the effects of chemotherapy treatment on language function can receive enhanced exploration. A study by Lewis et al. (2011) identified expressive language deficits and impairments in figurative language abilities in a group of 13 children treated for ALL. Murdoch et al. (1999) reported large variation in ability in this population, with language skills ranging from above normal to severely impaired across individual cases in their study.

6.5 Pragmatic Disorders Associated with Childhood Brain Tumour

Pragmatic skill development is a complex and multi-dimensional area, which is commonly disrupted in individuals with CBT (for review see Hocking et al. 2015; Schulte and Barrera 2010). Pragmatic disorders associated with CBT make it difficult for individuals to interact appropriately with peers, family or the broader social networks of a community, leading to social and community isolation (Agnihotri et al. 2012).

Pragmatic and social skills deficits associated with CBT are many and varied. These deficits include challenges reading facial expressions; problems initiating communication; becoming more withdrawn and using more internalising behaviours; problems with emotional expression including mood changes, irritability and impulsivity; and limited awareness of self and others (Adamoli et al. 1997; Agnihotri et al. 2012; Bonner et al. 2008; Carey et al. 2001; Deasy-Spinetta and Spinetta 1980; Frayne et al. 1999; Noll et al. 1990; Saury and Emanuelson 2011; Upton and Eiser 2006; Vannatta et al. 1998; Wolfe et al. 2013). These pragmatic and social impairments are summarised in Table 6.1.

A challenge to studying pragmatic skills in CBT has been a lack of operationally definable constructs of social ability (Schulte and Barrera 2014). One approach to measurement, applicable to children with CBT (Schulte and Barrera 2014), is Rose-Krasnor's (1997) adaptation of Cavell's (1990) tri-component model of social competence. Rose-Krasnor (1997) defined and operationalized four areas of social competence: (i) social skills, able to be measured using behavioural checklists; (ii) sociometric status where social competence is measured via peers' perceptions; (iii) relationship quality as requiring measurement of both partners in a relationship; and (iv) functional outcomes where competence is considered to be environment- or context-specific, requiring identification of social goals and tasks. This approach highlights the many communicative partners who are critical to informing an assessment of social abilities (e.g. peers, teachers, parents, in addition to clinician-derived checklists) and provides clarity over constructs of measurement.

Table 6.1 Pragmatic and social deficits reported in children with childhood brain tumour

Poor facial expression recognition
Peer relationship problems, including difficulty making friends, having no close friends, peer exclusion, bullying, social isolation
Problems expressing emotions, mood changes, irritability, impulsivity
More withdrawn, socially inhibited, lack of self confidence
Difficulty initiating communication, restricted leadership, topic-maintenance issues
Limited awareness of self and others
Increased internalising behaviours, anxiety, depression
Severe to profound problem-solving difficulties
Differences in narrative macrostructure story retell

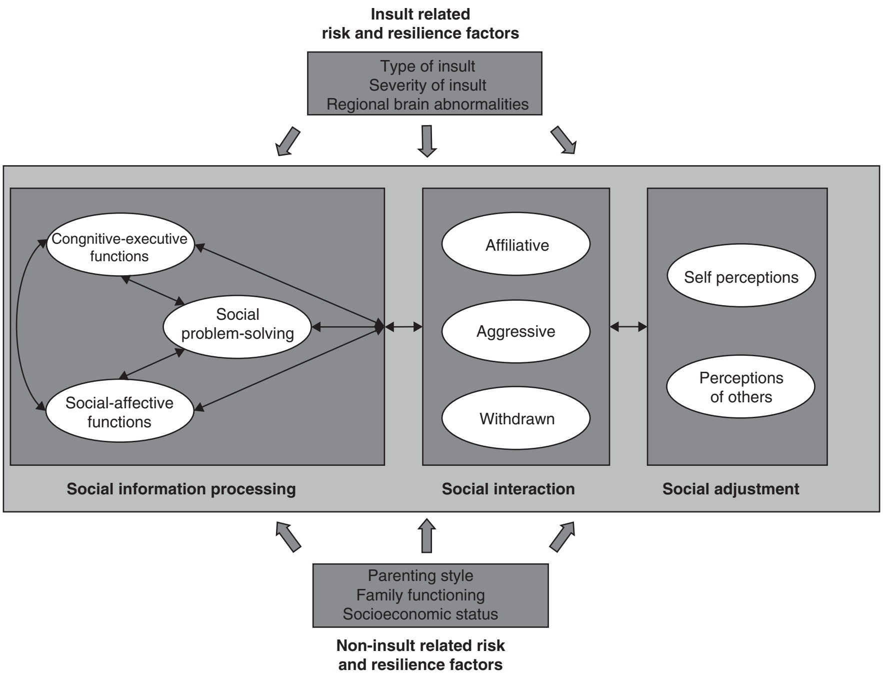

Fig. 6.1 Integrated model of social competence in children with brain disorders (Reprinted with permission from Yeates et al. 2007)

Further to this approach, there is also a need for a more integrated explanatory model, examining mechanisms and interacting variables that lead to an informed view of social competence. Such a model has been suggested by Yeates et al. (2007) in relation to social competence in children with a wide range of brain disorders (see Fig. 6.1). This model consists of three key areas of social competence: social information processing; social interaction; and social adjustment. Hocking et al. (2015) recently suggested that this model is applicable to those with CBT. The model highlights the complexity of mechanisms that may contribute to pragmatic abilities in this population.

A plethora of explanatory or inter-related predictors of social skills in CBT have been examined, such as neuroanatomical and demographic (including gender) factors, verbal and non-verbal IQ, psychosocial and socioeconomic predictors (see Schulte and Barrera (2010) and Hocking et al. (2015) for review). Taking the broadest view, social competence in CBT brings together social-affective and cognitive-executive functions, social interactional behaviours and social adjustment factors (see Fig. 6.1). Of all of these factors, the interaction between executive functioning and social competence has been most explored (Carey et al. 2001; Wolfe et al. 2013) (see Riggs et al. (2006) for review).

Wolfe et al. (2013) describe the importance of executive functions of self-monitoring, inhibition, shifting and working memory for social tasks such as conversational turn-taking, maintaining friendships and abiding by school norms. Children with CBT have been shown to present with a wide range of executive functioning deficits that could impact on social skills. Like the domain of social skills, executive functioning is also a multi-dimensional construct which includes volition/initiation, planning, purposive action and effective performance (Lezak 2004). It is clear that social skills and executive functioning are almost inextricably linked and it is difficult to tease out directionality of a causal relationship in this area (Wolfe et al. 2013).

Furthermore, a positive correlation has been demonstrated between higher executive functioning abilities and social skills, independent of overall intellectual ability (Carey et al. 2001; Wolfe et al. 2013). This is an important distinction because it suggests that even in the presence of preserved or higher intellectual abilities, survivors of CBT may not be able to compensate for and overcome their vulnerability to pragmatic deficits. That is, there is something specific about the nature of social skills that may require more targeted work to enhance or optimise outcomes following surgery and radiotherapy for CBT.

The impact of higher-level, cognitive-communicative functioning in the area of linguistic problem-solving may also provide insight into subtle pragmatic deficits following CBT. Specific deficits and/or decreases in linguistic problem-solving have been reported in CBT case analyses conducted by Docking and colleagues, and was the only area of deficit noted to decrease over time to profoundly severe levels in these children (Docking et al. 2003a, b, 2007; Docking under review). In particular, a prospective examination of two cases exhibited significant deficits and decreases in problem-solving up to 18 months post-treatment (Docking under review). The first case was treated with surgery and radiotherapy for a low-grade astrocytoma in the brainstem and exhibited intact language skills on comprehensive examination, with a reduction in problem-solving only 12 months later. The second case, treated with surgery and chemotherapy for a right cerebellar ependymoma, also exhibited moderate deficits in problem-solving only and profound deficits in this area 12 months later. It is considered that if children lack insight into the social problem and use of language at a cognitive level, it is likely that a breakdown in pragmatic performance will occur. It was also noted that as a group, 12 children treated for posterior fossa tumour performed significantly more poorly across all cognitive-communication measures examining linguistic problem-solving, advanced semantic, and figurative language (Murdoch et al. 2004). Five children with supratentorial tumour, however, also exhibited reduced performance on problem-solving as well as higher-level receptive semantic measures. These more advanced competency levels required in social communication are also noted to have a role in the functional outcomes associated with pragmatic abilities in CBT.

Further insight may also be gained by exploring the functional narrative abilities of children who survive brain tumour. An analysis of the narrative abilities of 17 children, who underwent comprehensive language testing, revealed that both posterior fossa tumour location and hydrocephalus contributed to differences in macrostructural components when retelling a story (Docking et al. 2016). The macrostructure skills of children treated for brain tumour explored by Docking et al. (2016) included an analysis of story grammar elements such as introduction, conflict resolution, conclusion, as well as cognitive-communication skills such as referencing, cohesion, mental states and character development. These components were analysed using the Narrative Scoring Scheme (NSS; Heilmann et al. 2010). At an individual level, more than half of the children treated for brain tumour exhibited poorer macrostructure scores than their age- and gender-matched peers across these elements. Such components are considered likely to have a functional role in pragmatic outcomes and language use in children with brain tumour.

Individual analysis in the study by Docking et al. (2016) also revealed performance differences on microstructural elements, such as the number of different words (NDW), total number of utterances (TNU), mean length of utterance measured in morphemes (MLU), grammatical accuracy (GA), and number of mazes. Number of mazes is reported to be a measurement of the number of words or unattached fragments that do not contribute meaning to the utterance, including filled pauses or repetition of a sound, part, whole word or phrase (phonological, lexical, or grammatical revisions, or repetitive use of conjunctions) (Docking et al. 2016). In this study, 59 % of children treated for brain tumour scored below their age- and gender-matched peers on the number of different words used, 47 % on total number of utterances, 76 % on mean length of utterance, 41 % on grammatical accuracy, and 59 % on number of mazes.

The ability to engage in extended discourse using the narrative skills measured in the study by Docking et al. (2016) is considered essential for effective and functional social and interpersonal communication and academic outcome for survivors of CBT. Findings also highlighted that assessing narrative ability in children treated for brain tumour is an essential part of comprehensive assessment due to the potential for poor narrative abilities to be masked by intact performance on formal language measures in this population (Docking et al. 2016). Such discrepancy in performance is demonstrated in the case presentation of a male child of 5 years 4 months treated with surgery for a cerebellar astrocytoma. Figure 6.2 shows that his tumour at diagnosis on magnetic resonance imaging (MRI) is located in the superior left cerebellar vermis and medial aspect of the left cerebellar hemisphere. The axial view displays the swelling and mass effect of the tumour, whereby the surrounding cerebellar tissue and the fourth ventricle are impacted and encroached upon (also called partial effacement), leaving very little room for normal CSF flow.

Seven months following subtotal surgical treatment for a left cerebellar tumour, at the age of 5 years 11 months, this child produced a narrative during the Peter and the Cat Narrative Assessment (Leitão and Allan 2003) (see Box 6.1). The Peter and the Cat Narrative Assessment consists of a story re-tell task. During this task, the examiner reads the story script to the child using a 9-page picture storybook. The child is then instructed to re-tell the story to the examiner as accurately as possible using the same stimulus picture book.

Box 6.1 Narrative story re-tell extract of a CBT survivor at age 5 years 11 months during the Peter and the Cat Narrative Assessment (Leitão and Allan 2003)

Child: Peter

Child: Um what next

Child: Peter

Child: Um (pause)

Child: Palm tree

Child: A cat up in the tree

Child: Um

Child: Turned behind him and couldn't see it

Child: So he climbed up the tree

Child: And then

Child: And (Pause)

Child: He thought he was stuck

Child: And (Pause)

Child: He yelled

Child: He yelled and he yelled and he (unintelligible)

Child: And man down the street

Child: Um

Child: And heard him

Child: And

Child: And (pause)

Child: Got a big ladder

Child: And climbed up

Child: And he bringed the cat home

Child: And he said (pause)

Child: Um

Child: Mum can I keep this?

Child: And

Child: And his Mum said yes.

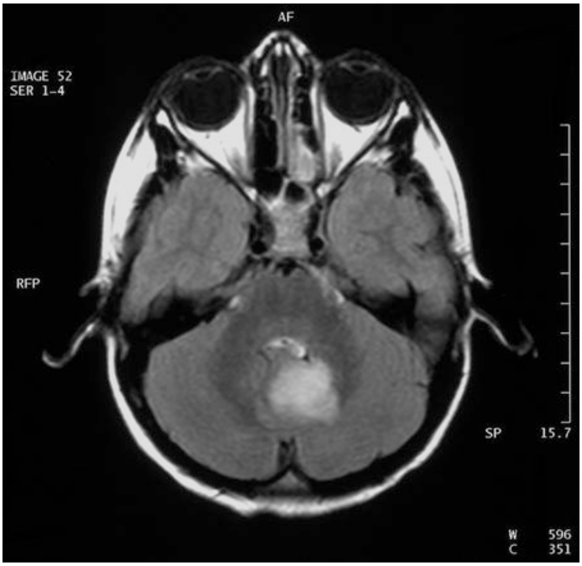

Fig. 6.2 Axial view MRI of a left cerebellar astrocytoma in a male child of 5;4 years

Despite exhibiting poor performance across macrostructure (story grammar elements) and microstructure elements during this task (including reduced NDW, TNU, MLU, GA, and increased use of mazes), this child with CBT did not display difficulty on any other language measures, including the Clinical Evaluation of Language Fundamentals – Preschool (Wiig et al. 1992), the Peabody Picture Vocabulary Test – Third Edition (Dunn and Dunn 1997), and the Hundred Pictures Naming Test (Fisher and Glenister 1992).

Poor social skills are debilitating in themselves. However, there are further negative outcomes associated with poor social skills, including impacts on psychological wellbeing, disrupted family life, limited intimate relations and career options and poor community integration (Boydell et al. 2008; D'Agostino and Edelstein 2013). Of great concern, social skills appear to be a significant modifying factor for depressive symptoms within the complex relationship of social skills, self-worth and depressive symptoms (Barrera et al. 2008). It is clear that supporting social skills is a key area of need for young adult survivors of CBT (D'Agostino and Edelstein 2013). Specific management considerations of this group are discussed further in the following section.

6.6 Assessment and Intervention of Pragmatic Disorders Associated with Childhood Brain Tumour

Research into the pragmatic abilities of children with CBT has burgeoned in the past 15 years. Related to this growth has been the development of a broad range of assessment and intervention approaches. Whilst there are no formalised guidelines or position papers to guide international best practice, it is widely recognised that those with CBT require an integrated surveillance program which monitors neurocognitive, motor, communication and social adaptive skills over time (Msall 2010). There is now wide recognition of the long-term and potentially broad impacts of CNS disruption in those with CBT. Surveillance programs are beneficial in ensuring a more equal approach to prioritisation of services so that fewer children ‘fall through the net’. This is pertinent to social skills functioning in CBT, where increases in social and attentional problems are reported over time (Mabbott et al. 2005; Boydell et al. 2008; Moyer et al. 2012). In this section, we discuss specific approaches to assessment and treatment which are to be applied within a model of ongoing, long-term monitoring for children with CBT.

6.6.1 Assessment Approaches

A range of paediatric social skills assessments are available. A recent systematic review evaluated the psychometric properties of assessment tools specific to children with CBT (Schulte and Barrera 2014). The authors set out to assess features of construct validity, internal consistency reliability, test re-test and inter-rater reliability and responsiveness (Schulte and Barrera 2014). To be included, papers had to be published in English and report on a quantitative measurement tool designed to assess social competence in children or adolescents (aged <18 years) with a brain tumour. The authors found ten assessment measures suitable for inclusion and identified the Social Skills Rating System (see Table 6.2) as having the most comprehensive psychometric data (i.e. construct validity, internal consistency and responsiveness) for the population with CBT. Other measures commonly used in this population were the Child Behaviour Check List/Youth Self Report, the PedsQL4.0 and the Revised Class Play (Schulte and Barrera 2014).

Importantly, Schulte and Barrera’s (2014) review identified a lack of data for test-retest or inter-rater reliability of these assessments. A lack of test-retest data is of concern given the need for repeated testing over time as part of surveillance or monitoring of social skills of these children throughout early life. The limited inter-rater reliability also impacts on our ability to make confident judgements regarding whether we should anticipate children and parents/significant others to identify similar patterns of social skill functioning in cases with CBT.

6.6.2 Intervention Approaches

A recent focus group study of young adult survivors with CBT by D’Agostino and Edelstein (2013) identified social skills as a key area of therapy need. In particular, these authors reported a critical need for multiple mechanisms for peer support, including a buddy system linking patients to peer mentors to navigate the medical system, face-to-face and virtual support groups, opportunities to socialise with other young adult cancer survivors and also counselling and coping skills geared to their age group. A highly insightful suggestion raised by one of the young adults in the focus group was that it would be helpful if, at the same time children are referred to an oncologist, they are also referred for psychosocial counselling.

A focus group study by Bruce et al. (2008) of school experiences of families of children with CBT reported that the most useful resources and strategies for reintegration to the school system included open and consistent communication, advanced planning and preparation, promotion of the child's social opportunities, regular psychological assessments (the theme of surveillance again reappearing), communication between the school and the relevant medical professionals, school-based awareness

Table 6.2 Assessment tools with sufficient psychometric properties for assessing pragmatic skills in CBT

Assessment tool	Age range	Description
Social Skills Rating System (Gresham and Elliot 1990)	Elementary: grades 3–6 Secondary: grades 7–12	Assesses social behaviours of co-operation, empathy, assertion, self-control and responsibility with forms completed by children, parent proxies and teachers. Example item: "I/My child make/s friends easily".
Child Behaviour Checklist/Youth Self Report (Achenbach 2001)	6–18 years, clinician administered 11–18 years, Youth Self Report	Standardised tool designed to assess child behaviour. There is a clinician-administered and a Youth Self Report (YSR) measure. The YSR is for children ≥11 years. There are 9 subscales with the relevant social domains being 'social competence' and 'social problems'. Example item from the social problems subscale: "Doesn't get along with other kids". Example item form the social competence subscale: "About how many close friends does your child have".
Pediatric Quality of Life (Varni et al. 1999)	2–18 years, parent proxy report 5–18 years, self-report	A 23-item measure designed to assess health-related quality of life. Four subscale scores (and total health-related quality of life score) provided across Physical, Social, Emotional and School Function. Social Function scale contains 5 items, e.g. "Other kids do not want to be my friend".
Revised Class Play (Masten et al. 1985)	Grades 3–6	Peer rating approach where children nominate peers who align with behavioural descriptors. RCP measures 'social reputation' across three areas: sociability/leadership; aggressive/disruptive; and sensitivity/isolation. The third factor is used to identify children who do not frequently interact with peers.

and education, adaptation of academic expectations to individual needs, and awareness on the part of teachers about the child's experiences and needs. Clear communication about mutual expectations is clearly a pressing need. It was suggested that there should be a written journal and meetings with teachers, principals and other support staff such as teaching assistants, and perhaps school visits by the relevant health officer (Bruce et al. 2008). Whilst friends and siblings were described as being critical to overcoming social skill challenges in the school environment, young adults remarked that it was not beneficial to provide information about the brain tumour to peers, and that at times this could make a situation worse, presumably by delineating points of difference.

Following on from these important focus group findings, Bruce et al. (2012) examined the efficacy of a school liaison program for CBT. The program familiarised teachers with the implications of each child's brain tumour treatment and outcomes in relation to learning, behaviour, and socialisation. Individual programs were negotiated for each child to address academic, behavioural and social needs. Bruce et al. (2012) then examined the experiences of nine families, teachers and relevant health professionals who took part in the liaison program. Interviews which were used to capture the benefits and challenges of the program were analysed. Parents, teachers and children were positive about the program. Children felt they were able to learn to their personal ability, rather than being constantly judged as being worse compared to peers. Parents reported that the program helped their child's advocacy skills and improved social and learning outcomes. Overall, there was considerable support for such a program to improve school outcomes, including social outcomes, for those with CBT (Bruce et al. 2012).

A number of studies have examined the effect of cognitive-behavioural training and social skills programs on pragmatic deficits in children with CBT (Barakat et al. 2003; Barrera and Schulte 2009; Poggi et al. 2009). Poggi et al. (2009) investigated the efficacy of the cognitive-behavioural approach in psychological interventions for young brain tumour survivors. The study examined a treatment group of 17 survivors of CBT and 23 controls who did not receive the treatment. The cognitive-behavioural approach focused on lack of adaptive behaviours including social skills and consisted of positive reinforcement, negative reinforcement, contingency contract, token economy, modelling, shaping, prompting and fading. Poggi et al. (2009) reported that the treatment group showed a significant advantage on the withdrawn, somatic complaints, social problems, attention problems, internalising and total problem scales of the Child Behaviour Checklist (Achenbach 2001). On the Vineland Adaptive Behaviour Scales (Sparrow et al. 1984), the treatment group did significantly better than the control group in the Social Skills domain.

A handful of studies have examined the ability of traditional social skills programs to address the pragmatic deficits of survivors of CBT (Barakat et al. 2003; Barrera and Schulte 2009). Barakat et al. (2003) evaluated the effectiveness of a manualised social skills group training program to enhance social skills and social functioning in individuals with CBT. The study conducted social skills training on three groups, each with 5–7 children aged 8–14 years. A parent component was included. Groups met weekly for six sessions. Thirteen children and their parents and teachers completed standard measures before and 9 months after the treatment. Social skills and social functioning outcomes improved and higher verbal and non-verbal functioning were associated with better improvement. Barakat et al. noted that randomised, multi-site, controlled studies were the next step in proving efficacy of the treatment.

A further group social skills treatment program for survivors of CBT examined the feasibility and outcomes of this approach in 32 survivors (14 females) aged 8–18 years. The treatment involved eight, 2-h per week sessions focused on social skills, including friendship-making and assertion. Feasibility analyses showed promising acceptability, retention, recruitment and treatment fidelity. Improvement was also found after intervention based on parents' reports of self-control, social skills and quality of life. The authors concluded the intervention was feasible and outcomes showed preliminary support for the efficacy of the program (Barrera and Schulte 2009).

There is also preliminary data supporting interventions such as a theatre skills-based, social skills intervention for adolescents with CBT (Agnihotri et al. 2012). The SMART (Swedish Memory and Attention Re-Training) cognitive training program combined with a parent coaching program has also been shown to be promising for three cases with CBT (van't Hooft and Norberg 2010). These studies show promise yet require randomised controlled trials to determine whether they are efficacious to a broader range of individuals with CBT. Finally, a double-blind, randomised controlled trial examining the efficacy of methylphenidate on neurocognitive functions reported that this treatment reduced attention and social skills deficits in the short-term in children who survived brain tumours and ALL (Mulhern et al. 2004a). Gains in attention, behaviour and social skills were also maintained into the longer-term, over 1 year (Conklin et al. 2010). Further studies replicating the findings of this randomised controlled trial are required.

6.7 Summary

Much advancement has been made in the treatment of CBT in recent years, with the concept of cure now considered to include optimisation of quality of life for survivors (Mulhern et al. 2004b; Mulhern and Palmer 2003). Despite recent improvements in paediatric oncology which have targeted adverse effects and employed neuroprotective strategies to minimise impact on pragmatics, language, and cognitive outcomes, children with CBT are still largely at risk of deficits in these areas (Ris et al. 2013). In fact, it has been acknowledged that it is those skills and abilities which are yet to be acquired that are most at risk, highlighting the importance of early and ongoing assessment and intervention (Walsh and Paltin 2015). Early approaches to management and intervention provide the promise of reducing or ameliorating neurocognitive sequelae, communication deficits, and pragmatic difficulties for children with brain tumours. Knowledge about risk factors, specific deficits, and their progression over time can assist clinicians and researchers in implementing early preventative interventions, providing improved service and tailoring investigations for those who are at greatest risk of poor outcomes (Janzen et al. 2015; De Luca et al. 2009; Castellino et al. 2014; Moore et al. 2013; Cheung et al. 2014).

An integrated approach to early intervention should also include a prospective plan for long-term management and monitoring of the acquisition of cognition, language and pragmatic skills, as children remain at risk throughout development following CBT diagnosis and treatment (Mulhern and Palmer 2003). The concern that this currently does not routinely occur is exacerbated as evidence continues to emerge that children fail to acquire or develop skills at the expected rate over time. However, many steps toward improving services in this area are underway (see Skinner et al. (2015) for a full discussion on establishing guidelines for surveillance of childhood cancer survivors).

It is also important to acknowledge that no single neurocognitive profile exists for CBT. While overall reductions in neurocognitive and language outcomes are reported following CBT, it must also be noted that variability exists due to the heterogeneity of presenting variables in this population (Docking et al. 2003a, b, 2007; Askins and Moore 2008; Murdoch et al. 2004). For example, not every child who receives the same treatment for the same tumour type in the same location will present with the same level of cognitive decline or specific profile of language and pragmatic deficits. Tumour histology, disease progression, tumour location(s), associated presenting symptoms and complications, age at diagnosis, gender, treatment combination, age since treatment, potential recurrences and re-treatment must all be considered individually when managing pragmatic and other deficits associated with CBT.

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Chapter 7
Cerebral Palsy

Stéphanie Caillies

Abstract Cerebral palsy describes a group of disorders of the development of movement and posture that limit activity. These motor disorders are attributed to non-progressive disturbances that occur before, during or shortly after birth. They are often accompanied by disturbed sensation, communication, perception and behaviour. Even though children with cerebral palsy patently have communication problems, little is known about their pragmatic abilities. Awareness of the pragmatic difficulties faced by children with cerebral palsy could, if appropriately acted upon, result in the improvement of their communication skills within the family, at school, and ultimately in the workplace. It is, therefore, particularly important to identify them. In this chapter, I examine the communicative and pragmatic abilities of children with cerebral palsy through a review of the literature, and indicate some new directions for research.

Keywords Cerebral palsy • Executive function • Mental state • Metaphor • Motor disorder • Motor speech impairment • Narrative • Pragmatic inference • Semantic inference • Theory of mind

7.1 Introduction

Cerebral palsy (CP) describes a group of disorders of the development of movement and posture that cause activity limitations. These disorders are attributed to non-progressive disturbances that occur before, during or shortly after birth. There is agreement that CP is due to a defect or a lesion in the developing brain. Consequently, CP has many aetiologies, including brain malformations, infections, and anoxic injury (Miller and Clark 1998). CP is traditionally classified according to the type of motor symptom (spastic, dyskinetic, or ataxic) and the location of the impairment (hemiplegia, diplegia, or tetraplegia). For example, an individual with spastic

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diplegia exhibits high and constant tightness or stiffness in the muscles of the lower extremities of the human body, usually those of the legs. These motor disorders are often accompanied by disturbances of sensation, communication, perception, behaviour, and/or by seizure disorders (Bax et al. 2005). CP has a prevalence of two per 1000 births in Western Europe, making it the most common cause of physical disability in children (Johnson 2002).

Although the literature on children with CP has traditionally focused on their motor impairment, a growing number of studies are now investigating their cognitive functioning (see Bottcher 2010), with a recent emphasis on pragmatic abilities. The latter refer to the comprehension and appropriate use of language in context. Clinical practitioners have frequently reported problems related to pragmatics in children with CP. Owing to their motor dysfunction and to varying degrees of speech impairment, children with CP often have less spontaneous contact with the environment, and therefore far fewer opportunities for interacting socially and actively manipulating objects than their peers (Pennington and McConachie 2001; Voorman et al. 2010). This results in pragmatic challenges that are not yet fully identified. Although there is an extensive body of findings regarding speech and language in children with CP (Hustad et al. 2010; Pirila et al. 2007), descriptions of their pragmatic abilities are rare, and do not draw any links with the children's type of motor symptom. In this chapter, after examining the communicative and pragmatic abilities of children with CP through a review of the literature, a small descriptive study of the understanding of action-verb metaphors by these children is presented. New directions for research are indicated throughout.

7.2 Communication Impairment of Children with Cerebral Palsy

CP is often associated with a wide range of comorbidities (e.g. mental retardation, epilepsy), including communication impairment (e.g. anarthria, dysarthria, auditory disorder). Studies of large population-based samples have found that 60 % of European (Bax et al. 2006) and 55 % of Canadian (Zhang et al. 2014) children with CP have some type of communication problems, suggesting that communication impairment is one of the most common dysfunctions associated with CP. Several studies have also reported that these communication problems are associated with the severity of motor deficits (Parkes et al. 2010; Zhang et al. 2014), as assessed by the Gross Motor Function Classification System (GMFCS; Palisano et al. 1997) or the Manual Ability Classification System (MACS; Eliasson et al. 2006). Scores on the Communication Function Classification System (CFCS; Hidecker et al. 2011), which is based on the concept of sending and receiving messages by an individual with CP during interaction with familiar and unfamiliar partners, appear to be correlated with the GMFCS and MACS (Hidecker et al. 2012). It may well be that this link between communication and motor impairment is mediated by the intellectual disability that is frequently observed in CP (Gabis et al. 2015).

These studies highlight the importance of identifying the communicative profiles of children with CP. We cannot provide effective interventions for these children unless we know the exact nature of their communication problems, especially in relation to their motor symptoms. At present, communication in children with CP is still poorly described, although some assessment tools are now being developed (see above; also Virella et al. 2016). The literature emphasizes the role played by motor speech impairment in communication (see, for example, Pennington and McConachie 2001), but more knowledge is needed, especially about the cognitive and language dimensions of communication. The literature on typical child development has highlighted the complex interrelations between speech and language development, and between speech and cognitive development. Motor speech problems in CP may affect expressive, and possibly receptive, language development, which could in turn affect communication abilities. In this vein, Hustad et al. (2010) developed a speech and language classification system for children with CP. She found that in addition to speech variables, language comprehension helped to differentiate between groups with different communication profiles.

7.3 Do Children with Cerebral Palsy Have a Pragmatic Impairment?

A range of abilities are involved in expressive and receptive communication. The ability to communicate verbally, for instance, relies upon formal language (phonological, lexical, and grammatical-syntactic systems) as well as semantic and pragmatic systems. Semantic abilities are required for speaking literally or for understanding what is literally said by a speaker, while pragmatic abilities are needed to communicate or understand meanings that vary in some way from what is literally said, depending on norms or contexts. Given that children with CP display communication problems, researchers have raised the question of whether or not their pragmatic abilities are impaired. Nevertheless, very few studies have explicitly investigated pragmatic abilities of children with CP. Conducting a pragmatic analysis of utterances produced by children with CP, Udwin and Yule (1991) demonstrated that the range of conversational acts they employed was very limited. This confirms the observations of clinical practitioners. More recently, Holck et al. (2009) compared the receptive pragmatic abilities of children with CP with those of two other clinical groups, using an inferential and literal comprehension task (adapted from Bishop and Adams 1992). Although their results did not clearly indicate a pragmatic impairment in the children with CP (see also Holck et al. 2010), given their study's limited sample size (10 children with CP), further research is clearly needed, at least at the receptive level. Moreover, although inferential activities can rely on pragmatic abilities, investigating inferential processes is a complex business, as there are different kinds of semantic and pragmatic inferences.

At the receptive level, inferences can be briefly defined as information generated by people to fill in information that is left implicit in *what is said* in the conversational situation. Understanding language in context often involves going beyond the meaning of what is said. By enriching that which is encoded linguistically by adding a wealth of implicit information, it is possible to retrieve the speaker's intended meaning, namely *what is implied* (Grice 1989). It can be assumed that *what is said* is determined by semantics (i.e. knowledge about the semantic content of utterances and about the world) and *what is implied* is determined by pragmatics (i.e. knowledge about the speaker and about the specific context). Both levels potentially require the drawing of inferences, as what is actually said is not always semantically explicit. Two kinds of inferences can, therefore, be distinguished: semantic inferences, which require the retrieval of general background knowledge and provide an interpretation of what the speaker *says*, and pragmatic inferences, which are based on the retrieval of specific contextual information and provide an interpretation of what the speaker *implies*.

Thus, a central component of successful language comprehension is related to both semantic and pragmatic inferential activities. However, to understand what the speaker implies in a conversational context, another kind of inference has to be considered: inferences about others' mental states, better known as *theory of mind* (ToM) in the literature. In summary, in order to study the pragmatic abilities of children with CP, we need at the very least to investigate their ability to infer the speaker's intended meaning, which relies on pragmatic inferences, their adaptation to the knowledge, beliefs, ignorance or emotions of their partner and, to some extent, their use of ToM for verbal communication. So what does the literature tells us about these inferential activities in CP?

7.3.1 Understanding of Others' Mental States in Cerebral Palsy

ToM is a social cognitive skill that has been intensively studied over the past 20 years, and which corresponds, briefly, to the ability to understand other people's mental states. In the developmental literature, the understanding of others' mental states has generally been investigated via false-belief tasks (Flynn 2006). The standard version of these tasks involves the unexpected transfer of a desired object, so that the protagonist entertains a false belief about the location of that object (Wimmer and Perner 1983). Findings indicate that typically developing children become able to successfully perform false-belief tasks at around 4 years (e.g. Flavell et al. 1983; Hogrefe et al. 1986; Perner et al. 1987). Children are unable to successfully complete second-order false-belief tasks, which involve the comprehension of recursive mental states (e.g. John thinks that Mary thinks…), until they are about 6 or 7 years old (Coull et al. 2006). The mastery of first- and second-order false beliefs should not be considered the endpoint of ToM development. Rather, it is the beginning of the child's understanding of mind (Baron-Cohen et al. 1999).

Few studies have attempted to investigate false-belief understanding in children with CP. Dahlgren et al. (2003) studied the ToM abilities of 14 non-verbal children with CP aged between 6 and 15 years, of whom only six were within normal-range intelligence. They predicted that, given the role played by conversational experience in ToM development (Milligan et al. 2007), the children with CP would have difficulty understanding other people's mental states. Consistent with this prediction, results indicated that the non-verbal children had difficulty with first-order false-belief understanding (see also Dahlgren et al. 2010). Along the same lines, when Caillies et al. (2012) investigated ToM abilities in 10 children with CP, aged 7–12 years, with no severe speech impairment and no mental retardation, they found that these children experienced problems with second-order false-belief tasks (see also Li et al. 2014). However, these children performed the first-order ToM tasks just as well as controls. This result is consistent with Holck et al.'s (2010) results, which failed to reveal any significant difference in first-order ToM performances between children with CP and controls (see also Sundqvist and Rönnberg 2010), but is inconsistent with Holck et al.'s (2011) finding which revealed that verbal children with CP performed significantly worse than controls on a first-order false belief test.

These findings lead us to conclude that conversational experience is a key factor for the typical development of ToM, and that the ToM difficulties exhibited by children with CP stem more from delayed ToM development than from a CP-specific ToM deficit. Children who have little or no functional speech may be particularly vulnerable to the delayed development of ToM because they have less conversational experience. Consistent with this conclusion, Falkman et al. (2005) used a longitudinal methodology to demonstrate that instead of a deviant pattern of development in false-belief understanding, children with CP who displayed severe speech impairment had a severe delay in ToM development, compared with children without any disability.

The ToM difficulties observed in CP could also result from general cognitive limitations, as children with CP are at risk of specific *executive function* (EF) deficits (Bottcher 2010). EFs can be defined as a set of general-purpose control mechanisms, often linked to the prefrontal cortex, that regulate the dynamics of human cognition and action (Miyake and Friedman 2012). There are generally agreed to be three core EFs: inhibitory control, encompassing behavioral inhibition and interference control (selective attention and cognitive inhibition), working memory, and cognitive flexibility (Diamond 2013). Because EFs have been related to ToM in typical development (see Perner and Lang 1999 for a review), we can surmise that executive dysfunctions underlie social cognition deficits in CP. To the author's knowledge, however, only two studies have investigated the relationship between ToM and EFs in CP. In verbal children with CP, Caillies et al. (2012) detected partial working memory problems, which were correlated with false-belief performances, but failed to observe any inhibitory control difficulties. It is worth noting that their sample was very small (10 children with CP and 10 typically developing children). Li et al.'s study, which included 42 children with CP and 42 typically developing children, indicated that children with CP have significant EF deficits, be it inhibition, updating (working memory) or cognitive flexibility. Furthermore, their study suggested that ToM deficits in children with CP are strongly related to their inhibition and updating impairments, but not to their cognitive flexibility deficit.

These findings indicate that poor conversational experience, probably due to speech impairment, and EF limitations are the cause of delayed ToM development in children in CP. The ability to take other people's mental states into account in a given social situation is a prerequisite for successful interpersonal communication, but is probably not sufficient in itself (Martin and McDonald 2003). As was previously mentioned, pragmatic abilities encompass the comprehension and appropriate use of language in context, which require adaptation to the partner's mental state, and inference of the speaker's intended meaning. Of course, this presupposes preserved language comprehension and/or intelligible speech production.

7.3.2 Semantic and Pragmatic Inferences in Children with CP

Little is known about the semantic and pragmatic inferential abilities of children with CP. Holck et al. (2010) investigated inference drawing in verbal children with CP. In their study, children were asked inferential questions after reading short stories. Although results did not clearly indicate inferential difficulties in the children with CP, the inferential questions posed in this study mostly required the retrieval of general background knowledge, and were therefore semantic in nature. Caillies et al. (2012) probed the pragmatic abilities of verbal children with CP by investigating pragmatic inference drawing through verbal irony comprehension. Irony is a kind of non-literal language that has no identifiable semantic criteria, in the sense that the semantics of an ironic sentence and a non-ironic one are indistinguishable (Attardo 2002). For example, saying 'He is bright' about an idiot can only be understood as ironic from the context. In other words, understanding an ironic utterance necessarily requires pragmatic inferences to be drawn from the context. Caillies et al. found that the children with CP performed worse than expected for their age on the comprehension of ironic remarks, and that their ToM performances modulated their ability to detect that the ironic speaker did not believe what he or she had literally said. It should be noted, however, that although the children with CP performed more poorly than controls, they could still understand some of the ironic remarks. As with ToM, these findings suggest that verbal children with CP are delayed rather than deviant in irony comprehension, and it might, therefore, be useful for clinicians to try to boost this developmental process.

It is commonly assumed that inference drawing, be it semantic or pragmatic, is a prerequisite for understanding narratives, given that inference generation facilitates coherence and thus supports comprehension (Kintsch 1998). It is also acknowledged that narratives, particularly children's narratives, communicate information not only about the sequence of events, but also about the actions and internal states of the characters. In other words, they communicate an intentional causality

(Trabasso et al. 1989), which requires the mobilization of ToM abilities. Consistent with this, explicit associations were found between several narrative measures (e.g. amount of information, length and complexity) and ToM in a study of subjects with autism and intellectual disability conducted by Tager-Flusberg and Sullivan (1995). But what do we actually know about the narrative abilities of children with CP?

In a study conducted by Holck et al. (2009), verbal children with CP, aged 5–10 years, appeared to have considerable difficulty with narratives, scoring several standard deviations below the mean score on a number of tasks. Moreover, using a story-retelling task, Holck et al. (2011) found that narratives produced by children with CP were less coherent than those of controls (see also Nordberg et al. 2015). This was manifested as a dearth of crucial information and coherence, making it hard for the listener to follow the narrative. The authors also reported that the children with CP used significantly fewer causal conjunctions than controls. These results reflect the difficulty that verbal children with CP have in achieving explicit coherence when retelling narratives.

In sum, investigations of the inferential activities of children with CP are rare, have focused solely on receptive abilities, and have been based on small samples of children with CP. It is, therefore, difficult to generalize their findings. Further research is needed in order to be able to answer the question of what is these children's potential pragmatic impairment at different levels: their adaptation to partners' mental states (ignorance, knowledge, false beliefs, and emotions), their understanding of speakers' intended meanings in conversational or narrative contexts, and their correct use of language in context. These abilities need to be studied in the light not only of their linguistic and cognitive development, but also of their type of motor symptom. The literature has emphasized the role played by motor speech impairment in communication, but other fine or gross motor aspects may well be implicated in the communicative or pragmatic problems encountered by children with CP.

7.4 Is Motor Impairment Related to Pragmatic Abilities? A Small Descriptive Study

Several authors have advanced the idea that people understand the actions of others, including the linguistic meanings they communicate, through embodied simulations, which allow them to imaginatively recreate the actions they observe or hear about (Gibbs and Perlman 2010). This idea leads us to assume that people's use and interpretation of language emerges as a kind of bodily activity. They imagine themselves as participating in the actions the language describes, even in cases where the actions depicted are abstract and physically impossible to perform, such as those conveyed by verbal metaphors (Gibbs 2006; Wilson and Gibbs 2007). Consistent with this, the cognitive neuroscience literature emphasizes the role of the motor system in action verb comprehension (see Willems and Hagoort 2007), and some developmental studies report that the acquisition of new words is facilitated when children are able to perform actions and handle objects, rather than simply observing another person handling them (see James and Swain 2011).

What, then, are the consequences of motor impairment for the use and interpretation of action meaning? One way of answering this question is to investigate the understanding of verbal metaphors describing actions such as *the clouds run* by children with CP, compared with typically developing children. Action-verb metaphor understanding is presumably particularly affected in children with CP, given their motor impairment. More specifically, compared with typically developing children, children with CP may display difficulty with the bodily mediated comprehension of words associated with actions, and these difficulties may become all the greater when these actions are the subjects of metaphors. To test this hypothesis, a small study was conducted in which verbal children with CP but no severe speech impairment and typically developing matched controls listened to metaphorical, semantically anomalous and literal sentences containing action, state and perception verbs. The children were first asked to determine whether the sentence they had heard was meaningful, after which they had to explain what they thought it meant. It was expected that the children with CP would have difficulty processing the state verbs, given that these refer to mental states.

7.4.1 Method

Participants: A total of 14 French children took part in the study: seven children with CP (three girls) and seven typically developing children. The mean chronological age of each group was 9; 9 years (range: 8–12; 7 years). The children with CP did not have any intellectual impairment, but did display speech and physical impairments. Six of them had spastic diplegia, and one had ataxia. The inclusion criteria for these children were intelligible speech, IQ > 85 (WISC-IV; Wechsler 2003) and preserved verbal comprehension, as assessed on a French standardized verbal comprehension test (score >25th percentile, Epreuve de compréhension syntaxico-sémantique, ECOSSE; Lecocq 1996). The group of typically developing children was matched for age, sex, and school grade level with the experimental group. Informed parental consent was obtained for all the children.

7.4.1.1 Material

The experimental material consisted of 24 French verbal metaphors and their 24 literal counterparts created especially for the study. Eight of the sentences in these two categories (metaphorical and literal) contained an action verb, eight a state verb

Table 7.1 Mean scores (and standard deviations) of children with CP and controls on both measures, as a function of type of language (metaphorical vs. literal) and type of verb (action vs. state vs. perception)

	Metaphorical	Literal
Action verb	Tout doucement, la nouvelle saison *marche* vers le froid.	Avec beaucoup de bruit, son frère *marche* dans le couloir.
	(Gradually, the new season *walks towards* the cold.)	(With a lot of noise, his brother *walks in* the corridor.)
State verb	Toute l'année, les jardins *comprennent* les saisons.	Dans la classe, tous les enfants *comprennent* la poésie.
	(Throughout the year, the gardens *understand* the seasons.)	(In the classroom, all the children *understand* the poem.)
Perception verb	Dans cet immense paysage, le ciel *entend* le silence.	Dans sa nouvelle chambre, Marthe entend la pluie sur le toit.
	(In this huge landscape, the sky *hears* the silence.)	(In her new bedroom, Marthe *hears* the rain on the roof.)

and eight a perception verb. Each literal sentence was syntactically similar to its corresponding metaphorical sentence, contained the same critical verb, and was constructed such that all the meaning words it contained were matched for frequency with those in the corresponding metaphorical sentence. Examples of sentences used in this experiment are provided in Table 7.1. In addition to the experimental materials, 30 anomalous sentences were created. These meaningless sentences were approximately the same length as the experimental sentences, and contained action (10), state (10), or perception verbs (10). In an earlier unpublished study conducted by the author, all the verbal metaphors had been rated on a 7-point scale as metaphorical and easily comprehensible by 59 native French-speaking adults. A set of possible meanings for the literal and metaphorical sentences was also collected from a separate group of 61 native French-speaking adults. This set of meanings served as the basis for coding the children's explanations of the meanings.

7.4.1.2 Procedure

The children were asked to listen to the 78 sentences and, for each of them, decide whether the sentence they had heard was meaningful (*meaning attribution*). One point was awarded each time the children answered correctly, recognizing the literal and metaphorical sentences as meaningful, and the anomalous sentences as meaningless. Every time the children answered 'yes', they had to verbally explain the meaning (*meaning explanation*). One point was awarded each time the children demonstrated that they had understood the meaning for which they had responded 'yes', based on our set of meanings.

Table 7.2 Mean scores (and standard deviations) of children with CP and controls on both measures, as a function of type of language (metaphor vs. literal) and type of verb (action vs. perception vs. state)

	Meaning attribution		Meaning explanation	
	CP children	Control children	CP children	Control children
Metaphor action	3.14 (1.77)	4.43 (0.79)	2.43 (1.51)	3.29 (0.95)
Literal action	7.86 (0.38)	7.57 (0.53)	7.29 (0.95)	7.43 (0.53)
Metaphor state	3 (2.31)	3.57 (2.37)	1.57 (1.51)	1.43 (1.62)
Literal state	6.29 (1.6)	7.29 (0.76)	6 (2.31)	6.71 (0.49)
Metaphor perception	3 (2.16)	3 (1.53)	2 (1.63)	2.29 (1.60)
Literal perception	7.57 (0.79)	8 (0)	7.29 (1.25)	8 (0)
Anomalous	9.90 (0.30)	9.81 (0.40)	–	–

7.4.2 Results

The mean numbers of correct answers (and standard deviations) for both measures (meaning attribution and meaning explanation) are provided in Table 7.2. First of all, results indicated that for the most part the literal sentences were correctly understood by both groups of children, confirming that the children with CP were correctly matched with their controls on general verbal comprehension. It should be noted that literal sentences containing a state verb were hardly understood by any of the children, but especially not by the children with CP. Two examples of incorrect meaning explanations of these sentences, provided by children with CP, are presented in (1) and (2). One possible explanation of this finding is that the children with CP struggled with these sentences perhaps on account of poorer skills in understanding people's mental states.

(1) To explain the meaning of the literal sentence 'Dans la classe, tous les enfants *comprennent* la poésie.' (In the classroom, all the children *understand* the poem.), one child with CP answered: 'Le maître ou la maitresse raconte la poésie, ce que ça veut dire.' (The teacher tells the poetry, what it means).

(2) To explain the meaning of the literal sentence 'Devant cette belle plage, on *rêve* de vacances' (In front of this pretty beach, one *dreams about* vacation), one child with CP answered: 'Quand on vient de la plage, on a envie de vacances.' (When coming back from the beach, one wants to go on vacation).

Results also indicated that metaphorical sentences were not often recognized as meaningful, either by the children with CP or by the control children (mean scores below 4, i.e. half the maximum score). The only mean score above 4 for meaning attribution in the action metaphor condition was achieved by controls. It should be noted that only one control child has a score below 4 (i.e. 3), compared with four of the seven children with CP. Linked to the first measure, the second one (meaning explanation) revealed similar mean performances by the two groups for the action metaphors: 77 % for the children with CP (2.43/3.14 * 100) and 74 % for the control children (3.29/4.43 * 100). These results were partially consistent with our main hypothesis, for while the verbal children with CP could understand words that designated actions when these actions were used literally, they had greater difficulty when these actions were the subject of metaphor. Two examples of incorrect meaning explanations of metaphorical sentences containing an action verb, provided by the children with CP, are presented in (3) and in (4). Children with CP are thus more prone to having difficulty creating new meaning for actions, as is required in metaphor understanding, than typical children.

(3) To explain the meaning of the metaphorical sentence ‘Tout doucement, la nouvelle saison *marche* vers le froid.’ (Gradually, the new season *walks towards* the cold.), one child with CP answered: ‘Le soleil ou l’été va bientôt venir.’ (The sun or the summer will come soon).
(4) To explain the meaning of the literal sentence ‘Parfois en janvier ou février, quand il fait très froid, l'hiver *coupe* la peau.’ (Sometimes in January or February, when it is really cold, the winter *cuts* the skin.), one child with CP answered: ‘Il arrache la peau, mais on a une autre peau.’ (It pulls out the skin but one has another skin).

These preliminary results suggest that motor impairment, above and beyond speech impairment, could be implicated in the pragmatic problems of children with CP. Of course, these data have to be viewed with caution, and cannot be generalized, given their descriptive nature and the very small sample of children of different ages. They show that further studies are needed to explore this embodied simulation hypothesis, and the consequences of motor limitations for language meaning.

7.5 Summary

Little is known about the pragmatic abilities of children with CP, even though they patently have communication problems. Studying pragmatic abilities in children is a complex task, and requires both expressive and receptive levels to be investigated. Research has so far focused on the receptive level, indicating several pragmatic comprehension difficulties in children with CP. These are difficulties that still need to be explored in the light of their language and cognitive development, as well as their motor symptoms.

The receptive pragmatic difficulties reported in children with CP include difficulty elaborating meaning in narrative and conversational contexts, which necessitates semantic and pragmatic inferences, but also difficulty understanding other people’s mental states, particularly false beliefs. Further research is needed in order to characterize the level of pragmatic impairment in CP, at both receptive and expressive levels. These children’s adaptation to their partners’ mental states (ignorance, knowledge, false beliefs, and emotions) could also be a means of investigation. A better characterization of these pragmatic abilities might allow clinicians to help children with CP more effectively. Awareness of pragmatic difficulties could, if appropriately acted upon, bring an improvement in communication skills within the family, at school and, ultimately, in the workplace.

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Part II
Acquired Pragmatic Disorders

Chapter 8
Disruption of Pragmatics in Adulthood

Caroline Jagoe

Abstract Pragmatic disruption is associated with a range of acquired communication disorders of both neurogenic and psychiatric origin. This chapter provides an overview of the main themes in the research into pragmatic disruption in people with aphasia, right hemisphere language disorder, schizophrenia, traumatic brain injury, Alzheimer's dementia, non-Alzheimer dementia and Parkinson's disease. These disorders are associated with particular patterns of pragmatic disruption which, in some cases, have been linked to disturbances in cognitive abilities, most often in theory of mind and executive function. Pragmatic strengths have typically been overshadowed by a focus on the pragmatic deficits in any given population. However, it is argued that these strengths form a crucial component of the pragmatic presentation of any client or clinical group more generally. Pragmatic disorders have a pervasive impact on the individual with the disorder as well as on those around them. Assessment and intervention in pragmatic disorders of adulthood must account for the profile of deficits and strengths, while considering the broader impact of the disorder on the individual and their social network.

Keywords Acquired communication disorder • Assessment • Executive function • Impact • Intervention • Pragmatic strength • Theory of mind

8.1 Introduction

Pragmatic disruption in adulthood is associated with a range of relatively common neurological and psychiatric disorders. Investigations of pragmatic disabilities have disproportionately focused on clinical conditions in children, and research on acquired disorders of pragmatics has typically focused on some populations at the expense of others (Cummings 2007a). Even within the research on pragmatic

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disruption in adulthood, the disciplines involved have largely worked independently, resulting in a body of research which can appear somewhat fragmented.

In the chapters which follow, pragmatic presentations associated with aphasia, right hemisphere language disorder, schizophrenia, traumatic brain injury, Alzheimer's dementia, non-Alzheimer dementias and Parkinson's disease are discussed in detail. An overview of the pragmatic impairments associated with these disorders follows in Sect. 8.2. Section 8.3 addresses the issue of pragmatic strengths in clinical populations while the impact of pragmatic disorders on adults and their conversation partners is discussed in Sect. 8.4. Issues related to the cognitive substrates of pragmatic impairments are briefly reviewed in Sect. 8.5 and addressed in detail by Cummings in Chap. 22. Pragmatic assessment and pragmatic intervention are addressed in Sects. 8.6 and 8.7, respectively. A summary of the chapter is presented in Sect. 8.8.

8.2 Acquired Pragmatic Disorders

This section provides a brief overview of disorders in which pragmatic disruption is evident, anticipating some of the issues raised in more detail in subsequent chapters. While a range of disorders are associated with pragmatic disruption, a subset has received more attention than others. Similarly, a subset of pragmatic phenomena appears to have been the focus of clinical pragmatic investigation, while other phenomena have been minimally considered (Cummings 2007a).

8.2.1 Aphasia

Aphasia has typically been considered to be a disorder in which there is relative pragmatic strength in the context of disruptions in language processing and production (Beeke 2012). Research in this domain has largely been qualitative in nature, with a significant body of work utilising conversation analysis. While pragmatic strengths are clear, these studies have also revealed the pragmatic consequences of aphasia. The presentation of people with aphasia highlights the difference between primary disruptions in pragmatic ability, and pragmatic disruption as 'a secondary consequence of […] language impairment' (Beeke 2012: 365) or, as articulated by Perkins (2014), the distinction between pragmatic impairment as opposed to the pragmatic consequences of breakdown at other levels of language functioning.

Despite the classic conceptualization of aphasia as a disorder in which pragmatic abilities are spared, specific pragmatic disruption has been demonstrated, including impairments in the interpretation of nonliteral language (e.g. Chapman et al. 1997; Giora et al. 2000; Gagnon et al. 2003) and difficulty processing speech acts (e.g. Soroker et al. 2005) and sarcasm (Giora et al. 2000). More recent research into pragmatic ability in the context of improving linguistic profiles of people with aphasia suggests that pragmatic deficits are not always secondary to language impairments (e.g. Coelho and Flewellyn 2003). While these recent studies suggest that pragmatic changes may not be fully related to structural language impairments in aphasia, the issue of situational context in evaluating pragmatic and discourse function is crucial, with features such as coherence manifesting differently across different contexts (e.g. Olness and Ulatowska 2011).

8.2.2 Right Hemisphere Language Disorder

Right hemisphere language disorder (RHLD), which is addressed in detail by Blake in Chap. 10, has been considered to be a quintessential primary acquired pragmatic disorder (Perkins 2007). However, people with RHLD form a heterogeneous population in terms of communicative presentation (Barnes and Armstrong 2010) and their performance in tasks tends to be different from that observed in conversational or more naturalistic communication contexts (e.g. Vanhalle et al. 2000). These differences are possibly related to the cognitive demands of test-like tasks (e.g. Monetta and Joanette 2003), which may lack the contextual support of more meaningful natural communication. The pragmatic or discourse characteristics typically ascribed to right hemisphere damage (RHD) include poor discourse organization with verbose and tangential output (e.g. Blake 2006), impaired ability to generate inferences (e.g. Saldert and Ahlsén 2007), impairments in the interpretation of nonliteral language (e.g. Giora et al. 2000; Rinaldi et al. 2004), and impairment in the comprehension and production of both linguistic and emotional prosody (e.g. Baum and Dwivedi 2003; Pell 2006). However, across many of these domains, equivocal or inconsistent results are common (see Chap. 10, this volume).

There is a growing body of research exploring the relationship between the communication presentation of people with RHD and the cognitive substrates assumed to underlie pragmatic function (see Sect. 8.5 for detailed discussion). Impairments in theory of mind (ToM) have been documented in this population and linked to difficulties in the comprehension of metaphor and indirect requests (Champagne-Lavau and Joanette 2009). However, the findings are not straightforward, with research suggesting that an alteration of the cognitive demands of the task influences how people with RHD perform in relation to ToM (e.g. Surian and Siegal 2001). Executive functions, including cognitive flexibility and inhibition, have been associated with pragmatic impairments in some studies (e.g. Champagne-Lavau and Joanette 2009) but not in other studies (e.g. McDonald 2000). This finding has led Champagne-Lavau (2015) to argue that both executive function and ToM deficits are involved in pragmatic disruption in the RHD population. She suggests that the lack of consensus may relate to 'different patterns of disturbance found in RHD groups' (123), reiterating the heterogeneity that characterizes this population. Cognitive substrates of pragmatic disorders will be examined further in Sect. 8.5.

8.2.3 Schizophrenia

Pragmatic disruption in people with schizophrenia has been documented since the earliest characterization of the disorder. Bleuler (1911/1950) stated: 'The abnormality does not lie in language itself but rather in its context' (147). Research in this area has relied predominantly on task-based assessment of phenomena such as the interpretation of idioms, proverbs, metaphor and irony (e.g. Brüne and Bodenstein 2005; Drury et al. 1998; Herold et al. 2002; Langdon et al. 2002; Tavano et al. 2008), story completion in relation to Grice's maxims (Corcoran and Frith 1996), and utterance interpretation in short stories (Corcoran and Frith 2005; Corcoran et al. 1995). Addressing a range of communicative abilities, Colle et al. (2013) demonstrated that people with schizophrenia display difficulties across linguistic, extralinguistic and paralinguistic domains as well as contextual factors and conversational management, both in terms of comprehension and production tasks. Analysis of conversational data has also been undertaken from different theoretical perspectives, including conversation analysis (e.g. McCabe et al. 2004), relevance theory (e.g. Jagoe 2015) and discourse analysis (e.g. Walsh 2007, 2008).

Much of the research on pragmatic function in schizophrenia has been undertaken with reference to theory of mind. For example, impairment in the application of conversational maxims has been linked to impaired ToM (e.g. Binz and Brüne 2010; Corcoran and Frith 1996). Notably, analysis of conversational performance has revealed evidence of the use of ToM which is not predicted by task-based performance (e.g. McCabe 2004; Jagoe 2012). Bosco et al. (2009) suggest that ToM deficits are a complex, non-unitary phenomenon in people with schizophrenia and argue for assessment to address the complexity of this cognitive skill.

Like individuals with RHD, people with schizophrenia also seem to benefit from modifications which support basic task demands. By asking questions of participants as each new piece of information was added in a ToM task, Pickup (1997) found less severe ToM difficulties than those described in other studies. While executive function deficits have been well documented in people with schizophrenia, findings with regards to pragmatic disruption have not been consistent. While executive function deficits may co-occur with pragmatic disruption in people with schizophrenia, there is little correlation between the two, with most research suggesting that ToM is better correlated with pragmatic tasks (e.g. Langdon et al. 2002; Brüne and Bodenstein 2005; Champagne-Lavau and Stip 2010). Champagne-Lavau and Stip (2010) conclude that 'pragmatic deficits cannot be completely explained by executive dysfunction' (293).

8.2.4 Traumatic Brain Injury

Traumatic brain injury (TBI) is associated with cognitive-communication impairments. These impairments have been described as involving difficulty in generating appropriate inferences (e.g. McDonald 1999) as well as disruption of discourse coherence and organization. Johnson and Turkstra (2012) have demonstrated difficulties in inference generation in conversation between people with TBI and familiar conversation partners. ToM deficits have been considered to contribute directly to the pragmatic dysfunction observed in TBI (e.g. McDonald 2013; McDonald et al. 2014).

Much of the research addressing the involvement of executive function deficits in pragmatic disorders has come from the domain of TBI. For example, pragmatic difficulties in TBI have been associated with poor inhibition (e.g. Channon and Watts 2003) and deficits in attention (Youse and Coelho 2009). Executive function deficits have also been linked to poorer story grammar in people with TBI, with researchers suggesting that disruptions in mental flexibility are related to narrative organization (Mozeiko et al. 2011). Flexibility and inhibition appear to be related to pragmatic performance, as demonstrated by a study in which a series of tasks elicited discourse production under different executive function demand conditions (McDonald et al. 2014). In a related study, Honan et al. (2015) demonstrated that ToM deficits, which were evident in a task involving comprehension of speech acts, may arise from working memory deficits. Such findings highlight that the relationship between executive function, ToM and pragmatics is complex and that executive function and ToM may interact in specific ways.

8.2.5 Alzheimer's Dementia

Investigations of pragmatic abilities in people with Alzheimer's dementia have revealed disruption in conversational management, impaired cohesion and coherence and difficulties with referential language (Guendouzi and Müller 2006; Müller and Guendouzi 2005). Pragmatic disruption in Alzheimer's dementia is related to cognitive impairments, such as impairments of memory and attention, which undermine an individual's ability to process utterances within the broader context. Pragmatic disorder in Alzheimer's dementia has also been linked to impairments in ToM (e.g. Cuerva et al. 2001). Qualitative research has been particularly important in exploring pragmatic ability and difficulties in Alzheimer's dementia. Conversation analysis has been used to focus on the interactional dyad, demonstrating the 'dynamic and emergent nature of communicative impairment' in this clinical population (Müller and Guendouzi 2005: 402). Guendouzi and Savage discuss the concept of socio-pragmatic competency in Alzheimer's dementia in Chap. 13.

8.2.6 Non-Alzheimer Dementias

Less well researched are the pragmatic disruptions associated with non-Alzheimer dementias. Some of the most common of these dementias include frontotemporal dementia, vascular dementia, Lewy body disease dementia, and Parkinson's disease dementia (Reilly et al. 2010). Speech and language presentations are diagnostically significant in terms of differentiating these different subtypes of dementia (Cycyk and Wright 2008; Garrard et al. 2005; Grossman et al. 1996), and pragmatic disorders have specific potential as diagnostic markers (Cummings 2012). Patterns of pragmatic presentation in these disorders are discussed in detail in Chap. 14.

8.2.7 Parkinson's Disease

There is a recent and growing body of research which has been investigating the pragmatic language abilities of people with Parkinson's disease without dementia. A range of pragmatic disruptions have been described in individuals with Parkinson's disease, including difficulties in conversational appropriateness, turn-taking, prosody, and impairments in metaphor comprehension (Monetta and Pell 2007; McNamara and Durso 2003). These difficulties have been linked to frontal lobe dysfunction or executive function deficits (e.g. Monetta and Pell 2007; McNamara and Durso 2003). It has been suggested that individuals with Parkinson's disease have difficulty allocating cognitive resources to the complex task of communication (Pell and Monetta 2008).

8.3 Pragmatic Deficits and Strengths in Clinical Populations

Clinical domains tend to focus on deficits – what has been disrupted in relation to typical functioning, resulting in a clinical diagnosis. These profiles and patterns of impairment may be diagnostically significant (Cummings 2012) and clearly have a role in informing intervention. However, a systematic identification of strengths arguably has an equally important role to play. Cummings (2005) highlights the notion of pragmatic strengths, suggesting that 'the clinical picture that emerges from these studies is more complicated (and optimistic) than is suggested by terms like 'deficit' and 'impairment'' (254). The recognition of strengths is not only important in relation to clinical implications (building on strengths in intervention, for example), but also has theoretical implications.

Not only has clinical research often neglected to recognize the pragmatic strengths of patients, but it has also arguably 'over-pathologised' aspects of communication breakdown. The notion that not all communication 'failure' is as a result of pathology is a distinct but related issue. Perkins (2014) argues that pragmatic impairment is best considered, not as a diagnostic category in its own right, but 'as a result of complex interactions at many levels – including the sociocultural and that of moment-by-moment social interaction between individuals, as well as the neurological, cognitive and linguistic' (131). Instances of breakdown in communication occur frequently in typical talk and, therefore, extracting instances of 'failure' in participants and comparing them to an ideal norm with little consideration of the conversational and situational 'context' is an exercise in fiction. There is a real risk in clinical pragmatics that the populations of interest are investigated within a vacuum – 'errors' and 'impairment' are sought out, often within contrived tasks, and these deficits are compared against an ideal norm (Duchan et al. 1999).

While these criticisms are far from novel, the solution has remained complex. One potential solution that has been proposed is that methods of analysing conversational performance in context be used in conjunction with more traditional structured assessments or quantitative approaches. The need to investigate linguistic ability within conversation has long been recognised in speech and language therapy (e.g. Beeke et al. 2003; Perkins 1995) and is of particular importance when investigating pragmatic ability (e.g. Chantraine et al. 1998; Friedland and Miller 1998; Perkins et al. 1998). Using methods to analyse utterances and interaction in conversation, it is argued, increases the ability of the clinician/researcher to situate performance alongside consideration of contextual factors, which may mitigate against judgments based on contrived tasks. However, this approach does not guarantee a balanced view of strengths and difficulties, an issue which will be addressed in Sect. 8.6.

Aphasia has, perhaps, the unique distinction of being the communication disorder in which identification of pragmatic strengths has been most highlighted (or taken for granted), with pragmatics typically listed as a relative strength against the backdrop of the profile of language impairment. Indeed, people with aphasia demonstrate particular skill in drawing on pragmatic abilities to compensate for their linguistic difficulties. As remarked by Holland (1977), people with aphasia 'communicate better than they speak' (173).

Pragmatic strengths have also been the focus of some of the clinical literature on communication in dementia. Literature addressing intervention with this clinical population is likely to consider the notion of pragmatic strengths. This is perhaps due to the fact that a substantial number of intervention approaches rely specifically on capitalising on spared abilities while minimizing demand on impaired abilities. It is well recognized that people with dementia have individual presentations of impaired abilities and preserved skills (e.g. Müller and Guendouzi 2005). These individuals often display retention of routine forms of language, including politeness strategies and 'small talk' or phatic communication (e.g. Guendouzi and Müller 2002, 2006; Davis and Guendouzi 2013; Schrauf and Müller 2013). Even in the late stage of Alzheimer's dementia, the individual may remain responsive to their name and social pleasantries, despite other linguistic communication being very severely restricted (Bayles et al. 2000). The synthesis by Guendouzi and Savage (Chap. 13, this volume) suggests that pragmatic strengths typically involve talk in which responses offer flexibility from a set of formulaic responses. In addition, these authors highlight how strengths, which may be evident to a researcher in the field, may not be so obvious to carers and family members, an issue which has implications for intervention.

Discourse strengths in RHLD have arguably been overshadowed by the clinical expectation of deficits. While pragmatic disruption is well documented, as discussed in Sect. 8.2.2, some studies have documented strengths in conversational discourse. There may be little notable difference between people with RHLD and controls (e.g. Kennedy 2000; Mackenzie et al. 1997), particularly where personal narratives or familiar material is being conveyed. While subtle differences may be documented in specific phases of the talk, for example in terminating the conversation (Kennedy 2000), the picture is one of communicative strength in the context of familiar material. The nature of the analysis may obscure subtle deficits, but equally, the naturalistic nature of tasks may allow for these individuals to demonstrate strengths that are masked by task demands in more traditional assessment processes. These issues are explored in detail by Blake (Chap. 10, this volume).

Pragmatic strengths have also been documented in people with schizophrenia (e.g. McCabe et al. 2002, 2004; Walsh-Brennan 2001; Jagoe 2012). In the context of clinical conversation, McCabe et al. (2004) demonstrated that people with schizophrenia engaged in 'anticipatory interactive planning', using ToM skills in the development of the conversation. Using a relevance-theoretic approach, Jagoe (in preparation) demonstrated similar communicative behavior. The abilities revealed by most of the people with schizophrenia in her study were remarkably similar to what is described by McCabe and colleagues. Findings point to a sophisticated pragmatic skill reliant on the ability to, in some way, anticipate the communicative needs and future 'moves' of the conversational partner. The pragmatic deficits expected in people with schizophrenia may, in some instances, be an artifact of how the conversation partner engages in the talk. Unless analysis addresses collaboration in meaning making, all conversational breakdown may be misattributed to the individual with the clinical diagnosis (Jagoe 2015). Strengths in 'small talk' and casual conversation have also been identified in people with schizophrenia (e.g. Walsh 2007), as well as in people with TBI (e.g. Bogart et al. 2012). Given the role of small talk in rapport building and social connections, these strengths deserve attention, both in terms of identification in profiling these populations, but also in building pragmatic skills in intervention.

People with TBI may also display pragmatic strengths. Indeed, Bosco et al. (2015) argue that the fact that the population is identified as being heterogeneous suggests that there is an inherent profile of strengths and deficits within individuals. People with TBI have been shown to be able to take on the role of information-giver across a number of real-life contexts (Togher et al. 1996). They also have skills in engaging in casual conversation with familiar others (Bogart et al. 2012). The performance of people with TBI in these studies was reported to be similar to that of matched controls. Relative pragmatic strengths may present concurrently with deficits within an interaction. For example, Dardier et al. (2011) demonstrated that while participants with TBI had poor topic maintenance, they displayed turn-taking ability and an ability to interpret indirect requests.

Clinicians require a thorough and up-to-date understanding of the clinical profiles of the populations they serve. The literature relating to pragmatic strengths serves as a reminder that a comprehensive profile of pragmatic ability should acknowledge both the disruption and the relative strengths which inevitably exist.

8.4 Impact of Pragmatic Disorders

The ability to communicate successfully is fundamental to maintaining social relationships and pursuing life goals, including vocational and leisure activities. Pragmatic disruption, therefore, poses a significant risk to the maintenance of relationships, and social and vocational engagement. Acquired communication disorders which involve disruption of pragmatic abilities represent a change from prior function and may have a considerable impact on an individual's ability to engage in chosen life roles, with consequences for psychosocial wellbeing, identity, engagement and participation more broadly.

The impact of pragmatic disruption in adulthood has lacked systematic investigation. What research there is tends to focus exclusively on psychosocial impact, with little consideration given to wider implications (Cummings 2014). Where psychosocial impact has been explored, it has typically been within specific clinical groups, with little consideration given to the broader issues that may be common to these populations. More recently, Cummings (2011, 2014) has addressed the issue of the impact of pragmatic disorders. She categorises possible impacts to include psychological, social, academic, occupational or vocational, behavioural and forensic impact. Although Cummings highlights the fact that these domains are interrelated, a descriptive classification of this type is useful in emphasizing the scope of impact in an area which has received limited attention. Some of these areas have had very limited formal investigation, specifically with regards to people with pragmatic disruption with onset in adulthood.

8.4.1 Psychological Impact

The psychological impact of acquired communication disorders has been widely recognized in the literature (Brumfitt 2010). There is some debate as to whether the psychological sequelae documented in neurological conditions are a direct result of the neurological insult (which can result in acquired communication disorders), or a reaction to the circumstances and changes which the individual must now face (Brumfitt 2010). There is limited research specifically related to the psychological wellbeing of adults with pragmatic difficulties. In relation to psychological status in adults with acquired communication disorders, depression in people with aphasia is arguably the most researched psychological issue (Code and Herrmann 2003).

Depression has also been documented in individuals with TBI and communication disturbances (e.g. Galski et al. 1998).

8.4.2 Impact on Social Interaction and Life Participation

With the centrality of language and communication to social interaction and engagement, pragmatic disruption has an obvious impact on social functioning. Participation restrictions have been associated with social communication deficits in those with TBI (e.g. Rispoli et al. 2010) and conversational performance and social communication have been linked to measures of social integration post-TBI (e.g. Struchen et al. 2011). Changes, specifically losses, in life roles have been documented in people with TBI (e.g. Hallett et al. 1994) and people who have had strokes (e.g. Satink et al. 2013). Much of this research has come from the field of occupational therapy. There has been limited investigation into the impact of pragmatic disruption on the maintenance or change of life roles. It is likely, however, that given the documented changes in the general population of people with brain injuries, those with pragmatic impairments will have an equal or even more significant impact to their ability to engage in pre-morbid life roles.

Communication is the medium through which individuals maintain a sense of identity. It is crucial to the ability of older adults to maintain social roles and relieve loneliness, depression, and anxiety (Lubinski 1995). The implications of pragmatic disruption in people with dementia are, therefore, far-reaching with regards to psychosocial function. Social isolation is considered 'a pressing concern in dementia care' (Müller and Mok 2012: 14). The cognitive-communication difficulties associated with the progression of the disorder impact on the ability of individuals with dementia to maintain existing social relationships (ibid).

Pragmatic disruption impacts on how individuals access services, including clinical services and commercial or leisure services. Pragmatic difficulties have very specific implications for how individuals engage in the opportunities available to them. One example is access to or full participation in clinical services. Chan and Mak (2012: 540) argue that pragmatic skills of people with schizophrenia, including 'the verbal communication skills to effectively and efficiently present their own concerns and needs […] in interaction with the provider', may have a significant impact on the ability of these individuals to engage in shared decision making as part of the cornerstone of good psychiatric care. While this is a participation restriction, the outcome of having less opportunity to engage in shared decision making may also negatively impact on psychological wellbeing. There has been limited research into the impact of acquired communication disorders on the ability of individuals to engage with commercial services. One exception is the work of Goldblum and Alant (2009) which has demonstrated that individuals with TBI may have challenges in engaging in retail encounters and that training of staff may increase access.

8.4.3 Impact on Employment

Employment and return-to-work after an injury or diagnosis that results in pragmatic disruption is likely to be challenging. Evidence to support this hypothesis has emerged from research in people with TBI and those with schizophrenia. Interpersonal skills, which rest on pragmatic ability, are associated with return-to-work outcomes in people with TBI (Struchen et al. 2008), and communicative abilities are predictive of employment status in this population (Isaki and Turkstra 2000). Indeed, employment stability is associated with communication ability after TBI, with a specific contribution of social inferencing ability and speed of verbal reasoning (Meulenbroek and Turkstra 2016).

Social communication is an independent predictor of vocational success for people with schizophrenia (Dickinson et al. 2007). An exploration of the return-to-work experiences of people with RHD suggests that the process is challenging (Koch et al. 2005). The functional limitations which people with RHD reported to have an impact on their return to work included aspects which indicated executive function deficits such as difficulties staying on task, disorganization, and impaired decision making. While Koch et al.'s study does not report specifically on pragmatic disruption, executive function deficits may have been linked to changes in pragmatic ability. The impact of pragmatic disruptions on occupational and vocational functioning in adults warrants further exploration in these and other populations.

8.4.4 Academic Impact

The academic impact of pragmatic disorders has largely been of concern to those working with children. However, given that the conditions associated with pragmatic disruption in adulthood may affect an individual in early adulthood (e.g. schizophrenia and some neurodegenerative disorders), these disorders may have an adverse impact on the ability to engage with or complete higher education. However, research in this area is lacking.

8.4.5 Forensic Impact

The forensic impact of pragmatic disorders is an area which is significantly under-researched. Work which addresses the language and communication needs of young offenders is most established. However, research within the adult domain is sparse, particularly with regards to specific investigations of language and pragmatic variables in relation to forensic issues. The cognitive substrates that underlie pragmatic difficulties may in some cases make an individual more vulnerable to engaging in risk-taking or criminal behaviours. The pragmatic disorder, then, co-occurs with the risk-taking behaviour due to a common underlying deficit in executive function. Pragmatic disruption may also be a contributor to problematic behaviours. Turkstra et al. (2003) point out that the cognitive-communicative presentation of many people with TBI may make them vulnerable to misperceiving a situation or communicating in a manner that is misinterpreted by others. Also, they may lack the communication skills that are needed to address conflict situations in a meaningful way. All of these would put the individual at risk of engaging in behaviour that could result in a criminal act.

The relationship between criminality and TBI is complex. The individuals most at risk of TBI are often risk-takers, perhaps those who are already within social contexts in which antisocial behaviours are occurring. A recent meta-analysis suggested that the rates of TBI in the offender population are very high at 60.25% (Shiroma et al. 2010). People with dementia may also be vulnerable with regards to forensic issues. The executive function deficits and changes in social awareness (including ToM abilities) that occur in dementia may make people with dementia more susceptible to engaging in behaviours that are viewed by society as criminal (Liljegren et al. 2015). Frontotemporal dementia in particular has been associated with criminal behaviour (Mendez 2010; Diehl-Schmid et al. 2013). Indeed, criminal behaviour is more common in frontotemporal dementia than in Alzheimer's dementia and may be one of the first manifestations of the condition (Liljegren et al. 2015).

Communication is central to all aspects of forensic services, and the impact of pragmatic disruption goes far beyond the potential for some individuals to engage in criminal behaviour. Good language and communication abilities are required in the full range of services, from situations in which police take statements from victims or interview suspects, to assessments of fitness to stand trial and legal proceedings themselves (Cummings 2016). Access to police, legal and justice services is hampered by communication disability (Communication Disabilities Access Canada 2015). Pragmatic disruption, therefore, may impact on how an individual engages with the law enforcement and justice systems as a victim, witness or defendant.

8.4.6 Impact on Conversation Partners

Disruption in pragmatic ability is a clinically significant factor in how adults with communication disabilities re-engage in life, as discussed above. These pragmatic changes, however, also impact on significant others and carers of those with such disorders. 'Third-party disability' is defined as the disability experienced by family members as a consequence of the health condition of their significant other (World Health Organization 2001). While this might be conceptualized as 'social impact', it is important to recognize that there is a distinct impact on family members and carers of the individual with a pragmatic disability. Viewing the impact through this wider lens may enable clinicians to provide more holistic intervention (or relevant onward referral) that addresses the specific impact on significant others or carers.

The impact for the significant others of people presenting with pragmatic disruption may fall into many of the categories discussed above. For example, if return-to-work is impacted for an individual with a pragmatic disorder, there are likely to be financial implications for the immediate family. The impact, therefore, is felt beyond the impact on the individual. Similarly, many of the domains of impact discussed above involve a resultant change in life roles. Again, significant others are therefore directly impacted by virtue of the need to adopt new roles themselves.

Given the central role that conversation plays in human relationships, where interactions are evaluated as less satisfying or more frustrating, there is likely to be a negative impact on the relationship between the individual and their significant other, changes in family functioning and psychological distress. Communication disturbances are one of the factors linked to psychological distress in family caregivers of people with TBI (Kreutzer et al. 1994; Anderson et al. 2002). In addition, conversation partners of individuals with TBI report that conversations are less rewarding, less appropriate and more effortful (Bond and Godfrey 1997), a finding which may suggest that significant others could experience loneliness of their own, or be less likely to engage with their family member.

Conversations with people with dementia have been reported to become less fulfilling for both conversation partners when the memory impairment affects the ability of the person with dementia to remember previous conversations or even the significant others with whom they converse (Nussbaum 2000). Such communication difficulties are associated with increased challenges in caring for a person with dementia (e.g. Orange and Colton-Hudson 1998; Dunn et al. 1994), and communication problems and behaviours that challenge have been linked to both caregiver stress and burden (Savundranayagam et al. 2005; Savundranayagam and Montgomery 2009). A reduction in reciprocal dyadic communication between a person with dementia and a spouse has been associated with increased rates of depression in the spousal caregiver (Braun et al. 2010). Marital satisfaction is an important facet which may be impacted by pragmatic disruption. The decrease in the ability of some people with RHD to interpret emotion from prosody and facial expression has been shown to impact negatively on marital satisfaction (Blonder et al. 2012).

8.5 Cognitive Substrates of Pragmatic Disruption

The role that abilities such as theory of mind and executive functions play in utterance interpretation has been explored in clinical populations. It has also been the focus of theoretical efforts in approaches such as relevance theory (Sperber and Wilson 1986/1995), cognitive pragmatics theory (Bara 2010) and modular pragmatics theory (Kasher 1991). In this section, theory of mind and executive function will be briefly discussed as a precursor to the in-depth analysis provided in Chap. 22.

8.5.1 Theory of Mind and Recovering Intentions

The ability to attribute intentions, thoughts and beliefs (all types of mental states) to the minds of others has been called ‘theory of mind’ (ToM). While there are debates about the nature of ToM, most scholars agree that humans are able to predict the behaviour of others based on attribution of mental states. The false belief task has become the standard test of ToM. This task stems from the notion, put forward by Dennett (1987), that the ability to predict the behaviour of an agent based on attributing them with a false belief would indicate the presence of ToM (Dennett 1987; Frith and Frith 2003). First-order ToM is the ability to entertain mental states about states of affairs in the world, while second-order ToM is the ability to reflect on beliefs about beliefs (Leiser and Bonshtein 2003).

Most models of pragmatics assume that the process of utterance interpretation is an inferential one, in which inferences are made about the speaker’s intentions during utterance interpretation. Intuitively, if one has to infer what a speaker intends to communicate, this process must involve reference to a speaker’s intentions and, hence, involve ToM abilities. This notion is foundational in Gricean and post-Gricean pragmatic theories. Consideration of a speaker’s intentions is seen by most pragmatists as a process grounded in ToM abilities.

Clinical pragmatics has provided impetus for this line of investigation, with seminal studies by Happé (1993) and others demonstrating ToM impairment in children with autism, and associating this impairment with pragmatic deficits. Neuroimaging studies seem to provide some support for this relationship. ToM (or ‘mentalizing’, as it is sometimes called) is strongly associated with the medial prefrontal cortex (Frith and Frith 2003). Importantly, neuroimaging studies on pragmatic function implicate the same cortical region (e.g. Ferstl and von Cramon 2002; Kampe et al. 2003). These studies have been interpreted to demonstrate that ‘the relationship between communicative and mentalizing functions is remarkably close’ (Frith and Frith 2003: 469). Advances in neuropragmatics will be discussed in detail in Chap. 21.

While neuropragmatics may support the relationship between ToM and pragmatic ability, research associating impaired ToM with pragmatic disruption and social functioning in children and adults has been both replicated (e.g. Frith 2004; Roncone et al. 2002; Champagne-Lavau and Joanette 2009; Corcoran and Frith 1996) and challenged (e.g. Astington 2003; Bloom and German 2000; Boucher 1996; Happé and Loth 2002; O’Neill 1996). Such findings seem to support Astington’s (2003) assertion that false-belief understanding is ‘sometimes necessary [but] never sufficient’ for the range of behaviours making up ‘social competence’ (13). Indeed, critics question whether ToM deficits are primary, or secondary to processing overload, attentional deficits, or related to working memory difficulties (e.g. Bloom and German 2000; McCabe 2009), that is, whether ToM deficits might be observed due to executive function disturbances.

8.5.2 Executive Function and Pragmatic Ability

Executive function is the second cognitive substrate that is considered to underpin pragmatic ability. While a single definition of executive function does not exist, it can be defined as those 'higher-level' cognitive functions involved in the control and regulation of 'lower-level' cognitive processes and goal-directed, future-oriented behavior'' (Alvarez and Emory 2006: 17). These process enable individuals to plan, initiate and monitor behaviours, and to problem solve and respond flexibly (Alvarez and Emory 2006; Royall et al. 2002). Component 'skills' of executive function include inhibition, sustained and selective attention, initiation and working memory. Sparrow and Hunter (2012: 262) highlight the degree of complexity of executive function, pointing out the seeming contradictions inherent in the description of these abilities: the ability to be flexible and adaptable, while at the same time being persistent; the ability to inhibit and to initiate. A high degree of executive function is demanded by 'novel, nonroutine, and unstructured situations' (Sparrow and Hunter 2012: 262). Conversation is one such situation; hence, the deployment of pragmatic abilities is likely to be reliant on executive function.

While the literature on executive function deficits in clinical populations is extensive, studies exploring both executive function and pragmatic ability are less well developed. Documented executive function deficits in clinical populations could be assumed to be associated with pragmatic disruption. However, this assumption belies the complexity of the relationship and the likely specificity of the nature of the executive function disturbance and resultant pragmatic presentation. Indeed, recent research in the domain of TBI has suggested that deficits in ToM may in fact reflect deficits in specific aspects of executive function which themselves are required for adequate ToM function (e.g. McDonald et al. 2014; Honan et al. 2015).

8.6 Pragmatic Language Assessment

Like demarcating the domain of pragmatics itself, drawing a distinction between typical pragmatic ability and pragmatic impairment is a challenge to the field (Cummings 2007b; Perkins 2007). In the attempt to identify pragmatic disability, clinical pragmatic research and practice has seen the development of checklists and profiles. While these assessment methods have clinical value, they have also been criticized (Cummings 2009). In response, conversation analytic and discourse analytic approaches to assessment have increased, adding to social, interactional and sociolinguistic perspectives on a range of clinical concerns (e.g. Ferguson 1996; Perkins 1995, 2007; Tarling et al. 2006; Walsh 2007, 2008; Wilkinson et al. 2010). At the same time, descriptions of pragmatic impairments in terms of their neurological, cognitive and behavioural substrates are also increasing. It is through this context of burgeoning models, descriptions, research approaches and clinical applications that the clinician and client must navigate.

8.6.1 Tools and Methods for Evaluation of Pragmatic Abilities

Methods for evaluating pragmatic skills differ in their focus and approach and have typically been classified as falling into one of three categories: profiles or checklists; pragmatics tests; and discourse or conversation analysis. Penn (1999) profiles a useful matrix to conceptualise the dimensions across which pragmatic evaluations differ. Evaluations differ in the following dimensions: (1) profile/single skills – whether the evaluation focuses on discrete skills or generates a profile; (2) assessment/test – whether the evaluation tests skills in a decontextualised task or assesses in a defined context; and (3) process/product – whether the evaluation is focused on the presence or absence of a skill or on the interaction process involved. Each dimension can be considered to be a continuum, and each evaluation can be considered along each of the dimensions.

Pragmatics profiles and communication checklists are characterized by their use of 'a descriptive taxonomy of pragmatic behaviours' (Cummings 2009: 180), and typically draw on a pragmatic theory as their base for identifying the behaviours listed. The range and disparate nature of these behaviours are in part testament to different perspectives on pragmatics, but also to the array of abilities which are brought to bear on pragmatic function (Perkins 2014). Profiles and checklists of pragmatic abilities are typically used in the context of observations by an examiner who judges the presence or absence, or appropriateness or inappropriateness, of specific abilities designated as pragmatic. Some checklists, however, are designed to be used by significant others or the individual with the pragmatic disorder themselves, with the interpretation of the responses undertaken by the clinician. The fact that these instruments are based on observation (or self-perception) is argued to add to the naturalness and authenticity of the behaviours captured. Examples of such instruments include Prutting and Kirchner's (1987) Pragmatic Protocol, The Profile of Communicative Appropriateness (Penn 1985) and the La Trobe Communication Questionnaire (Douglas et al. 2000). These instruments are discussed in detail by Saldert (Chap. 20, this volume).

Tests of pragmatic language ability are relatively easy to administer and are predictable in terms of the time that is required for their administration, scoring and interpretation. However, they have been criticized for their lack of ecological validity. Also, the subtlety of some pragmatic dysfunction belies assessment on formal tests, but may emerge through a careful analysis of conversational and monologic discourse (Cummings 2009). Discourse analysis and conversation analysis have both been applied to this domain. While research using these methodologies is extensive, their clinical application arguably remains much more limited. Supporting Partners of People with Aphasia in Relationships and Conversation (Lock et al. 2001) and the Conversation Analysis Profile for People with Aphasia (Whitworth et al. 1997) provide the clinician with a structured approach to eliciting conversational data and analyzing it for intervention purposes. Both of these tools were designed for use with people with aphasia and their conversation partners.

8.6.2 Judgments of Appropriacy in Pragmatic Assessment

Even where assessment data is conversational in nature, there is a risk of misconstruing a participant's pragmatic performance, as shown in Cummings' (2007b) critique of the field. That is, the researcher or clinician may fail to acknowledge their own role in constructing the individual's profile of ability or disability, both within the process of clinical interaction (Duchan et al. 1999) and within the process of analysing conversational data more generally (Cummings 2007b). Where the pragmatic analyst is the clinician involved in the conversation, there is the potential that the nature of the interaction may construct the individual as pragmatically incompetent. For example, it is recognised that in speech and language therapy clinics the person with a communication disorder may easily be cast in the role of 'errormaker' (Kovarsky et al. 1999: 293), and that an interaction may be constructed in a manner which is unlikely to be representative of the client's ability and may even mask pragmatic skill. Similarly, the practice of asking 'test questions', in which it is manifest to both parties that the clinician knows the answer, may erode the true pragmatic nature of the task and result in responses which are appropriate in the 'test-question' context, but 'inappropriate' if construed (and analysed) as typical question-response sequences.

Even when the interaction is approached with sensitivity to pragmatic features and the analysis incorporates considerations of resourcefulness alongside instances of difficulty, making judgments on appropriacy has been demonstrated to be potentially contentious (Leinonen and Smith 1994). In addition, designating pragmatic behaviours as 'inappropriate' is not likely to be helpful in either descriptive or explanatory accounts of pragmatic disorders. Garcia et al. (2001) make the point that judgments of inappropriateness (or 'irrelevance' in this case) must be made with caution. The implication is that the role of analysts in judging appropriateness may be just as powerful as whether the speaker is in fact inappropriate (or 'irrelevant') at all:

> It is important to ask how judgments of irrelevance are being made. We need to be able to specify what inferences are derived from the conversation to arrive at our clinical diagnoses and what kind of adaptive strategies are useful for intervention. If we do not seek to answer these questions, clinical hypotheses that are made during assessments may be wrongly confirmed. […] the role of the hearer must not be neglected in developing such tools. Relevance may very well be in the eye and ear of the beholder and not reside so much with the speaker (Garcia et al. 2001: 34–35).

The importance of considering the conversation partner and the broader context of deployment of pragmatic abilities cannot be overstated. However, equally, it should not be assumed that merely through the analysis of conversational data (rather than 'test' data) an accurate portrayal is guaranteed. Pragmatic assessment may be best achieved with a combination of tools and approaches, with a clear understanding of the theoretical underpinnings and practical limitations of each method.

8.7 Pragmatic Language Intervention

One way to approach the range of interventions addressing pragmatic abilities in adults is to classify them according to their therapeutic focus. They include: (i) interventions directly targeting the pragmatic skills of patients; (ii) interventions targeting the cognitive substrates assumed to be responsible for the pragmatic presentation, and (iii) interventions focused on the skills or behaviours of communication partners. This section will briefly outline examples of intervention approaches in each of these categories. Saldert addresses pragmatic intervention in adults in detail in Chap. 20, this volume.

8.7.1 Interventions Targeting Pragmatic Skills

This category of intervention approaches encompasses techniques in which conversation skills are explicitly taught to the individual. This is often as part of a social skills training programme or as part of group therapy in which pragmatic skill training or practice is the focus. During both activities, role play with a focus on the development of skills identified as pragmatic may be used. Social skills training is a core feature of intervention for people with pragmatic impairments. It includes training in conversation skills such as initiating conversation, topic maintenance and small talk. It typically involves a range of skill areas and entails:

> The systematic teaching of interpersonal skills through the process of breaking complex behaviors into their constituent elements, demonstrating (modeling) those skills in role plays, engaging clients in role plays to practice those skills, providing positive and corrective feedback to improve performance, additional role play practice, and developing assignments to practice those skills in naturally occurring interactions in clients lives' (Mueser and Bellack 2007: 549).

The evidence for the effectiveness of social skills training is generally accepted. This training is acknowledged to impact on behaviour skills and social functioning (e.g. Bellack 2004; Kurtz and Mueser 2008). However, there are still debates about the magnitude and significance of such improvements (Mueser and Bellack 2007). In addition, generalisation of skills has been recognised as a significant challenge (Pilling et al. 2002).

Group therapy is considered to be a context in which functional communication is promoted and in which group members get the opportunity to practice pragmatic skills in a more natural setting (Elman 2007; Braden 2014). Studies of group therapy with people with TBI have demonstrated improved pragmatic skills and social communication skills more generally (e.g. Dahlberg et al. 2007; McDonald et al. 2008). Indeed, in addressing pragmatics in people with TBI, the most current evidence appears to support group treatment, with fewer studies on individual interventions appearing (Braden 2014).

8.7.2 Interventions Targeting Cognitive Substrates

Interventions targeting the cognitive substrates of pragmatic impairments have included a focus on theory of mind, specific aspects of executive function and, more recently, affective states such as anxiety. ToM has been a target for pragmatic intervention, although this has most often occurred in intervention with children with autism. Work on ToM in people with schizophrenia has been undertaken, although this is not always with explicit reference to communication or pragmatic abilities. Jagoe (forthcoming) proposes that any intervention in this regard needs to be carefully constructed and tailored to capture the moment-by-moment contribution of ToM to a conversational exchange. A 'catch-all' ToM intervention, it is argued, is unlikely to have clear or transferrable effects to pragmatic ability.

There has been limited consideration given to addressing specific executive functions in interventions for pragmatic disruption. One example is an intervention targeting attention in people with TBI. The intervention was compared to one targeting social skills in a multiple treatment comparison design with two participants with TBI (Youse and Coelho 2009). The findings suggest that attention may be a reasonable focus for intervention, possibly being most appropriate for individuals in acute rather than chronic stages of TBI, and for those with less severe injuries. In addition, the authors highlight that in order to maximize the outcomes, intervention of this nature should include natural contexts in a generalization phase.

Cognitive pragmatic treatment, an intervention approach based on cognitive pragmatic theory (Bara 2010), is designed to address ToM, executive function and inferential abilities as they relate to pragmatic language (Gabbatore et al. 2015). The intervention itself occurs within a group setting and is structured by topic over 24 sessions. The majority of sessions are focused on specific communicative tasks, including sessions on 'general communicative ability', 'linguistic ability', 'extralinguistic ability' and 'paralinguistic ability', for example. Executive function is targeted in two sessions where the specific focus is on the cognitive ability of planning, with the assumption that planning underpins effective communicative behavior. Theory of mind is similarly addressed over two sessions through discussion of video-taped scenes and use of role play to enhance the patients' ability to formulate metarepresentations of mental states. Cognitive pragmatic treatment is a recently developed intervention. It has been shown to be efficacious in a study addressing pragmatic abilities in people with TBI (Gabbatore et al. 2015) and a second study involving people with schizophrenia (Bosco et al. 2016).

More recently, clinicians have begun to explore how to address affective states such as anxiety which may impact on pragmatic function in adults. In people with schizophrenia, the presence of anxiety disorders is common and relates to poorer social functioning (Blanchard et al. 1998). On one view, social skills difficulties (incorporating pragmatic disruption) are related to social anxiety and the affective states of the individual (Bellack et al. 1997). The application of cognitive behaviour approaches, such as cognitive behavioural therapy (CBT), is relatively novel in speech and language therapy with adults with pragmatic disruption, although it has been applied in other areas such as fluency disorders (e.g. Fry 2013) and voice disorders (e.g. Miller et al. 2014). Brophy (forthcoming) outlines how incorporating strategies from this approach can assist the speech and language therapist to conceptualise the communication (largely pragmatic) difficulties of people with schizophrenia in relation to unhelpful thinking or self-perceptions.

Generalisation to social communication of the skills gained by targeting cognitive substrates of pragmatic ability remains challenging and brings into question the utility of such approaches (Cummings 2009). However, improved tailoring of these interventions to target cognitive processes with specific reference to pragmatics may show more promise (Jagoe forthcoming).

8.7.3 Interventions Targeting Communication Partners

This group of interventions targets the carers and significant others of people with a range of communication disorders that impact on pragmatic function, including aphasia, dementia and TBI. Training materials are used which are designed and validated for the specific purpose of partner intervention. Alternatively, interventions may use detailed individual assessment profiles, such as those generated through conversational analysis, to intervene on specific behaviours within a conversational dyad. The nature of training varies. Many programmes are didactic in nature or are focused on discussion. Some programmes incorporate an element of one-on-one training or feedback on performance, while other programmes only use one-on-one tailored training and feedback.

Efficacy data on these interventions varies. While most studies report a positive impact of training, the manner in which this is measured may be significant. Some studies measure an increase in awareness of communication strategies. However, those that include conversational data and observation of behaviours pre- and post-training are more compelling. The nature of the training is likely to be significant in terms of skill acquisition and maintanance, with some evidence that didactic training should be accompanied by criterion-based performance training (in which training of specific skills is undertaken and performance is monitored against pre-determined criteria of proficiency with feedback provided) (e.g. Bourgeois et al. 2004).

Interventions such as Supported Conversation for Adults with Aphasia (Kagan et al. 2001) are based on the principle that aphasia masks an inherent communicative competence. Training conversation partners in strategies, which are designed to allow the individual to capitalise on their communicative strengths, results in improved communicative interactions (Kagan et al. 2001). Supporting Partners of People with Aphasia in Relationships and Conversation (Lock et al. 2001) and the Conversation Analysis Profile for People with Aphasia (Whitworth et al. 1997) are both based on a detailed conversation analysis of recorded conversations and are thus highly tailored to the individual dyad. By training conversation partners and significant others, the nature of the interaction can be influenced to reveal competence and capitalise on pragmatic strengths.

In the case of dementia, working with conversation partners typically involves teaching strategies to reduce the demand on impaired cognitive systems and thus maximize opportunities for successful engagement. Examples of such programmes include FOCUSED (Ripich et al. 1995) and the Nursing Assistant Communication Skills Program (McCallion et al. 1999). Training of conversation partners has been demonstrated to be effective for staff caring for those with dementia (e.g. Ripich et al. 1995; Done and Thomas 2001; Maxim et al. 2001) and for significant others, and is recognized to be a core role of the speech and language therapist by the Royal College of Speech and Language Therapists (2014). Müller and Mok (2012) highlight the importance of providing opportunities for successful and enjoyable communicative engagement for people with dementia. They examine features of conversations that may allow individuals with dementia to participate more fully. Despite improvements in conversations as a result of these interventions, carers' perception of burden may not change (Behn et al. 2012).

Training conversation partners of people with TBI has also been undertaken, although arguably in a less systematic, programmatic manner. In a novel intervention, Togher et al. (2004) trained police officers in techniques to enhance their interactions with people with TBI. Training of caregivers of people with TBI in conversational strategies has also been demonstrated to be successful, resulting in conversations that were judged to be more rewarding and appropriate (Behn et al. 2012). A recent systematic review concluded that conversation partner training can be an effective intervention to improve communication outcomes for people with TBI (Wiltshire and Ehrlich 2014). Evidence for the efficacy of conversation partner training in this population is accumulating (e.g. Togher et al. 2004, 2013).

The existing body of research on conversation partner training has implications for the types of strategies, principles and beliefs that are incorporated into training for carers and conversation partners more generally. It is notable that the research on intervention approaches that specifically set out to highlight or capitalise on pragmatic strengths are largely focused on aphasia – where pragmatic ability is assumed to be relatively intact – and dementia – where the progression of the condition means that compensation naturally forms a part of the intervention plan. Capitalising on pragmatic strengths and recognizing the collaborative nature of conversation could arguably benefit all patients with pragmatic disorders. Thus, conversation partner training in some form is of relevance across this domain.

8.8 Summary

Pragmatic disruption in adulthood is associated with a range of neurological and psychiatric disorders. Pragmatic presentations are heterogeneous across populations, and variability exists even within aetiological groupings. Research on the impact of pragmatic disorders is small but growing, and suggests that the impact of these disorders can be pervasive. While much of this research has focused on the psychosocial consequences of acquired communication disorders, impact may extend to occupational, academic and forensic domains. The impact of pragmatic disruption is experienced not only by the individual with the disorder, but also by their significant others, an area which is underrepresented in research. Despite a focus on pragmatic deficits in clinical populations, an analysis of pragmatic strengths is also important in clinical practice and has theoretical significance. A balanced view of pragmatic strengths and difficulties should be obtained during pragmatic assessment and inform intervention choices.

Pragmatic disruption in adulthood represents a vast and complex field in which nuances and variability are the norm. It is only through strong theoretical accounts and systematic research that addresses pragmatic impairment and its consequences that the field of clinical pragmatics can adequately serve the individuals living with these disorders. The chapters which follow present the current state of research in relation to specific clinical populations, while synthesizing existing issues in the field and pointing to new developments.

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Chapter 9
Aphasias

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Abstract Aphasias are a family of language impairments. They are associated with focal damage to the neurological networks that support language and that are typically localized to the left cerebral hemisphere. This chapter examines the pragmatic abilities of people who have aphasia. Component, perspectivist and functional views of pragmatics are each considered, for their influence on the operationalization of pragmatic ability in aphasia. The chapter adopts a functional view of pragmatics, which assesses situated discourse produced by people with aphasia for its coherence, as a primary index of pragmatic ability. Specifically, samples of personal narratives told by people who have aphasia – both elicited personal narratives in monologue and personal narratives naturally embedded in conversation – are assessed for their referential and evaluative coherence. Natural reactions and responses of interlocutors to the situated narratives told by narrators with aphasia provide converging evidence for the pragmatic ability of the narrators. Examination of the samples suggests that coherence is intentionally and collaboratively developed by narrators with aphasia through a dynamic integration of linguistic content and contextual sources of meaning-making. This narrative coherence is interpreted as a manifestation of the pragmatic competence of people who have aphasia.

Keywords Aphasia • Coherence • Context • Discourse • Grice, H.P. • Impairment • Language • Narrative • Pragmatics • Preservation

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9.1 Introduction

The symbolic system of systems that humans call 'language' arguably constitutes the phylogenetic and ontogenetic capstone accomplishment of our species – neurologically, cognitively, behaviorally, and socially. Unfortunately, it is the very complexity of the neurological networks required to support language in all its subtlety and sophistication that renders language vulnerable to even the slightest disruption of or damage to its associated neurological substrates. The family of acquired language disorders following focal damage to neurological networks that support language (i.e. damage to networks typically localized to the left cerebral hemisphere) are called 'aphasias'. Because aphasia represents an impairment of language, it negatively impacts to some degree both the production and the comprehension of language in all of its behavioral manifestations: speaking and understanding what is spoken; writing and understanding what is written. Linguistic levels of phonology, morphology, syntax, and semantics may each be negatively affected by aphasia across the different aphasia types and various degrees of aphasia severity.

The purpose of the current chapter is to examine the pragmatic abilities of people who have aphasia. In Sect. 9.2, we provide the conceptual motivation for how pragmatic ability will be operationalized, namely, as *coherence of discourse*, and more precisely, *coherence of discourse within its context of use*. In other words, we examine whether the discourse-in-context 'hangs together' or makes sense as a whole within its context of use. Subsequent illustrative examples of discourse produced in context by people who have aphasia provide insights into the pragmatic profile of these communicators.

Many of the illustrative examples will focus on the coherence of *narrative discourse* in particular, motivated by the strong ecological validity of this discourse genre. Humans imbue virtually every conversation with narrative accounts of personal experience (Ervin-Tripp and Küntay 1996; Labov 1997; Norrick 2000). Whether these are short narrative abstracts or extended narrative accounts, monologue stories or joint narrations, we communicate as *homo narrans*, regardless of whether we have aphasia. The personal salience of narratives, and the themes and points that we highlight through the process of narration, support their fulfillment of intra-personal functions. The re-construction and re-evaluation of remembered experience in the moment of telling are fundamental to the *storying* and *re-storying* associated with life review, reminiscence, and *biographical ageing* (Randall and Kenyon 2001). The personal salience of narratives, and the themes and points that we highlight through the process of narration, also support inter-personal functions. We present our identity to others and bond with them through shared experience and culture (e.g. Johnstone 1990), even to the point that the onset of aphasia may be regarded as a form of identity theft (Shadden 2005). Moreover, in the medical and clinical contexts in which people with aphasia are served, the opportunity for the client or patient to tell his or her story may be especially important, both ethically and therapeutically (Armstrong and Ulatowska 2007; Bernstein-Ellis and Elman 2007; Charon and Montello 2002; Frank 1995). Thus, there is strong motivation for a narrator to strive for maximal coherence as he or she produces personal narratives in context. For this reason, personal narrative as a discourse genre provides an optimal testing ground for assessing how speakers with aphasia garner all the resources available to them to achieve maximal possible coherence, and thus strategically use narratives as a pragmatic mechanism for social interaction (van Dijk 1997).

Explication of the conceptual foundations for this discourse-based approach to pragmatics, and the way in which they are operationalized, serves as an essential starting point. The burgeoning field of pragmatics has been fraught with disagreement regarding its boundary conditions and operational frameworks as the field has developed. This has yielded in turn an associated diversity of approaches to operationalizing and conceptualizing the pragmatic abilities of people with aphasia. Through identification of the conceptual foundations of the discourse-based approach of the current chapter, as well as acknowledgement of those pragmatic approaches on which the discourse-based approach is not founded, we situate our examination of the pragmatic skills of people who have aphasia within the larger field of pragmatics as a whole.

9.2 Conceptual Approaches and Operationalization of Pragmatic Ability in Aphasia

Mey (2001: 8–11) provides an accessible overview of three different but related conceptual approaches to the study of pragmatics: a component view, a perspectivist view, and a functional view. Ultimately, it is the functional view of pragmatics that the current chapter will employ to frame our discussion of the relatively preserved coherence of discourse-in-context among narrators who have aphasia and their interlocutors. However, we begin by addressing each of the three conceptual views of pragmatics in turn, with reference to how each of these conceptual views of pragmatics has shaped the design and interpretation of research on the pragmatic abilities of people who have aphasia. This positions the current chapter within the larger conceptual frameworks on clinical pragmatics and aphasia.

9.2.1 Component View of Pragmatics as Applied in Aphasiology

Under the *component view* of pragmatics (Mey 2001), a linguistic pragmatic component is assigned its own set of linguistic features in contradistinction with features of the other linguistic components of phonology, morphology, syntax and semantics. For those familiar with pragmatics, this view encompasses many of the studies of deixis, implicature, and presupposition. The component view is often manifested operationally in experimentally constrained contexts that place high if not exclusive demands on linguistic ability for task success.

As an example of implementation of the component view of pragmatics in aphasiology, Borod et al. (2000) experimentally elicited verbal monologues from individuals with aphasia to assess their pragmatic abilities. Specifically, the researchers asked the participants to produce monologues based on pre-determined themes and rated transcripts of the verbalizations for their pragmatic appropriateness on several dimensions derived from Gricean maxims of quantity, quality, relation and manner (Grice 1975). Raters were blind to the themes used to elicit the monologues and rated transcripts of the verbalizations only; no extra-linguistic or paralinguistic information was available to the raters. Participants with aphasia were rated lower than participants with no brain damage on four pragmatic dimensions: specificity vs. vagueness; completeness vs. incompleteness; appropriate and varied lexical selection vs. inappropriate and limited lexical selection; and relevance of remarks vs. irrelevance of remarks. What one notices is that each of these four pragmatic dimensions depends inherently on skills of verbal lexical production—the very skill that is compromised due to the anomia that is a core characteristic of all types of aphasia. Moreover, no extra-linguistic information or themes were made available to the raters to contextualize the content of the production. Thus, pragmatic (in)ability of people with aphasia as operationalized in the experimental context of the Borod et al. (2000) study is tightly bound to the linguistic impairments of the study participants. This represents an approach to understanding the pragmatic abilities of people with aphasia based on a component view of pragmatics.

Notably, even in studies of pragmatics and aphasia that do not claim to be based in the component view of pragmatic ability, an experimental approach that places heavy emphasis on language production as the response mode for dependent measures of pragmatic ability may still lead to the conclusion that participants with aphasia display a pragmatic deficit. For example, Kasher et al. (1999) hypothesized that people with aphasia may have pragmatic difficulty due to deficits in the central cognitive system and not due to language deficits *per se*. The researchers presented participants with aphasia with both verbal and non-verbal implicatures (Grice 1975), i.e. scenarios in which there is purposeful flouting of Gricean maxims of quantity, manner, quality or relation and where the underlying meaning (implicature) can be understood only when interpreted in context. The researchers worked on the assumption that measured deficits in both verbal and non-verbal implicatures would provide evidence for a deficit in the central cognitive systems that support pragmatics.

However, the responses that Kasher et al. (1999) required of participants in both the verbal and non-verbal implicature conditions placed relatively high demand on language production abilities. The individuals with aphasia were asked to verbally identify and solve the implicatures under both presentation conditions. In the verbal implicature condition, stimuli were in the form of two-sentence conversational vignettes that were incongruous when interpreted literally, e.g. the first person in the conversational vignette comments that George and Mary moved out of town, and the second person in the conversation responds that it was too bad that George left. The participant is asked to verbally identify and solve the implicature associated with the second comment in the vignette. In the non-verbal implicature condition, stimuli were in the form of famous paintings that were literally problematic and for which an implicature needed to be drawn to interpret their meaning, e.g. Magritte's painting 'Le domaine d'Arnheim' in which an eagle embedded symbolically in a mountain is positioned over a nest of eggs. Again, the participant is asked to verbally identify and solve the implicature.

The relative inability of the participants with aphasia to verbally explain both verbal and non-verbal implicatures, as compared to participants without aphasia, was interpreted by the authors as evidence of a cognitively-based pragmatic deficit. However, the verbal response mode across both conditions may have been a source of confound, a possibility highlighted by the fact that implicature measures were correlated with the measures of verbal naming impairment of the participants. As another example of the potential for interpretive conflation of linguistic impairment with pragmatic impairment, Chapman et al. (1997) conducted a study of proverb interpretation in aphasia. Proverbs are a form of non-literal language whose production and comprehension are a reflection of pragmatic ability. The authors of this study found that proverb interpretation was relatively inaccurate when the response format made high demands on linguistic ability, namely, when the participants were asked to verbally define the proverbs. In contrast, proverb interpretation was more accurate when response format placed relatively lower demands on expressive language, namely, when the participants were asked to identify the correct non-literal interpretation of the proverbs within a multiple-choice response format. A final example of the potential for linguistic deficits to be interpreted as pragmatic deficits is found in Wright and Newhoff (2004). In this study, an experimental lexical priming task, which is strongly dependent on lexical semantic access (i.e. a linguistic process compromised in aphasia), was the method used to operationalize the pragmatic inability of participants with fluent aphasia to revise inferences drawn across sentence pairs.

In summary, the preceding examples of pragmatic studies of aphasia whose models or experimental design fall under the component view of pragmatics, place relatively high emphasis on the linguistic contributions to pragmatic ability, to the relative exclusion of non-verbal and extra-textual factors that may contribute to the pragmatic abilities of people who have aphasia. The contexts in which these studies are conducted are experimentally controlled, and thus they are not necessarily representative of the pragmatic abilities of people with aphasia as manifested in naturalistic, ecologically valid contexts that are discourse-based. However, these experimentally constrained, component-view studies of pragmatics in aphasia provide evidence for the relative disability in pragmatics that may be manifested in contexts where the linguistic demands are high and where other contributing sources of pragmatic information such as prosody, gesture, shared world knowledge and culture, and immediate textual and environmental context are minimal or unavailable. They also remind us that language plays a pivotal role in our understanding of the pragmatic abilities of people who have aphasia, and that we should avoid pragmatic assessment designs that include only non-linguistic sources of pragmatic information such as eye gaze and gesture, to the relative exclusion of the linguistic sources of pragmatic information with which they are combined. As noted by

Cummings (2009: 244), language must be at the centre of any account of pragmatics. As we will see exemplified in the current chapter, linguistic abilities of people who have aphasia, whatever their level of impairment, operate in concert with non-verbal and contextual sources of pragmatic information to support the pragmatic abilities of people who have aphasia (Armstrong and Ferguson 2010; Goodwin 2003).

9.2.2 Perspectivist View of Pragmatics as Applied in Aphasiology

Next, we consider a *perspectivist view* of pragmatics (Mey 2001). Under this view, pragmatics is defined as the forming of a sociological, cultural, and psychological perspective on the natural variation and adaptation of language activity – on variation and adaptation of phonology, morphology, syntax and semantics – as these language activities operate pragmatically in context. For instance, sociological and cultural factors, such as relative socio-economic status of interlocutors and their cultural identities, offer a perspective on the pragmatic appropriateness and usefulness of certain dialects or registers within a given context of communication. In this way, the pragmatic perspective serves as an overlay for interpretation of the pragmatic functionality of natural language variation and adaptation as studied in ‘hyphenated’ fields such as sociolinguistics and psycholinguistics. Examples of implementation of the perspectivist view of pragmatics in aphasiology are found in the literature on code switching by speakers who speak more than one language and who have aphasia (e.g. Muñoz et al. 1999; Riccardi et al. 2004). As defined by Muñoz et al. (1999), code switching is the alternating use of one’s languages to add communicative intent, emphasis, or emotional value. Code-switching ability may be preserved in at least some speakers who have aphasia, which in turn represents a pragmatic preservation. For instance, Riccardi et al. (2004) describe pragmatically appropriate code switching in a quadrilingual with Wernicke’s aphasia. Also, Ulatowska and Olness (2003) describe a pragmatically appropriate switch in register and use of dialectal forms in the narrative direct speech of a potentially bi-dialectal narrator with aphasia, as contrasted with the forms used by the same speaker in the same narrative when no direct speech was being produced. Although the field still questions whether code switching may represent, in part, a compensation for underlying aphasia-related verbal expression deficits, there is evidence under a perspectivist view of pragmatics that pragmatics may be preserved in aphasia in some contexts.

In contrast with the preceding examples of pragmatic preservation in aphasia under the perspectivist view, there may be instances in which the language deficits of a speaker with aphasia are associated with pragmatic difficulty in certain communicative contexts, although evidence suggests that intervention within those contexts may yield functional improvements in communicative pragmatics. For example, Fox et al. (2009) describe the difficulties that a speaker with mild aphasia encountered when engaged in argumentative repartee, a form of conversation that she had previously enjoyed with her husband prior to the onset of her aphasia. As a pragmatic act, argumentation is associated with rigorous demands for high fluency and precise timing of expression. Unfortunately, for the person with aphasia, her residual anomia, and the hesitancies and lexical imprecisions associated with it, made argumentation difficult. Fortunately for this woman, conversation-based intervention with the couple increased the woman's successful participation in argument-based conversations of the dyad. As another example of a context-specific pragmatic difficulty, a woman with aphasia who had been assaulted was initially deemed incompetent to testify in legal proceedings associated with her case (E. Ganzfried, personal communication, December 3, 2010). High demand for referential clarity in legal settings – a referential clarity often compromised in aphasia – may have been the precipitating factor in the initial decision. Fortunately, the restriction was eventually overturned and the woman provided her testimony using techniques of supported communication.

As one considers the perspectivist view of pragmatics and how it applies to the pragmatic abilities of people who have aphasia, one is reminded of people with aphasia who purposefully adjust the context of communication by educating and informing the unfamiliar interlocutors about their aphasia. In this way, their language-impaired productions are not pragmatically misinterpreted as purposeful flouting or inadvertent violations of Gricean maxims of quantity, quality, or manner. For example, the automatic signature lines in e-mails of a middle-aged man with non-fluent aphasia who is familiar to the first author conclude with the words *Aphasia, Stroke* and *Sorry if my English is bad*. In a similar way, speech-language pathologists will often invite clients who have aphasia to develop business-sized cards that explain their aphasia, to carry and present to unfamiliar interlocutors so the client's aphasic impairments are not pragmatically misinterpreted in the communicative context. In a fundamental way, these pragmatically informed moves of the person with aphasia are shifting the culture-based assumptions held by the interlocutor regarding norms of quantity, quality and manner of communication. Once the interlocutor has been informed, it is the interlocutor without aphasia who would be deemed pragmatically inappropriate if he violates the now-shifted norms of quantity, quality and manner in that communicative context.

Notably, a pragmatic deficit from a perspectivist view may be ascribed in cases of individuals with aphasia with a pronounced anosognosia, i.e. a lack of awareness of one's deficits. The classic type of aphasia that is characterized by anosognosia is Wernicke's (fluent) aphasia. In cases of severe Wernicke's aphasia, the person is seemingly unaware of the pervasive jargon and paraphasic errors in their oral expression, which violate the Gricean maxim of manner. These pragmatic violations are further exacerbated by a hyperfluency which is in violation of the Gricean maxim of quantity. Notably, however, the severe auditory comprehension deficits that are theorized to underlie the anosognosia and hyperfluency of a person with Wernicke's aphasia are typically the first aspect of the disorder to be addressed in therapy, and are amenable to intervention.

In summary, a perspectivist view of pragmatics expands our understanding of the pragmatic abilities of individuals with aphasia as we examine how speakers with aphasia may or may not be able to vary and adapt linguistic forms to align pragmatically with specific contexts of communication. Intervention in the context of communication that includes adjustment of the context proper, or intervention for the mitigating auditory comprehension deficits in cases of Wernicke's aphasia, may be used to improve the pragmatic functioning of the person with aphasia in everyday contexts of communication.

9.2.3 Functional View of Pragmatics as Applied in Aphasiology

Finally, we consider a *functional view* of pragmatics (Mey 2001: 10–11), which has its roots in the functional characterisations of language proposed by Karl Bühler and elaborated by Roman Jakobson. This view of pragmatics considers how human expression functions as an appeal to other language users and as a means of social togetherness, rather than simply as a means of transmitting impersonal information. Importantly, a functional approach to pragmatics has the potential to bring together the component and perspectivist approaches (Mey 2001: 10). Specifically, the functional approach uses the range of available linguistic techniques – componential features (e.g. deixis, implicature) – as its backdrop. It describes (not prescribes) which of these features are typically used within communicative contexts that are described cognitively, socially, and culturally (perspectivist framework) to the functional satisfaction of the interlocutors who are involved (functional view). Thus, the perceived pragmatic functionality of the exchange among the user-interlocutors, operationalized as the objective and subjective evidence for their satisfaction with the exchange in that particular context, provides the ultimate outcome measure (dependent measure) of pragmatic ability under a functional approach to pragmatics.

A functional approach to understanding the pragmatic abilities of people who have aphasia is typically operationalized through sampling of naturally occurring, discourse-based, face-to-face situations, within the very context of their instantiation. In keeping with this approach, it is the contextualized discourse productions of individuals who have aphasia that will serve as the window into the pragmatic abilities of people with aphasia for purposes of the current chapter.

With respect to pragmatic assessment, the functional perspective of pragmatics adopted in this chapter entails assessment of the satisfaction of the interlocutors engaged in the discourse-based exchange-in-context. This assessment of satisfaction will be operationalized through assessment of *narrative discourse coherence*, relative to the sampling context of narratives produced by narrators with aphasia. One group of narratives considered in the current chapter will be narrative monologues produced by people with aphasia in response to a personally salient thematic prompt such as “Think of a time when you were frightened or scared. What happened?” or “Tell me the story of your stroke. What happened?” Labov (1972) in the field of sociolinguistics, and Ulatowska and colleagues in the fields of neurolinguistics and aphasiology, make extensive use of this narrative sampling technique. It emulates production of narrative monologues found in everyday contexts in which the interlocutor cedes the floor to the narrator and serves as an interested listener (Schegloff 1982; Norrick 2000).

For elicited monologue narratives that have been transcribed, narrative coherence, i.e. semantic unity of themes and points of emphasis in the narrative, is often operationalized through a system of ratings (e.g. Glosser 1993). Narrative coherence is achieved through sufficiently clear reference to person, action, place and time; use of evaluative devices that selectively highlight or add prominence to information in the narrative for purposes of making an evaluative ‘point’ with the narrative; and thematically coherent expression of evaluative content and commentary, which may include content of a narrative abstract or coda that is consistent with the theme of the elicitation (Olness and Ulatowska 2011). Thus, assessment of personal narratives under the functional view of pragmatics often includes qualitative (and occasionally quantitative) assessment of clarity of reference, and evaluative and thematic content. These coherence-building characteristics of the narrative ultimately serve to engage the audience or interlocutors in the narrative telling and augment the perceived satisfaction with the story (cf. Ulatowska et al. 2004).

A second group of narratives considered in the current chapter will be narratives produced by narrators with aphasia in a conversational context. These may be narratives of personal experiences expressed within the context of a group or dyadic conversation. Narratives in conversation may range from short narrative abstracts to extended narrative monologues within the conversational setting. They may include both narrative monologues and narratives jointly told by narrators who share a common experience (Norrick 2000). In addition, conversational narratives that are sampled via video recording may analyse multimodal means of communication such as gesture, deictic pointing, and prosodic contour as they are orchestrated with verbalization in the ongoing interaction (e.g. Goodwin 2003). This may include reference to the verbalizations of others in the interaction (Goodwin 2013).

A clinical approach to assessment of the coherence of personal narratives produced by narrators with aphasia in conversational contexts is currently being developed and adapted by Olness and colleagues (e.g. Olness et al. 2012). Under the functional view of pragmatics, narratives-in-conversation are assessed for their intra-textual coherence just as elicited monologue narratives are. This includes examination of the referential clarity and evaluative and thematic coherence of their content. In addition, their content is assessed for extra-textual coherence with the ongoing conversation and the culture at large, including assessment of whether the story is ‘tellable’ within the cultural context; assessment of whether themes and points in the narrative are coherent with the topic of the preceding conversation, which render it ‘tellable’ within the immediate conversational context; and assessment of interlocutor reactions to the narrative. Reactions of the interlocutors to the personal story are a key index of the pragmatic functionality of the narrative under a functionalist pragmatic view. A pragmatically successful narration in a conversational context is met with reactions and commentary of the interlocutors that are consistent with the evaluated content and themes of the narrative, since the motivation to convey a ‘point’ or theme with the story may be the very reason why a story is told in the first place (Polanyi 1989). Illustrations provided in the current chapter highlight the key narrative indices of the pragmatic abilities of communicators with aphasia: (1) the intra-textual coherence of monologue narratives and narratives told in conversation; (2) the prominent content of narrative-in-conversation as it relates coherently to the context in which the narratives are expressed; and (3) reactions and responses of interlocutors engaged in conversation in which personal narratives are used, as they cohere with the content of the narrative and the conversation at large.

9.2.4 Closing Comments on the Clinical Application of the Three Pragmatic Views

It is important to note that conclusions regarding the pragmatic abilities of individuals with aphasia may be different under each of the different conceptual approaches to pragmatics. As a result, any given individual with aphasia may be assessed as having a pragmatic disorder under one of the conceptual views of pragmatics, while an assessment of their pragmatic abilities under a different conceptual view of pragmatics may come to quite a different conclusion. For example, as we have already discussed, an individual with Wernicke’s aphasia may be assessed as having pragmatic difficulties in conversation secondary to his auditory comprehension deficits, paraphasias and anosognosia, resulting in inadvertent violations of Gricean maxims under the perspectivist approach to pragmatics. In contrast, the same person with fluent aphasia may successfully and coherently convey themes during the process of personal narration, which would be a reflection of retention of his pragmatic abilities under the functional view of pragmatics.

The three conceptual approaches to pragmatics may be grouped metaphorically. This can serve to highlight associated implications for how they operationalize language impairment within studies of the pragmatic abilities of people who have aphasia and for application to clinical practice. Under the component view of pragmatics, language operates as a building block in support of pragmatic abilities. So language impairment will inevitably have a negative impact on pragmatic ability when pragmatics is defined in this fashion. In contrast, under the perspectivist and functional views of pragmatics, language operates as a tool – indeed, one of many tools – to be used in the pragmatic meaning-making process, so language impairment will not necessarily have a negative impact on pragmatic ability. Residual language abilities, regardless of level of impairment, may be sufficient to achieve the target pragmatic functions, or they may be re-tooled to fill the pragmatic functions at hand. In addition, the person’s use of residual language can be integrated in its function with other meaning-making tools, such as prosody, gesture, contextual cues, reference to the immediate conversation, and shared world knowledge to achieve intended pragmatic goals. Moreover, if the pragmatic context at hand allows for the use of a variety of tools in tandem with language, or if the pragmatic context can be adapted to allow for the integration of a variety of meaning-making tools, the underlying pragmatic abilities of the person with aphasia may be revealed.

The three pragmatic views can be considered in light of clinical models of service provision associated with pragmatic abilities of clients with aphasia. The component view of pragmatics is associated with a *behavioral model* of clinical assessment and intervention. Under this clinical model, assessment is performed in circumscribed contexts and activities as pre-defined by the therapist. The pragmatic 'problem' is assumed to rest within the client with aphasia. Clinical intervention consists of treating the underlying aphasic problem in the client through impairment-level intervention for language deficits. The therapist acts as a consultant to the person with aphasia in establishing treatment goals, and outcome measures are typically quantitative. Clinical intervention in the behavioral model falls under the *Body Structures and Functions* component of the World Health Organization's International Classification of Functioning, Disability and Health (WHO-ICF) (World Health Organization 2002). The therapeutic goal is to reduce the underlying aphasic impairment. This impairment-level intervention is conducted in a clinical context, through engagement of the person with aphasia in structured communicative *Activities* such as speaking and writing, to address *Activity Limitations* (WHO-ICF). Under the behavioral model of clinical intervention, however, the WHO-ICF component of *Participation Restrictions*, i.e. constraints in the participation of the person with aphasia in everyday communicative situations and contexts, is not directly addressed.

In contrast, the perspectivist and functional views of pragmatics are associated with a *systems-social model* of clinical assessment and intervention. Under this clinical model, assessment is performed in natural contexts to determine which contexts promote successful performance. The pragmatic 'problem' is assumed to rest in a mismatch between the client's abilities and the contexts in which they are communicating. Clinical intervention consists of changing the context of communication to better align with the abilities of the client, or addressing the underlying impairment and compensatory strategies of the client to better align with the context, or both. Also, the therapist and the person with aphasia participate as collaborators in establishing intervention goals. Outcome metrics in the systems-social approach consist of qualitative descriptions of functional outcomes, including criterion-referenced measures, which are tailored to the everyday living situation of the person with aphasia. These measures are used to determine the success of communication in context toward the ultimate satisfaction of the interlocutors. Clinical intervention under the systems-social model falls under the *Activities*, *Participation*, and *Contextual Factors* components of the WHO-ICF, and addresses *Activity Limitations* and *Participation Restrictions* of the client.

As one considers the medical and clinical models of service delivery as they relate to the pragmatic ability of people who have aphasia and engage in clinical intervention, it is important to note that modern models of healthcare service delivery, such as the WHO-ICF, have placed ever-increasing emphasis on clients' functionality in the contexts of daily life that are the most important to them. Thus, models such as the WHO-ICF validate intervention that is designed to maximize the pragmatic success and satisfaction of individuals with aphasia, and that of their interlocutors, within their everyday contexts of communication. Such intervention may include direct work on linguistic impairments, design of compensatory communicative strategies, and modifications of the communicative environment. What the successful implementation of these interventions may suggest, in the final analysis, is that the linguistic impairments of people who have aphasia belie an underlying pragmatic competence that is manifested through collaborative tooling, re-tooling and re-integration of available meaning-making resources.

9.3 Narrative Coherence and Its Linguistic Foundations

In Sect. 9.1, we argued that the coherence of personal narratives in their context of use, i.e. the degree to which the narrative semantically 'hangs together' or makes sense as a whole within its context, acts as a window into a narrator's pragmatic ability. Given the strong motivation of a narrator to make a story coherent so that it can fulfill its key intra-personal and inter-personal functions, we will further argue that the speaker with aphasia draws on every available meaning-making resource toward the goal of making his narrative coherent. In this section, we provide a brief overview of the linguistic meaning-making resources that the narrator with aphasia uses within the narrative to develop two key aspects of coherence that are essential for the production of a coherent narrative: *referential coherence* and *evaluative coherence*. A more detailed discussion of resources used for developing referential and evaluative coherence is provided in Olness and Ulatowska (2011).

Regarding the implementation of coherence-building linguistic resources by narrators with aphasia, two points will be highlighted. Firstly, even though the narrator with aphasia has a language impairment, one observes that he uses his residual linguistic abilities dynamically and with intention toward the goal of developing coherence, selectively revising those linguistic errors that may compromise coherence. This is a phenomenon that clinicians frequently observe in the narratives of people who have aphasia, and we will see this exemplified in the current chapter. This active striving for coherence by the narrator with aphasia is evidence that the narrator holds to the foundational *Cooperative Principle* of pragmatics (Grice 1975) under which speakers recognize that each successive remark or contribution in a talk exchange should be meaningfully integrated (cohere) toward fulfillment of a common purpose or set of purposes in the exchange. It is theorized that the overarching purpose of any communicative exchange is to maximize the *relevance* of each utterance (Sperber and Wilson 1995). Thus, it is with an eye toward semantic relevance and overall coherence that we will examine the narratives of speakers with aphasia, as a reflection of their pragmatic abilities.

Secondly, we will highlight the point that linguistic resources used for coherence-building need not be lexically, morpho-syntactically, or semantically complex to accomplish their coherence-building purpose. Indeed, this may be the case regardless of whether a person has aphasia, as any transcriptionist of naturally-occurring language will attest. In particular, we will argue that evaluative coherence, as compared to referential coherence, may be relatively easier to achieve linguistically for speakers with aphasia due in part to the linguistic simplicity of several of the *evaluative devices* that may be used to develop evaluative coherence. For example, a speaker with aphasia who wishes to emphasize specific information within his narrative may simply repeat a previous utterance using changed prosody to emphasize the content of that utterance, regardless of the lexical or morpho-syntactic level of complexity of the utterance (Ulatowska et al. 2000).

9.3.1 Referential Coherence in Narrative

A narrative that is intended to be referentially coherent is associated with a *representative* pragmatic act. The pragmatic goal is to represent the facts that refer to the 'who, what, where and when' of the narrated event, as a form of information transmission, in sufficient detail and with sufficient clarity that the interlocutors receive the information. Reference to agents and actions in discourse may be particularly vulnerable in narrators who have aphasia (Ulatowska et al. 1990), secondary to the anomia and paraphasias that are characteristic across all types of aphasia. Aphasia affects lexical access during production of the verb phrases and noun phrases that are essential for expression of the temporal-causal sequence of actions that represent the sequence of events in the story being narrated.

We consider an example of personal reference (the 'who') in a personal narrative. A middle-aged African American preacher with a moderate fluent aphasia was asked for a narrative of a frightening experience as part of an extended narrative discourse battery that asked people with aphasia to relate personal narratives. In response, he told the story of his stroke and how it occurred while he was preaching at church. Near the beginning of the story, he attempted to refer to a man who was a member of his congregation and who was there when the stroke occurred, saying *"…and I, I had a young, I had a a ma, a master, not a master, but he was a man who was a member of, of there where I preached when I was preaching…"*. The listener is not quite sure exactly who the man is. At first glance, one might conclude that such reference difficulties may have a negative impact on pragmatic abilities, because they make expression less accurate and less specific. They thus violate, for example, the pragmatic maxim of manner (Grice 1975), which specifies that cooperative communicators should avoid obscurity of expression and ambiguity.

However, upon further consideration, one could very well come to quite the opposite conclusion, namely, that the reference difficulties of aphasia are not necessarily associated with pragmatic deficits *per se*. The violations of Gricean maxims associated with reference problems of people who have aphasia are not failed attempts at *intentional* flouting of the maxims, nor are they interpreted as such. One is reminded that it is intentional flouting of maxims as used to create implicature, i.e. an additional proposition external to what is said, that is the ultimate focus of Grice's classic work in pragmatics. Just as pragmatics always involves the intention to communicate (Cummings 2009: 248), so pragmatic deficits should involve a failure in communicating the pragmatic intent. For instance, there is no intentional attempt on the part of the speaker with aphasia quoted above to use obscurity and ambiguity to invite the listener to derive an implicature such as 'This utterance is obscure and ambiguous in its reference to apologize for the facts or to keep a secret'. What is truly intentional, in contrast, is the very striving of this speaker to adhere to Grice's Cooperative Principle to make the communication go as smoothly and rationally as possible, despite his aphasia. This intentional and focused revision until he achieves referential success is a sign of pragmatic preservation.

Moreover, reference to the full identity of the man cannot be assumed to be essential to the overall referential coherence of the story. In other words, isolated problems of reference are not necessarily associated with problems of referential coherence in narrative. Reference to the man may have served simply as background information about the presence of a congregational member who, ultimately, would not be an important agent engaged in the narrative event line of the stroke story. Was he just a bystander there at the church where the stroke occurred, or was he the very person who would drive his pastor to the hospital? When narrating, the pragmatic abilities of the speaker with aphasia, like those of speakers without aphasia, are manifested as the narrator chooses which references to agents and actions should be made clear during the process of narration, and which can remain less than clear because they are not essential to the overall coherence of the story and its event line.

Indeed, the pastor's narrative continues, and there is no further reference to the man. Rather, reference is made to the main events in the story: the occurrence of the stroke, the phone call to the paramedics, and the arrival at the hospital. Again, local problems with reference are manifested, but the narrator revises until the event line is referentially clear. This renders the story referentially coherent as a whole, regarding the sequence of events that occurred, which again is a manifestation of pragmatic ability.

> *Because and while I was preaching, the condition happened to me. My stroke hit right here in church. Then I had to allow this, the doctor I mean with the the s- stroke what cause me to have the pol-, not the police. But the the phone. And they had to come get me way of um while I was here in the church. I was brought me here from to, in Blair- Baylor.* [referring to Baylor hospital in Dallas]

Notably, the referential coherence of this event sequence is supported by shared world knowledge between speaker and listener, namely, that when a medical emergency occurs, the paramedics are called and one is taken to the hospital. Such extratextual sources of referential information support narrators with aphasia in development of referential coherence. Additional sources that support the referential coherence of a narrative include shared cultural knowledge and shared experience.

For example, as we will see in an example of joint narration of a movie by three men with aphasia who had all seen the same film, the cooperative nature of the narration reduced the demand for linguistic referential clarity on any one of the joint narrators.

Typically, narratives are not intended primarily for fulfilling the representative function when they are told. Polanyi (1989) comments that the purpose of most personal narratives is to express the narrator's attitudes, opinions and emotions about the event being narrated, i.e. the *point* of the story, and it is not necessarily to convey the actions and agents in full detail. Now, exceptions to this may occur in contexts that call for high referential clarity as the primary goal in telling the narrative, such as when giving testimony in a court of law, or when the story is told as a form of procedural discourse to give the interlocutor step-by-step instructions. However, as one assesses the overall level of referential coherence of a story, one must remain cognizant of whether or not the context in which the story is being told is one that demands detailed referential coherence or not. In the case of the stroke story discussed above, one recalls that the narrator was asked for a story of a frightening experience, and not a recount of the events for a court of law. So one would expect that the story could be referentially coherent within such a context of sampling, without developing referential clarity for every last detail in the story.

Notably, much emphasis in clinical contexts is placed on assessing referential clarity, full referential coherence, and transmission of referential information. Thus, clinical contexts are contexts in which strong focus is placed on discourse reference. On standardized tests, the individual with aphasia is asked to narrate the events that preceded his hospital admission. The tester may present a picture and ask the patient what is going on in the picture. Discourse productions are assessed for fluency of information transmission and for referential completeness and accuracy (e.g. Nicholas and Brookshire 1993). This focus on referential abilities in standardized aphasia testing is understandable, given that the purpose of the testing is to provide information on the typology and severity of the client's aphasia, and because our traditional models of aphasia are built on the referential function and deficits thereof. Thus, the model of assessment of narrative coherence in the current chapter breaks with the tradition of heavy and exclusive focus on full referential clarity, because many communicative contexts do not demand it. Instead, we examine the *degree* of referential clarity that may be needed to make a narrative coherent in the context in which it is told with the goal of achieving its pragmatic purpose.

In summary, the clinician and scholar of pragmatics and aphasia recognizes that standardized aphasia testing and a focus on isolated instances of referential problems place an emphasis on a representative function. However, one must also keep in mind that referential abilities of people who have aphasia, which are most certainly in deficit, must be differentiated from the ability to develop referential coherence in narrative, which is a pragmatic ability that may very well be preserved in aphasia. In everyday narratives, only certain agents and actions in a story take high priority for referential clarity, while other agents and actions that are off the event line do not take priority. It is the context in which the personal narrative is told, and the purpose that the story fulfills within that context, that determines the degree to which a representative pragmatic function is a priority. Contexts that prioritize full referential clarity are rare in everyday life. The pragmatic goal and accomplishment of the narrator with aphasia is to successfully convey the most important referential information through the story in fulfillment of its pragmatic purpose, and not to exhaustively convey every last referential detail in the story.

9.3.2 Evaluative Coherence in Narrative

Evaluative coherence is coherence of content that expresses the theme or point that the narrator is emphasising through the telling of the story. This evaluative, point-making function may be the very reason why personal stories are told in the first place (Labov 1972; Polanyi 1989). They may be told to highlight the narrator's attitude, opinion, or emotion regarding the event that he is narrating. The points of emphasis in a conversationally embedded story are rendered all the more coherent when those points align with the ongoing topic of conversation, for example, when a story emphasising a brush with death during a tornado is embedded in a conversation on threatening weather, as occurred in one aphasia group familiar to the first author. Because evaluative coherence is fundamental to the overall coherence of personal narratives, the topic warrants special consideration in a chapter on narrative coherence as a reflection of pragmatic abilities. Moreover, evidence suggests that expression of evaluative content and the associated evaluative coherence of narratives may be relatively well preserved in aphasia (Armstrong and Ulatowska 2007; Olness et al. 2010; Olness and Englebretson 2011; Olness and Ulatowska 2011; Ulatowska et al. 2013). Because evaluative coherence plays a central role in the relatively preserved coherence of personal narratives told by people who have aphasia, we afford special attention to this small but important literature for the interested reader.

The process of narrative evaluation is also called 'narrative appraisal' (Martin and White 2005). Evaluation or appraisal of information within a personal narrative conveys the 'so what?' of the story, through selective promotion or demotion of content, with the express purpose of coherently conveying themes or points through the story. The linguistic forms that are used to add selective prominence to information in narratives are called 'evaluative devices' (Labov 1972; Martin and White 2005). Integration of the collective content highlighted by evaluative devices serves as a means to express the narrator's attitudes, opinions, or emotions regarding the event that he or she is narrating (Olness and Muñoz 2011). Evaluative devices found in narratives of speakers who have aphasia include evaluative lexical choice (Armstrong 2005), commentary external to the narrative event line (Armstrong and Ulatowska 2007), repetition (Ulatowska et al. 2000), and verbal mimicry, such as direct speech and onomatopoeia (Olness et al. 2012; Ulatowska et al. 2011; Ulatowska and Olness 2003).

Notably, the evaluative devices used to add prominence to information in narratives (Labov 1972) come from all linguistic levels. They need not be lexically, morpho-syntactically, or semantically complex to fulfill their evaluative function.

This may account, in part, for the relative preservation of evaluative coherence in the stories told by people who have aphasia. Use of evaluative devices emphasises associated content through intensification, comparison, dramatization, and a slowing or suspension of progression of the narrative event line (analogous to the way in which slow-motion action at the climax of a movie highlights the climactic action for the viewer). A study by Olness et al. (2010) suggests that certain evaluative devices are most common in personal narratives regardless of the aphasia status of the narrator. These include selected commentary (e.g. *the most scariest time of my life*), repetition (e.g. *it was in church…my stroke hit right here in church*), direct speech (e.g. *"Why? I can't talking"*, direct quotes of the narrator's self-talk during his stroke), and negation (e.g. *but I couldn't get up*).

Even the distribution of evaluative devices may be similar in personal stories of people with and without aphasia. While each of these forms of evaluation may occur in isolation, they often co-occur within a given utterance, especially at the peak of action of the narrative. This pattern may hold both for narrators with and those without aphasia (Olness et al. 2010). Also, use of an evaluative device may sometimes be accompanied by extra-high pitch on the evaluated content, as an additional means of content intensification (e.g. *It seem*^{HIGH} *like it took*^{HIGH} *forever*^{HIGH} *to get that plane stopped*). Moreover, a study that assessed the coherence of evaluative content of individual narrators with aphasia telling personal narratives suggests that intra-textual evaluative coherence is maintained for them, regardless of the evaluative device(s) used to emphasize that content (Olness and Englebretson 2011). These patterns of narrative coherence that are present regardless of aphasia status provide additional evidence in support of the maintained pragmatic abilities of narrators who have aphasia.

As an example of how individual evaluative devices are used to develop coherence of semantic content within a narrative of a speaker who has aphasia, consider the same narrative of the African-American pastor with fluent aphasia that we examined earlier. In response to a request for a story of a frightening experience, he told the story of his stroke. The evaluative point of emphasis that he makes throughout the story is that the stroke occurred while he was preaching in church, which is a source of evaluative coherence of his story. In this particular story, coherent emphasis of content is achieved through *repetition* of that content. Consider the evaluative coherence that results from the repeated evaluative content highlighted in bold print in his orthographically transcribed narrative. This is despite the presence of multiple paraphasic errors. (Unintelligible content is indicated with XXX.)

> (Interviewer: *Tell me again the frightening experience that you had or something that you were afraid of.) The worst XXX* ***when I was at church.*** (Interviewer: *Oh, then you, okay. When you were in church.*) ***It was in church. I was in church.*** (Interviewer: *So now…tell me the entire story about when you were in church and something frightened you.*) *Yeah, it was in church while in XXX* ***I was preaching****. And I, I had a young, I had a a ma, a master, not a master, but he was a man who was a member of, of* ***there where I preached when I was preaching****. Because and* ***while I was preaching****, the condition happened to me.* ***My stroke hit right here in church****. Then I had to allow this, the doctor I mean with the the s-stroke what cause me to have the pol-, not the police. But the the phone. And they had to come get me way of um* ***while I was here in the church****. I was brought me here from to, in Blair- Baylor* [referring to Baylor hospital in Dallas].

The repeated content of the story emphasises that the stroke occurred in church while the narrator was preaching, which lends evaluative coherence to the story. Notably, the prosody used when expressing this content, albeit prosody that was not transcribed here, lends additional emphasis. This intra-textual coherence of evaluative content in narratives of people who have aphasia is echoed in the work of Armstrong and Ulatowska (2007), who identified evaluative themes expressed through stories of stroke told by people who have aphasia. In this particular example, the choice to emphasize that the stroke occurred unexpectedly in a familiar and public location fits with the original request for a frightening experience, which also contributes to the coherence of the story. Moreover, the very selection of a stroke story is also coherent given the original request for a frightening experience story. As noted by Ochs and Capps (2001), the very process of selecting which story to tell within the cultural and conversational context is itself considered to be a form of evaluation. Thus, expression of thematic evaluative content in a story worth telling – which content is also coherent with the context in which the story is told – represents an integration of sources of evaluative coherence in narratives told by people who have aphasia. This is, in turn, a manifestation of their pragmatic abilities.

9.3.3 Closing Comments on Referential and Evaluative Coherence in Narratives

There are a few final points to highlight as we close our discussion of referential and evaluative coherence of narratives told by people with aphasia. Firstly, the reader will remember that the current chapter subscribes to the functional view of pragmatics when assessing the pragmatic abilities of people who have aphasia. Under this framework, a key index of pragmatic ability is assessment of the functional satisfaction of the interlocutors in the interaction. Thus, for a monologue narrative that has been elicited on a theme, such as an elicited story of a frightening experience or an elicited story of one's stroke, a judgement by the listener that the narrative is coherent in its content relative to the theme constitutes evidence for the pragmatic success of the narrative. Likewise, for a naturally occurring personal narrative embedded in conversation, interlocutor reactions that are coherent with the content of the narrative relative to the conversational context also serve as indicators of the pragmatic success of the narrative. These interlocutor reactions may include emotive commentary in response to the evaluated content of the story (e.g. *oh my goodness, unbelievable*) or subsequent production of a story that makes a similar evaluative point. These reactions also may include those of the narrator with aphasia himself as he confirms the reactions of others (e.g. *Yeah! Yeah!*).

As we will see later in the chapter, evidence for the pragmatic abilities of narrators with aphasia may also be manifested in their active collaboration with their interlocutors in development of referential coherence and evaluative coherence in narratives, in keeping with the Cooperative Principle. Using a systems-social approach to intervention that involves joint training of both interlocutors in a dyad holds promise for achieving success in this dynamic of cooperative communication (e.g. Beeke et al. 2014) as do models that train conversational partners alone (Kagan et al. 2001), since both interlocutors with and without aphasia maintain their pragmatic intent in conversation. Whatever the nature of the interaction or intervention, however, narratives embedded in conversation can still be considered pragmatically successful when the interlocutors demonstrate signs of functional satisfaction with the narrative telling. In contrast, signs of an incoherent story, i.e. a pragmatically unsuccessful story, may include silence on the part of the interlocutors, or a shrug combined with the question ‘So what?’.

Secondly, we emphasise that any given personal narrative may fulfill a variety of pragmatic illocutionary functions – e.g. representative, hortatory, argumentative, conciliatory (Searle 1969) – depending on the context in which the story is told and the functions that it is fulfilling in that context. Note that the personal narrative told in context is functioning as a *pragmatic act* (Mey 2001), which is provided affordances and constrained in the function that it fulfills by the very context in which the narrative is being produced. (*Affordance* is a concept that we will discuss further in Sect. 9.4.) For now, our point is that the same story may fulfill different pragmatic functions, depending on the context in which it is told. For instance, a personal narrative of a stroke told by a woman with aphasia may be related to maximise referential coherence when the interlocutor is a physician taking an initial medical history. In other contexts, the same story could also be used for different evaluative pragmatic purposes. These purposes may include to convince the family that her life is surprisingly better after her stroke as compared to prior to her stroke; or to convey to a researcher how fearful the stroke event was, when the researcher asks for a personal narrative of a frightening experience; or as a joint narration with a spouse when a third party enquires about the unusual events that occurred on the day of the stroke; or as a form of advice to her friend to emphasize how to avoid a stroke by taking heed of the warning signs. Thus, the pragmatic success of a personal narrative as a pragmatic act may also be assessed based on the effect that it has on the audience, as evidence for the pragmatic abilities of the narrator with aphasia.

Finally, because aphasia is neurogenic in its origins, a discussion of the potential neurological substrates underlying the pragmatic abilities of narrators with aphasia is in order. Clinicians have long been familiar with the facility that speakers with aphasia have with expression of emotive language, as compared to non-emotive language, a finding which has been documented experimentally by Borod and colleagues across multiple studies. These include a study in which emotive content facilitated performance on discourse pragmatic measures in speakers who have aphasia (Borod et al. 2000), perhaps associated with intact right hemisphere functioning in people who have aphasia. Furthermore, Nespoulous et al. (1998) hypothesise that the facilitation effects of emotion on language abilities of speakers with aphasia may also extend to more subtle forms of emotion-based language. These forms are what Nespoulous et al. call ‘modalising language’, i.e. language that expresses the attitudes or opinions of the speaker. They, too, conclude that a relative preservation of modalising language over referential language in speakers with aphasia and left hemisphere damage may be associated with intact right hemisphere functioning, or limbic functioning, or both. The narrative evaluative devices that we have considered in this chapter have been hypothesised to serve as forms of expression of emotional and modalising language (Olness and Muñoz 2011). As already noted, these are relatively preserved in narratives told by people with aphasia, in support of evaluative coherence. This neurologically supported preservation of evaluative coherence may be of particular pragmatic advantage to narrators with aphasia, given that expression of evaluative content may be the primary reason that most personal stories are told in the first place (Polanyi 1989).

9.4 Narrative Coherence Achieved Through Integration of Multiple Semantic Sources

In Sect. 9.3, we highlighted the linguistic means that people use to develop referential coherence and evaluative coherence in their narratives (e.g. verb phrases, noun phrases, and evaluative devices) and how people with aphasia may utilize them in narratives. However, as noted by Armstrong and Ferguson (2010), language is only one source of content used to achieve meaning-making in functional communication. Although language will remain at the core of our working definition of pragmatics, we now turn to additional examples of personal narratives-in-context told by people with aphasia, as well as examples of other forms of pragmatic acts, to illustrate how coherence is achieved through integration of meaning from multiple semantic sources available to the speaker and interlocutors. For example, as seen in the preceding discussion of the pastor with aphasia who tells his stroke story, linguistic sources of meaning are *integrated* with shared cultural sources of meaning-making to develop the referential coherence of his story's narrative event line. As a result, reference to the event sequence in the stroke story is both coherently produced and coherently understood.

Shared cultural knowledge falls under the broader category of meaning-making sources called 'context'. As a superordinate term, context subsumes a variety of meaning-making sources. These sources encompass information derived from shared world and cultural knowledge about the 'way things work', which includes shared knowledge of how narratives and conversation are organized in the culture. They also encompass information derived from the preceding 'text' of the narrative – also called 'intra-textual information' – as well as the prosody used when producing that content. Other meaning-making sources include information derived from the content of the immediate conversation in which the narrative is embedded, including the contributions and questions of both interlocutors, information about the current and past relationship and shared experiences of the interlocutors, and information derived from the immediate physical context, which includes the relative physical positioning and body movements of the interlocutors in the interaction. Thus, any linguistic utterance – whether a full-length narrative monologue or an utterance that is a single proposition in length – can act as a discourse production with a specific pragmatic purpose when produced in a meaningful context, and its coherence (and thus its pragmatic success) is assessed by the interlocutors relative to the context in which it is produced.

One model for conceptualising the role of contextual sources of information for meaning-making views contextual information as a *static resource* that contributes to the process of meaning-making. Under this view, the spoken act (cf. speech act) carries more weight than the context that supports it. For example, the primary linguistic means of reference expressed by the pastor with aphasia are *supported* in achieving referential coherence through integration of shared world knowledge as a meaning-making source.

Under an alternative model (Mey 2001: Chapter 8), it is the context that 'sets up' and determines the nature of the pragmatic act. Thus, the language used in any pragmatic act *adapts* itself to the context, given the *limitations* and *affordances* determined by the context, to develop maximum coherence. Under this view of pragmatics, the context carries more weight than the speech that operates within it. For example, the context of shared world knowledge about medical emergencies *affords* the pastor with aphasia the flexibility to not make his language about the event sequence carry the full weight in developing referential coherence. The context also *affords* the pastor with aphasia the flexibility to assume that the listener shares the cultural knowledge about the significance of the verbal modality during preaching, which affords evaluative coherence to his repeated linguistic statements that his stroke occurred in church while he was preaching.

Likewise, the context places *limitations* on the pastor with aphasia, since the listener does not share detailed information about the speaker's church and its membership, or the name of the hospital that he went to when he had his stroke. The speaker *adapts* his language accordingly to maintain coherence despite the limits that the context places on him. For instance, he abandons difficult-to-express information in the narrative (e.g. the quantity and identity of people at the church that day), because it is not available in the context and does not contribute to the referential coherence of the event line of the story. As another example, he mentions information even if it is difficult to express if it is important to develop evaluative coherence within the story and the conversation (e.g. he works to express the name of Baylor hospital, which is the hospital through which the narrator and his interlocutor first made contact). Under this model, the context is *dynamic* and not static. So, for instance, the interlocutors may express hypotheses, questions or verification of information as the narrative progresses, thus changing the context in which the story is told over time. As the narrative develops, the speaker uses language to develop referential and evaluative coherence that fits the pragmatic purpose of the narration within the dynamic and ever-changing context. This is narration as a *pragmatic act*. The success of these pragmatic acts, then, is ultimately defined under the functional pragmatic view via the interlocutors' expressed satisfaction that the pragmatic purpose of the communication in that context was fulfilled.

In summary, in the words of Mey (2001: 207), "pragmatics studies language as it is used by people, for their own purposes and within their own respective limitations and affordances." People with aphasia adapt whatever linguistic abilities they retain to deal with the limitations placed on them by the context, and to capitalize on the affordances provided to them by the context in order to achieve maximum coherence. It may be this selfsame pragmatic adaptation that leaves the clinical aphasiologist and research aphasiologist alike with the following long-lived impression: People who have aphasia can communicate better than they talk, and the severity of their language impairment does little to predict their ability to function in everyday life (Holland 1977: 173; Holland 2010).

In Sects. 9.4.1 and 9.4.2, we discuss additional examples of narratives told by people who have aphasia, as illustrations of the way in which they integrate a variety of meaning-making sources to achieve contextually situated narrative coherence. Converging data used to assess the narrative pragmatic abilities of people with aphasia is supplied from two different narrative sampling contexts: audio-recorded personal narratives in monologue, elicited by an interviewer who requests a story on a theme and then serves as an interested listener; and video-recorded personal narratives naturally embedded in the context of open conversation in an aphasia group setting among relatively familiar interlocutors. Pseudonyms are used to maintain anonymity.

9.4.1 Oral Personal Narratives in Monologue told to an Interested Listener

The first context of narrative sampling that we will consider is one in which a relatively unfamiliar interviewer-interlocutor requests an oral narrative on a personally salient theme. The elicitation takes place as part of a structured discourse elicitation protocol or semi-structured interview and is audio-recorded for later orthographic transcription and analysis. The thematic prompt is specifically selected to be personally salient to maximise engagement and ecological validity, e.g. *Tell me a story about a time when you were frightened or scared. What happened?* The interviewer-interlocutor then assumes the role of an interested listener, providing minimal feedback during the process of narration. This method of narrative elicitation is similar to that used by the sociolinguist William Labov (1972), who used an interested listener-interviewer to solicit personal narratives of near-death experiences.

Ulatowska and colleagues have made extensive use of this method of narrative sampling in the field of aphasiology. The experimental advantage of this context of narration is that it allows for a narrow focus on linguistic contributions to narrative coherence, with support from only two static aspects of context: the theme of the elicitation and shared world knowledge. Ecological validity is maximised by the personal salience of the theme. The method holds parallels to real-life situations in which an interlocutor cedes the floor to the narrator and serves as an interested listener (Schegloff 1982; Norrick 2000).

The first example we consider highlights how narrators with aphasia combine multiple linguistic evaluative devices to successfully develop narrative coherence. A middle-aged former novitiate of the Catholic Church who has chronic mild-moderate aphasia of a non-fluent type is asked to tell a personal story of a frightening experience. She recounts the story of being trapped in her home with her friend, William, during a violent shootout in the street. They take out guns to protect themselves. Combining evaluative devices of repetition, direct speech, negation, and metaphoric language, she coherently emphasizes her dependence on God to get her through the five-hour ordeal. For example, she repetitively mentions praying for support while they waited: *And we went and prayed. Okay? Okay? And we prayed and sat with our guns.* She also uses direct speech that emphasises putting trust in God: *And um we're sayin(g), "What do we do"? It, it's, you got to be strong with God. Okay? "What do we do?" God help me.* When the gunman is finally arrested, she repeats content of direct speech emphasising thankfulness to God for protecting her and William: *…police are getting um the um gunmen. I said, "Thank God." William said, "Thank God for me. Yes."* When asked for the coda to the story, she states *God heals.*

Individuals with more severe aphasia may use a combination of basic evaluative devices in their stories, not necessarily as a form of evaluation, but to develop referential coherence of the event line, a phenomenon that has been described elsewhere in the literature (Ulatowska et al. 2011). Often, these are in the form of direct speech, repetition, and onomatopoeia, or sometimes the singing of an iconic tune. One middle-aged man with a moderate-severe non-fluent aphasia is asked to tell the story of his meeting and courtship with his wife. Shared world knowledge affords both listener and speaker with an understanding of typical events in such a story: first meeting, perhaps a temporary and tearful break-up, then a reunion and eventual marriage. He expresses the tearful break-up through use of repetition and direct speech, as well as a choice verb: *And bye bye. Bye bye XXX. Crying. I say, "Golly. How I do it? How I do it?"* Similarly, at the eventual point in the story where they are married, he uses an iconic wedding tune and direct speech to refer to this event. The event is introduced with a temporal marker: *And after, they say, "da da da da da"* [sung to the tune of a wedding march]. *I say, "Thank you."*. During the narration, referential coherence, and thus pragmatic success, of the narration is further evidenced in the response of the interviewer at each key juncture in the story: *Uhhuh….Mhm…Oh goodness…Mhm…Good.*

Typically, evaluative devices such as direct speech are concentrated at the peak of narrative action, a phenomenon discussed by Olness et al. (2010). For example, a young-elderly woman with moderate fluent aphasia of an anomic type uses direct speech to express the moment in her story when she confronts a home intruder: *And I was uh, I said, I said, "What are you doing?"* Moreover, she repeats and re-phrases the direct speech associated with this important moment in the story, to afford it further evaluative emphasis: *And I was uh, I said, I said, "What are you doing?… I said I said, "What do you want?"* This concentration of evaluative content at the most highly charged point in the story is evidence of the narrator's pragmatic use of evaluative language, as she coherently develops her story.

Finally, consider narrative Example A below. It provides an illustration of the important role of the context in forming narrative coherence. The reader is invited to read the narrative first without context, and then assess whether the narrative is coherent while de-contextualized. Notice that the narrator is emphasizing two points using repetition as an evaluative device: the knock at the door, and her inability to wake up. The narrator is a middle-aged woman with moderate aphasia.

Example A

Is about a man…I was sleep. And he came to the story. And knock. And he kept calling, causing. And I couldn't wake up. 'Cause he wouldn't go away, what I'm saying. 'Cause I'm asleep. And he can't, couldn't xxx, xxx just couldn't understand it. Because he is uh, I couldn't wake up. Because the knock. And, and I was trying to wake up. But I couldn't get up.

Coherence is enhanced when one is told the context. The woman has been asked to tell a story of a frightening experience. She is narrating a fearful event, presumably, the day she had her stroke. Specifically, when the stroke happened, she found herself in a comatose or semi-comatose state in which she could hear what was going on around her, but she could not respond. This was a fearful event to her (*…and I was trying to wake up. But I couldn't get up.*). Evaluation in the form of negation and repetition is common in stories of stroke told by people with aphasia.

9.4.2 Personal Narratives in the Context of Conversation and Everyday Life

The pragmatic abilities of people who have aphasia are also manifested in discourse of naturalistic contexts of conversation and everyday life. It is production of discourse in naturalistic contexts that we now consider. Sacks (2010: chapter 2) describes a woman who successfully continued an active social life, including hosting social events, despite having severe aphasia. One can presume, at minimum, that she retained the ability to engage in phatic communication, i.e. what many would call 'small talk', which is evidence for her preserved pragmatic ability. A case like this invites us to delve further into natural and ecologically valid contexts to find evidence for the pragmatic abilities of people who have aphasia.

However, as outlined and justified in Sect. 9.1, we will not attempt to consider conversational abilities of people with aphasia across the entirety of the field. This would be outside the scope of the chapter. Rather, we maintain our sharp focus on coherence of personal narratives specifically. In particular, we now examine coherence of personal narratives told by people who have aphasia as they are embedded in everyday conversation.

As before, we will examine both referential and evaluative coherence of the personal stories. Also as before, our framework will consider the limitations and affordances placed on the speaker by the context, as linguistic tools are employed for the development of narrative coherence. However, now in the more naturalistic conversational setting in which we will observe embedded narratives, context is expanded to its full multi-dimensionality, as are the associated limitations and affordances that the context provides to the speaker in development of a coherent narrative. For example, the coherence of the personal narrative, as a reflection of pragmatic ability, now may also include: the coherence of the narrative content relative to the topic of the ongoing conversation; referential coherence in the story, achieved through collaborative reference-making among the conversationalists; and coherence achieved through combinations of linguistic, paralinguistic, and physical aspects of the context, including physically pointing to someone who has just said what one also wishes to express.

Analogously, our means of assessing the coherence of a narrative, and thus pragmatic success, now includes observation of the reactions of the interlocutors. For example, do the interlocutors laugh if the purpose of the narrative was to create humor? Or do the interlocutors follow up one coherent story with another coherent story of their own on the same topic? Alternatively, as evidence that the story is *not* coherent in its context of use, and thus not pragmatically successful, do the interlocutors stay silent after the story was told, or perhaps ask *So what?*

The response of the interlocutors is essential as an index of the pragmatic success of a personal narrative told in conversation. One member of an aphasia group known to the first author had mild-to-moderate non-fluent aphasia, with relatively preserved auditory comprehension skills. However, he also had a severe speech-motor programming disorder (apraxia of speech), which severely limited his verbal output to not much more than a resounding *Yeah* or *No* (cf. Goodwin 2003). Yet, the man was a natural-born story teller, and his pragmatic success in telling coherent stories in conversation resulted in frequent laughter and exclamations of incredulity from members of the group as he told his stories – stories of encountering a naked woman at a car wash, or shooting at rats with a BB gun in a laundry room. Specifically, he achieved this pragmatic success in personal narration through use of conversational dynamics well described in the literature (e.g. Laakso and Klippi 1999) in which the speaker hints at each element of content in sequence – using gesture, body movement, embodied action, and/or prosody to depict a scene (Wilkinson et al. 2010) – and the interlocutors guess in turn until they guess right. Ironically, this selfsame narrator once tried an alternative way to tell stories in conversation, and it failed miserably. He and his wife painstakingly programmed an augmentative communication device with one of his favorite stories, in its entirety. During the next meeting of the aphasia group, the optimal moment in the conversation for telling the story arrived, he pressed the button, the story was produced by the device in its entirety, and was met with absolute silence. Its preprogrammed 'coherence' was not coherent, referentially or evaluatively, for the situated context in which it was produced, as indicated by the flat response of the members of the group.

Narratives in conversation can be as short as a one-utterance narrative abstract, or as long as an extended monologue. They can be told solo, or jointly with others (Norrick 2000). The point is that they are told in a dynamic conversational context, and the goal is to produce them coherently based on their purpose within that context. In the examples that follow, we consider the coherence of narratives told by people with aphasia in conversation during meetings of their university-based conversation group, which is part of a clinical student training program. Although not as ecologically valid a context as conversations in a home setting (cf. Goodwin 2003), this group is designed to foster free flow of conversation among the interlocutors, who include people with aphasia and student clinicians. Instances of personal narratives that emerge during these conversations are identified. Analysis of these conversationally embedded narratives forms the focus of a nascent effort to develop a transcription-free approach to characterization of the referential and evaluative coherence of personal narratives told by people with aphasia in natural conversational settings (Olness et al. 2012). The contributions of multi-modal communication and context toward the overall coherence of the stories told by narrators with aphasia are integral to the analysis. In the current discussion, effort will be made to refer to the relevant non-verbal and physical aspects of the context and narration, within limits of the text format we use here, acknowledging that visual representation and tracings may be optimal for advancing research in this area (cf. work by Charles Goodwin). All narrators in these examples have aphasia.

Consider narrative Example B. A group member (pseudonym Pat) with mild anomic aphasia contributes her story, which is coherent within itself, and within the conversational and cultural context, as evidence of her pragmatic ability. Moreover, the response of the group members provides confirmatory evidence of the pragmatic success of the story. The narrative is embedded in a group discussion of extremely hot Texas weather. Someone has mentioned that, in weather this hot, people can fry eggs on the sidewalk. Pat contributes her personal narrative related to the topic. Notice that she uses linguistic ellipsis at the end of the story, perhaps secondary to her anomia. However, the conversational context affords her this means of expression. An enactment of the throwing of the egg is included with the verbalization. Coherence, and thus the narrator's pragmatic ability, is evidenced in the query of the student clinician, as well as in the group laughter that confirms the narrator's pragmatic success in conveying the humor of the narrated event.

Example B

Pat: *I tried to do that with my… with an egg when I was little. 'Cause it was so hot so I took it outside and threw it down there to see if it would…* (gestures throwing the egg down)

Student clinician: *Did it work?*

Pat: *No.*

(group laughter)

The next example illustrates pragmatic success of a narrator with moderate nonfluent aphasia in creating a humorous implicature through the use of a situated narrative abstract. Harry is a middle-aged, college educated man with a wry sense of humor that serves as a communicative resource, an individual profile observed elsewhere in the literature (Hengst 2006). The group is having a conversation about personal injury and health events, including stories of stroke. However, one group member (pseudonym Vince) who has a traumatic brain injury from a vehicle accident, and no aphasia, is inappropriately monopolizing the floor while telling a tall tale (as he often does), this time a long story of getting accidentally shot in the leg in an alligator-infested swamp. Vince has been talking for quite some time and no-one else is getting a chance to tell their own personal injury story. Harry gets a smile on his face, leans forward into the group with his arms on the table, and as Vince pauses between sentences, Harry says laughingly and quickly – *I had a stroke! I had a stroke!* – then leans back from the table to complete his turn. The group around Harry bursts into laughter and two people reach out laughingly to touch Harry on the shoulder. Harry's too-brief abstract of his own personal injury story has been told and his point has been made: that Vince's story is far too long. Harry has purposefully flouted the maxim of quantity by telling a stroke story that is far too short given its personal import, with the aim of expressing that Vince's story is so long that no-one else can fit their personal stories in edgewise. This is evidence of Harry's pragmatic ability.

In the same group, narrative coherence in the form of collaborative, joint narration among interlocutors who are familiar with the same story (Norrick 2000) represents adherence to the Cooperative Principle. In Example C, three male group members collaboratively narrated the story line of a movie that they all knew, about a family trapped inside a stalled car by a rabid dog.

Example C

Sam: *Clicking, clicking* (turning hand to enact the family's failed attempts at starting the car)

Ed: *Yeah. She tr- tries to start the car. Doesn't work.*

Tom: *Didn't work.*

This collaborative and coherent referencing and evaluation of events in a jointly told narrative is reminiscent of collaborative referencing between individuals with aphasia and their routine communication partners in situated communication, as described in the literature (Hengst 2003). There is a striving for mutual understanding among the interlocutors as a form of cooperative activity (Klippi 2003; Goodwin 2003) that evidences their pragmatic ability to adhere to Grice's Cooperative Principle.

Notably, narrative coherence or pragmatic functionality is not always successfully achieved by the person who has aphasia. Harry, the pragmatically adept user of the humorous narrative abstract (*I had a stroke!*), also occasionally attempts longer narratives, which are met with mixed success in terms of group reaction. Although narrators with aphasia have the underlying pragmatic ability to coherently situate narratives, they may sometimes have difficulty meeting their pragmatic goals. This presents a prime area for intervention.

9.4.3 *Moving Forward: Research on Narrative Coherence and its Pragmatic Applications*

What we conclude from the preceding examples of people with aphasia telling their personal narratives – both personal narratives as elicited monologues and personal narratives that emerge naturally in conversation – is that the active and intentional engagement of these narrators in developing coherent personal narratives is a fundamental manifestation of their preserved pragmatic competence. This pragmatic competence can be defined only with reference to the limitations and affordances of the specific context in which each story is told, the purpose that the narrative fulfills within that context, the linguistic tools available to the individual speaker in face of the contextual limitations and affordances, the pragmatic purpose the narrator seeks to fulfill through the story, and the way in which the narrator with aphasia orchestrates all the meaning-making sources available to him within that context. Observation of the response of the interlocutors to the story, including the response and perceptions of the narrator himself, may be the most ecologically valid way to document pragmatic success in situated narration.

We have suggested in this chapter that personal narration is a fundamental process in the life of *homo narrans.* We may seek to coalesce narrative coherence approaches as described in the current chapter with current conversation analytic approaches to intervention (e.g. Beeke et al. 2007). We may also find ways to combine alternate communicative modalities, such as writing (e.g. Beeke et al. 2014), toward our goal of maximizing narrative coherence. Armstrong and Ulatowska (2007) describe a man, MD, whose coherence of narration in writing was revelatory of his ability to express a coherent life story. Likewise, Paul West's (2008) classic written account of living with aphasia as a man of letters is a means of pragmatic self-expression that is uniquely his.

Whatever our approach to intervention, we must keep in mind that, although the linguistic abilities tested in the clinic may not be the same abilities that we use in everyday life (e.g. Beeke et al. 2007), the narrator with aphasia may identify desired contexts of communication whose defined limitations and affordances on the speaker may place high demands on language abilities. Impairment-level intervention must be included in such cases in support of pragmatic success. Impairment-level approaches to intervention may complement use of communication partner training (e.g. Kagan et al. 2001) to promote pragmatic success.

Important issues that we have not addressed include cross-cultural effects on our definition of context and narrative pragmatic functionality (cf. Lind 2005), documentation of changes in pragmatic abilities of narrators with aphasia over time (e.g. Coelho and Flewellyn 2003), and documentation of changes following intervention (e.g. Fox et al. 2009). Our hope is that the frameworks and cases we have presented in this chapter might contribute to the on-going dialogue regarding our research-based understanding of pragmatic abilities of people with aphasia and toward clinical applications that may be of some small support throughout their lifetime of narrative engagement.

9.5 Summary

The coherence of personal narratives told in context by people who have aphasia manifests their pragmatic ability. Narrative coherence comprises both referential coherence (coherence of content related to narrative agents and their activities) and evaluative coherence (coherence of the points or themes that express the narrator's attitude, opinion, or emotion regarding the narrated event). Two different approaches to narrative sampling provide converging evidence for narrative coherence and pragmatic preservation in aphasia: elicited personal narratives in monologue as told to an interested listener, and naturally occurring personal narratives embedded in conversation. Multiple meaning-making sources, both linguistic and contextual, are integrated by narrators with aphasia to achieve narrative coherence. Combinations of these meaning-making sources are unique to each instance of narration by each narrator with aphasia, in fulfillment of the situated purpose of each narration.

It has been suggested that, in most contexts, the primary purpose of telling a personal narrative is to coherently express evaluative content, in fulfillment of the story's pragmatic purpose within that context. Moreover, evidence suggests that evaluative coherence is relatively preserved in narratives told by people who have aphasia, accomplished largely through their effective use of linguistic evaluative devices and prosody. Referential coherence is achieved by narrators with aphasia through intentional and dynamic adaptations of residual linguistic referential tools, which are orchestrated with contextual and enacted sources of referential meaning-making. Even when linguistic reference is compromised, referential clarity may be sufficient to support overall narrative coherence, especially given that referential coherence may not constitute the primary pragmatic purpose of most situated narratives. The pragmatic success of personal stories coherently told by narrators with aphasia is further evidenced by interlocutors' natural reactions to the story. These reactions are an indication that the pragmatic purpose of the story as told within that context has been fulfilled.

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Chapter 10
Right-Hemisphere Pragmatic Disorders

Margaret Lehman Blake

Abstract Pragmatic deficits are a key component of the communication disorders related to right hemisphere brain damage. The deficits are heterogeneous and include expression and comprehension of prosody, emotion, humor and non-literal language, as well as discourse production and theory of mind. These pragmatic processes are complex and are subserved by extensive neural networks which often include both right and left hemisphere regions. As a result, it is rare to find clear connections between lesion localization and behavior, simple dichotomies of strengths and weaknesses, or consistent patterns of deficits across clients. More research is needed to explore the functional consequences of these deficits and how they can best be treated to improve quality of life for our clients with right hemisphere damage.

Keywords Discourse • Emotion • Empathy • Humor • Non-literal language • Prosody • Right hemisphere stroke • Theory of mind

10.1 Introduction

Damage to the right cerebral hemisphere (RHD) has long been linked to deficits in pragmatics. Around the turn of the century there were at least two proposals for a new label for RHD cognitive-communication deficits that highlighted pragmatics as a key component. Myers (2001) coined the term "apragmatism," while Joanette and Ansaldo (1999) suggested "pragmatic aphasia." While neither of the labels caught on, pragmatics remains central to the contemporary understanding of communication impairments associated with RHD.

This chapter will cover several aspects of pragmatics that have been specifically studied in adults with RHD. The review of deficits will begin with discourse production, followed by emotion and empathy, non-literal language and humor, and finally

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theory of mind. It will quickly become apparent that the literature on RHD pragmatic deficits is replete with contradictions, equivocal findings, and overgeneralizations. Two primary factors that play a role in creating these discrepancies are (a) the population of adults with RHD is quite heterogeneous in terms of deficits and deficit patterns, and (b) task demands influence performance and may obscure specific pragmatic processing abilities. Regarding the former, it has been estimated that approximately 50 % of adults with RHD have some sort of cognitive or communication deficit (Blake et al. 2002). Of those in a rehabilitation unit, the percentage jumps to 75–80 % (Blake et al. 2002; Côté et al. 2007). To date, there is no way to identify *a priori* which individuals are more likely to exhibit specific pragmatic deficits, so researchers commonly include participants on the basis of a right hemispheric lesion, and not on a diagnosis of a cognitive, language, or behavioral deficit. Thus, in most experimental studies there is a subset of participants who perform similar to a control group while the rest show evidence of the particular pragmatic disorder being examined. Unfortunately, in many cases individual performance is not examined and results are generalized to the whole sample and population.

In terms of task demands, the more implicit or natural the task is, the more likely it is that adults with RHD will do well and perform similarly to adults with no brain damage (NBD). The more complex or contrived the task is, the more likely it is that adults with RHD will exhibit impaired performance (e.g. Monetta and Joanette 2003; Tompkins et al. 2012). This is especially apparent when there are metacognitive or metalinguistic demands which require participants to think about their thought processes. It is critical to determine which problems are the result of overburdening the cognitive system and which are true pragmatic impairments that are subtle enough to appear within normal limits in relatively simple tasks.

Throughout the chapter, 'NBD' will be used to refer to healthy individuals with no brain damage who are often used as control groups. 'RHD' will be used for adults with right hemisphere brain damage. 'RH' and 'LH' will be used to refer to the intact right and left hemispheres, respectively.

10.2 General Discourse Production

In their cross-cultural studies, Ferré et al. (2012) identified four clinical profiles of RHD deficits based on French Canadian, Brazilian, and Portuguese versions of the Montreal Evaluation of Communication (MEC; Ferreres et al. 2007; Fonseca et al. 2007; Joanette et al. 2004). In three of the four profiles conversation is affected, illustrating the prevalence of pragmatic and discourse deficits in this population.

The abnormalities in discourse production attributed to RHD encompass a variety of characteristics. These primarily lie within the realm of macrolinguistics; basic semantic and syntactic processes usually are not affected. Over the years, characteristics that have been identified include reduced cohesion and coherence, disorganized structure, and content characterized by tangentiality, overpersonalization, and inappropriate topics. These anomalous characteristics are not consistently observed.

In naturalistic tasks such as conversations or recounting personal experiences, or story re-tellings that tap well-known information (e.g. the Cinderella story), few if any systematic differences are observed, as illustrated in the following studies.

In conversations, arguably the most naturalistic tasks, there are no specific deficits that are consistently reported. Kennedy (2000) examined first-encounter conversations between patients with RHD and speech-language pathologists. Results indicated that there were no overall differences in use of topic scenes by adults with RHD and those with NBD. The only obvious differences in the conversations were in the termination phase, in which RHD participants tended to produce new topics, suggesting they were not adequately noticing or interpreting the cues to terminate the conversation. Similarly, Mackenzie et al. (1997) reported similar conversational skills in RHD and NBD participants, with the only differences reflecting use of eye contact in some of the individuals with RHD.

Brady et al. (2003, 2005, 2006) conducted a series of studies to examine discourse production by adults with RHD compared to NBD in three different genres (picture description, structured interview, and procedural discourse). They examined several features of discourse: overall length, syntactic complexity, cohesion, coherence, use of illustrative gestures, and verbal disruptions. Across the three studies they found no systematic differences between groups or across genres. Additionally, they examined change over time for the RHD group, collecting discourse samples at one and six months post-onset. Again, no systematic changes were observed. The prompts for the interview and the procedural discourse were familiar: recounting one's stroke story, or explaining how to make a sandwich and replace a light bulb. Appropriate production of procedural discourse was also reported by McDonald (2000). In contrast to interviews and procedural discourse, picture description is not a naturalistic task for adults. However, having the picture available throughout the task lessens the cognitive demands on memory and organizational structuring, which likely contributes to success.

Marini et al. (2005) collected discourse samples using three tasks: story paraphrasing, creating a story from a sequence of six pictures, and creating a story from a set of pictures that first had to be sequenced into a coherent order. No differences between NBD and RHD groups were observed on the paraphrasing task, but reductions in coherence, cohesion, and number of main ideas were apparent in the latter tasks in which the story had to be created from multiple pictures. The authors suggest that the latter tasks required participants to generate the structural organization or mental model, and the poorer performance reflected these more complex processing demands.

One final example is from Blake (2006). Adults with RHD and NBD read aloud stories and completed a thinking-out-loud task, in which they were instructed to talk about what was happening in the stories as they read. While thinking-out-loud protocols are considered to reflect actual cognitive processing and add only minimal demands to the primary task (in this case story comprehension), the task itself is somewhat novel and the instructions emphasized generating inferences. The transcripts were rated by experienced speech-language pathologists in terms of tangentiality, overpersonalization, and quantity (verbosity or paucity of speech).

The results indicated that the RHD group's transcripts were rated as more tangential and more overpersonalized. Additionally, those that were on the extremes of quantity were both from adults with RHD.

The absence of clearly defined discourse production deficits seems in stark contradiction to the prevalence of conversational deficits reported by Ferré et al. (2012). However, in the MEC, 17 aspects of communication are included in the conversation rating scale. It is likely that there are numerous patterns of deficits present in any sample of adults with RHD, and so studies like those above that examine a few characteristics individually may not detect anomalous communication that results from the interaction of changes in several different aspects of communication.

The sensitivity of measures used to assess differences in discourse production including whether individual measures of discourse characteristics can adequately differentiate "normal" from disordered performance has been questioned (e.g. Brady et al. 2006). Relevant evidence can be found in a study of adults with traumatic brain injury. Lê et al. (2011) reported that the "goodness" of stories was not adequately captured by examining either completeness or organization individually. Whereas 50–75 % of the adults with TBI performed similarly to the NBD group on either characteristic alone, no more than 50 % would have been misclassified as NBD with a conjoined measure that included both characteristics. The practice of focusing on individual variables or characteristics in the RHD literature likely limits the chances of detecting the global differences, particularly given the heterogeneity of the population and the various processes required for successful verbal communication.

A final concern is how expectations influence diagnoses of discourse production deficits. The stereotypical description of RHD includes obvious and sometimes bizarre differences in discourse and conversation. It is possible that clinical biases to find such deficits clouds judgment and results in over-diagnosis of problems that might be considered odd but within normal limits for an older adult with no history of stroke.

In summary, for conversation and discourse production, there are no specific deficits that consistently and systematically differentiate adults with RHD from NBD. The novelty of the task or the content of the discourse (e.g. retelling a personal experience versus an unfamiliar story) may affect production. Additionally, assessments using more sensitive measures or exploration of the utility of combined measures are necessary. Finally, work is needed to examine the social and vocational consequences of changes in discourse production for this population and to design and evaluate treatments that will effectively address the deficits.

10.3 Emotion and Empathy

Expressing one's own emotions and correctly interpreting others' emotions are important aspects of human communication. Emotions are most commonly conveyed through vocal expression (prosody), facial expression (facial affect), and body language. Comprehension and production of prosody and facial expression have been extensively studied in relation to the right hemisphere. For the purposes of this discussion, the term "comprehension" will be used to represent a variety of receptive tasks including discrimination, identification, and recognition of emotion. The term "production" encompasses performance on repetition/imitation, cued, and spontaneous production tasks. The discussion will begin with hypotheses about the right hemisphere's role in emotional processing, followed by reviews of facial affect and prosody, and will finish with an exploration of empathy.

10.3.1 Theories of Emotion Processing

Several theories have been proposed to explain the right hemisphere's role in emotion processing. The Right Hemisphere hypothesis suggests that the RH is dominant for all emotions. In the strong interpretation of the hypothesis, the LH has little or no role, while in weaker versions emotional processing requires both hemispheres but the RH is dominant. Early work by Borod and colleagues (Borod 1993; Borod et al. 2000), which indicated poorer performance by RHD compared to LHD groups on a variety of emotion comprehension tasks, supported the RH hypothesis. The Valence hypothesis suggests that the RH is dominant for negative emotions while the LH is dominant for positive emotions (Davidson 1984/1990). A more recent theory is the Emotion Type hypothesis (Ross and Monnot 2011), which suggests that the RH processes primary emotions (e.g. happiness, sadness, fear) while the LH is responsible for social emotions (e.g. embarrassment, boredom, pride, pity) and the cultural rules for displaying emotion. The Emotion Type hypothesis has not been directly assessed with stroke survivors, but rather intuited based on patterns of aging and commonalities between processing patterns of older adults and adults with RHD.

While both the RH and the Valence hypothesis have garnered some support, neither has been consistently supported over time. Findings from two disparate lines of research create problems for the RH hypothesis. One consists of imaging studies that have identified an extensive bilateral network for processing emotions (Ethofer et al. 2012; Kotz et al. 2003; Rymarczyk and Grabowska 2007; Wildgruber et al. 2009). The existence of this network makes the strong version of the RH hypothesis untenable. The other evidence arises from studies of stroke survivors which suggest that some adults with LHD have difficulty identifying or discriminating emotional prosody or facial expressions, although they typically are more accurate than those with RHD (e.g. Braun et al. 2005; Kucharska-Pietura et al. 2003; Pell 2006; Schirmer et al. 2001).

According to the Valence hypothesis, RHD should impact processing of negative emotions but not positive emotions. Supportive evidence from some EEG and other imaging studies indicates greater LH activation in response to positive stimuli and greater RH activation in response to negative stimuli (e.g. Iredale et al. 2013; see Demaree et al. (2005) for review). However, this pattern has not been consistently replicated (e.g. Braun et al. 2005; Ethofer et al. 2012).

Methodological differences across studies may influence findings. Some studies of the Valence hypothesis compare only one positive with one negative emotion (e.g. happy vs. sad). Others assess a variety of positive and negative emotions but then analyze differences based on averages of positive versus negative emotions. The emotions used typically are selected from the six "universal" emotions (happiness, sadness, fear, anger, disgust, surprise) that are conveyed similarly across cultures. Examination of the list, however, reveals only two positive emotions (happiness and [pleasant] surprise) while the other four are negative. The bias towards negative emotion and the potential influence on results is rarely discussed.

A second, possibly more important, finding is that positive emotions are identified faster and more accurately than negative emotions. Pell (2005) reports this bias in studies of his Facial Affect Discrimination Test (FADT). Healthy adults routinely are more accurate at identifying "happy" compared to "sad" faces. While this may be in part due to the stimuli in the FADT, similar patterns have been reported in other studies. Kucharska-Pietura et al. (2003) reported that both identification and recognition of negative emotions (via facial expression and prosody) were less accurate than positive emotions. The discrepancy was also reported by Abbott et al. (2014) who examined recognition of emotions from whole versus partial faces (e.g. only eyes or only mouth). Visual inspection of data reported by Charbonneau et al. (2003) suggests the same discrepancy, although the researchers did not analyze the differences. Despite this converging evidence, the positive emotion bias does not appear in all studies. Harciarek et al. (2006) found no differences in positive versus negative emotions, although their NBD group performed at ceiling on all conditions. In an event-related potential (ERP) study, Iredale et al. (2013) found greater effort, as evidenced by the N3 component, for comprehension of happy compared to angry prosody.

Results from studies that assess both facial affect and emotional prosody do not consistently support the Valence hypothesis, but rather suggest interactions between valence and modality. Charbonneau et al. (2003) found that adults with RHD were more accurate on comprehension and production of positive versus negative prosody, but showed the opposite pattern (more accurate for negative versus positive) for facial expression. Harciarek et al. (2006) reported the opposite dissociation, in which their RHD group was most accurate for negative emotional prosody and positive facial expression. Kucharska-Pietura et al. (2003) reported that their RHD participants were impaired on comprehension of emotional prosody as well as facial expression with no systematic differences between positive and negative valences across either modality.

Some researchers examine emotional types independently rather than classifying them into positive and negative categories. No differences across emotion types have been reported in a handful of studies (Orbelo et al. 2003; Dara et al. 2014; Ross and Monnot 2008; Wildgruber et al. 2009; Paulmann et al. 2010). However, differential performance not linked to valence has been reported by others. For example, Charbonneau et al. (2003) reported less accurate production of facial expressions conveying happiness, surprise and fear compared to sadness and anger. Studies of emotional prosody comprehension suggest that different types of emotion may be localized in different areas. Rymarczyk and Grabowska (2007) reported that damage to the frontal lobes affected comprehension of happy prosody while sad prosody was affected by temporo-parietal lesions. Adolphs et al. (2002) reported deficits in not only sadness, but also anger and surprise from temporal lobe lesions, while patients with frontal lobe lesions tended to display deficits in comprehension of all emotions.

10.3.2 Emotion and Facial Expression

A RH advantage for processing facial affect has a long tradition. Support for the finding comes from a variety of sources, including lesion studies (adults with RHD are less accurate at identifying or producing emotional facial expressions than adults with LHD), imaging studies (there is greater RH than LH activation for emotional expressions), and studies of facial asymmetry. Results from asymmetry studies indicate that the left hemi-face is more expressive than the right. The contralateral motor control of the lower half of the face has led some to conclude that the right hemisphere has a greater role in creating facial expression (e.g. Ross and Pulusu 2013). This hypothesis has been questioned at several levels, including the bilateral motor control of the upper face and the differences between posed and spontaneous facial expressions, the former which are cortically-mediated and the latter which may be controlled by extrapyramidal and subcortical motor systems (Duffy 2013).

As suggested above, comprehension of facial affect is complex and cannot be satisfactorily explained by either the Right Hemisphere or Valence hypotheses. Additionally, different portions of the face may not be processed similarly. Thomas et al. (2014) examined eye-tracking patterns of healthy young adults viewing minimally happy or sad faces. More time was spent looking at the left hemi-face for sad faces and the right hemi-face for happy faces. Participants also focused longer on the eyes of sad faces and mouth for happy faces. Calvo and Beltrán (2014) used either whole faces or the top half (eyes only) versus bottom half (mouth only). They reported that the RH played a larger role in evaluation of whole faces while the left hemisphere was important for identifying emotion from either eyes or mouth alone.

There are no estimates of the incidence of deficits in comprehension or production of facial affect or the impact of these deficits on social and vocational outcomes. There are a few standardized assessments of facial affect processing such as the Florida Affect Battery (Bowers et al. 1999) and the Facial Affect Discrimination Test (Pell 2005). However, it is unknown how often these assessments are used in clinical practice.

10.3.3 Emotion and Prosody

It is well established that the RH is involved in emotional prosody, and there is fairly consistent evidence that the RH has a greater role in comprehension and production of emotional prosody compared to linguistic prosody (Walker et al. 2002, 2004).

The latter encompasses the use of prosody to mark syntax and semantics, including differentiating questions from statements or creating emphatic stress.

Differences between RH and LH prosodic processing can be viewed in terms of function (emotional versus linguistic content) or physical/acoustic properties (Van Lancker Sidtis et al. 2006). The RH tends to be superior at detecting and decoding pitch variations while the LH is dominant for temporal variations (e.g. Gandour et al. 2000; Guranski and Podemski 2015). Emotional prosody tends to be conveyed through pitch variations that extend over several phonemes or segments, while linguistic prosodic markers are more often temporal and affect fewer phonemes or single segments. Combining these processing differences provides a coherent explanation: relative RH dominance for emotional processing and LH dominance for linguistic processing. "Relative dominance" is emphasized, as not all of the evidence supports such a clear-cut explanation.

Aprosodia, or a deficit in the comprehension and/or production of prosodic contours, is more common following RHD than LHD, although the actual incidence is unknown. Estimates range from 20 % of patients in an inpatient rehabilitation unit (Blake et al. 2002) to 80 % in acute care (Dara et al. 2014). Dara and colleagues suggest that deficits of prosody comprehension might be a more sensitive indicator of RH stroke than unilateral neglect. In their study they found that the presence of aprosodia identified nearly 80 % of the patients with acute RHD, while the presence of neglect identified only 55 %.

While there are few abilities or processes that have been clearly localized within the right hemisphere, anterior/posterior distinctions have been reported for prosody. One of the earliest and most cited is Ross's (1981) finding that expressive aprosodia is more common after anterior lesions while receptive aprosodia is more common after posterior lesions and the subsequent conclusion that the prosodic system is arranged similarly to the LH language system. Most of the evidence supporting this localization scheme comes from the same laboratory (e.g. Gorelick and Ross 1987; Ross and Monnot 2008). In contrast, Adolphs et al. (2002) found lesions in the right frontal lobe, particularly the frontal operculum and pre-frontal regions, most commonly resulted in comprehension deficits. Dara et al. (2014) reported similar findings involving the right orbitofrontal region and inferior frontal gyrus. As described above, anterior-posterior distinctions also have been reported for types of emotion, with happiness related to the frontal lobe (Rymarczyk and Grabowska 2007) and sadness, surprise, and fear linked to temporal or temporo-parietal regions (Adolphs et al. 2002).

Pell (2007) examined how stroke survivors use prosody to determine speakers' attitudes, specifically politeness and confidence. Statements were constructed with introductory stems that varied in the level of politeness (you must, could you, please would you…) and in confidence (I am, I think I am, I might be), and were produced with rising (more polite) or falling (more confident) intonations. Participants rated how polite or confident the speaker seemed. In general, adults with RHD were able to use prosodic cues to determine speaker attitudes. In terms of confidence, both the RHD and NBD groups were able to accurately classify strong versus moderate versus weak confidence. In an alternate condition in which nonsense sentences were produced with the same variations in intonation, the RHD group was no longer able to report varying degrees of confidence but rather rated the statements dichotomously: the statements were either judged to be confident or not confident. In yet another condition in which there was a discrepancy in lexical and prosodic cues (e.g. a polite statement produced with falling intonation), participants with RHD tended to rely more on the linguistic cues than on the prosodic cues. Once again, they were unable to detect gradations of attitudes, rating statements only as polite or not.

10.3.4 Empathy

An extension of emotional processing is empathy, defined by Hillis (2014) as the ability to "recognize, share in, and make inferences about another person's emotional state" (p. 981). Empathy has been divided into two general components: emotional contagion and affective perspective-taking. Emotional contagion includes recognition of, and sharing, another's emotions. This is thought to be a relatively early-developing process, and has been linked to regions of the brain important for emotion recognition, including right temporal cortex and the amygdala. Perspective-taking is a more complex process that occurs later in development. It involves making inferences about others' emotions, and relies on cognitive processes generally ascribed to the frontal lobes such as working memory, attention, abstraction, and flexibility (Leigh et al. 2013). Yet another distinction is between cognitive and affective/emotional empathy. Cognitive empathy involves perspective-taking and understanding another's feelings or emotions, while affective empathy involves experiencing affective responses to another's feelings or experiences (Dvash and Shamay-Tsoory 2014). A meta-analysis of empathy studies suggests that there is an extensive empathy network in which the RH is more involved in affective empathy while the LH has a greater role in cognitive empathy (Fan et al. 2011). In contrast to that proposed pattern, Yeh and Tsai (2014) reported RHD impairments in cognitive empathy perspective-taking, while performance on emotional empathy was similar to that of adults with LHD without aphasia.

Leigh et al. (2013) examined recognition of emotional prosody and empathy in adults with acute stroke. Empathy was assessed through questions following orally-presented stories or videos, and the Interpersonal Reactivity Index (Davis 1983) which contains a series of questions tapping perspective-taking, the ability to imagine oneself in fictitious situations, emotional concern and personal distress. They found that all of the patients with impaired empathy had difficulty with recognizing emotional prosody, but not all those with impaired prosody had difficulty with empathy. They concluded that while recognition of prosody is required for emotional contagion, it is not necessary for generating inferences and perspective-taking.

The functional and social consequences of emotional processing deficits have not been well studied. However, a recent pilot study by Hillis and Tippett (2014) suggests that they may be more important than would be assumed given the state of the literature. Stroke survivors and caregivers were asked about the importance of a variety of deficits resulting from the stroke. The list of deficits was broader than typical quality-of-life questionnaires, and included specific deficits (e.g. prosody, spatial attention, memory, walking, left weakness) as well as other items that are less often evaluated in such questionnaires (e.g. fatigue, empathy, sexual function). The surveys were completed approximately 2 years post-stroke. Empathy was the deficit most commonly rated by caregivers as being important (reported by 50 %). Approximately 30 % of caregivers reported that aprosodia was an important problem. Only somewhat surprising was the finding that only 14 % (2 of 14) individuals with RHD reported significant concerns about empathy and none of them reported that aprosodia was a problem.

Blonder et al. (2012) found meaningful relationships between marital satisfaction and some measures of prosody and facial affect discrimination. While the case for facial expression was relatively weak, there was a moderately strong correlation for marital satisfaction and non-affective prosody. In terms of social participation, Cooper et al. (2014) examined social implications of emotional processing in stroke survivors. There was a moderately strong relationship between emotional processing (combined facial expression and prosody recognition) and social participation.

The few studies of functional consequences suggest that deficits in comprehension and expression of emotion and empathy can have important effects on social interactions and relationships. There are few studies of treatment for such deficits. There is fairly good evidence supporting the efficacy of treatment for expressive prosody (Leon et al. 2005; Rosenbek et al. 2004, 2006), but currently, there are no treatments specifically for RHD that target empathy or comprehension of emotional prosody.

Conclusions from extensive research on emotion include the following: there is a complex, bilateral network for emotional processing in which the RH has a greater role than the LH; some adults with RHD have difficulty using prosody or facial expressions to convey or interpret emotion; no one specific emotion (e.g. happiness, anger, sadness) or one valence (positive vs. negative) is systematically affected by RHD; and comprehension of emotional prosody is necessary, but not sufficient, for empathy.

10.4 Non-literal Language

The crux of human communication is interpreting what someone means. This is relatively easy when the linguistics and syntactic structure directly convey the intended meaning. More often, however, speakers use figurative language, humor, hints, or sarcasm/irony, and intent must be constructed from integration of multiple cues.

10.4.1 Idioms, Metaphors, and Sarcasm

Non-literal or figurative language includes a variety of language forms in which the intended meaning cannot be derived solely from linguistic elements. The most commonly studied forms of non-literal language in the RHD population are idioms, metaphors, and sarcasm/irony.

Idioms are established phrases for which the intended (non-literal) meaning cannot be derived solely from the linguistic elements. Not all idioms are alike, but can differ in terms of literality, transparency, and compositionality (e.g. Keysar and Bly 1995, 1999; Nunberg et al. 1994). Essentially, some can have both literal and non-literal meanings (e.g. he's sawing logs – he's snoring), while others have no meaningful literal interpretation (e.g. she's on cloud nine – is ecstatic). For many idioms, the meaning can be partially derived by decomposing the phrase into its component parts (e.g. his masked slipped – he showed a hidden aspect of himself), while yet others have no meaningful link between the words and the idiomatic meaning (e.g. to kick the bucket – to die suddenly).

Metaphors can be single words with both a literal and figurative meaning (e.g. bright: light and smart) or phrases in which an item is equated with another to express commonalities between two typically disparate things (e.g. "all the world's a stage"; "pigeons are flying rats"). As with idioms, not all metaphors are equivalent, but rather vary in terms of familiarity, appropriateness of the comparison, semantic similarity of the words, and imageability (e.g. Marschark et al. 1983).

Sarcastic or ironic statements are literally false. They serve a variety of purposes, such as to create humor or convey derision, disapproval, or criticism. The intended meaning generally is signaled through the contradiction between reality and what is said and often with prosodic manipulations used to highlight the statement (Shamay-Tsoory et al. 2005; Sperber and Wilson 1981).

Despite the pervasive belief in non-literal language processing deficits associated with RHD, there are very few studies that directly examine the issue, and not all provide evidence of such deficits. Kempler et al. (1999) and Myers and Linebaugh (1981) both reported deficits related to RHD in matching idioms to pictures either with or without additional sentential context. Papagno et al. (2006) recently confirmed those findings, although they reported a strong correlation between visuospatial deficits and impaired performance on the idiom-picture matching task. Problems with picture-matching tasks include the influence of visuoperceptual and visual attention but also the difficulty in depicting abstract meanings (e.g. a heavy heart) in simple line drawings.

Tompkins et al. (1992) used an on-line, implicit, word-monitoring task to assess RHD adults' ability to access and interpret common idioms without additional visuoperceptual and metacognitive demands. Familiar, ambiguous idioms were embedded into two-sentence contexts that biased either toward the idiomatic meaning ("Sue knew the right people. She could *pull some strings* and make things happen.") or the literal meaning ("Mary liked the wooden puppets. She could *pull some strings* and make them dance."). The word-monitoring task was to respond to the final word of the idiom – in this example, “strings”. Participants with RHD responded to idiomatic and literal meanings equally quickly, similar to the NBD control participants, suggesting that they could rapidly access idiomatic meanings. Following the implicit measure, all participants were asked to define a set of idioms presented without context, half of which had been used in the implicit task. In this metalinguistic task, the RHD group was less accurate than the NBD group (78 % versus 91 %), although very few of the RHD responses reflected strictly literal meanings. Interestingly, there was no meaningful relationship between performance on the definition and the implicit tasks.

In terms of metaphors, there are slightly more studies that directly assess metaphor processing or interpretation in adults with RHD, and the results are a bit more consistent (Brownell et al. 1990; Giora et al. 2000; Rinaldi et al. 2004; Winner and Gardner 1977; Zaidel et al. 2002). These studies employed a variety of tasks including metaphor-picture matching, selection of related words based on literal versus metaphoric meaning, and verbal explanations of metaphoric phrases. Overall, the results indicate that metaphoric processing is not abolished after RHD, but accuracy is generally reduced compared to adults with LHD or those without brain damage (but see Gagnon et al. (2003) for conflicting results).

For sarcasm/irony, there is still more consistent evidence of a processing deficit. The few studies that examine sarcasm in adults with RHD indicate a deficit in correctly interpreting the intended meaning when sarcastic comments are embedded into short vignettes (Bihrle et al. 1986; Giora et al. 2000; Shamay-Tsoory et al. 2005). One explanation for the difficulty with sarcasm compared to inconsistencies from idiom and metaphor studies is the nature of sarcasm. For metaphors and most types of idioms there is a semantic relationship between at least some of the linguistic elements and the non-literal meaning. Thus, using a decomposition strategy, a comprehender may be able to get close to the intended meaning. In contrast, in sarcasm the intended meaning is the opposite of the literal meaning and interpretation typically relies on comparing the statement to the surrounding situational context. Additionally, sarcastic comments generally are produced with prosodic emphasis to highlight the intended meaning. Studies that use written stimuli require interpretation of intended meaning with only a subset of the natural cues generally used to identify and interpret sarcasm.

The literature on production of figurative language following RHD is minimal. Van Lancker Sidtis and Postman (2006) analyzed conversational samples from adults with RHD, LHD, or no brain damage to identify use of formulaic language. Formulaic language includes established phrases such as idioms, metaphors and conventional conversational phrases such as “first of all…” or “as a matter of fact…”. Approximately 16 % of words produced by adults with RHD were part of formulaic phrases as compared to 24 % for NBD and 29 % for the LHD group.

There is a rather extensive literature on figurative language processing centers and networks in healthy adults without brain damage. Some studies suggest bilateral involvement in figurative language processing (Diaz et al. 2011; Coulson and Van Petten 2007; Lauro et al. 2007) while others report primarily LH involvement (Eviatar and Just 2006; Ferstl et al. 2008; Lee and Dapretto 2006; Mashal et al. 2009).

Very few report RH dominance (e.g. Mashal et al. 2007). Results from two meta-analyses (Bohrn et al. 2012; Yang 2014) and one review (Kasparian 2013) indicate that there is no widespread RH dominance for figurative language processing. Rather, there is a bilateral network extending through frontal and temporal regions with increased RH activation apparent during certain task manipulations. Three factors influencing site of processing have been identified (Bohrn et al. 2012; Yang 2014): salience, context, and the processing demands of the task.

First is the salience of the stimuli. Based on predictions of Giora's (1999) Graded Salience Hypothesis (GSH), familiar or salient meanings are processed differently from novel or non-salient meanings. The GSH has been used to explain LH versus RH processing differences, such as that familiar idioms and metaphors are processed primarily in the LH because they have strong lexical-semantic representations. In contrast, the RH is more involved in processing novel figurative language because the intended meanings must be generated by activation of less common (possibly abstract) meanings or features and integrated with the surrounding context (Cardillo et al. 2012; Diaz et al. 2011; Eviatar and Just 2006; Lai et al. 2015; Lee and Dapretto 2006; Mashal et al. 2008). Bohrn et al. (2012) also reported RH dominance for sarcasm compared to idiom and metaphor processing.

The second factor influencing figurative language performance was the presence of context (Yang 2014). Some studies present minimal context (e.g. word pairs or triads), while others present metaphors embedded in sentential contexts. RH activation is more likely in processing sentential contexts than word sets. This finding is in line with other research suggesting that the RH is important for contextual integration (e.g. Coulson et al. 2005; Xu et al. 2005).

The third factor illuminated by Yang's (2014) meta-analysis was the complexity or level of semantic processing required. Yang focused on two commonly used tasks: valence judgment tasks, in which subjects were asked if a sentence was generally positive, negative or neutral, and semantic relatedness tasks. The former requires relatively superficial processing, and may be dependent on single words (e.g. not, impossible, never), while semantic relatedness judgments require deeper lexical-semantic processing and possibly interpretation of figurative meanings. The latter is more likely to engage RH processing networks.

To summarize, there is little evidence from patient studies or studies of normal language processing to support broad-based impairments of figurative language processing after RHD. Few, if any, studies have reported strictly literal interpretation of figurative language, and metacognitive and visuospatial demands are not consistently controlled. The intact RH may be more involved in constructing intended meanings of novel compared to familiar idioms and metaphors, but there have been no published studies of novel idiom or metaphor processing in the RHD population. The spontaneous use of figurative language by adults with RHD may be reduced, but more work is needed to further examine production. Lundgren et al. (2011) described a metaphor treatment that improved adults' ability to interpret simple metaphors. However, the impact of this treatment on daily communication was minimal.

10.4.2 Humor

Jokes typically revolve around an ambiguity or a re-interpretation. Context is often critical. Three studies have examined the use and interpretation of humor/jokes in adults with RHD (Brownell et al. 1983; Bihrle et al. 1986; Cheang and Pell 2006). Several studies used cartoons or verbally-presented jokes with the punchline omitted. The participants' task was to select the ending that makes the cartoon/joke funny. In Bihrle et al.'s (1986) study, adults with RHD less often selected the appropriate ending than a control group and adults with left hemisphere damage. The types of errors differed, such that adults with RHD tended to select a humorous non-sequitur ending (e.g. a pie in the face, unrelated to the set-up of the joke or cartoon), while those with LHD selected coherent but not funny endings. The authors concluded that while adults with RHD retain the idea that jokes rely on an element of surprise, they were impaired in processing the context and selecting an ending that was coherent with the set-up. There are several critical elements of these studies that detract from the conclusions. First, visuospatial abilities (including visuospatial neglect) were not tested prior to the cartoon task to ensure that the participants were able to adequately process the stimuli. Second, the verbal task had a heavy memory demand. Jokes were read aloud and participants had to choose one of five possible endings. The RHD participants were equally poor at selecting a coherent non-funny ending to a story, indicating that they had just as much difficulty with story completion as with joke completion. Third, there was no evaluation of individual performance.

Cheang and Pell (2006) extended the work of Brownell et al. (1983) and Bihrle et al. (1986). In their study of ten adults with RHD, only four of the participants exhibited deficits on the joke task. This was possibly due to a simplification of the task. There was a written and an auditory presentation of the jokes/stories and only four options were provided for conclusions. Regardless, the results suggest that only some adults with RHD may have difficulty with interpretation of jokes.

To reduce the potential effects of metacognitive demands, Heath and Blonder (2003, 2005) examined the use of and response to humor in a naturalistic setting. Participants included adults with RHD, LHD, and a control group of adults who were post-orthopedic surgery with no neurological damage. Each person was paired with his or her spouse and participated in a semi-structured interview that included open-ended questions about the stroke (or orthopedic surgery, for the control participants) and the resulting deficits and adjustments. Approximately 40 mins of recorded interactions were analyzed for each couple. Two college-age males who were naïve to the purpose of the study were trained to identify and rate humor events and responses to those events. Events identified by only one of the two raters were re-evaluated. If there continued to be disagreement, the event was excluded. Results indicated that the proportion of humor events produced was equivalent for all three groups. The groups also evidenced similar responses to humor. Differences did occur in the level of agreement between raters: there was lower agreement between the raters, and thus more excluded events, for the conversations including participants with RHD. These results suggest that there may have been qualitative differences in the humor used by adults with RHD and it is possible that the excluded events reflect unsuccessful humor attempts.

Heath and Blonder (2005) also used the Humor Orientation Scale (Booth-Butterfield and Booth-Butterfield 1991) to obtain ratings of humor use and responses before and after a stroke. Both patients and spouses completed the scale. RHD stroke survivors and their spouses agreed that they used and appreciated humor less after their stroke than before their stroke. The results suggest that there may be subtle changes in humor detected by stroke survivors and their spouses, but that these are not obvious to naïve observers. This study highlights two important factors in pragmatics research. The first factor is the difference between natural or spontaneous communication and controlled experimental studies. The second factor is the need for information from spouses or family members regarding pre-stroke abilities in order to identify subtle changes post-stroke. These changes may be very important for social and vocational outcomes but fall within the wide range of "normal" performance on subjective measures of pragmatic function.

A RH role in humor processing has been supported by studies of healthy adults using two different imaging techniques. Coulson and Williams (2005) used ERPs to examine activation within the RH and LH during joke comprehension. The stimuli were single sentences in which the final word was manipulated to create control (expected) endings as well as jokes and non-jokes (statements with unexpected endings). For both jokes and non-jokes, the final words were equally unlikely endings, but one resulted in a statement and the other a joke. The results suggested that in the LH, the final word was more incongruous in the joke than non-joke sentences. In contrast, the jokes and non-jokes were processed similarly in the RH. The authors concluded that the RH is more adept at joke interpretation, perhaps because the RH more broadly activates meanings and features, thus making it more efficient at linking unexpected words to less common interpretations. Marinkovic et al. (2011) identified three phases of joke processing using magnetoencephalography (MEG). The first involved initial semantic activation in the left hemisphere. This was followed by activation of both right and left prefrontal areas during activation and assessment of plausibility of alternative meanings, and then bilateral fronto-temporal activation during resolution of the meaning of the joke.

Taken together, results from the few studies examining humor after RHD suggest that there may be subtle changes in the spontaneous use and appreciation of humor after RH stroke. More striking deficits appear for some individuals on experimental tasks with visuospatial and cognitive demands. However, these individuals generally retain the basic understanding of jokes and the need for a surprise ending.

10.5 Theory of Mind

Theory of mind (ToM) is the ability to understand others' thoughts, feelings, and ideas, and that those can differ from one's own mental states. The idea that RHD might impair ToM processing began around the 1990s with studies of pragmatic interpretation (Kaplan et al. 1990; Weylman and Brownell 1989). Researchers suggested that difficulties in correctly interpreting someone's intended meaning might be caused by an inability to understand fully the other person's thoughts (see also Champagne-Lavau and Joanette (2009)).

As addressed in Chap. 22 (this volume), ToM is a complicated concept with multiple facets. There are several types of beliefs encompassed in the concept of ToM. The most commonly studied are first-order and second-order beliefs. First-order beliefs refer to what a protagonist knows about people and events in the world. Second-order beliefs are what a protagonist knows about another character's beliefs and other mental states. Such beliefs are important for understanding deception (white lies and double-bluffs), persuasion and sarcasm. The ToM or "mentalizing" network is a bilateral network that involves the medial prefrontal areas, temporoparietal junctions, temporal poles, precuneus, and the posterior superior temporal sulcus (Bohrn et al. 2012; Hillis 2014).

As with other research in RHD, there are contradictory findings about ToM reported from a small group of studies that have used a variety of methods. This review will be restricted to studies of ToM in individuals with stroke. There are more ToM studies that examine the role of the RH in patients with traumatic brain injury (see meta-analysis by Martín-Rodríguez and León-Carrión (2010)). However, these are complicated by potential diffuse axonal injury that accompanies the primary damage to the RH. Three commonly used types of stimuli include short vignettes, cartoons, and animated shapes that move in patterns suggesting intentional interaction. For the first two, the stimuli are followed by a series of comprehension questions that are designed to assess participants' understanding of characters' intended actions or utterances. For the animations, ToM is assumed if participants attribute intention to the animated shapes.

Happé et al. (1999) examined ToM in adults with RHD in a series of experiments using vignettes, cartoons, and cartoon pairs. Half of each type of stimuli probed ToM. In these stimuli, second-order beliefs were crucial to understanding a character's intentions in situations involving persuasion, white lies, double-bluffs or mistakes. The remaining stimuli were "non-mental" stories or cartoons in which the critical inference revolved around physical causation as opposed to a character's mental state. Across all three types of stimuli, the RHD group was less accurate in explaining a character's action than the NBD group for the ToM items but performed similarly to the NBD group on the non-mental stimuli. The authors concluded that RHD impairs ToM. The research team later replicated the results (Griffin et al. 2006).

In line with these results are two other studies that report adults with RHD can accurately respond to first-order beliefs but have difficulty with second-order beliefs (Martin and McDonald 2003; Siegal et al. 1996). Demands on other cognitive processes may also influence performance. For example, working memory may play a role in retaining and processing information during comprehension, and inhibition may be required for the participant to suppress his own knowledge when answering questions about a character's knowledge or action. Siegal et al. (1996) and Surian and Siegal (2001) conducted two manipulations of the standard vignette and post-comprehension question tasks and found that making questions more explicit and providing visual aids increased their RHD groups' performance on a second-order belief task. Siegal et al. (1996) provided one group of RHD participants with the typical question "where will she look for the item?", while the other group was given a more explicit question "where will she look *first* for the item?". The participants who received the more explicit question were as accurate as a control group, while the group with the standard (and less specific) question showed a deficit. In another study, Surian and Siegal (2001) provided visual aids in one condition. Just as with the question manipulation, the RHD groups evidenced ToM deficits with the standard procedures but performed on par with a control group when the cognitive demands were lessened by the presence of visual cues.

A third study supports the notion that stimulus and task complexity may play an important role in RHD adults' performance on ToM tasks. Tompkins et al. (2008) re-evaluated the verbal stimuli used by Happé et al. (1999) and found that the ToM stories contained an explicit contradiction as well as more characters and more perspective shifts compared to the control stories. These differences, as well as the metacognitive task of describing a character's intentions may have impacted the RHD participants' ability to succeed in the task. Tompkins and colleagues revised the control stimuli to match the complexity of the ToM stimuli and constructed yes/no questions to follow each story which probed the characters' intentions. With the revised stimuli and tasks, the RHD impairment on ToM stories was not replicated. It was found that the RHD and NBD groups were equally fast and accurate in responding to the questions. In contrast to this argument, Griffin et al. (2006) reported that ToM performance could not be explained only by cognitive function. Accuracy on their non-mental, but not ToM, stimuli was related to executive function, as measured by the Trails A and B tasks (Reitan 1992).

In an effort to minimize task complexity, Weed et al. (2010) used animated shapes that had previously been used in a variety of studies of ToM in children and adults. Four short animations involved random movement of two geometric shapes around an enclosed space with a segment that could swing open like a door. Four other animations showed the shapes moving in relation to each other in such a way that it suggested that the shapes were intentionally interacting. These were referred to as ToM stimuli. Participants completed two tasks. First, they simply indicated whether or not they felt the animation depicted a story. Second, they were asked to describe the animation. The descriptions were classified into three categories: description of the actions with no ascribed intention or mental state; description of intentions but not mental states; and description of mental states. Inter-rater reliability for the classifications was less than satisfactory.

Results indicated that the RHD group was nearly at chance level (53 %) in identifying whether the animations depicted a story or not. The NBD group, however, was only at 73 % accuracy, suggesting that the animations did not unambiguously represent random motions versus interactions. Examination of the descriptions of the animations indicated that while the NBD group ascribed more intentions to the shapes in the ToM stimuli, the RHD group tended to use the same proportion of basic action and intention statements across the random and ToM stimuli. As with most studies of RHD, there was considerable variability within the RHD group. Approximately half of the RHD participants used more than 50 % basic action statements when describing the ToM animations, which was interpreted by the authors to reflect poor ToM. The other half of the RHD group, however, used less than 33 % basic action descriptions, meaning that nearly 70 % of their descriptions involved ToM.

Taken as a whole, the literature suggests that adults with RHD may have a ToM deficit, but it has not unambiguously been separated from effects of task complexity. Only one treatment has been proposed (Lundgren and Brownell 2010). However, data from only one participant has been reported, limiting the conclusions that can be drawn.

10.6 Conclusion

One factor that has been highlighted throughout this chapter is complexity. The influence of stimulus or task complexity is multifaceted. In some cases, mild or subtle deficits only appear in complex tasks (e.g. discourse production). In other cases, deficient performance observed only in complex or contrived tasks may not reflect the pragmatic process of interest (e.g. idiom comprehension), but rather a combination of cognitive processes that together impact performance. Clearly, simply saying that complexity matters is an unsatisfactory conclusion. Sensitive measures are needed to assess specific pragmatic processes in a variety of tasks with different levels of familiarity and processing demands in order to identify the true underlying impairments that diminish the quality of communication in adults with RHD.

Few would dispute the assertion that RHD can cause pragmatic deficits. However, broad assertions of deficits in any general area, such as figurative language or ToM, are not supported by the literature. Pragmatics is too complex and nuanced for such simple assertions. Our clients, too, are complex individuals and deserve more than to be judged by stereotypes. Few would dispute the assertion that pragmatic deficits affect quality of life and social and vocational outcomes. However, only a small number of studies have assessed the functional implications of pragmatic deficits. Clearly, more work is needed to identify underlying impairments and develop treatments that address those impairments in order to create meaningful changes in functional communication and quality of life.

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Chapter 11
Schizophrenia

Francesca M. Bosco and Alberto Parola

Abstract Patients with schizophrenia exhibit a range of pragmatic difficulties which compromise communicative interaction. The aim of this chapter is to provide an overview of these difficulties and to analyze whether impairments of cognitive factors such as theory of mind (ToM), executive functions and intelligence quotient (IQ) could be helpful in explaining them. First, we provide an overview of the communicative-pragmatic difficulties observed in schizophrenia. We describe how impairment of ToM has been proposed to explain schizophrenic pathology, and the role that such a deficit could play in explaining these patients' pragmatic difficulties. We then describe executive function deficits in schizophrenia and the relationship between these deficits and pragmatic impairments. We consider studies that have examined the interplay between ToM, executive function and other cognitive abilities such as IQ. Finally, we summarize the empirical evidence presented, concluding that the role of ToM in explaining patients' difficulty in comprehending certain pragmatic phenomena still persists when the role of IQ and executive functioning is controlled. However, neither an impairment of ToM nor an impairment of executive function or IQ seems to be able to systematically explain the pragmatic difficulties of patients with schizophrenia. We suggest that other cognitive factors, such as inferential ability, could be considered in future research.

Keywords Communication disorder • Executive functioning • Mindreading • Pragmatics • Schizophrenia • Theory of mind

11.1 Introduction

Schizophrenia is a disorder characterized by the impairment of several cognitive domains, such as thought, perception, language and emotion, in addition to the presence of motor disorders. The distinctive symptoms of the disorder range from deliria, hallucinations and affectivity problems to catatonic and disorganized

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behaviour (American Psychiatric Association 2013). Since the first description of the disorder by Bleuler (1911) and Kraepelin (1919), many different aspects of schizophrenia have been investigated. In this section, the epidemiology and aetiology of schizophrenia are described. In Sect. 11.2, the attempts of various authors to characterize the linguistic impairments of schizophrenia are examined. One group of impairments in particular, pragmatic impairments, are the focus of this chapter and will be described in detail in Sect. 11.3. Increasingly, investigators are relating deficits in the pragmatics of language to cognitive deficits in theory of mind and executive functions. Aside from specific cognitive deficits, there has been an attempt to relate pragmatic impairments to generalized cognitive impairments such as reduced IQ. These various cognitive deficits, and their relationship to pragmatic impairments, will be examined in Sects. 11.4, 11.5 and 11.6. Finally, the main points raised in the chapter will be summarized in Sect. 11.7.

Epidemiological findings indicate that schizophrenia is a widespread disorder that occurs in several societies across different countries. A meta-analysis by McGrath et al. (2008) estimated a median incidence rate of 15.2 per 100,000/year. The distribution of incidence differs between (1) males and females, with a male to female index ratio of 1.4, (2) migrants and native-born individuals, with a migrant to native-born index ratio of 4.6, and (3) urban settings and rural-urban settings, with an estimated median rate of 19 vs. 13.3 per 100,000/year. Economic status does not seem to affect incidence estimates. As far as prevalence rates are concerned, the estimated median point prevalence and lifetime morbid risk are respectively 4.6 and 7.2 per 1000 individuals. The distribution of prevalence does not show any significant difference between males and females, or between rural, urban or mixed contexts. Prevalence has instead been found to be affected by ethnicity, with migrants to native-born ratio of 1.8, and by socio-economic status, with developed country median estimates of 3.3 per 1000 versus less-developed country median estimates of 2.6 per 1000. The onset of schizophrenia is generally in late adolescence and early adulthood, with differences between genders. Men typically develop the disease between the ages of 18 and 25, while women show a later onset between the ages of 25 and 35. Women also show a two-peak distribution of onset, with a first peak after the menarche and a second (lower) peak after the 40s (Ochoa et al. 2012).

The exact aetiology of the disease is still unclear, but recent research suggests that a combination of genetic, neurobiological and environmental risk factors can contribute to the onset of the disorder. The role of genetic factors has been supported by twin and family studies that indicated a high rate of heritability in individuals who share a common genetic pool (e.g. Cannon et al. 1998; Sullivan et al. 2003). Chromosomal abnormalities have been reported in schizophrenia. However, no studies have established a stable association between specific risk genes and the expression of the disorder. Environmental risk factors include both psychosocial and biological events (Tandon et al. 2008). Maternal exposure to virus and malnutrition during the antenatal period, as well as obstetric and perinatal complications have been reported among the biological events associated with schizophrenia (Maki et al. 2005). An association between paternal age at conception and an increased risk of schizophrenia has also been found (Whol and Gorwood 2007). Psychosocial risk factors include childhood trauma, parental separation or death, urbanicity during childhood, cannabis use during adolescence and migration. However, the exact role of each of these factors and their association with schizophrenia remain unclear. Future directions point to identifying how genetic, neurobiological and psychosocial factors might interact in causing schizophrenia.

11.2 Language Impairment in Schizophrenia

From phonology to pragmatics and discourse, authors have described the poor performance of adults with schizophrenia in different aspects of language production and comprehension (Rieber and Vetter 1994; Stassen et al. 1995). The term ‘schizophasia’ (or ‘word salad’) has been coined to describe a range of language impairments in patients with schizophrenia such as the use of confused utterances, clanging (i.e. the association of words with similar sounds), and the creation of bizarre neologisms (Lecours and Vanier-Clément 1976). In a review of the literature, Covington et al. (2005) reported that phonological aspects are generally preserved, and that patients with schizophrenia rarely exhibit deficits in producing speech sounds. The authors concluded that morphological impairments are also quite rare, and when present can result in the loss of the end part of the word, as in this example reported by Chaika (1990: 92): “I am being *help* with the food and the *medicate*...”.

One widely investigated issue is the extent to which linguistic structure, that is, syntax (Lelekov et al. 2000; Bagner et al. 2003; Tavano et al. 2008) and semantics (Goldberg et al. 1998; Rossell and David 2006), is impaired. Syntactic structure of schizophrenic speech was traditionally described as normal (Andreasen 1979). However, more recently, some authors have reported that the syntactic structure of speech acts of patients with schizophrenia may be more simplified than those of healthy controls (DeLisi 2001), and that semantic anomalies may also occur, for example, on naming tasks, disorganized semantic storage and priming abnormalities (e.g. Rossell and David 2006; Barrera et al. 2005). A recent study by Moro et al. (2015) specifically focused on syntax and semantics in schizophrenia, showing that in patients with schizophrenia only the ability to identify syntactic anomalies (e.g. ‘*Chi gli scrivi prima di incontrare*/Who do you write to him before meeting’) is impaired. By contrast, the authors did not find a similar impairment in the detection of semantic anomalies (e.g. ‘*Asciugherò il bucato con l'acqua*/I'll dry the laundry with water’). The authors concluded that the semantic difficulty ascribed to patients with schizophrenia could be due to high-level semantic or discursive and pragmatic impairment.

Even when syntactic and semantic aspects of language are not specifically compromised, patients with schizophrenia may show pervasive difficulties at the pragmatic level of language. Andreasen et al. (1985) compared syntactic, semantic and discursive aspects of schizophrenic patients’ language and showed that these individuals only exhibited poor performance at a discursive level, whereas syntax and semantics were intact. Based on a review of research into language in schizophrenia, Frith and Allen (1988) also observed that when patients' syntactic and semantic abilities are intact, they nonetheless show deficits in the more complex use of language. It is to an examination of these pragmatic impairments that we now turn.

11.3 Pragmatics in Schizophrenia

In recent years, pragmatic aspects of language have been extensively studied in individuals with schizophrenia (Cummings 2009). Studies have examined receptive and expressive aspects of pragmatics in linguistic, extralinguistic and paralinguistic modalities. Meilijson et al. (2004) examined the communicative abilities of patients by testing linguistic, non-verbal and paralinguistic aspects of conversation. The results showed that these person exhibited inappropriate communicative abilities in using all expressive means compared with participants with mixed anxiety-depression disorder and participants with hemispheric brain damage. Using the Profile of Functional Impairment in Communication (Linscott et al. 1996), Linscott (2005) also pointed out that patients with schizophrenia demonstrate a higher index of pragmatic impairment compared with healthy controls. Bazin et al. (2005) used the Schizophrenia Communication Disorders Scale to study patients with schizophrenia. This scale takes the form of a structured interview that consists of items relating to the patient's difficulties in the integration of contextual information and in attributing mental states to the minds of others. It assesses a patient's ability to manage conversation on everyday subjects such as family, professional activities, hobbies and so on. Bazin et al. found that individuals with schizophrenia performed worse on this scale than people affected by mania or depression.

Several studies in the literature have found that patients with schizophrenia perform worse than healthy controls in the comprehension of those speech acts in which the literal meaning does not correspond to the intended meaning, such as indirect speech acts (Corcoran et al. 1995; Corcoran 2003) irony, and figurative language like metaphors and idioms (Langdon et al. 2002; Tavano et al. 2008; Schettino et al. 2010). In a recent study, Haas et al. (2015) evaluated pragmatic abilities of individuals with schizophrenia, both in comprehension and production. Production ability was evaluated through the analysis of semi-structured interviews that were audio-recorded and transcribed by the examiner. The authors analyzed different aspects of the sample discourses, such as the use of connectors and total number of words. Comprehension ability was evaluated using the Barth and Küfferle (2001) proverb test, which requires the subject to interpret the meaning of a proverb (e.g. "When the cat's away, the mice will play") by choosing from among four alternatives provided by the examiner.

Patients showed difficulties in production. They used fewer connectors and fewer total words than control subjects. They also exhibited deficits in the comprehension of proverbs, obtaining a lower score compared to controls in the proverb test. The authors also found a correlation between comprehension and production deficits, which in their view reinforced the idea of a common underlying pragmatic impairment. Patients with schizophrenia have also been shown to have difficulties in deceit comprehension (Frith and Corcoran 1996), narrative aspects (Marini et al. 2008), recognition and recovery of communicative failures (Bosco et al. 2012b) and recognition of violation of Grice's maxims (Mazza et al. 2008). For example, Tényi et al. (2002) showed that patients produced more errors, compared to healthy controls, in recognizing the implicit meaning of vignettes in which an actor voluntary violates the Gricean maxim of relevance to implicate a negative hidden opinion, e.g. "A professor is asked an opinion about his junior lecturer. He says: 'She is a female'".

Recognition of prosodic cues and facial expressions, both vital components of successful communication between speakers and hearers, has also frequently been reported to be impaired in patients with schizophrenia. Ross et al. (2001) examined patients with chronic schizophrenia using a battery which evaluates different prosodic aspects, such as the repetition of words and syllables expressing a certain emotion, and the recognition of affective auditory prosodic stimuli. The majority of patients exhibited deficits both in the recognition and expression of affective-prosodic elements. Leitman et al. (2005) administered two tests to evaluate affective prosody in patients, i.e. a voice emotion identification and a voice emotion discrimination test, and two face emotion processing tests, i.e. a face emotion identification and a face emotion discrimination test. The results showed clearly that the ability to recognize emotional contents of vocal-auditory stimuli is severely impaired in schizophrenia, and that these impairments are related to sensory processing dysfunction in the auditory system.

In addition, the authors found that individuals with schizophrenia also had difficulty in recognizing and discriminating facial emotions. Indeed, alongside prosodic deficits, there is evidence of impaired recognition of facial expressions in adults with schizophrenia. Sachs et al. (2004) investigated facial recognition in individuals with schizophrenia using a computerized battery that evaluated different aspects of emotion recognition, such as differentiation between emotional facial expressions, memory for emotional facial expressions and rating of the emotional valence of facial expressions. Individuals with schizophrenia performed poorly, compared to healthy controls, in all emotion recognition tasks. These deficits correlated with cognitive deficits and negative symptoms. A meta-analysis by Kohler et al. (2010) confirmed the extent of the impairment in facial emotion perception by individuals with schizophrenia compared to healthy controls. Deficits of these functions thus constitute an integral part of schizophrenic pathology (Stein 1993; Stassen 1991; Stassen et al. 1995; for a review, see Edwards et al. 2002).

Overall, the clinical literature has principally focused on language and overlooks the possibility of using other expressive modalities – such as the extralinguistic one – to convey meaning in a given context. Furthermore, since studies in the pragmatic domain typically focus on one or two pragmatic phenomena at a time – usually only in comprehension or production – it is difficult to compare the results obtained by different experimental designs. To overcome these limitations, Colle et al. (2013) used the Assessment Battery for Communication (ABaCo; Sacco et al. 2008; Angeleri et al. 2012; Bosco et al. 2012a) to investigate the ability of patients with schizophrenia to comprehend and produce different pragmatic phenomena. These phenomena included direct and indirect communicative acts, deceit and irony, and used different expressive means such as linguistic, extralinguistic and paralinguistic modalities.

The results showed that participants with schizophrenia performed significantly worse than a healthy population, based on the normative values of the ABaCo (Angeleri et al. 2012), on all the evaluation scales—linguistic, extralinguistic, paralinguistic, contextual and conversational—for both comprehension and production tasks. Comparing some of the pragmatic phenomena investigated, the authors detected a similar pattern of increasing difficulty on the linguistic and extralinguistic scales. Specifically, the comprehension and production of direct and indirect communication acts were the easiest tasks while the comprehension and production of deceit and irony were the most difficult tasks to complete. The authors explained this pattern of increasing difficulty in terms of demands on one's inferential ability. Pragmatic phenomena which require more inferences to be drawn in order to fill the gap between the literal and intended meaning of an utterance were more difficult for the subjects with schizophrenia to both comprehend and produce (see also Bara 2010; Bosco et al. 2015).

There was considerable variation in the responses of patients with schizophrenia to tasks on the ABaCo. Some responses were unfocused and bizarre. Other responses revealed partial comprehension of the expressive (i.e. literal) meaning of an utterance or amounted to a not completely correct production of a specific communicative act. What follows are some examples of the responses of patients with schizophrenia to some of the tasks on the linguistic comprehension scale of the ABaCo. The tasks involve the comprehension of a specific communicative act undertaken as part of a short video-recorded communicative interaction. These examples are provided in order to illustrate the possible pragmatic difficulties of adults with schizophrenia. In each example, the experimental question posed to the participants was: 'What did the actor mean to say to the partner?'.

Indirect (non-conventional) communication acts:

A boy is in a room, putting a racket in a closet. A girl comes in and asks him "Did you go jogging yesterday evening?"

The boy answers: "I had a very high fever!"

An example of the replies is: "I don't know if he was trying to tell her that he was tidying the closet".

In this case, the patient failed to make the correct inference (i.e. if a person has a high fever he is not able to go jogging) that would have allowed her to understand that the boy is answering that he did not go jogging. She tried to link the utterance to the (communicatively irrelevant) behavior played out by the actor.

Deceit:

A girl and a boy are sitting at a table in a classroom, studying. The girl gets up and leaves the room. The boy accidentally spills some coffee on the sheets of paper on the table. The girl comes back and asks "Who spilt coffee on my notes?"

The boy answers: “I’ve no idea.”
What did the boy want to say to the girl? Why did he answer like that?
An example of the replies is: “He can’t say anything, because she knows it was him.”

In this case, the patient failed to understand that the utterance was false and was performed in order to deceive the partner. The patient failed to realize that the girl did not know that it was the boy who spilt the coffee.

Irony:
In a store, a girl is trying on a dress that is obviously too tight for her. She asks the boy who is with her “How does it look?”
The boy answers: “It’s a bit big.”
An example of the replies is: “He’s stating a fact, he’s serious”

In this case, the patient’s comprehension is limited to the literal aspect of the communicative act. He fails to understand that the utterance overtly contrasts with the fact that the dress is obviously too tight for the girl and that the utterance was intended to be ironic.

The literature discussed above provides convincing evidence that patients with schizophrenia often suffer from communicative-pragmatic difficulties. In the last decade, there has been growing interest in determining whether such difficulties might be due to an underlying cognitive deficit in theory of mind and executive functions, or whether they might arise as a consequence of reduced IQ in patients in comparison with healthy participants. The next section will begin to focus on these issues.

11.4 Theory of Mind in Schizophrenia

11.4.1 Theory of Mind Deficits in Schizophrenia

Theory of Mind (ToM) refers to the ability to attribute mental states such as beliefs, desires and emotions to one’s own mind and to the minds of others in order to predict behaviour (Premack and Woodruff 1978). Frith (1992) was the first author to propose that a deficit in the ability to infer mental states (i.e. ToM) was able to explain the cognitive and behavioural abnormalities observed in schizophrenic pathology. In particular, he proposed that an impairment of ToM is responsible both for positive symptoms (i.e. delusions, hallucinations and disordered thoughts and speech) and negative symptoms (i.e. catatonic behaviour, poverty of speech and action, flattening of affect and social withdrawal) exhibited by patients with schizophrenia. In the following years, several studies confirmed Frith’s hypothesis by demonstrating the presence of ToM impairment in schizophrenic individuals (Corcoran et al. 1995; Frith and Corcoran 1996; Corcoran et al. 1997; Mazza et al. 2001; Sarfati and Hardy-Baylé 1999; Brüne 2005b; Bosco et al. 2009c). Frith and Corcoran (1996) evaluated ToM in patients with schizophrenia using false belief and deception stories. These stories were accompanied by cartoon figures in order to reduce the memory and verbal requirements of the task. Compared with healthy controls and non-psychotic psychiatric patients, patients with schizophrenia exhibited severe impairment of the ability to infer other people's mental states and intentions.

A review by Harrington et al. (2005) of studies that compared the performance of schizophrenic individuals and healthy controls in ToM tasks found that in almost all of the studies individuals with schizophrenia obtained significantly worse scores than healthy participants in at least one of the ToM tests administered. Brüne (2005a) reviewed evidence of ToM impairment in schizophrenia. He concluded that ToM deficits are a specific deficit in schizophrenia and should not be considered to be the consequence of general cognitive impairment, i.e. reduced IQ. Indeed, even in studies in which IQ, attention and memory have been controlled for, the difference between patients with schizophrenia and controls in ToM tasks has remained significant (Mo et al. 2008; Brüne 2005b).

In a meta-analysis, Sprong et al. (2007) examined studies of patients with schizophrenia with the aim of quantitatively summarizing findings about the relationship between ToM and schizophrenia. The results indicated that the average performance of patients with schizophrenia on ToM tasks is more than one standard deviation below that of controls, and that this result is not affected by demographical factors such as educational level, gender and age. A more recent meta-analysis was carried out by Bora et al. (2009), who adopted more rigid inclusion criteria, excluding, for example, those studies that used overlapping samples. The results confirmed the extent of ToM deficits in schizophrenia, with a large effect-size characterizing the ToM impairment. However, the deficit was less severe than that suggested by the previous meta-analysis of Sprong et al. (2007). The result also confirmed that ToM impairment is widespread in schizophrenia, and that is not only a consequence of symptomatology or medication, but also affects patients in remission.

11.4.2 Theory of Mind and Communicative-Pragmatic Ability in Schizophrenia

Frith (1992) systematically explained communicative-pragmatic disorders in schizophrenia in terms of ToM deficits. The author proposed that some individuals with schizophrenia are not able to take the mental states of the listener into account correctly when they communicate, and that this deficit makes schizophrenic discourse unintelligible and obscure. In detail, Frith hypothesized that (i) *disorder of willed action* was responsible for poverty of speech and perseverative and incoherent communicative behaviour; (ii) *abnormalities of self-monitoring* were responsible for deficits in planning a discourse, difficulties in recognizing and repairing communicative failure, and difficulties in selecting the relevant contextual factors and information; and (iii) *abnormalities in the awareness of others* were responsible for deficits in comprehending non-literal and figurative expressions, in comprehending conventional social norms of communication, and in the use of referential and cohesive devices within a discourse. Frith identified in ToM the cognitive mechanism allowing for the correct functioning of all these processes.

In the years following Frith's early study, many investigations showed that ToM deficits co-occurred with pragmatic impairments in a variety of tasks. These tasks included the comprehension of non-literal and figurative forms of language such as indirect requests and hints, metaphor, proverbs and irony (Corcoran et al. 1995; Langdon et al. 2002; Brüne and Bodenstein 2005; Mo et al. 2008; Champagne-Lavau and Stip, 2010; Gavilán and García-Albea 2011), the recognition of the violation of Gricean maxims and social norms of communication (Corcoran and Frith 1996; Mazza et al. 2008), the use of cohesive devices and referential markers during conversation (Abu-Akel 1999; Champagne-Lavau et al. 2009), and recognition and recovery of communicative failure (Bosco et al. 2012b).

However, it should be noted that in several studies ToM has been assessed through the comprehension of pragmatic expressions such as indirect speech acts and irony. Accordingly, it has not been possible to establish a direct correlation between pragmatic ability and ToM deficits, since from a theoretical perspective and from the point of view of methodological procedure the two tasks have been collapsed into one. For example, Corcoran et al. (1995) used a hinting task, which requires patients to recognize an indirect speech act uttered by one of the protagonists at the end of a story (e.g. "Look, those sweets look very good" to say "Please mom, buy me those sweets"). The task was specifically devised for schizophrenic patients in order to reduce memory use and verbal loading. The results confirmed that the patients were impaired in recognizing the intention behind indirect speech acts compared with normal subjects and a psychiatric control group. The authors suggested that such a deficit testified to the presence of ToM impairment.

A subsequent study by Corcoran and Frith (1996) evaluated the appreciation of the Gricean maxims of quantity, quality and relation in patients with schizophrenia. The task consisted of a number of stories in which participants had to decide the most likely option between two alternatives, one adhering to the maxim and one in conflict with the maxim. Patients with schizophrenia were shown to be severely impaired in this task. Unlike controls, they were not able to recognize the correct ending of the story. Once again, the authors suggested that this deficit indicated the presence of an impairment of ToM. Champagne-Lavau et al. (2009) evaluated the ability to use referential markers during a conversation with a partner in patients with schizophrenia and healthy controls. The task required patients to describe some figures to a partner who was separated by an opaque screen. The speaker's ability to provide correct information to his partner as well as the appropriate use of referential markers were evaluated. The authors found that participants do not use referential markers in an appropriate way, and that they do not adequately mark the information they provide. These deficits, which were exhibited only by individuals with schizophrenia and not by healthy controls, were interpreted as being related to a ToM difficulty in correctly attributing mental states to their conversational partner.

Other studies have provided independent measures of ToM and pragmatic ability in order to evaluate an association between these two abilities using correlational analysis. Langdon et al. (2002) investigated the relation between ToM and comprehension of metaphor and irony in individuals with schizophrenia. The authors used a false belief picture-sequencing task to evaluate ToM, and a story-comprehension task to evaluate irony and metaphor comprehension. Two types of ironic statement were used, i.e. banter ("Are you trying to ruin my day?") and sarcasm ("That was clever"). Two types of metaphorical statement were also investigated, i.e. nominal metaphors ("This job is a jail") and figurative expressions ("You have got too many balls in the air"). The results showed that patients achieved lower scores than controls for all the pragmatic phenomena investigated, and that they also produced significantly more errors than controls on the false belief tasks. Logistic regression analysis showed that patients' performance in the ToM task predicted irony comprehension scores but not metaphor comprehension scores. In line with what Happé (1993) proposed and observed in autistic children, the authors claimed that metaphor comprehension does not involve ToM abilities whereas irony does.

Mazza et al. (2008) replicated the results of Langdon et al. (2002). They found a correlation between ToM and irony comprehension in schizophrenic patients, and concluded that an impairment of ToM can be considered to be the cause of the patients' poor performance in the irony comprehension task. By contrast, Mo et al. (2008) evaluated ToM using false belief tasks. A story comprehension task was used to assess the comprehension of metaphorical ("You are a ship without a captain!") and ironical ("You really are so good at making decisions!") statements. The results showed that patients have difficulties in terms of both ToM and the comprehension of irony and metaphor. The authors also found a correlation between metaphor comprehension and ToM performance, while previous studies did not (Mazza et al. 2008; Langdon et al. 2002). In line with Mo et al., Brüne and Bodenstein (2005) also found that ToM performance predicts a significant amount of variance in the ability of patients with schizophrenia to comprehend proverbs.

When compared with healthy controls, Bosco et al. (2012b) found that patients with schizophrenia exhibited ToM deficits and difficulty in recognizing and recovering different kinds of communicative failures. These failures were (i) failure of the literal meaning of an utterance, (ii) failure of the speakers' intended meaning, and (iii) failure of the communicative effect, that is, the unsuccessful attempt to convince someone to do something. Furthermore, patients showed an increasing trend of difficulty both in recognizing and recovering these kinds of failures. The authors found a correlation between the patients' ToM deficit and their difficulty in recognizing and recovering each kind of communicative failure investigated. However, there was no evidence that ToM was the factor that best explained the increasing trend of difficulty shown by patients in recognizing and recovering the communicative failures. The authors suggested that the increasing inferential demands underlying the different tasks provided a better explanation of the observed phenomenon.

In line with Frith (1992), Abu-Akel (1999) proposed a distinction between diminished use of ToM, or ‘undermentalizing’, and the hypertrophic use of ToM, or ‘overmentalizing’, arguing that this distinction plays an important role in explaining the communicative-pragmatic difficulties of individuals with schizophrenia. In the author’s view, schizophrenic patients in whom positive symptoms are predominant are characterized ‘as having representational understanding of mind but over-attributing mental states or over-generating hypotheses about mental life’ (Abu-Akel and Bailey 2000: 737). The author analyzed the conversations of patients with schizophrenia, reporting repeated failure in the use of bridging references, rapid shifting in the topic, and an inability to recognize or repair communicative failures, as if patients were not able to understand what information the listener needs. There follows an example from Abu-Akel (1999: 266–267) of an interview with a patient. It shows the disruptive use of unclear references:

Interviewer: Why? What happened to the family? (long pause) You said that you have brothers and sisters, what else?

Patient: Eh (…) I know (…) one day I’m going to escape. I know that **they** all have problems, yes, everybody has problems, that’s why I don’t love **them**. Do you understand?

The patient has not clarified in the previous part of text to whom the pronouns *they* and *them* refer. The referents of these pronouns are not clear because they do not refer to information previously shared by the speakers, but only to the patient’s own private world.

An fMRI study by Brunet et al. (2003) showed that patients with schizophrenia display hypoactivation of cerebral networks which are normally active in healthy controls during a non-verbal ToM task of intention attribution. In another fMRI study, Walter et al. (2009) showed that schizophrenic patients, like healthy controls, exhibit activation of a mentalizing network during the recognition of communicative intentions and during the perception of physical causality when the recruitment of the mentalizing network is not requested. A more recent study by Montag et al. (2011) investigated ToM deficits in schizophrenia using the Movie for Assessment of Social Cognition (MASC). This instrument distinguishes between ToM errors which are due to ‘undermentalizing’ and those which are related to ‘hypermentalizing’. The results demonstrated a correlation between positive symptoms and over-mentalizing scores, while undermentalizing errors occurred more frequently in patients with negative symptoms. These data support the hypothesis that there is abnormal activity of part of the cerebral network underlying ToM. This includes the prefrontal cortex and the posterior orbital cortex.

Even if ToM impairment in patients with schizophrenia is well documented and seems to play an important role in explaining pragmatic deficits in schizophrenia, some authors have proposed that ToM deficits could more properly be referred to as a primary deficit of another cognitive component. That component is executive functioning (Thoma and Daum 2006; Thoma et al. 2009; Sponheim et al. 2003; Mossaheb et al. 2014). We will address this issue in the next section.

11.5 Executive Functions in Schizophrenia

11.5.1 Executive Function Deficits in Schizophrenia

Some authors have argued that executive function deficits should be considered the core cognitive impairment of patients with schizophrenia, and that such deficits are primary to other cognitive impairments (Weickert et al. 2000; see also Reichenberg and Harvey 2007). Executive function refers to a set of complex abilities generally associated with the activity of the frontal brain areas (Eisenberg and Berman 2010). These abilities allow people to perform goal-directed behaviour in a flexible and effective way by planning actions and decisions in a sequential and hierarchical order, monitoring and correcting performance during task execution, maintaining a goal over time, and adapting it to the specific request set by the surrounding context. In the last two decades, several models of executive function have been proposed, each of them identifying different subcomponents. Miyake et al. (2000) proposed a model with three executive sub-components, namely *updating* (i.e. the ability to manipulate information in working memory), *shifting* (i.e. the ability to shift attention between multiple tasks), and *inhibition* (i.e. the ability to suppress automatic or pre-potent responses). Fisk and Sharp (2004) confirmed the validity of Miyake et al.'s model. However, they found an additional executive process corresponding to the efficiency of access to information in long-term memory. Other conceptualizations include executive functions beyond those mentioned above, such as cognitive flexibility (i.e. the ability to shift between thought or action according to the demands of the task at hand), planning (i.e. the ability to formulate, evaluate and select a sequence of thoughts and actions to achieve a desired goal), and working memory (i.e. the ability to temporarily store and manage the information required to perform cognitive tasks).

A large body of evidence has shown that all the above executive functions are severely impaired in schizophrenia (for a review, see Reichenberg and Harvey 2007; Orellana and Slachevsky 2013). However, even if there is consensus that executive function deficits exist in schizophrenia, some questions remain regarding the nature and extent of these deficits. An unresolved issue concerns the possibility that executive function impairment could in fact be the consequence of a global cognitive impairment (Dickinson et al. 2008). Schizophrenic patients generally exhibit an IQ which is significantly below the normal score (Fioravanti et al. 2012; Henry and Crawford 2005) as well as a wide range of other cognitive deficits affecting attentional processes (Dickinson et al. 2007b; Fioravanti et al. 2012), long-term memory (Aleman et al. 1999), processing speed (Henry and Crawford 2005) and visuospatial ability (Dickinson et al. 2007b). In order to address this issue, Reichenberg and Harvey (2007) performed a meta-analytical study. The results seem to suggest that executive function impairment is more severe than the impairment of other cognitive abilities, such as IQ, attention and long-term memory.

More recently, Raffard and Bayard (2012) evaluated four executive functions (updating, shifting, inhibition and divided attention) and premorbid IQ in patients with schizophrenia and schizoaffective disorders. They found that almost all patients exhibited an impairment of at least one of the four executive functions evaluated, and that general cognitive impairment and processing speed predicted nearly 50% of the variance in the executive function tasks. This result suggests that only some executive function deficits could be explained by a general cognitive impairment. The large amount of unexplained variance points to a distinctive and unique contribution of executive function processes.

Some studies have examined whether executive function could play a role in explaining ToM deficits in schizophrenia. Pickup (2008) reviewed studies that investigated both ToM and executive function deficits in schizophrenia. It was concluded that ToM deficits are not dependent on executive function. Pickup's review found that patients with schizophrenia have impaired cognitive and mentalizing abilities, and that these abilities are often strongly correlated. However, it was also found that most of the studies confirmed the residual presence of ToM deficits, even after controlling for executive function.

11.5.2 Executive Functions and Pragmatic Ability in Schizophrenia

Communicative-pragmatic competence requires the complex interplay of different cognitive abilities. To communicate in an effective way, it is necessary to focus attention on linguistic and non-linguistic stimuli, shifting attention from one source to another in a rapid and flexible way. The speaker must also organize the contents of discourse in a logical and sequential order, plan discourse coherently and maintain the goal of discourse over time. The speaker should also tailor his or her behaviour, adapting it to the request and the response of the listener, monitoring and adjusting communicative performance constantly and dynamically. Finally, to comprehend figurative language, such as metaphors, proverbs and idioms, it is necessary to inhibit irrelevant information, and to use abstract thinking resources and cognitive flexibility in order to grasp the figurative aspects of the message. Executive function deficits can widely disrupt the ability to communicate in an effective way within a social context, contributing to the generation of pragmatic disorders.

The study of the cognitive underpinnings of pragmatic disorders in schizophrenia has substantially increased in the last two decades. Research has focused on the comprehension of figurative forms of language such as metaphor and proverbs. Sponheim et al. (2003) evaluated proverb comprehension in a sample of patients with schizophrenia. The aim was to determine the contribution of IQ, executive function and the severity of the patients' symptomatology to proverb comprehension. Proverb interpretations were rated as abstract, concrete, literal or bizarre-idiosyncratic. The results showed that an abstract interpretation was associated with a higher IQ, suggesting a link between abstraction ability and general intelligence. Moreover, a poor concrete interpretation was related to a low IQ, but it was more strongly associated with executive functions (planning, set-shifting and working memory). This association was not found in the control group, reinforcing the hypothesis that the tendency to provide a concrete interpretation can be a direct consequence of executive function impairment and frontal lobe dysfunction in schizophrenia.

In line with this study, Thoma et al. (2009) found severe proverb comprehension impairment in patients with schizophrenia compared with patients with alcohol dependence and healthy controls. The authors evaluated the role of IQ, executive function and symptomatology. The results showed that IQ had a modest role in proverb interpretation, while among the executive functions (working memory, divided attention, set-shifting and inhibitory control) only divided attention correlated with proverb recognition. No association between proverb comprehension and symptomatology was found. A recent study by Mossaheb et al. (2014) assessed metaphorical comprehension in patients with schizophrenia spectrum disorders using both conventional and non-conventional (novel) metaphors. The results showed that patients were impaired in all the tasks examined, and that this impairment was related to executive dysfunction. Cognitive flexibility predicted performance in the recognition of conventional metaphor, while vocabulary predicted performance in terms of novel metaphor comprehension.

Together, these studies suggest that executive function plays a role in the comprehension of figurative language and that this role is not accounted for by other cognitive factors such as IQ. However, it has not been possible to find a consistent pattern of association between the impairment of specific executive function processes (e.g. divided attention, set-shifting and cognitive flexibility) and the impairment of specific pragmatic phenomena such as metaphors or proverbs. The variability in the experimental results can be explained in part by the different tasks used to assess figurative language comprehension. Furthermore, a specific type of figurative language, for example metaphor, can vary widely with regard to aspects such as the degree of conventionality, familiarity, concreteness and meaningfulness (see Bambini et al. 2014). While Sponheim et al. (2003) paid attention to conventionality, other variables have not been controlled for in the above studies.

The majority of studies have focused on figurative language, with only a few studies examining the relation between executive functions and other communicative-pragmatic abilities (e.g. conversations and narratives). Dickinson et al. (2007a) used a series of role-playing scenarios in which participants had to interact with the experimenter in order to achieve a specific communicative goal (e.g. an employer has to obtain a promotion). Conversational content, non-verbal content and global effectiveness were evaluated. The authors also evaluated IQ, verbal ability and executive function (working memory and cognitive flexibility), and assessed their relationship to conversational tasks. The results showed that all the cognitive measures accounted for approximately 50% of the variance of the conversational task. IQ, verbal ability and cognitive flexibility were associated with the conversational task, while no association with working memory was found.

Marini et al. (2008) examined narrative ability in a sample of individuals with schizophrenia, finding that narrative impairment was more severe at the macro-linguistic level, i.e. pragmatics, than at the micro-linguistic level, i.e. phonology, morphology and syntax. The authors also examined language, verbal memory and executive function (inhibition, cognitive flexibility and attentional shifting). The results showed that impairment at the macro-linguistic level can be explained in part by executive functions, in particular by attentional shifting and planning ability.

To this point in the discussion, we have addressed studies in the literature that have separately investigated the role that ToM and executive function might play in explaining the communicative-pragmatic difficulties of individuals with schizophrenia. In order to understand the interplay among these components, we will examine in the next section a number of studies which have investigated the combined role of ToM and executive function in explaining the communicative-pragmatic difficulties of adults with schizophrenia. We will also consider studies which have investigated the role played by IQ in explaining the communicative-pragmatic difficulties of these patients.

11.6 Cognitive Impairment and Pragmatic Disorders

The idea that communicative-pragmatic disorders might originate from the interaction between different impaired cognitive abilities has received increasing support in recent years, and has been investigated in clinical populations such as patients with traumatic brain injury and right hemisphere brain damage (e.g. Martin and McDonald 2003). Some authors have attempted to explain pragmatic disorders in schizophrenia in terms of ToM and other cognitive processes, in particular executive functions. Other authors have tested the hypothesis that a generalized cognitive impairment of, for example, IQ could be responsible for defective communicative-pragmatic performance.

Linscott (2005) examined the hypothesis that impaired pragmatic language comprehension in patients with schizophrenia could be caused by a generalized decline in cognitive function measured in terms of IQ. He found a strong correlation between low IQ and poor pragmatic comprehension, suggesting that pragmatic language impairment can be secondary to a generalized cognitive decline. However, only a limited number of studies have confirmed the validity of the association between a low IQ and poor pragmatic comprehension (Linscott 2005; Varga et al. 2014), while other studies have not reported any relation between IQ and pragmatic performance (Brüne and Bodenstein 2005; Thoma et al. 2009). The specific role of IQ is thus unclear, with pragmatic impairments still evident even after controlling for general cognitive impairment.

For example, Gavilán and García-Albea (2011) examined linguistic (lexical and syntactic) comprehension and comprehension of figurative language such as metaphors (“It’s going to cost him an arm and a leg”), proverbs (“A bird in the hand is worth two in the bush”) and irony (“I think that you work too much” to say “you are not working at all”) alongside ToM in patients with schizophrenia. The authors used verbal and non-verbal tests and controlled for the role of IQ. It was found that patients performed worse than control subjects in all language comprehension and ToM tasks. Logistic regression showed that only metaphor and irony scores and ToM abilities (but not IQ) predicted membership of the schizophrenic group. Additional correlational analyses showed that ToM, independently of the nature (verbal vs. non-verbal) of the ToM test used, strongly correlated with the comprehension of each of the different types of phenomena investigated (metaphor, proverb and irony). The authors also found that this correlation is not affected by IQ. In particular, irony showed the highest correlation with the ToM tasks followed by proverbs and metaphors.

In addition to IQ, Brüne and Bodenstein (2005) investigated the role of ToM and executive functions (i.e. cognitive flexibility and planning ability) in comprehending proverbs in patients with schizophrenia. The authors found a correlation between proverb comprehension and all the cognitive abilities investigated (i.e. IQ, executive functions and ToM). Furthermore, a partial correlation showed that the relation between ToM and proverb comprehension still persisted after controlling for IQ. By contrast, when the authors controlled for ToM, proverb comprehension no longer correlated with IQ, suggesting that IQ exerts a modest role in patients' pragmatic difficulties. A regression analysis also showed that ToM was the best predictor of patients' pragmatic performance, explaining a large amount of the variance in performance, while the only significant contribution of the executive functions was provided by cognitive flexibility, which explained a significant but limited part of the variance.

Mazza et al. (2008) investigated whether ToM deficits and pragmatic disorder are stable markers of pathology in schizophrenia, and whether they are independent of other cognitive measures such as IQ and executive function. The authors administered to patients with schizophrenia and to their relatives a pragmatic conversational maxims task, consisting of short conversational exchanges, at the end of which patients were asked to choose the most pertinent answer to a question. For example, possible answers in response to the question "*How would you like your tea?*" were (a) With milk and (b) In a cup. The authors also used a false belief task to evaluate ToM, and tested IQ level and executive functions (planning and cognitive flexibility). Schizophrenic patients and their relatives performed worse than control subjects in both the ToM and pragmatic tasks. These differences remained after controlling for IQ and executive functions. The relatives of the patients did not perform as poorly as the patients, but they occupied an intermediate position between the patients and the controls. Moreover, the authors found a correlation between ToM and the number of errors in the Gricean maxims tasks in individuals with schizophrenia and their relatives but not in the control group.

Finally, Champagne-Lavau and Stip (2010) examined in patients with schizophrenia the role of ToM and executive function (i.e. shifting, inhibitory control and cognitive flexibility) in the comprehension of different pragmatic phenomena. The phenomena investigated were indirect requests (e.g. "*It's cold here*" to say "*Close the window*"), idiomatic metaphor (e.g. "*This bus is a turtle*") and non-idiomatic metaphor (e.g. "*My friend has a heavy heart*"). The authors reported a correlation between pragmatic comprehension and cognitive flexibility and shifting, but not with inhibitory control. The analysis clearly showed that differences in the performance of pragmatic tasks between the patients and the control subjects still persisted after controlling for the role of executive function. By contrast, after controlling for ToM, differences remained only for the comprehension of non-idiomatic metaphor. The data suggested that only indirect speech acts and idiomatic metaphor, but not non-idiomatic metaphor, were related to ToM. The authors concluded that only idiomatic metaphors involve ToM abilities while non-idiomatic metaphors involve different cognitive processes (see also Giora 2002; Bosco et al. 2009b, 2012c). In line with the results of Brüne and Bodenstein (2005), this study indicates that the comprehension of metaphor is related to ToM processes beyond the contribution of executive functions.

11.7 Summary

Communicative impairments have been considered a hallmark of schizophrenia since the earliest characterisation of the disorder (Bleuler 1911; Kraepelin 1919). Several studies have been conducted with the aim of identifying which specific aspects of language (e.g. syntax, semantics) are impaired in these patients. The most impaired communicative domain is pragmatics (Tényi et al. 2002; Bazin et al. 2005; Mazza et al. 2008; Schettino et al. 2010; Colle et al. 2013). Pragmatic impairment compromises a number of skills including the ability to understand figurative language and others forms of non-literal language as well as the ability to sustain a conversation in everyday situations.

In recent years, investigators have begun to study the cognitive processes that contribute to communicative-pragmatic disorders in schizophrenia. Frith (1992) was the first theorist to claim that communicative disorders in schizophrenia can be related to an inability to infer other people's mental states, i.e. impaired ToM. Results of subsequent studies have confirmed that pragmatic and ToM deficits co-occur in individuals with schizophrenia, with several studies revealing a correlation between a deficit of ToM and poor pragmatic performance (Langdon et al. 2002; Brüne and Bodenstein 2005; Mazza et al. 2008; Champagne-Lavau and Stip 2010). Some studies have found that ToM is associated with the comprehension of irony but not with the comprehension of metaphors (Langdon et al. 2002; Mazza et al. 2008), while other studies have revealed the opposite pattern of results (Brüne and Bodenstein 2005; Mo et al. 2008). The available evidence does not allow us to draw definitive conclusions about the role of ToM in explaining specific pragmatic phenomena or the extent of this relationship. Most studies have provided only correlational analyses which do not permit us to draw a causal relation between these abilities. Moreover, studies that have used multivariate statistical analysis have shown that ToM only explains a limited amount of variance in pragmatic disorders.

Some authors have tried to identify other cognitive factors that are responsible for pragmatic deficits in patients with schizophrenia. Executive functioning has been identified as one of the most likely causes of pragmatic disorders. Studies that have examined the relationship between executive functions and pragmatic deficits have found that a deficit in executive functioning, in particular, cognitive flexibility, set-shifting and working memory, can play a role in the pragmatic comprehension of figurative expressions such as metaphor and irony. However, once again it has not possible to find a stable association across studies between specific executive function processes and pragmatic phenomena.

Considering that cognitive factors can reciprocally influence each other, some authors have examined concurrently the role of ToM, executive functions and general cognitive impairment in pragmatic deficits in schizophrenia. The contribution of IQ to these deficits is uncertain, with some studies showing a correlation between IQ and pragmatic abilities (Linscott 2005; Varga et al. 2014) while other studies do not find any such association (Brüne and Bodenstein 2005; Thoma et al. 2009). Studies that examined other cognitive functions in addition to IQ, such as ToM and executive function, found that the relation between pragmatic performance and these other functions still persisted even after controlling for IQ (Gavilán and García-Albea, 2011; Brüne and Bodenstein, 2005; Mazza et al. 2008). It was concluded that IQ seems not to have a specific role in pragmatic comprehension.

Studies that have analysed the role of executive functions and ToM in pragmatic performance suggest that ToM plays the most important role in explaining pragmatic disorders. However, the nature and extent of the relation between ToM and pragmatic ability in schizophrenia is still not completely clear. Several studies have examined ToM using the comprehension of pragmatic phenomena such as indirect speech acts and irony or the appreciation of Gricean maxims (Frith and Corcoran 1996; Corcoran and Frith 1996). These studies conflate the theoretical concept of ToM with the notion of pragmatics and, as a result, use the same experimental tasks to measure both abilities. Even if ToM and pragmatic tasks do involve some common processes, these abilities cannot be considered equivalent (see Sperber and Wilson 2002; Tirassa et al. 2006; Tirassa and Bosco 2008; Bosco et al. 2009a). The heterogeneity of the experimental results concerning the role of cognitive abilities such as ToM, executive functions and IQ in pragmatic interpretation indicates that other factors, which have not yet been examined, could help explain poor pragmatic performance in schizophrenia.

One possible factor to be investigated is inferential ability, a process which is considered central in pragmatics (Grice 1969; Searle 1969). Numerous studies have shown that patients with schizophrenia exhibit impairments in different types of inference, such as probabilistic inference, transitive inference and associative inference (Kruck et al. 2011; see also Cummings 2014). Although few attempts have been made to control the inferential processes involved in different kinds of pragmatic phenomena, such as indirect speech acts, irony, figurative language and so on, these could play a role in explaining the pragmatic difficulties exhibited by individuals with schizophrenia. More research is needed in order to clarify the relationship between communicative disorders and the ability to draw contextually relevant inferences in schizophrenia, as well as the relationship between inferential ability and other cognitive functions such as ToM and executive function.

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Chapter 12
Traumatic Brain Injury

Lyn S. Turkstra and Adam M. Politis

Abstract Children and adults with traumatic brain injury (TBI) are at high risk for impairments in pragmatic language and social communication more broadly. In this chapter, we provide an overview of epidemiology and outcomes after traumatic brain injury as a context for the study of pragmatics in this group. We then consider models of pragmatics in TBI, and their use in theory and clinical practice, and review findings from illustrative studies in children and adults. Finally, we discuss new approaches to the study of pragmatics in children and adults with TBI, and consider how these approaches can inform research and clinical practice.

Keywords Adult with TBI • Child with TBI • Cognitive-communication disorder • Conversation • Language • Pragmatics • Social cognition • Traumatic brain injury

12.1 Introduction

Traumatic brain injury (TBI) is defined as a change in brain structure or function that is caused by biomechanical force applied to the brain (Menon et al. 2010). TBI can result in focal left hemisphere damage and aphasia, but damage is more commonly multifocal and diffuse and affects cognitive functions underlying language use rather than language itself. Because impaired cognition is the underlying mechanism of these problems in language use, the communication phenotype of TBI is referred to as a 'cognitive-communication disorder' (American Speech-Language-Hearing Association 1991). Cognitive-communication disorders are manifest most

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often in connected language, and pragmatic communication disorders are the hallmark of TBI.

In this chapter, we provide an overview of epidemiology and outcomes of TBI as a context for the study of pragmatics in this group. We then consider models of pragmatics in TBI, and review findings from relevant studies in children and adults. Finally, we discuss new approaches to the study of pragmatics in children and adults with TBI, and consider how these approaches can inform research and clinical practice. One point about the terminology used in this chapter should be made. The terms 'pragmatic language' and 'pragmatic communication' were common in early literature on communication outcomes after TBI, and referred specifically to language. Current clinical literature often uses the term 'social communication' instead of 'pragmatics'. This evolution of terms reflects evidence that TBI affects not only language use but also use of nonverbal information such as prosodic cues, as well as processes involved in the perception of social information, or *social cognition*. In this chapter, we will attempt to differentiate among these terms, recognizing that in clinical settings they are often used interchangeably.

12.2 TBI Epidemiology

TBI is a major cause of death and disability worldwide, with an estimated annual incidence of 10 million in children and adults (Hyder et al. 2007). Available numbers are likely to vastly underestimate the incidence and prevalence of TBI, as there are no systematic reporting mechanisms in many countries where TBI risks are high (Hyder et al. 2007), and under-reporting is common even in first-world countries with established reporting systems (Farrer et al. 2013). The risk of TBI is high in vulnerable populations such as very young children and older adults (Centers for Disease Control and Prevention 2015), homeless individuals (Topolovec-Vranic et al. 2012), incarcerated youth and adults (Farrer et al. 2013), and individuals from violent or impoverished environments (Bruns and Hauser 2003). The peak incidence of TBI is in adolescence, and TBI is more than twice as common in males than in females (Centers for Disease Control and Prevention 2015; Bruns and Hauser 2003). Individuals in many of these groups – including males – are also at risk for comorbid problems such as developmental language delays and disorders.

TBI is classified on a continuum of severity, based on the patient's clinical signs at the time of the injury. At the mildest end of the continuum is concussion or mild TBI, typically characterized by short-lived functional changes rather than long-lasting structural changes (McCrory et al. 2013). At the other end of the continuum are moderate or severe injuries, which impair physical, sensory, and cognitive functions and also can affect basic life functions such as breathing and sleep-wake cycles, sometimes permanently. Currently, severity is determined by the patient's status at the time of injury (Malec et al. 2007), but initial injury severity predicts long-term morbidity in only the most general sense. That is, most patients with mild TBI will fully recover, and most patients with moderate or severe injuries will have life-long impairments in at least some aspects of sensorimotor, cognitive, and psychosocial functioning. Beyond that broad statement, however, initial injury characteristics are very poor predictors of long-term functional outcomes for an individual patient (Maas et al. 2015). Language and communication rarely are included in predictive studies, so prediction of pragmatic language outcome is even more problematic than prediction of other aspects of function. Thus, TBI may be described in the research literature as mild, moderate, or severe. However, these labels can be misleading in terms of the patient's communication functioning in the chronic stage post-injury, including pragmatic communication functions.

12.3 Neuropsychological and Psychosocial Outcomes from TBI

TBI can cause a wide variety of neuropsychological impairments, particularly in cognitive functions such as working memory, new learning, information processing speed, and executive functions (Ruttan et al. 2008). There are also downstream effects on cognitive processes dependent on those functions, such as control of attention and behavior, organized storage and retrieval of information, metacognition, and abstract thinking (e.g. Wilson et al. 2011; Towne and Entwisle 1993). A relatively new addition to the literature on neuropsychological impairments is evidence of TBI-related impairments in social cognition, broadly defined as the cognitive processes required for social interaction (Adolphs 1999). As will be discussed in the next section, these impairments may play a critical role in pragmatic communication in both children and adults with TBI. Again, severity of neuropsychological impairments generally relates to severity of injury, but this is only a general principle and it is possible for individuals with even mild TBI to have chronic cognitive impairments.

Among the sequelae of TBI, one of the most disabling and stressful for survivors and family members is loss of social participation (Engberg and Teasdale 2004; Finset et al. 1995; Pagulayan et al. 2006). Children and adults with TBI report loneliness and loss of social opportunities (Mclean et al. 2014) as well as loss of pre-injury friendships and fewer new friendships (Hoofien et al. 2001; Seibert et al. 2002). Negative social outcomes from TBI may be due in large part to the social behavior problems that often are associated with TBI (Rosema et al. 2012), including the pragmatic communication problems that will be discussed next.

12.4 Models of Pragmatic Communication in TBI

The study of pragmatics in TBI has focused largely on cataloguing atypical pragmatic behaviors, and theoretically or empirically derived models are scarce. The study of pragmatic communication needs models, however, for several reasons. First, models can help differentiate among what Dennis (2000) referred to as 'cognitive phenocopies', that is, similar behaviors arising from different underlying causes. For example, individuals who fail on theory of mind tasks (i.e. tasks that require inferences about another person's thoughts) may do so for a variety of reasons, including impairments in language, executive function, social cognition, or right-hemisphere functions related to the inference of intentions from actions (Siegal and Varley 2002). Second, a model also can link apparently different behaviors that stem from a single underlying cause. For example, Cherney et al. (1998) noted that discourse places a communicative load on the performance of the individual with TBI, and the resulting deficits may be manifest at multiple levels of analysis, including sentence grammar, intersentential cohesion, and story grammar. Thus, a core cognitive deficit such as impairment in working memory could be manifest in multiple aspects of performance. In both of these cases, a model linking behaviors to cognitive processes could facilitate the interpretation of the individual's behavior. Third, a model may facilitate the development of intervention strategies aimed at processes rather than checklists of signs and symptoms, an approach that may be more effective than symptomatic treatment. This is of particular relevance in TBI, a population in which pragmatic therapy has had limited success (Driscoll et al. 2011). In the following sections, we describe a few models that may help us understand pragmatic communication impairments in TBI and guide assessment and treatment.

The most common approach to understanding pragmatic communication in TBI is to link pragmatic behaviors to underlying neuropsychological impairments. Many researchers have attempted to do this. Figure 12.1 shows the general framework of these neuropsychological models. The pragmatic measures typically include scores from tests of pragmatics (Dennis and Barnes 1990); measures of discourse organization (Chapman et al. 1992), cohesion (Coelho et al. 1994), coherence (Van Leer and Turkstra 1999), and fluency (Anderson and Turkstra 2001); or scores on specific social tasks such as negotiating and giving an explanation (McDonald 1993a, b; Turkstra et al. 1996). These pragmatic behaviors are compared to cognitive measures such as scores on standardized tests of memory, language, nonverbal reasoning, and executive functions. The relationships among cognitive and pragmatic functions may have relative weights, e.g. eye gaze may be influenced more by working memory than by episodic memory, whereas cohesion may be influenced more by word-finding ability than by working memory.

The basic neuropsychological model was adapted for speech-language pathology by Hartley (1995), who proposed links among cognitive functions and communication. According to this model, social communication behaviors are a function of perceptual and sensory processes; cognitive functions, such as working memory and long-term memory for social scripts; executive functions such as planning and

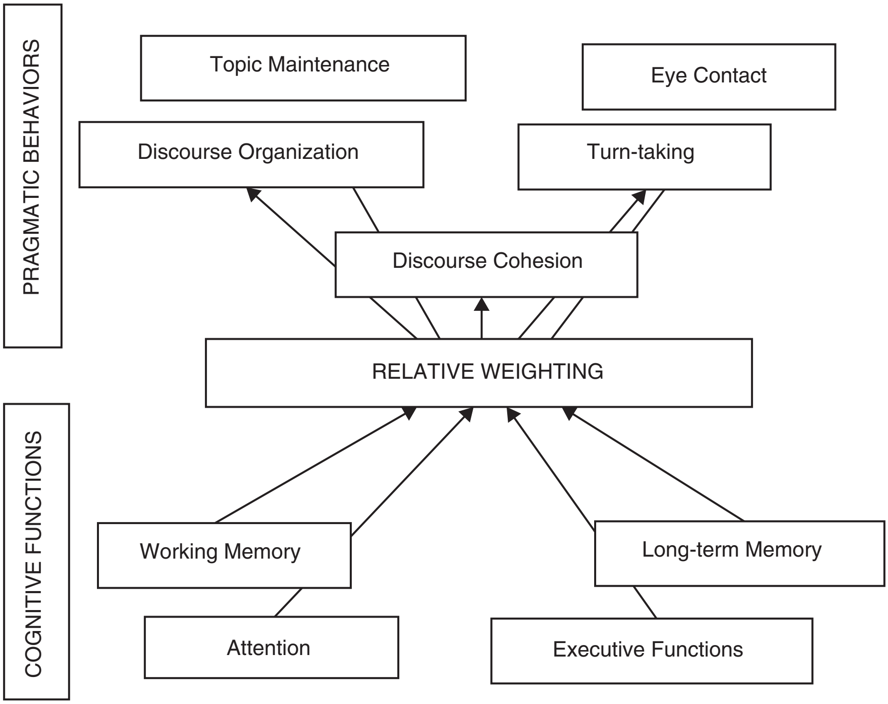

Fig. 12.1 General framework for neuropsychological models of pragmatic behaviors in TBI

organization; and limbic functions such as emotion and motivation. These functions interact to generate plans for social behavior that are then executed in a more or less linear fashion, according to situational demands. Feedback from the receiver shapes future behaviors. Using this model, Hartley related specific cognitive, emotional, and perceptual functions to impairments on communication tasks. For example, the effect of impairments in sustained attention would be inconsistent perception of words and a tendency to make topic changes without warning.

Like other neuropsychological models, the Hartley (1995) model had clinical utility in its casting of pragmatic communication tasks in cognitive terms. It helped clinicians translate the term 'cognitive-communication disorder', which was relatively new at that time, into familiar communication tasks, and the tasks and relationships had face validity (e.g. it makes sense that a person with poor working memory would be tangential in a conversation). Although the specific arrangements of cognitive functions depicted in the model is inconsistent with current concepts (e.g. Ginstfeldt and Emanuelson 2010; Miyake et al. 2000; Diamond 2013), the general notion that aspects of cognitive function link to aspects of pragmatics is intuitively appealing.

A feature of more current neuropsychological models of pragmatic communication is the addition of social cognition as one of the cognitive predictors of communication performance. While there is some variability across studies in processes included in social cognition, it includes at minimum the ability to recognize emotions and also theory of mind (Adolphs 1999). Social cognition has gained widespread research attention in the past two decades, but the concept has been described under other names for more than a century. Relevant to pragmatic communication, early work by Flavell (1968) described the emergence of ‘role-taking ability’, a skill that requires theory of mind. Flavell contended that the young child, by nature egocentric in his or her communication, began as a toddler to learn to recode inner thoughts to meet the needs of the listener. In a series of classic studies (Masangkay et al. 1974; Lempers et al. 1977; Flavell et al. 1980; Flavell 1968), Flavell employed barrier games and other tasks to demonstrate the emergence of this skill in early childhood. For example, an examiner sitting across from a child would ask the child to close his eyes while she chose a picture, then open his eyes and see the picture she showed him. Then they would change roles. The measure of perspective taking was the number of times the child presented the picture to the examiner in the examiner’s orientation (i.e. right-side up for the examiner). The Sally-Anne task (Baron-Cohen et al. 1985), used in the study of theory of mind in autism, is another version of this experimental task. Performance on these tasks improved with age during the preschool years, and Flavell found that perspective taking was mastered by about age 6 or 7 years.

Flavell’s model has been studied extensively in clinical populations, including children and adults with TBI (Rowe et al. 2001; Stuss et al. 2001; Hartley 1995; McDonald and Turkstra 1998; McDonald 1993a). In fact, in one of the earliest reports of behavioral outcome from frontal lobe injury, the injured railway worker Phineas Gage was observed to have begun “manifesting but little deference for his fellows” after his injury (Harlow 1993). In a study of adults with frontal lobe injury, McDonald and Pearce (1995) administered a barrier task modeled on the work of Flavell to adult males with TBI and their uninjured peers. The task required subjects to explain a simple board game to a listener who was not present in the room. Subjects were not told the rules of the game, but rather played it until they had mastered the procedures, so there were no verbal cues. McDonald found that individuals with TBI were more likely to be bound to the physical properties of the stimulus before them, and neglected important details that a listener would need to play the game. This result was confirmed in adolescents with TBI (Turkstra et al. 1996). The loss of this social perspective-taking ability may be one of the most socially handicapping sequelae of TBI.

By contrast to the neuropsychological models just discussed, Dennis (1991) modeled pragmatics in the context of brain development, specifically development of the frontal lobes and psychological functions linked to those brain regions. Dennis’ heuristic is shown in Fig. 12.2. The purpose of this heuristic was to depict both the levels of complexity of frontal lobe functions within an individual, and the development of frontal lobe functions from childhood into adulthood. According to this model, information is introduced into the system at the presentation level, subject to various regulatory influences such as attention and anticipatory set. The output of this regulated process goes into a working memory buffer, where it is

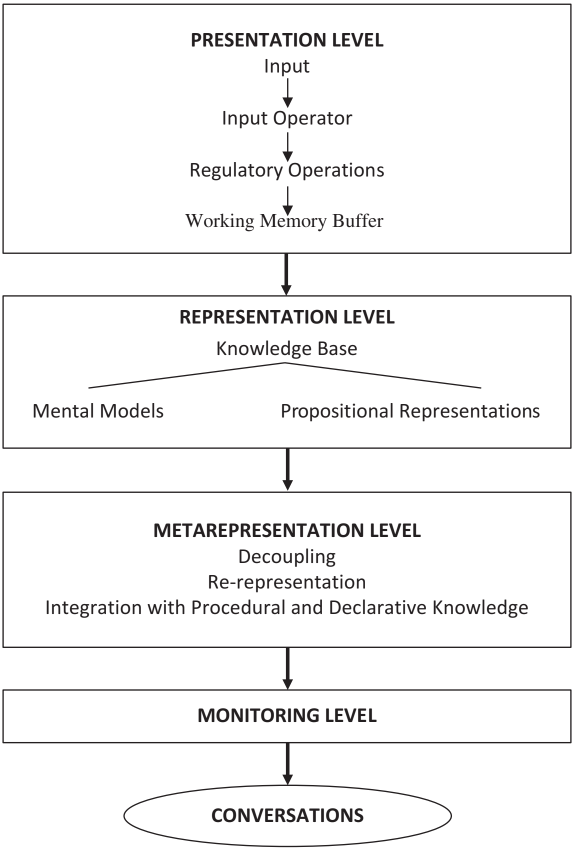

Fig. 12.2 Heuristic for examining executive function proposed by Dennis (1991)

recoded into symbols. The output of the working memory buffer is the knowledge base, which is the beginning of the representational level. The knowledge base includes mental models, structured like the situations they represent; semantic representations, concerned with the meaning of words and events; and intentional representations, concerned with "the beliefs and thoughts that people entertain about themselves and others" (Dennis 1991: 337). These representations may become decoupled from their original referents and become metarepresentations, which permit functions such as inference, distinguishing appearance from reality, and understanding metaphors. There is an increase in complexity of processes across each level (e.g. from sensory input to working memory), and between levels (e.g. from basic input of information to metarepresentation of constructs such as deception). Complexity also increases in a developmental dimension. For example, a young child may engage in pretend play, which is evidence of ability at the metarepresentational level, but still may not be able to detect false beliefs. The levels and functions

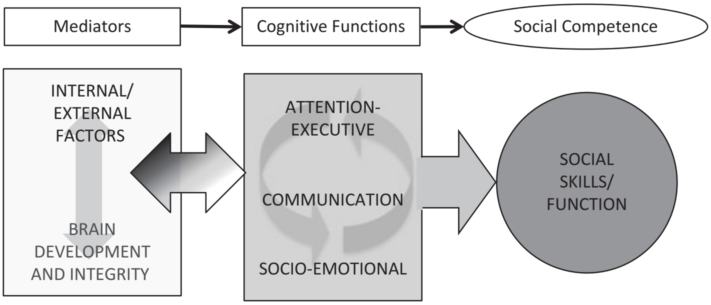

Fig. 12.3 The SOCIAL framework for the development of social skills (Beauchamp and Anderson 2010)

in the model are interrelated, and Dennis (1991) asserted that if "all these systems work well, a schematically coherent, semantically meaningful, and socially responsible conversation is possible" (337).

The Dennis model is appealing for several reasons. First, it includes metacognition, a function that is not addressed in many pragmatic models and may play an important role in one's ability to benefit from pragmatic intervention. Second, it lends itself to assessment of discrete skills, which may assist in the identification of specific strengths and weaknesses in individuals with acquired executive dysfunction. Third, consistent with the earlier research by Flavell (1968), it considers relatively complex pragmatic skills to be present in some form from a very young age. This is contrary to the once-prevalent view that pragmatic behaviors and executive functions emerged rather suddenly at an adult-like endpoint, without acknowledging developmental changes through childhood and adolescence (Dennis 1991). Dennis also used this approach to show that even mild TBI can result in cognitive impairments that affect pragmatic language (Dennis 2000; Dennis et al. 2001).

More recently, Beauchamp and Anderson (2010) proposed an alternative developmental model of social communication, the 'socio-cognitive integration of abilities' (SOCIAL) model (Fig. 12.3). The model is based on studies of children with TBI by the authors (Beauchamp et al. 2009, 2011; Crowe et al. 2011; Cooper et al. 2014) and others (e.g. Yeates et al. 2010). It represents a biopsychosocial approach, i.e. development of social skills does not occur in isolation, but is mediated by internal factors such as personality or physical attributes, and external factors such as socioeconomic factors or culture; and biological factors related to brain development and function. Arising from this context are cognitive functions with established links to social skills or social functioning, including social cognition (included in the socio-emotional function). The authors acknowledged that many other cognitive functions affect social behavior, and the category of 'communication' is underspecified. Nevertheless, the SOCIAL model is unique in considering social communication in a broader context.

A general limitation of the neuropsychological models is that empirical links between measures of pragmatic communication and tests of cognitive functions either have not been tested empirically, or are weak. The lack of strong empirical evidence linking cognition to pragmatics may reflect a combination of factors. First, cognitive functions are typically operationalized as summary scores on standardized tests, and summary scores can represent more than one construct (Burgess et al. 1998). Second, standardized tests, particularly tests of executive functions, have been harshly criticized for lack of ecological and predictive validity (Chaytor and Schmitter-Edgecombe 2003), so measures of cognitive functions in a standardized test setting may not capture use of those cognitive functions in everyday communication contexts (Donovan et al. 2011). Third, the pragmatic tasks used may not elicit typical behaviors or enough behavior to capture the range of typical performance. Tasks such as fictional story generation, immediate story re-telling, and online narration may not capture the essential elements of daily communication (Van Leer and Turkstra 1999).

A fourth factor potentially contributing to the modest relationships among model elements is that the relation of cognition to pragmatics in impaired speakers may differ from that in normal speakers. For example, Turkstra and Kuegeler (2001) compared the frequency of hesitations, revisions, and repetitions in spontaneous adolescent conversations to scores on a parent-report measure of executive function in daily living (Gioia et al. 2000). Although a significant correlation between parent reports and conversational fluency was noted, this correlation was moderate (R^2s = .25–.30), because both conversational fluency and executive function measures were relatively homogeneous and high. By contrast, in a later study (Turkstra et al. 2004), incarcerated juveniles who had significantly poorer memory test scores than their non-incarcerated peers also had stronger relationships between conversational fluency and self-reported executive function than did their peers. In other words, cognitive function was a predictor when it was poor but not when it was within normal limits.

A last potential contributor to weak evidence of pragmatic-cognitive relationships is that non-cognitive factors may play a role in social behavior (Cavell 1990). An individual with excellent cognitive skills may lack the opportunity or motivation to practice social skills, and therefore may not have a sufficient repertoire of peer-appropriate behaviors. Thus, although the general approach of relating pragmatic ability to specific cognitive functions appears to have potential, there is a need to refine measures, compare individuals with TBI to their peers, and include noncognitive factors that potentially contribute to social success.

An alternative to neuropsychological models of pragmatics in TBI was put forth by Perkins (1998). Perkins proposed a holistic, interaction-focused view of pragmatics, which he called ‘emergentist pragmatics’ (Perkins 2002). In this view, pragmatics is not a unitary phenomenon, such as a level of language or cognitive skill. Rather, it emerges from “interactions between linguistic, cognitive and sensorimotor processes which take place both within and between individuals” (Perkins 2005: 367). According to Perkins, pragmatic impairment can result from deficits in any of the processes

Table 12.1 Examples of cognitive and sensorimotor processes/elements involved in pragmatics. Adapted from Perkins (2005)

Pragmatics			
Cognitive elements		Sensorimotor elements	
Linguistic	Nonlinguistic	Sensory input	Motor output
Phonology	Inference	Auditory perception	Voice
Prosody	Memory	Visual perception	Gesture
Morphology	Attention		Gaze
Syntax	Social cognition		
Discourse	Executive function		
Lexis	Affect		
	Conceptual knowledge		

involved in interpersonal communication (see Table 12.1). It may also be "the consequence of one or more compensatory adaptations" (Perkins 2005: 371) to these deficits.[1] Due to the complex interplay of processes and adaptations, there is often no clear connection between a deficit and an observed pragmatic impairment.

Perkins' model provides a unique explanation for the lack of strong evidence linking pragmatics to cognition in previous studies of TBI: by definition, emergent phenomena are "greater than the sum of their parts." This means that emergent pragmatic behaviors are not linearly related to their constituent cognitive processes. Consequently, the weak pragmatics-cognition relationship observed in previous studies of TBI may simply be an artifact of neuropsychological models that characterize nonlinear relationships as linear.

12.5 Pragmatic Communication in Children and Adolescents with TBI

TBI can have a significant impact on the pragmatic communication of children and adolescents. Immediately following their injury, children and adolescents may experience acute problems with a range of pragmatic communication skills. Many of these problems may persist for years and cause chronic difficulty at home, school, and the community. For younger children, problems not present initially may emerge later in life (Chapman 2006), as impairments in cognitive skills and reduced

[1] Perkins describes these adaptations as attempts "to resolve competing demands on compromised communicative resources when faced with the task of designing one's conversational turn to meet the particular contingencies of the situation at hand" (Perkins 2014: 145). For example, an individual with TBI may consistently introduce new topics of conversation prematurely, in order to compensate for deficits in attention, memory, and executive functioning that make it difficult to recall the current topic of a conversation. Note that individuals are generally not aware that they are employing these adaptations.

opportunities for social participation disrupt acquisition of later-developing pragmatic communication skills. Regardless of when pragmatic communication problems begin, they are generally most pronounced for children and adolescents with moderate-to-severe injuries, although they have been found following mild injuries as well (e.g. Dennis and Barnes 2001).

In this section, we will provide an overview of pragmatic communication in children and adolescents with TBI. We begin by reviewing key findings from the research literature. We then illustrate several common pragmatic communication problems for children and adolescents with TBI via language transcripts from two research studies. Finally, we discuss important themes across studies and implications for future research.

12.5.1 Pragmatic Findings

Beginning over 25 years ago, researchers have studied a variety of pragmatic communication skills in children and adolescents with TBI, ranging from production of individual speech acts (Dennis and Barnes 2000) to comprehension of proverbs (Moran et al. 2006). These skills have been studied in highly structured tasks (e.g. Dennis and Barnes 1990), as well as more naturalistic paradigms (e.g. Biddle et al. 1996). Most studies have been cross-sectional, although several longitudinal studies have shown the importance of examining long-term recovery and the impact of TBI on later pragmatic communication development (e.g. Chapman et al. 2001; Walz et al. 2012; Ryan et al. 2015). Also, with the growing recognition of the importance of social cognition for communication, more recent studies have examined verbal and nonverbal skills not previously associated with pragmatic communication.

Studies of pragmatic communication in children and adolescents with TBI have generally focused on non-literal language comprehension, inference making, and discourse production. With respect to non-literal language comprehension, multiple studies have reported impairments in comprehension of metaphor and idioms, in both children and adolescents with TBI (e.g. Dennis and Barnes 1990; Jordan et al. 1996; Moran and Gillon 2004). Deficits have also been noted in children's comprehension of irony (Dennis et al. 2013), and adolescents' comprehension of sarcasm, humor, and proverbs (Turkstra et al. 1996; Docking et al. 2000; Moran et al. 2006). In terms of inference making, impairments have been observed in children and adolescents with TBI in spoken language (e.g. Dennis and Barnes 1990; Barnes and Dennis 2001; Moran and Gillon 2005), and written language (Dennis and Barnes 2001).

Impairments in discourse production have been observed across discourse genres. Narrative discourse has been studied most frequently, with deficits observed across a wide range of studies (Chapman et al. 1992, 1998, 2001, 2004, 2006; Biddle et al. 1996; Ewing-Cobbs et al. 1998; Brookshire et al. 2000; Hay and Moran 2005; Walz et al. 2012; Crowe et al. 2014). Although findings across studies are variable, in general deficits have been found to be "…primarily at a macro level, involving maintenance of global meaning and organization of information, and secondarily at a micro level, involving the lexical-semantic and syntactic aspects of words and sentences" (Brookshire et al. 2000: 742). Chapman and colleagues (2004, 2006) consistently found that children and adolescents with TBI had difficulty extracting and conveying the gist of narratives (e.g. summarizing a story, identifying main ideas, producing interpretative statements).

Conversational, expository, and persuasive discourse production also have been examined in children and adolescents with TBI. Campbell and Dollaghan (1990) studied conversation in children and adolescents, generally finding reduced productivity and syntactic complexity, although they reported considerable variability in performance. Hay and Moran (2005) examined expository discourse in children and adolescents, noting significantly reduced performance on all micro- and macrostructural measures. Moran et al. (2012) studied persuasive discourse in adolescents, and reported significant group differences primarily on measures of language content (i.e. essential elements of a persuasive argument), although they also observed reduced efficiency (i.e. increased use of mazes).

More recent studies of communication in children and adolescents with TBI have examined social cognition skills. Children and adolescents with moderate-severe TBI may have impairments in recognizing emotions from either faces or vocal intonation (Tonks et al. 2007; Schmidt et al. 2010). Theory of mind deficits also are common. Theory of mind tasks are frequently classified as first-order (i.e. thinking about another person's thought about an event) or second-order (i.e. thinking about another person's thought about a third person's thought about an event)[2] (Baron-Cohen 1989). Across multiple studies, children and adolescents with TBI display deficits in theory of mind, with greater difficulty typically observed on second-order tasks (Turkstra et al. 2004; Walz et al. 2009; Dennis et al. 2012; Bellerose et al. 2015).

12.5.2 *Pragmatic Impairments Illustrated*

To demonstrate several typical pragmatic communication difficulties, samples of narrative and conversational discourse produced by children and adolescents with TBI are presented below. The samples were excerpted from Chapman et al. (1998) and Turkstra (unpublished data). In a narrative discourse task used by Chapman et al. (1998), participants completed a story generation task using the five picture sequence cards below:

[2] An example of first-order theory of mind would be, "Rosie thinks Joe is going to the party." An example of second-order theory of mind would be, "Rosie thinks Joe thinks Kim is going to the party."

Response from control participant (age 6 years, 7 months):

"Once upon a time a little girl lost her kitty up in a tree. Her father tried to climb up the tree and get the cat. He tried to get it but it hissed at him. Then the cat fell and he got stuck on the branch and then the fireman came."

Response from participant with severe TBI (age 6 years, 8 months):

I see the little girl crying, and I see the man who climbing up the tree trying to get the cat, and I see, (see, see) the man trying to get it, the cat, (cat,) and I can see the man drop the cat, and the girl trying to catch (unintelligible) and then she started crying…

According to Chapman et al. (1998: 443), the story produced by the participant with TBI demonstrates several issues: "The [story] … shows stereotypic repetitive sentence structure (i.e. "I see..."). The child states the events as if describing a picture rather than creating a narrative. The story structure (omission of a resolution) and the gist are impaired (i.e. failure to state the role reversal of the man getting stuck in the tree and needing to be rescued)."

The following, unpublished data were collected by the first author during a conversational discourse task. In this sample, the experimenter and a participant are engaging in unstructured conversation. The participant (P) is a 13-year-old male with TBI. The experimenter (E) is a 23-year-old female graduate student.

1. E: I think my favorite kinds of movies are comedies. You like comedies?
2. P: Yeah, comedies are fine.
3. E: 'Cuz I don't like it getting so intense.
4. P: No.
5. E: Ya know?
6. P: I don't like those. I don't like the little horror films and stuff. They make no sense.
7. E: I agree, it's just…
8. P: Comedy at least makes, you kinda get involved (laughs).
9. E: Well, I feel like I go and I want to be entertained. I want to go and leave and be happy.
10. P: Yeah, you go and like actually be able to enjoy it inserted of going "oh my gosh this
11. could happen."
12. E: And plus half the time when they try to do the thriller type of movie you know the
13. ending anyway.
14. P: [They] they end up messing or something. You could tell those bloopers right off the
15. bat. Where in the comedy, it's really kinda hard to tell, and it makes you want to try
16. to figure 'em out.
17. E: Umhmm, umhmm. Plus you get to laugh a lot and have a good time.
18. P: Yeah.
19. P: What's your favorite candy?
20. E: (laughs) My favorite candy? When I go to the movie I like to get Twizzlers actually.
21. P: Skittles.
22. E: Skittles. I like chocolate. I'm pretty happy with anything I can get.
23. E: I have the biggest sweet tooth. My dad will go out to eat, if we're at a buffet and as
24. we're going to sit down, he'll grab a dessert before we even sit down and have his
25. dessert. It makes my mom so mad.
26. P: Hmm.
27. E: Do you do that?
28. P: Ummhmm, I do it every time.
29. E: (laughs)
30. E: I would do it but….
31. P: What's your favorite kind of home cooked meal?
32. E: My favorite home cooked meal, hmm? Do I have to cook it myself?
33. P: Hmm?
34. E: My moms cooking or my cooking?
35. P: I don't know.
36. E: Cooking in general, I love, I like, ya know what I like, Thanksgiving dinner, the turkey

37. and the...I have to say, I feel like that's kinda generic, but it is my favorite.
38. P: Mmhmm.
39. P: I kinda like Easter with the ham.
40. E: Ah.
41. P: Easter and Christmas with the ham.
42. E: Ham, I'm not a big fan of ham. If I have it with mustard. If you have like a real good
43. mustard. Do you like it just plain?
44. P: Hmm.
45. P: Well I do a lot of seasoning in it.
46. E: Oh, what kind?
47. P: Umm, clovers, pineapple, juice, umm, pineapples mixed in over the juice. That makes
48. a good mix.
49. E: Wow.

In this short conversation, the participant exhibits several behaviors that appear to place an undue conversational burden on the experimenter. On two occasions, he interrupts the experimenter mid-utterance (lines 8 and 31). He also initiates abrupt topic changes (lines 19 and 31), asking questions unrelated (or minimally related) to the current conversational topic. When the experimenter requests clarification of one of the questions, the participant does not provide it (line 35). After the experimenter answers his questions, the participant provides his own answers to the questions unprompted, rather than inquiring about the experimenter's answers (lines 21 and 39).

12.5.3 Themes in Pragmatic Literature

The literature on pragmatic communication in children and adolescents with TBI has several recurring themes. First is the issue of development. As compared to adults, the age at which children experience a TBI is far more crucial to outcome, because of the impact of brain damage on future language and cognitive development. Although it was once commonly assumed that children recovered better than adults due to increased brain plasticity (see review in Dennis 2010), current research demonstrates that disruptions to a developing system can result in reduced 'functional plasticity' (Anderson et al. 2005), with major effects on subsequent development. Children, especially younger children with severe TBI, may experience what has been called 'neurocognitive stall' (Chapman 2006: 11):

> We define "neurocognitive stall" as a halting or slowing in later stages of cognitive, social, and motor development beyond a year after brain injury. Despite remarkable recovery during their first year … children may appear to "hit a wall" or "fail to thrive" in terms of their continued cognitive growth. It is not so much that they lose already acquired skills as it is a failure or lag in development of later emerging cognitive milestones. The neurocognitive stall may emerge despite seeming to have recovered cognitive abilities commensurate to their pre-injury level.

Difficulties with pragmatic communication skills may emerge years after injury, due to disruptions in later-developing cognitive skills, particularly executive functioning. It is therefore extremely important to conduct longitudinal studies of pragmatic communication in children with TBI. Several longitudinal studies have shed light on the recovery and development of pragmatic communication skills in children with TBI (Brookshire et al. 2000; Chapman et al. 2001; Walz et al. 2012; Crowe et al. 2014) up to 3 years post injury, but further research is needed over a longer time scale.

A second recurring theme in the study of pragmatic communication in children and adolescents with TBI is the contribution of cognitive skills to pragmatic communication function. Early studies of pragmatic communication in TBI generally attempted to study pragmatic communication behaviors in isolation or in relation to structural language skills (i.e. syntax, semantics). Consistent with the neuropsychological models discussed earlier in this chapter, cognitive skills such as working memory, executive function, and theory of mind are recognized to play key roles in pragmatic communication behaviors. For example, Moran and Gillon (2005) found no difference between individuals with TBI and healthy controls on measures of inference making when working memory demands were minimized, and significant differences when demands were high. Thus, what was once considered to be a deficit in pragmatic communication is now seen to be a consequence or symptom of deficits in underlying cognitive skills.

The final, recurring theme in the research literature on pragmatic communication in children and adolescents with TBI is variability. Across studies, children and adolescents with TBI demonstrate significant variability in performance on a wide range of pragmatic communication tasks. This is undoubtedly due to a number of factors, including the heterogeneity of the participants studied and the tasks used to examine them. In addition to the age of injury and performance on cognitive assessments discussed above, participants display differences in factors such as severity of injury, pre-existing level of functioning, and socioeconomic status that may contribute to neurobehavioral recovery (Anderson et al. 2004). Also, given the context-sensitive nature of pragmatic communication, differences in tasks used to assess a particular construct (e.g. assessing 'narrative discourse' using story generation, story retell, and personal narrative tasks) may produce distinctly different results among participants.

12.5.4 Conclusion

TBI can result in a wide range of pragmatic communication deficits in children and adolescents. Researchers have made significant strides in describing many of these deficits, and have begun to identify factors that underlie them and predict communication outcomes. As the literature on pragmatic communication in children and adolescents is still relatively small, additional research is needed. Future research should continue to explore factors that contribute to the significant variability observed in pragmatic communication performance. Ultimately, what is needed is a clear understanding of which factors predict long-term pragmatic communication outcomes, and how disruptions in pragmatic communication due to TBI can best be ameliorated.

12.6 Pragmatic Communication in Adults with TBI

Adults with TBI may experience significant problems with pragmatic communication due to their injury. These problems can lead to loss of employment and social isolation, which in turn are associated with a high risk of depression, suicidal ideation, and poor quality of life (Meulenbroek and Turkstra 2015; Struchen et al. 2011; Galski et al. 1998; Riggio and Wong 2009). Deficits in pragmatic communication may persist for decades (Raymont et al. 2011) and potentially worsen as individuals experience age-related cognitive decline (Moretti et al. 2012). These deficits have been reported at all levels of injury severity and across a wide range of tasks (Tucker and Hanlon 1998; Chapman et al. 2006).

In this section, we will survey pragmatic communication in adults with TBI. First, we summarize pertinent findings from the TBI literature. Next, we provide examples of several common pragmatic communication problems seen in adults with TBI. Last, we review important themes across studies and discuss implications for future research.

12.6.1 Pragmatic Findings

The communication deficits of adults with TBI have been examined for more than 50 years. As research has progressed, there has been a consistent broadening of the factors thought to contribute these deficits, which is reflected in the terminology used to describe them. Initially, core linguistic abilities were studied and deficits observed were considered to be ‘aphasia’ (Levin et al. 1976). Subsequent research demonstrated that the majority of adults with TBI did not exhibit aphasia related to damage of perisylvian language areas in the brain, but rather language disturbances resulting from frontal or diffuse brain damage. These disturbances were subsumed under the term ‘non-aphasic language disorder’ (McDonald 1993b). Recognition that disruption in cognitive skills such as attention, memory, and executive functioning could lead to deficits in language function inspired use of the phrase ‘cognitive-linguistic disorder’ (Hinchliffe et al. 1998). This phrase was modified slightly to ‘cognitive-communication disorder’ (American Speech-Language-Hearing Association 2005) as the focus of inquiry expanded beyond language to include nonverbal aspects of communication. Most recently, as researchers have identified the role of social cognition in communication, the term ‘social communication’ has become prominent (Dahlberg et al. 2006).

Table 12.2 Levels of analysis and associated measures of discourse production identified by Coelho (2007)

Level of analysis	Measures
Microlinguistic	Productivity, grammatical complexity, number of propositions
Microstructural	Cohesion and cohesive adequacy
Macrostructural	Local and global coherence
Superstructural	Story grammar elements

In the study of communication deficits resulting from TBI, there has been considerable focus on examining discourse production. This makes good sense, as pragmatic communication deficits that contribute to negative real-world outcomes are most readily observed at the discourse level. Among the genres of discourse, narrative and conversational discourse have been studied most extensively. With regard to narrative discourse, Coelho (2007) identified four levels of analysis that capture a wide range of deficits observed: microlinguistic, microstructural, macrostructural, and superstructural levels. Specific measures for each level of analysis are listed in Table 12.2.

Studies of narrative discourse in adults with TBI have frequently found reduced productivity, decreased coherence, and impaired story grammar (Coelho 1995; Coelho et al. 2005). Mixed results have been found for grammatical complexity and cohesion (Coelho 1995; Coelho et al. 2005). In conversation, adults with moderate-severe TBI are often described as tangential, egocentric, inefficient, or 'inappropriate' to the context (Hough and Barrow 2003; Kennedy and Deruyter 1991; Mcdonald 1993a; Linscott et al. 1996). Despite considerable variability amongst studies in task design and analysis procedures, adults with TBI are consistently found to exhibit decreased topic management and informativeness (Coelho 2007).

In addition to discourse production, many researchers have studied social cognition in adults with TBI. Studies have focused on identifying deficits in emotion recognition and theory of mind, as well as relating these deficits to difficulty with social communication and reduced social participation. Tasks used in these studies have ranged from decontextualized assessment of recognition of 'basic' emotions to naturalistic video-based assessment of social inferencing (McDonald et al. 2006; Turkstra 2008). Across studies, adults with moderate to severe TBI display deficits in emotion recognition and theory of mind (Byom and Turkstra 2012).

12.6.2 Pragmatic Impairments Illustrated

To illustrate some of the common pragmatic language difficulties for adults with TBI, samples of narrative and conversational discourse are presented below. The samples were excerpted from Coelho (2007) and Turkstra (unpublished data). Coelho (2007) used a narrative discourse task in which participants completed a monologic story retell of the picture story *Old MacDonald had an Apartment House.* All participants were more than 35 years post severe TBI. Four samples are presented below, displaying a range of pragmatic difficulties.

Sample 1: Reduced verbal productivity:

1. well let's see a man and a woman was uh doing something
2. he was picking fruit
3. and she was looking at a flower
4. and later she had uh an orange tree
5. and then he went and picked some vegetables

Sample 2: Decreased grammatical complexity:

1. Old McDonald and Mrs. McDonald had an apartment
2. and they had one room that was not rented
3. so they went to this room and grew plants on the table
4. and Mr. McDonald went out and cut the trees down
5. and they put a garden outside
6. and the other tenants didn't like this garden until this garden grew fresh fruit and everything
7. and they weren't real happy with it
8. so Mr. McDonald moved the dirt and every- thing inside
9. and they was growing the plants inside
10. and everything went well until the roots come through the ceiling of the apartment below
11. and this made the people awful mad
12. and cows come in and wanted the roots

Sample 3: Poor cohesive adequacy (cohesive markers that were judged to be incomplete or errors by Coelho (2007) appear in italics and bold type):

1. Once upon a time there was a lady who tried to grow a plant.
2. and uh while she was trying to grow a plant there was **somebody** chopping a tree down
3. then later uh the plant grew up during ***May and June***
4. and as it grew the idea of growing things caught on in ***the community***
5. Pretty soon there people were growing vegetables in every conceivable ***place***
6. vegetables were getting so large that ***they*** had carrots coming through ***the roof***
7. and while that was going on there was also ***animals***
8. one scene showed a man leaning up against a multistory building with ***cows*** looking out of windows
9. later on there was a man who had built a building
10. and was putting up a sign saying ***fruits and vegetables***
11. next scene showed ***people*** very happy 'cuz they didn't have to go in ***this house*** with animals to get their vegetables
12. ***they*** could go to one ***place*** to buy their ***fruits and vegetables***

13. earlier in the story when the lady was trying to grow her plant it was ***five o'clock*** in the afternoon
14. when the plant grew that was ***April***
15. Then in ***May*** you could see the plant on the table growing and that was ***five o'clock***
16. and the man cutting down the tree that was about ***one thirty*** on ***that day***

Sample 4: Poor story grammar; excerpted by Coelho (2007) from Sample 3 and segmented into T-units. (A T-unit is an independent clause and any of the dependent clauses attached or embedded in it.):

1. Once upon a time there was a lady who tried to grow a plant.
2. and uh while she was trying to grow a plant there was somebody chopping a tree down
3. then later uh the plant grew up during May and June
4. and as it grew the idea of growing things caught on in the community
5. Pretty soon there people were growing vegetables in every conceivable place vegetables were getting so large that they had carrots coming through the roof
6. and while that was going on there was also animals
7. one scene showed a man leaning up against a multistory building with cows looking out of windows
8. later on there was a man who had built a building and was putting up a sign saying fruits and vegetables
9. next scene showed people very happy 'cuz they didn't have to go in this house with animals to get their vegetables

In the first sample, verbal productivity is reduced, as the participant produced relatively few words overall, few words per T-unit, and few T-units per narrative. The second sample exhibits reduced grammatical complexity, calculated by Coelho (2007) to be 0.13 subordinate clauses per T-unit. In the third sample, cohesive adequacy, defined as percent complete ties out of total ties, is reduced at 0.55. Finally, in the fourth sample, Coelho (2007: 134) identifies several suprastructural issues, including:

> [T]he participant begins several episodes (as in T-unit 1) but does not integrate subsequent actions into a logical sequence (T-unit 2) nor is he able to bring in a Direct Consequence (as in T-unit 3). Some of the information that is provided is inaccurate (as in T-unit 4, the McDonalds grew the vegetables, not the people in the community) and some is added but not integrated (as in T-units 6 and 7).

The following data is from an unpublished interview conducted by the first author. In this sample, the experimenter (E) is interviewing the participant (P) for a story in her lab's newsletter. The participant is a 56-year-old male with a severe TBI. The experimenter is a 20-year-old female undergraduate student.

1. E: Why is communication important and what does it mean to you?
2. E: Do you have a personal story you can tell that shows the importance of
3. communication? A time it was difficult for you to communicate?

4. P: It’s very important to help spread good values, meaning good fortune to increase the
5. knowledge to the families and friends around us.
6. P: Go back a few blue moons, when I was just beginning to get out of a coma and going
7. to rehab. They were being too overly nice and easy but I wanted to be able to give
8. back. I didn’t want to get above their prosperity. I could barely speak when I just got
9. out of a coma, I had no pronunciation at all, and the words were locked in the back of
10. my throat. When I got the chance to talk, I shocked the hell out of them. If I hadn’t
11. seen the speech pathologist at UW I would not be where I am today.
12. P: I don’t want to plateau, I don’t want to stop improving.
13. P: I just can’t stop giving back.
14. P: I was able to speak my two cents, and give new ideas to the therapists about his way
15. and how to cooperate.
16. P: I know that the ability to speak and communicate gives me the ability to give back to
17. our community.
18. P: Burning drive to give back to everybody, to our world, our campus.

Despite the discourse of this participant being relatively fluent, productive, and grammatically complex, it is extremely difficult to follow. The participant appears to try to address all of the experimenter’s questions concurrently, resulting in reduced coherence. On several occasions, the participant uses pronouns without clear referents, including “they” (line 7), “their” (line 8), “them” (line 10), and “his” (line 14). He also displays possible difficulty with word retrieval, evidenced by odd word usage in several instances (“good values…good fortune” on line 4, “knowledge” on line 5, “prosperity” on line 8, and “cooperate” on line 15). Thus, while the participant shows relatively intact microlinguistic aspects of discourse, he exhibits clear impairments in microstructural and macrostructural aspects that affect his comprehensibility.

12.6.3 Themes in Pragmatic Literature

Many of the same themes observed in the literature on children and adolescents with TBI are present in studies of pragmatic communication in adults with TBI. These include the contribution of cognitive skills to pragmatic communication and the variability in performance on pragmatic tasks. Owing to the larger body of literature on pragmatic communication in adults with TBI, these themes have been explored in more depth (e.g. Martin and McDonald 2003; Bellon and Rees 2006). However, despite the greater coverage of these issues, new insights have not come quickly enough yet to alter clinical practice in a meaningful way.

Two themes unique to the research literature on adults with TBI have emerged in recent years. The first is the focus on the reciprocal influence of adults with TBI and their communication partners. By taking the view that communication is jointly constructed, researchers have begun to examine how the communicative behavior of adults with TBI influences and is influenced by that of their partners. Togher and colleagues have studied this extensively, using analytical methods from systemic functional linguistics (e.g. Togher et al. 1997; Tu et al. 2011; Sim et al. 2013). Duff and colleagues have also explored interactive behaviours, within the framework of distributed cognition (Duff et al. 2012). The second theme unique to the adult TBI literature is the notion of sex-based differences in social cognition. Turkstra and others have begun to examine social perception in women vs. men, identifying differences in performance not explained by other factors (Despins et al. 2015). Taken together, both emerging themes can be seen as attempts to measure and describe potential sources of variability inherent in communication and social interaction.

12.6.4 Conclusion

Adults with TBI may experience significant difficulties with pragmatic communication as a result of their injury. These difficulties have been attributed to disruptions in an increasingly large set of linguistic, cognitive, and social factors. As a result, researchers have gained more detailed insights into pragmatic communication disorders, yet much remains unexplained. More research is needed to better characterize communication between adults with TBI and their communication partners, and to identify and describe the factors that contribute to problems with this communication.

12.7 New Approaches to the Study of Pragmatic Communication in TBI

Historically, the study of pragmatic communication in TBI has benefited from theoretical and methodological contributions from outside fields. Moving forward, innovations in other fields may advance our understanding of pragmatics in TBI. In this section, we will briefly describe two such fields, cognitive neuroscience and computer science, and discuss their potential for improving research and clinical practice in pragmatic communication in TBI.

12.7.1 Cognitive Neuroscience

Cognitive neuroscience is an interdisciplinary field of research that is focused on understanding the neural basis of human cognition (National Science Foundation 2016). It studies a wide range of phenomena, ranging from low-level sensory and motor processes like visual perception and execution of movement, to high-level cognitive functions, such as attention, executive functioning, and social cognition. These phenomena are studied using a combination of behavioral methods and neuroimaging modalities, such as magnetic resonance imaging (MRI), electroencephalography (EEG), magnetoencephalography (MEG), and near-infrared spectroscopy (NIRS). Data obtained using these methods is used to identify and interpret brain-behavior relationships.

With regard to social cognition, there has been a recent proposal to shift the theoretical focus of cognitive neuroscience away from static laboratory tasks and into the real world. Conceptual and empirical developments from several fields within cognitive neuroscience has highlighted "the need for investigations that allow the study of real-time social encounters in a truly interactive manner" (Schilbach et al. 2013: 393). According to Schilbach and colleagues, "this suggestion is based on the premise that social cognition is fundamentally different when we are in interaction with others rather than merely observing them" (2013: 393). Rather than continue to focus exclusively on participants' passive, third-person observation of others' social behavior, Schilbach and colleagues propose a "second-person neuroscience" paradigm (2013: 394) in which participants are studied as they actively interact with others.

Cognitive neuroscience research conducted using a second-person neuroscience (2PN) approach has the potential to advance the study of pragmatic communication in TBI in two ways. First, it may elucidate mechanisms involved in normal pragmatic communication that can then be assessed in individuals with TBI. For example, Stephens et al. (2010) conducted a functional magnetic resonance imaging (fMRI) study of interactive, verbal communication in which a speaker told a story to a listener. The authors found that communicative success, defined as comprehension of stories, was predicted by the extent to which activity in certain regions of the listener's brain anticipated activity in corresponding areas of the speaker's brain. Thus, this study provided evidence that prediction is an important aspect of successful interactive communication. Second, research using a 2PN approach may further our understanding of atypical pragmatic communication in TBI. As noted in Sect. 12.4, similar pragmatic impairments may arise from different underlying causes, and seemingly different pragmatic impairments may result from a single underlying cause. Future TBI studies could evaluate specific pragmatic communication behaviors and identify the neural structure(s) and activity pattern(s) that predict these behaviors.

12.7.2 Computer Science

Within the broad field of computer science, approaches have been developed that allow for controlled exploration of pragmatic communication. These include simulated social interaction and cognitive simulation (Byom and Mutlu 2013). Simulated social interaction refers to programming artificial agents (e.g. virtual characters, robots) to produce social behavior. Simulations allow researchers “to generate precisely controlled social behaviors in artificial agents and to create dynamic, interactive experimental scenarios” (Byom and Mutlu 2013: 6). For instance, an artificial agent could be programmed to produce a specific verbal or nonverbal cue, in order to determine if participants use that information when making mental state inferences (e.g. Mutlu et al. 2009). Cognitive simulation builds on this approach by programming artificial agents with computational models of specific cognitive mechanisms, allowing them to react to participants’ social behavior. This allows for even more interactive experimental scenarios, as well as for testing of specific computational models of social behavior. For example, Breazeal et al. (2006) programmed a robot to maintain separate sets of beliefs for itself and for participants. By using these different sets, the robot was able to identify differences in its beliefs from those of participants. This allowed the robot to identify actions it might take or skills it might learn in order to create a shared set of beliefs. Taken together, simulated social interaction and cognitive simulation provide a unique and promising means to examine how individuals with TBI respond to and produce pragmatic communication behaviors.

12.7.3 Conclusion

Innovations in the fields of cognitive neuroscience and computer science may greatly advance our understanding of pragmatic communication in individuals with TBI. These innovations could enable controlled examination of pragmatic communication in naturalistic contexts by individuals with TBI. Such studies are greatly needed, as they may help elucidate the neural and cognitive mechanisms underlying pragmatic impairments in TBI. Ultimately, it is hoped that future findings will be informative and useful in identifying effective treatments for pragmatic impairments resulting from TBI.

12.8 Summary

Chronic impairments in pragmatic communication and broader social communication are common after moderate-to-severe TBI in both children and adults. These impairments can be major contributors to negative outcomes such as loss of employment, loss of friends, and social isolation. TBI can affect any communication genre and any aspect of pragmatic communication, from comprehension of word-level inference to maintaining the topic in connected speech. Researchers have made significant strides in describing pragmatic impairments, and have begun to identify factors that underlie them and predict communication outcomes. However, the literature on pragmatic communication in children and adults is still relatively modest. Additional research is needed in order to identify factors that contribute to the significant across- and within-person variability in pragmatic performance. Ultimately, we need to understand which factors predict long-term pragmatic outcomes, and how we can most effectively treat impairments in pragmatic communication due to TBI.

Our understanding of pragmatic communication after TBI has been informed by conceptual models. They include neuropsychological models that link communication signs and symptoms to underlying impairments in cognitive functions such as working memory, executive function, and social cognition; developmental models that view pragmatic communication benchmarks from the perspective of cognitive development; and psychosocial models that consider pragmatic communication in the broader context of life factors such as social opportunity. These models have also informed assessment and intervention practices for individuals with TBI. Looking ahead, theoretical and methodological innovations from other fields have the potential to deepen yet further our understanding of pragmatic communication in TBI.

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Chapter 13
Alzheimer's Dementia

Jacqueline Guendouzi and Meghan Savage

Abstract Socio-pragmatic processing is a complex feature of human communication that relies on several cognitive systems such as attention, working memory, and the ability to access semantic information in the lexicon. This chapter examines socio-pragmatic processing in the context of Alzheimer's dementia (AD). We consider (a) the characteristics of communication in dementia, (b) how cognitive limitations associated with AD interact with the ability to fully process the contextual information necessary for attending to, and comprehending, socio-pragmatic information, and (c) the implications of interacting with people with AD for neurotypical communication partners. Consideration of qualitative studies published in the past decade in addition to the examination of data collected in an ethnographic study suggest that people with AD are often adept at managing to sustain the use of small-talk and politeness tokens in conversational dyads. However, this may be due to the nature of these particular forms of talk which allow for more paradigmatic choices than other forms of talk that contain greater propositional density.

Keywords Alzheimer's disease • Context • Executive function • Pragmatic competency • Pragmatic processing • Procedural processing • Relevance theory • Social cognition • Socio-pragmatics • Theory of mind

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13.1 Introduction

Pragmatics is an area of linguistics that emerged from work in the philosophy of language and formal semantics (e.g. Quine 1960; Strawson 1952; Wittgenstein 1958). Rather than considering the propositional meaning of sentences, scholars and researchers began to consider how speakers imply, and listeners infer social meanings. The focus of analysis and discussion in pragmatics moved to exploring function rather than the form of language (e.g. Austin 1962; Grice 1975, 1989; Leech 1983; Levinson 1983; Searle 1969). The inferential model of communication (Grice 1989) proposed an alternative to the classical code model which 'posits that speakers encode their messages into a signal, which is then decoded by a listener using a matching (or identical) code' (Guendouzi 2013: 39). The classical model implies that language users should be able to infer meaning based on their knowledge of language. In contrast the inferential model suggests that listeners infer meaning based on the evidence the speaker has provided. Grice suggested that the listener's inference is dependent on both the linguistic content and other contextual evidence that accompanies the verbal utterance. Thus, in order to interpret an utterance a listener is required to process all the available 'other' evidence (e.g. facial expressions, gestures, tone of voice, and context) at the same time as processing the actual words they are hearing. Even for neuro-typical listeners this is difficult enough, but in the case of people with cognitive disorders (both acquired and developmental) this task presents even greater challenges.

In this chapter, we intend to discuss how the acquired neurologic disorder Alzheimer's disease (AD) affects the ability of individuals who have the disease to negotiate socio-pragmatic meaning in their daily interactions. First, for those who are unfamiliar with the characteristics of AD, we will give an overview of the clinical features associated with this form of dementia. Second, we will consider what is meant by pragmatic ability. Third, we will discuss what is involved in socio-pragmatic processing. And finally, based on the results of qualitative research carried out over the past decade, we will consider how the communication characteristics of people with AD affect their ability to manage everyday conversations.

13.2 Clinical Features of Alzheimer's Dementia

Dementia is a general term for degenerative diseases that cause a decline of intellectual functioning and memory loss that impede daily living abilities. The most common form of dementia is Alzheimer's disease, accounting for 60–80 percent of cases (Alzheimer's Association 2015a). The neuropathology of this progressive disorder is characterized by the presence of beta-amyloid plaques and neurofibrillary tangles in the brain (Hassenstab et al. 2013). This results in a loss of memory, thinking and language skills, and behavioral changes (Alzheimer's Foundation of America 2015). The course of the disease is 7–10 years from the onset of initial symptoms to death (Hassenstab et al. 2013). Currently, there are 5.3 million Americans living with AD. 5.1 million individuals are over the age of 65 years. By 2025, this number is expected to increase by forty percent to 7.1 million people (Alzheimer's Association 2015b).

AD is considered a major neurocognitive disorder which is diagnosed according to criteria in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association 2013). DSM-5 states that for a diagnosis to be made, the following criteria must be satisfied. There must be (a) substantial cognitive decline from previous performance in one or more of six cognitive domains (attention, executive function, learning and memory, language, perceptual-motor function, or social cognition) as reported by the individual, another person or clinician, and there must be neuropsychological test results which corroborate the decline in cognitive function; (b) everyday activities are unable to be carried out due to the cognitive decline; (c) cognitive deficits are present without a state of delirium; and (d) the cognitive deficits cannot be explained by a different mental disorder (American Psychiatric Association 2013).

As previously mentioned, there are six cognitive domains that can be impaired in AD to the extent that they interfere with daily life activities. Deficits in learning and memory include problems with free recall, cued recall, object recognition, semantic and autobiographical memory, long-term memory, and implicit learning. Deficits in complex attention can include difficulty with sustained, divided, and selective attention, and processing speed. Problems with executive function skills can include planning, decision-making, working memory, responding to feedback, inhibition, and flexibility. Deficits in perceptual-motor function can include difficulty with visual perception, visuo-constructional reasoning, and perceptual-motor coordination. Deficits in language can be exhibited in the form of problems with object naming, word-finding, fluency, grammar and syntax, and receptive language. Social cognition is recognition of emotions, theory of mind, and insight (Sachdev et al. 2014: 636).

AD is a continuum that begins with mild cognitive impairment and progresses to full AD dementia. Stages are classified as very mild/mild, moderate, and severe (Hassenstab et al. 2013). A family member or friend of the patient typically identifies features of mild AD. The predominant problem is learning and retaining new knowledge (i.e. recalling appointment dates, etc.). The patient may repeat information, forget to do tasks like taking medication, and misplace items. They may be disoriented to time and new places. Executive function impairments become apparent when organizing information and decision-making become impaired. Cognitively complex tasks such as managing finances and driving a car can become challenging. Most self-care tasks can still be carried out independently but may be done with less accuracy than previously. The patient may be described as a little more quiet or withdrawn (Hassenstab et al. 2013). Language skills at this stage are characterized by difficulty with word-finding and descriptive abilities in conversation can be mildly impaired (Woodward 2013).

In the moderate stages of AD, the cognitive decline precipitates supervision for nearly all areas of daily living. The person with AD cannot retain new information. Attention is impaired to the degree that the person has difficulty completing tasks. Disorientation to familiar places can be a significant problem for the person with AD. Decision-making and problem-solving can be impaired to the point that the person can pose a danger to themselves and others (Hassenstab et al. 2013). Communication skills decline with disease progression and in the moderate stages functional language use, comprehension, and writing skills become compromised (Woodward 2013). In the advanced stages of AD, the person may not know family members, or recognize their surroundings (Hassenstab et al. 2013). The person may be mute, use echolalia, say words or phrases without attached meaning (Woodward 2013), or be unable to comprehend language (Hassenstab et al. 2013). In this stage, the person with AD can no longer perform any activities of daily living (Hassenstab et al. 2013).

In each of these stages of AD, communication and language skills progressively decline. This can have an adverse effect on all aspects of the client's functioning. As Woodward (2013: 877) remarks: 'Poor communication can have a particularly profound effect on the lives of persons with AD, as it affects their ability to interact socially, maintain relationships, plan daily activities, and express basic needs and thoughts to those around them. In turn, these deficits progressively limit patient independence. The inability to convey meaning due to impaired verbal expressions and the misinterpretation of non-verbal signs (gestures, expressions, etc.) can be frustrating for all parties involved, and can add significantly to the stress and burden of care in AD.'

As Woodward suggests, communication can be frustrating for all parties involved in the care of people with AD. This frustration may be due to the inability of people with AD to express their daily needs. But equally, it is because people with AD may be unable to recognize contextual aspects of the interaction such as their interlocutor's identity, the context or setting they are in, or understand the social significance of the event in which they find themselves. Indeed, it is the inability of people with AD to recognize the social expectations of a speech event that often causes pragmatic problems rather than actual language deficits. Meaning is constructed as 'interlocutors mutually orient to each others' perspectives and construct and interpret utterances from these perspectives' (Holtgraves and Kashima 2008: 74). Mutual orientation relies on an interaction between cognitive processes and the relevance of pragmatic principles. As Holtgraves and Kashima (2008) suggest, language is a tool for social cognition and interactions involve a joint social collaboration between speakers and listeners. In the case of AD, it is damage to the cognitive systems underpinning language that causes pragmatic breakdowns in interactions. Therefore, in order to better understand what is happening in conversations involving people with AD, we need to examine the interaction between cognitive processes and pragmatic principles. Below, we will first consider what is entailed in achieving sociopragmatic competency and then discuss the factors that affect optimal pragmatic processing in people with AD.

13.3 Socio-pragmatic Competency

Socio-pragmatic competency has been defined as 'the effective and appropriate use of language to accomplish social goals, manage turns and topics in conversations, and express appropriate degrees of politeness, awareness of social roles, and recognition of other's conversational needs' (American Speech-Language-Hearing Association 2014). This definition delineates what a skilled communicator should be able to accomplish in everyday interactions. A pragmatic disorder refers to cases where an individual is deemed to consistently display difficulties managing their interactions in an effective or appropriate manner. As the chapters in this book attest, pragmatic disorders can result from a deficit in any domain of speech, language, or cognition (e.g. memory). However, pragmatic misunderstandings can also occur due to lack of shared socio-cultural knowledge. It is important in any discussion of pragmatics to note that a pragmatic disorder is not a condition that an individual *has*. Rather, it is a phenomenon that emerges when a characteristic of the individual (e.g. a head injury) or of the situation (e.g. cultural ignorance) causes communication to break down (Perkins 2008; Guendouzi and Müller 2006). Although characteristics may vary across individuals, it is likely that the cognitive deficits associated with AD are likely to interfere with optimal socio-pragmatic processing. In order to discuss the extent to which people with AD (and their interlocutors) are likely to encounter pragmatic difficulties, we first need to consider the components of pragmatic processing.

13.3.1 Components of Pragmatic Processing

Socio-pragmatic competency initially relies on our ability to recognize, and account for, both our own and others' presence within the interactional field. That is, we need to know where we are, who we are with, and why we are interacting with a particular person. If we lack the ability to reference the relevance of contextual features (e.g. participants, setting, etc.) to the conversation at hand, we may become confused and misinterpret another speaker's intended meaning. Thus, context is the variable that frames our understanding of any speech event, providing us with a backdrop against which we scaffold the unfolding interaction. In the case of people with AD, recognizing the contextual details or knowing the interlocutor's 'actual' identity (e.g. family member) or social identity (e.g. a nurse) can be a major challenge.

In addition to evaluating contextual information, we also rely on our *theory of mind* (Baron-Cohen 1988) to correctly interpret the socio-pragmatic meanings carried by a particular utterance. Theory of mind is an overarching, higher-order, cognitive skill that provides individuals with a conceptual frame for interpreting others' intentions – it is how we understand 'self' in relation to 'other' and recognize that others may not share our views, interpretations, or interactional goals. Theory of mind also allows us to connect and empathize with others, thus enabling us to make effective and appropriate socio-pragmatic judgments. Developmental research (e.g. Gopnik and Aslington 1988; Meltzoff 1995) suggests that it takes children several years to develop theory of mind skills. This developmental trajectory is reflected in children's acquisition of implicatures, with simple implicatures which involve few theory of mind skills acquired before more complex implicatures. Studies involving Finnish and English children have shown that at 3 years old children may find it hard to recognize implicatures unless they are based on familiar daily routines. For example, because of the context and frequency with which they hear an utterance such as 'it's bed time', children may readily grasp that this indirect speech act is actually a command to go to bed rather than a statement about time (Ryder and Leinonen 2011). Thus, it would seem that implicatures tied to routine events are used to bootstrap the more complex implicatures associated with indirect speech acts such as sarcasm or hints.

Theory of mind has also been shown to be related to neural activity in specific regions of the brain. Research carried out by Saxe and colleagues (Gweon and Saxe 2013; Koster-Hale and Saxe 2013; Saxe 2013) has shown that the medial prefrontal cortex and temporal-parietal junction (TPJ) are linked to theory of mind skills. For example, transcranial magnetic stimulation in these areas of the brain has been shown to affect the ability to make socio-pragmatic judgments (Young et al. 2010). In the case of people with AD a loss of cortical tissue or damage to the areas of the brain associated with theory of mind may alter the individual's ability to interpret implied meaning and make appropriate social judgments. Although Saxe and colleagues' work suggests a direct relationship between the TPJ and social judgment, it may also be that stimulating this part of the brain cuts off a neural circuit involved in inferential processing. Thus, if a person with AD has lost brain tissue in a region (e.g. TPJ) that is associated with theory of mind or social judgments, we might expect a permanent loss in this function. However, it is notable to those who work with people with AD that their performance on processing tasks that rely on inferential, rather than linguistic understanding can be variable, that is, on some occasions they appear to 'get' a humorous or sarcastic remark but on other occasions they may be confused by the same remark.

Ascertaining whether the person with AD has understood an implicature can be difficult because although they might not understand the implied humor of an utterance's verbal content, they may still reflexively respond to the tone of voice or a non-verbal gesture (e.g. wink) that accompanies a comment. For example, in the excerpt below the researcher (R) has asked a man (E) with AD a question about a city that E used to live and work in. E has previously shown some difficulty in recalling any details when asked about this city. For the purposes of transcription, contextual comments are in bracketed italics and pauses are marked in seconds (e.g. (3.0) indicates a 3-second pause). Stressed words are underscored and unintelligible segments are notated by (xxxx).

Extract 1:

R: it's got some interesting neighborhoods though I found the last time I was there (.) different little niches in town, (.) it's not just big buildings *(laugh)*
E: I haven't even (.) I haven't bothered to look around like that *(looks confused)*
R: *(laughs)* too busy probably huh?
E: well, (5.0) my honey is a driver *(looks at researcher with a knowing look)*
R: oh *(smiles and nods)*
E: she drives
R: oh: you're lucky *(laughs)*

E's initial response to the researcher's question about the city under discussion may be an attempt to cover up the fact that he no longer remembers details about the area. He tells her that he has not "bothered to look around like that". The researcher's response to this remark was an attempt to address the potential face-threat to her interlocutor by implying E was too busy. As E no longer works and has vision problems, he is reliant on his wife to leave the house and it is his wife who drives him everywhere. The facial expression and tilted head accompanying this remark appeared to suggest E was making a joke at this point. However, when the researcher smiles and nods at E, his response "she drives" is uttered with an even tone and face expression. R reported that at the time she felt E was simply clarifying that it was his wife who drives. This extract shows that for the neuro-typical interlocutor it is not always easy to judge whether some remarks are meant humorously or not. People with AD may use paralinguistic and non-verbal indicators (e.g. a wink or knowing look) where such non-verbal enhancers are not typically expected (Guendouzi 2013). This suggests that people with AD still retain an underlying awareness that communication is not just about providing propositional content but also involves imparting emotions, humor, and implied secondary meanings that represent shared knowledge and a close interactional bond between the two interlocutors. The coupling of non-verbal behaviors to linguistic forms is a pragmatic skill that requires a listener to discern the relevance of the non-verbal behaviors in relation to the propositional content within the context of the current conversation. However, as noted above, a neuro-typical listener cannot always be sure that the person with AD is deliberately creating an implicature that is humorous or ambiguous, because the accompanying non-verbal signals may be simply reflexive behaviors.

13.3.2 Semantic Aspects of Pragmatic Processing

In addition to attending to information that is relevant within the context, we also have to interpret the verbal content of an utterance. For the neuro-typical individual access to the declarative semantic information stored in our mental lexicon(s) is not necessarily a problem. But for people with AD, this is not the case. The mental lexicon is thought to be constructed by storing and organizing information into categories and schemas which are then connected in a semantic-conceptual network. Several cognitive mechanisms are utilized to store this information including cognitive schemas or frames (Minsky 1975; Goffman 1974, 1981), behavioral scripts (Schank and Abelson 1977), groups of words, phrases or ideas that share features or functions (e.g. Rosch 1973; Wittgenstein 1958), and taxonomic groupings. Exemplars stored in these categories (Lakoff 1987) may be closely associated by virtue of sharing properties such as features (phonological similarity), semantic function (e.g. *chair* and *stool*), or grammatical function (e.g. *the, an, those* are all determiners). Connectionist models of language processing suggest we store information in a network of nodes that are linked (Dell et al. 1999; Longworth and Marslen-Wilson 2011). For example, words that are frequently combined even though they do not share phonological or functional features would have stronger weighted connections (e.g. *red* and *fire engine*). We should note that in referring to connectionist networks, we are not referring to organic neural networks. Rather, we are referring to the network of information stored across the brain. As Dell and Kittredge (2011: 170) have noted 'connectionist modelers aim to correctly characterize the cognitive mechanisms in language processing, with hopes that eventually these mechanisms can be identified with brain areas'.

The connected nature of our semantic networks leads to a process of spreading activation whereby when we hear an utterance (or read a text) multiple lexical items become activated in our working memory. For example, when I hear an utterance such as 'it has wings' several lexical items associated with wings may be activated (e.g. a bird, a plane, a restaurant). But if I hear the remark in a conversation with friends deciding where to go for lunch, the most likely interpretation is that the person is referring to a restaurant where they serve chicken wings. Our language processing system typically utilizes the context (discussion about where to go at lunch time) to inhibit (disregard) other less likely interpretations that are also potentially activated. Thus, optimal pragmatic processing requires that we understand the link between the verbal and non-verbal indices (e.g. face expressions) that accompany an utterance. In addition, there is a need to inhibit any associated items that may also be activated in our semantic networks. As Cowan's (2011) model of memory suggests, when we hear (or read) words there is an event area of associated items that become activated in our working memory. The task of our language processor is to inhibit any potential competing lexical items or meanings. This process of spreading activation may be a causal factor in word-finding errors in people with acquired cognitive impairments.

13.3.3 Cognitive Aspects of Pragmatic Processing

Cognitive mechanisms such as attention, inhibition, working memory, and executive function are crucial to maintaining optimal pragmatic processing. If any of these resources are compromised, as is often the case in AD, it may disrupt the ability of the person with AD to process information further at a higher-order semantic level. For example, if people with AD are unable to pay attention to the contextual, paralinguistic, or nonverbal cues that accompany the words in an utterance (e.g. tone of voice), they may not recognize that a remark was intended by a speaker to be a sarcastic comment and thus interpret it literally. Or if they cannot hold the components of a grammatically complex utterance in their working memory before the memory trace fades or decays (Cowan 2011), they may not be able to fully interpret the underlying implicature contained in an utterance.

A further problem is that many people with AD are living in care facilities and are therefore not exposed to typical time and date markers that are experienced in the outside world. There is no need to remember the bus schedule, a work schedule, or what season it is because there are no required tasks or events associated with the passing of time for which the person with AD is responsible. In the extract below, a lady (F) with AD asks the researcher (J) whether it is Friday.

Extract 2:

F: is it Friday?
J: It's Friday today
F: really?
J: hmm
F: I never know what day it is (.) a Monday or (.) anything here is the date *(appears distressed)*
J: hmm (*light laugh)* that's because when you don't work anymore you don't have to worry <u>do</u> you? about what day is what when you don't work anymore you have to- you don't need to worry about what day is what
F: yeah (xxxx)
F: (xxxx) they don't - they don't change their for this you know (2.0) (xxx)
J: did you have a good Christmas?
F: pardon?
J: did you have a good Christmas?
F: what we- what were talk
J: did you have a good <u>Christ</u>mas
F: well (.) alright?

In this exchange, F notes that she never knows what the day or date is because she is in a nursing home. J attempts to soothe F's distress by telling F that because she no longer works she doesn't need to worry what day or date it is. J's remark was intended to imply that F was lucky that she was not held to a tight schedule anymore. F responds with an affirmation "yeah" but then mumbles something unintelligible and appears a little confused when she looked up towards the researcher. J reported at the time that she felt F had missed the pragmatic meaning in her utterance. F's next remark was uttered in a tone that sounded accusatory towards the staff at the nursing home. J did not appear to understand what F was trying to signify in her reply so she changes the topic to ask about Christmas. F does not adapt well to this sudden topic shift and requests clarification from J who repeats her question. F then asks what they were talking about, and J repeats her question for the third time. F has no visual cues or context to refer to and does not seem to be able to hold information in her short-term memory for a long enough period to fully process it but she is able to opt for an "appropriate" sounding reply "well (.) alright." Structurally, F manages the exchange fairly well and can offer responses to requests for information but she doesn't appear to be able to process the information in a timely manner and follow what J is saying.

The initial stage of pragmatic processing (recognizing and assimilating contextual aspects of a situation) appears to require little overt monitoring or processing for neuro-typical people. That is, neuro-typical people are able to reflexively or rapidly process such information when compared to other semantic processing (e.g. the proposition in a declarative statement). It may be that the processing of contextual details such as place, participant identity, and purpose of interaction has a direct route to the schemas and scripts stored in our lexicon. However, due to deficits in memory and processing speed people with AD may be unable to negotiate this initial stage of the communication process. For example, they may stress their already limited cognitive resources by simply trying to establish the identity of an interlocutor, or to establish the relevance of the encounter to their own situation. As Guendouzi (2013) noted, one woman with AD exhibited a continual need to establish and re-establish her interlocutor's identity, a communicative behavior that often disrupted the flow of conversational topics. People with AD may be overwhelmed by trying to organize and process lower-order information – an aspect of conversation that is usually taken as *given*.

At the start of any conversation interlocutors are required to instantly recognize participants, settings, and purpose whilst also paying attention to any paralinguistic and non-verbal behaviors accompanying an utterance. This information has to be rapidly processed and matched against the propositional linguistic information being delivered. For example, people with AD who were part of an ethnographic study carried out by the first author in a day care center that modeled its décor on a commercial restaurant often acted as if they were at a coffee shop and were confused when they could not order what they wanted and were not able to leave at will. One woman with AD in this study assumed she was the hostess of the establishment. She continually walked around the table seeing if her guests were served and her conversations focused on topics of small-talk that you might ask in such a situation. For example, she would continually ask "can I get you some more coffee" or "do you need anything". Conversations are triggered by our interpretation of the context and for people with AD this part of an interaction is often misinterpreted but not in an illogical way.

The information at level one in Fig. 13.1 is crucial because it allows interlocutors to establish the context of the interaction and interpret the speaker's meaning and its relevance to the situation at hand. The task of identifying contextual stimuli typically places the lowest processing load on interlocutors and it is likely we have a more direct processing route to the declarative-semantic information stored in our language network. For the person with AD the processing system may become stalled at this lower level and perseveration on processing at this level makes it difficult to hold onto and process the information contained in the interlocutor's verbal and non-verbal behaviors. Thus, processing information at level one would typically

Processing load	Processing task	
HIGH **Level 6**	Consideration and formulation of response	
Level 5	Matching to stored semantic-declarative information *Including schemas, scripts (with social norms) and categories of words, concepts*	Direct processing route to stored schemas By-passes mid-level processing and instant recognition of the speech event and social norms
Level 4	Comprehension of propositional and semantic content *Relies on ability to understand implied meanings, ambiguity, figurative language, speaker's intentions, read non-verbal and paralinguistic signals*	
Level 3	Parsing morpho-syntax *Relies on good working memory and ability to process at a functional speed*	
Level 2	Decoding of speech signal *Relies on good working memory skills and good auditory function*	
Level 1 **LOW**	Recognition of contextual variables (i.e. participants, setting, purpose) *Typically, there is a direct pathway to higher-level information. This pathway relies on access to long-term memory and declarative information.*	**In AD the lack of ability to interpret this level may cause a "stalling effect"**

Fig. 13.1 Pragmatic processing load

require less cognitive effort for a neuro-typical person but for a person with AD this stage of processing places a great deal of stress on their cognitive resources resulting in confusion. In extract 3 below, the lady (F) with AD had been moved to an unfamiliar lobby area of a nursing home while her usual recreational area was cleaned. She appeared to think that she was being taken to a waiting area where she expected to meet her brother who she assumed was late. In the conversational segment below on this occasion F was less coherent than in other previous conversations.

Extract 3:

F: my brother *(sniffs)* but (.) my brother w- would like me to come out (xxxx) waiting me just being (.) being kept well an everything
J: mhm
F: and my own brother (xxxx (.) xxxxx)
J: what's your brother's name?
F: my brother (.) my brother (10.0) (xxxxx)

J: where does your brother live,
F: ah (3.0) *(sighs)* oh dear
J: York?
F: no?
J: oh doesn't live in York (2.0) does he live in Castlebridge?
F: no? (2.0) (xxxx) there (3.0) oh it had been taken away with me (.) an they want me to make (xxxx)
J: ahh right who took it away?
F: (10) I get (xxxx)
J: what've* you done to your <u>leg</u>
F: who? (xxxx)

F had to make sense of an unfamiliar environment (the lobby area) and a conversational partner (the researcher) who did not appear to match her expectations of relevance given the physical context in which she found herself. The conversational break that occurred on this occasion is evidenced in the long pauses, unintelligible segments, and lack of cohesion in the topic flow. F appeared highly agitated during this particular interaction continually looking about as if searching for someone, her brother perhaps. Despite her confusion she was working hard to find some relevance to the situation.

13.3.4 Relevance Theory and Pragmatic Processing

Relevance is a highly important aspect of interactions that has given rise to a cognitive perspective of pragmatics. Developed in 1986 by Dan Sperber and Deirdre Wilson, relevance theory is an 'inferential approach to pragmatics that situates itself within cognitive science' (Jagoe 2015: 55). Relevance theory (Sperber and Wilson 1986, 2002) posits that relevance is a cognitive processing mechanism that allows interlocutors to make sense of the stimuli they encounter in an interaction. This mechanism allows the hearer to focus on what is meaningful to his or her interpretation of the current situation and disregard other possible interpretations. Listeners assess stimuli by the degree of their relevance (to the context at hand), a process that results in multiple inputs competing for the individual's cognitive resources. Van der Henst and Sperber (2004) suggest that the focus of attention will be directed to the inputs that appear 'relevant enough to deserve attention' (142). Relevance operates on the notion of predictability and 'best fit' given the context of a speech event. That is, hearing an utterance P in a particular context X by participant Y will be interpreted as proposition Z. As Jagoe (2015) notes, it is a 'process of optimal relevance that guides both how communicators produce utterances and the process which hearers undertake in interpreting these communicative events' (55). Guendouzi (2013) states 'hearers typically follow the interpretative path that requires less cognitive effort [...] relevance is satisfied when there is a great enough *positive effect* to offset the *cognitive processing effort*' (42).

Relevance in the case of people with AD is somewhat different. If, as Sperber and Wilson (2002) contend, relevance is a cognitive mechanism that has become a 'hard-wired' or habitualized behavior, then we might assume that it still operates (to a degree) in people with AD. As is the case with neuro-typical interlocutors, people with AD are still attempting to assess contextual inputs to find a relevant interpretation of the interactions in which they take part. When they do not comprehend a speaker's meaning, a potential processing mechanism for people with AD is to use whatever linguistic item best allows a conversation to continue without too much disruption. Politeness tokens and formulaic phrases are likely to fit many scenarios thus they are an easily accessed linguistic resource.

However, recognizing and interpreting level one stimuli may prove difficult for people with AD. As was noted above in the case of the lady (F) with AD, we may be habitually primed to seek relevance in all situations despite acquired neurological damage or memory. Consider the context of a medical examination in Table 13.1 below (based on an account given to the first author by a family caregiver).

As is shown in column two in Table 13.1, a neuro-typical patient would instantly recognize the setting (a hospital examination room), participants (a doctor), and the purpose of the interaction (chest examination) and be able to easily assimilate this information by matching it to the scripts and schemas stored in their long-term memory. However, people with AD may not recognize the contextual details and become confused or aggressive (as happened in the case cited in Table 13.1). The principle of relevance appears to be operating. However, without completion of the required level one processing (i.e. correct identification of the setting, participants, and goals) the person with AD came up with what might be assumed to be the most logical interpretation following an X+Y+P = Z formula.

(a) X {hospital} + Y {doctor/ nurse} + P {request to remove clothes} = Z {medical chest examination} *correct inference*
(b) X {public setting} + Y {unknown male} + P {request to remove clothes} = Z {attack/ rape} *inference based on failing to process level one information*

Contextual details cue the cognitive process involved in interpreting an interaction. They are 'the set of premises used in interpreting an utterance' and represent a 'subset of the hearer's assumptions about the world' (Sperber and Wilson 1986/1995: 15). In the scenario in Table 13.1, the beliefs of the woman with AD about the world (i.e. strange men, who want to take your clothes off, is likely to be an attack) are beliefs that are probably shared by many women who would also become aggressive in that particular situation.

13.4 Conversational Behaviors and Pragmatic Skills in Alzheimer's Dementia

In addition to the cognitive aspects of pragmatic processing discussed in the previous sections, individuals also need to acquire a system of communication behaviors or pragmatic skills that are recognized within a particular socio-cultural milieu.

Table 13.1 Stages of pragmatic processing in Alzheimer's dementia

Speech event	Neuro-typical patient	Patient with dementia
Doctor enters treatment room, smiles and says	**Patient is aware of context:**	**Person with AD is uncertain of contextual conditions:**
"Good morning Ms A, how is your cough today?"	**1. Location**: Recognizes	**1. Location**: Unsure
"I just need you to take off your shirt so I can listen to that chest?"	**2. Participants**: Recognizes	**2. Participants:** Unsure
	3. Activity: Understands what is going on in the current situation	Who is this, what is their relationship to me?
	4. Intentions/ goals: Understands the expected intentions of the participants	**3. Activity**: Unsure
	5. Interactional norms: Recognizes 'script'	**4. Intentions/ goals**: What are we doing?
	6. Conditions met for relevance: Focus of attention on the interaction at hand so proceeds to interpreting the interaction	**5. Interactional norms:** Does not recognize script or social context
	7. Listen and discriminate sounds in speech channel	**6. Conditions for relevance not met:** Focus of attention is stalled on trying to establish context. This may result in any verbal message decaying in working memory. Interaction does not proceed according to expectations of doctor's visit
	8. Parse grammatical, paralinguistic, non-verbal signs	*Response:* Patient with AD becomes aggressive, protests or refuses to cooperate
	9. Match communication acts to stored declarative information	**may fear they are being attacked
	10. Higher level of cognitive processing	
	Response: "I'm fine thanks" Formulation of response	
	Action: takes off shirt	

That is, we acquire the rules or norms of appropriate interactions (e.g. turn-taking, conversational scaffolding, acceptable use of silence, politeness, etc.) agreed upon by the society in which we live. Babies and infants acquire this aspect of communication through daily routine interactions with their caregivers (e.g. bathing, feeding, etc.). It is how they learn to manage turn-taking, make appropriate eye contact, or respond to emotions signaled by smiling. Over time many of these patterns of interaction become procedural in nature such that a response to others' speech acts, gestures, or facial expressions becomes reflexive. For example, a phatic token such as a 'greeting' immediately elicits a reciprocal salutation when we pass a friend or colleague in the street. These routine forms of language such as phatic talk (Malinowski 1923) or politeness tokens (Brown and Levinson 1987; Leech 2014) have been frequently noted in corpora of data collected from people with AD (e.g. Davis and Maclagan 2013; Guendouzi and Müller 2002, 2006; Davis and Guendouzi 2013; Schrauf and Müller 2013; Wray 2013).

Although socio-pragmatic norms may vary across different social and cultural groups, there are some common expectations of what might occur during the initial stages of a conversation with others. For example, we typically expect people to respond to an interlocutor's greetings, to perhaps ask about their interlocutor's physical well-being and/or current life-status and respond with similar information about their own life. In addition, we might expect a certain amount of small-talk. Small-talk or social talk becomes habitual and consists of high frequency forms of language such as greetings, politeness tokens (e.g. 'thank you'), or phatic comments (e.g. 'nice day today'). These language items may have particularly strong connections within an individual's semantic network and, therefore, require less overt cognitive processing than propositional language. Such forms of language may to some extent bypass the need for higher-order processing and, therefore, enable people with AD to (partially at least) engage in social interactions despite their cognitive decline. Research has shown that people with AD may (a) respond appropriately to greetings, (b) effectively use politeness tokens (e.g. 'that's a nice watch'), (c) engage in phatic talk (e.g. 'it's lovely out there'), and (d) engage in adapted forms of narrative telling (Guendouzi and Müller 2006; Guendouzi et al. 2015; Wray 2013). The automaticity of formulaic language forms (Wray 2010) may play a role in this retained ability to respond in a manner that appears socially (if not semantically) appropriate (e.g. Davis and Maclagan 2010, 2013; Guendouzi 2013; Guendouzi and Müller 2002, 2006; Guendouzi and Pate 2014; Wray 2010).

In the case of routine phatic talk the fact that a response can be selected from a large set of paradigmatic choices may account for why people with AD use these forms of language frequently. For example, if a person with AD is greeted with a salutation such as 'hey, how's it going?', he or she could respond with any one of multiple exemplars. In contrast, if they are asked 'what college did you go to?', there is only one correct response. Many phatic tokens have a large set of alternative linguistic items that can be paradigmatically substituted without disrupting a conversation or seeming out of place. A person with AD who is living in a care facility may be presented with a visual stimulus such as the arrival of a smiling person who sits down beside them and greets them. In this situation the outcome may be different to the case cited in Table 13.1. This is because the person with dementia is in their normal daily location and so has less new information to process and is more familiar with their surroundings. Although the person with AD may not recognize the individual (visiting graduate student), the habitual social behavior to greet someone who visits your 'home' is instinctive. The presentation of this stimulus (the arrival of a visitor) likely activates a large range of potential social responses in the listener's semantic network, any one of which would not be out of place in the

Table 13.2 Paradigmatic greeting choices

Greeting	Paradigmatic set of possible responses
How are you today?	*fine*
	doing okay
	not so good
	on top of the world
	good and you?
	so so
	oh you know
	yeah not too bad
	feeling a bit low
	wonderful
	hi
	good morning
	good day
	ready for a walk
	lovely day isn't it?
	etc.

context. Therefore, during the initial stage of interaction there is less need to inhibit other exemplars that are also activated. The person with AD could offer any one of several linguistic items to fulfill their interactional social obligation of acknowledging and greeting the visitor regardless of their identity. It is not unlike looking at a 'Where's Waldo?' picture ('Where's Wally?' in the UK) and being able to select any of the figures in the picture to serve as Waldo (Table 13.2).

Another form of routine talk that has structural flexibility is politeness tokens (e.g. compliments on appearance or achievements). These are lexical strings that can be used or inserted at any point in a conversation. For instance, we can abandon a current topic and insert the phrase 'you look nice today' or 'that's a nice X' (where X = dress, coat, watch, bracelet, etc.) without disrupting the conversational flow. In keeping with relevance theory's notion that conversations operate within a system that weighs the gains from cognitive effects against the cost of cognitive processing load, the benefits of using politeness tokens and formulaic language pay high dividends to the person with AD – they are able to engage in conversation, keep conversations going, and avoid placing too much stress on limited cognitive resources.

13.5 Shared Realities and Collective Memory

Successful interactions also rely on a degree of shared knowledge and 'common ground' (Clark 1996). Common ground works at both macro and micro levels. At the macro level people share political, social, religious, or cultural beliefs. At the micro level we share beliefs about the way conversations should proceed (Sacks et al. 1974) and the types of speech acts that are appropriate for a particular context. In the sections above, we noted that at the micro level people with AD can produce relatively functional social conversations. To borrow a term from relevance theory, the conversations of many people with AD do reflect a mutual manifestness – that is, the person with AD appears aware of the social obligation to engage in conversation and often will use forms of phatic talk and/or politeness tokens to help sustain the interaction. Sperber and Wilson ([1986] 1995) have suggested that 'mutual manifestness may be of little cognitive importance but it is of crucial social importance' (60). There is, however, another area of mutual understanding in interactions that does rely more heavily on cognitive and semantic resources and that is the sharing of memories. As Hirst and Echterhoff (2012) remark:

> 'Memory plays an important role in human social interaction. People converse with others about the past or about previously learned information for a variety of reasons: to inform others, to seek desired information, to create a sense of intimacy, or to influence others' (56).

Hirst and Echterhoff (2012) suggest that interlocutors use collective memory to recreate current versions of shared past events with our families and friends. Through a process of jointly remembered events participants are able construct meaningful narratives to express their social relationships with each other. Such occasions also allow participants to discursively reference both current and former identities and express their relationship to the other party. Due to cognitive constraints people with AD are less likely to be able to engage in this form of collective remembering. However, in some cases people with AD are able to co-construct former life events through the use of semantically unspecific statements that are focused around a particular piece of autobiographical information from their past. For example, one woman (Ms A) with AD would continually make the point of telling the first author she had been a teacher. It was a regular topic in her conversational repertoire and one which she appeared to use both to maintain the conversation and to project a more socially active identity than her current life situation displayed (Ms A was a dependent client at a respite facility). The interactions between the researcher (R) and Ms A were jointly created using question-answer pairs, the end point of which was the discursive creation of a competent and socially sanctioned professional identity for Ms A. Furthermore, this particular conversation topic was one that could be invoked (by either party) to sustain their interactions.

Extract 4:

R: so you used to teach?
Ms A: yes it in (0.2) oh somewhere in South America
R: oh that must have been interesting what were the kids like?
Ms A: well you know children *(face tilts to one side)*
R: hmm yes I can imagine *(smiles)*
Ms A: you had to be strict (.) make them work hard *(shakes her finger)*

R: yes that's true (.) what did you teach?
Ms A: well you know everything (.) a bit of math or reading
R: mhm the usual (.) were you in a city or the country
Ms A: well we were out there (.) you know in the trees
R: nice was it warm?
Ms A: Oh yes warm
R: that must have been an interesting job

As can be seen in this extract, Ms A and the researcher became quite adept at co-constructing stories about Ms A's teaching career by using generalized formulaic phrases that did not contain precise information but did allow the conversation to move forward and appear cohesive. For example, when the researcher comments "nice was it warm", Ms A can construct her response from the researcher's words to reply "yes it was warm". The turn-taking is appropriate. The researcher asks a question and Ms A replies with a response that completes the adjacency pair. When asked what she taught in South America, Ms A can offer a response that covers all options, "you know everything (.) a bit of math or reading". The participants were able to use the conversational topic of Ms A's teaching career to scaffold their weekly interactions. The example above is reflective of phatic communion (Malinowski 1923), that is, talk that is considered *interactional* rather than *transactional*. As Cheepen (1988) suggests 'phatic communion may extend over a whole encounter', enabling 'speakers to relate to one another through the use of language' (20). In the encounter above, this is indeed what appears to the case. Ms A and the researcher's conversations did not establish facts about Ms A's past career. Rather, the participants used the stories to acknowledge each other's presence and validate a past social identity.

However, it is important to remember that it did not matter to the researcher that the details Ms A described might vary or were not always 'correct'. However, there are social expectations that our conversations with those who are close to us should share more than time. They should share facts about prior life events or include discussions relating to status of other family members' lives. Indeed, it is often seen as evidence of someone's affection for us if they remember the details of our lives or recall experiences we shared with them. Thus, interactions between family members may require that the participants discursively mark the relationship between both parties. For example, a father may gain self-validation when his son acknowledges the role the father played in helping him through a difficult event or when he describes sharing an enjoyable evening together at a concert. Typically, participants hope to leave such interactions with a sense of well-being and self-validation – we understand our sense of self in relation to others within our close social networks. But what happens when this process is not possible because of the presence of dementia?

13.6 Facilitating Conversation in Alzheimer's Dementia

An important question arising from our discussion is whether the characteristics of communication noted by the research cited above are perceived by caregivers (professional and familial) as effective compensatory strategies in sustaining meaningful conversations. Interactions between researchers and people with AD have yielded lengthy conversations (e.g. Guendouzi and Müller 2006) that appear to flow relatively smoothly and achieve a level of satisfaction for both partners. However, this may be because the dyads include a communications researcher who has no expectations of specific information being present in the conversation, or of sharing past experiences. In contrast, family members, caregivers, and friends of people with AD report a different experience. They are often frustrated by the lack of shared communication or recognition on the part of the person with AD.

Interviews with caregivers suggest that there are three aspects of interactions that appear to distress many caregivers and/or family members of people with AD (Guendouzi 2013; Guendouzi and Müller 2006). The first is not being recognized by the person with AD. The second is not being able to participate in discussions that remember or reference past events. The third is a resentment of the overuse of semantically empty language, formulaic phrases, or talk that was described by one family member as 'meaningless'. This latter complaint is somewhat ironic because it is precisely the type of talk that research suggests people with AD are likely to use in their interactions with others. Caregivers reported to the first author that their communication with the person with AD often broke down after the initial greeting stages. However, does this breakdown in communication occur due to a lack of semantic coherence in the language of the person with AD? Or does it occur because the neuro-typical interlocutor finds it difficult to tolerate the communication style of the person with AD?

David Deutsch's constructor theory in physics sums up an approach that challenges researchers to provide a 'new fundamental theory to formulate science in a completely different way' where 'predictions will be supplemented with statements about what tasks are possible, what are impossible and why' (Marletto 2014). Adapting this approach to dementia it seems we should approach dementia by defining what *is* or *isn't* possible when interacting with people with AD. First, at this point in time it is not possible to cure Alzheimer's dementia or offer rehabilitation therapy to people with AD in the same manner that we can for someone who has had a traumatic brain injury – that is, with the goal of achieving some level of recovery. Second, we cannot change the cognitive limitations that dementia places on the individual's ability to process information and communicate effectively. Third, we know that people with AD are likely to engage in what caregivers perceive as empty or meaningless phatic talk. Given that we cannot rehabilitate the person with dementia, or help them recover functional access to memories, what should we (as clinical professionals and/or researchers) be doing with the information we have gathered in our research studies over the past decade?

As Deutsch suggests the answer is to consider what is 'possible'. In the case of dementia that means continuing to collect, describe, and analyze 'naturalistic' encounters with people with AD in order to examine the range and variety of conversational styles and pragmatic strategies they present in their interactions. More importantly, we should use this information to create training programs, protocols, and best practice models for managing our interactions with people with AD. In particular, this includes educating students, professionals and caregivers about the complexity of pragmatic processing which is a higher-order communication skill. Even as functional adults we are likely to make errors when attributing intentions to others. It is these higher-order skills in dementia that seem to suffer greatly. Perhaps in dementia the higher-order skills suffer most because they are the last to be learned and laid down and are subject to a practice-refinement process. That is, pragmatic skills and tasks that rely on theory of mind develop later than other language skills. There is, therefore, less opportunity for pragmatic skills to be refined over time based on exposure to indirect language such as implicature. Indeed, it is often the case that these linguistic skills are not fully developed until adulthood. In contrast, the procedural elements of social communication such as turn-taking, acknowledging others, engaging in phatic talk, or using politeness tokens are pragmatic forms of language that begin at birth. Children learn rudimentary versions of these forms of talk from an early age. This continual practice allows for an earlier refinement of these interactional skills and they appear to remain deeply embedded in the conversational repertoire of the person with AD. This may afford these forms of talk a greater degree of protection against decline in the early to moderate stages of dementia.

13.7 Summary

Qualitative research has noted that people with AD retain some communicative behaviors that can be utilized in social interactions. For example, there does appear to be evidence from many of the studies discussed above that people with AD adhere to an underlying cooperative principle, that is, they attempt to react to their interlocutor by providing information they believe to be true (given their own interpretation of the context) in as clear a manner as possible (given their cognitive constraints). People with AD also demonstrate appropriate use of social skills such as turn-taking, telling small stories (Davis and Maclagan 2013), and the use of phatic talk (e.g. 'lovely day today') and politeness tokens. From a pragmatic perspective, their conversational contributions reflect evidence of the need to address their own and their partner's face needs (Brown and Levinson 1987).

We are not suggesting that people with AD overtly address the interlocutor's face needs in a way that would rely on intact memory or optimal cognitive function. For example, people with AD do not typically use utterances that reflect knowledge of their interlocutor's personal achievements, preferences, or life events (e.g. 'that's a pretty sweater you always did like blue'). Rather, they use these forms of talk because they have become habitual behaviors acquired over a lifetime of social interactions. They are forms of talk that appear to operate without direct access to higher-level information stored in declarative-semantic memory. Alternatively, they do not require the interlocutor to produce a specific response and so the language system can by-pass the inhibition process that is needed to obtain the exact exemplar a question requires. As was noted above, the set of paradigmatic choices available in the case of phatic talk are numerous particularly when compared to a question that calls for a specific answer (e.g. being asked to give the current date and year). In contrast, in the case of phatic or politeness talk it is possible for the person with AD to respond with any one of several linguistic items that might be acceptable within any conversation.

Although people with dementia appear able to use politeness or phatic talk to functionally negotiate conversations according to socially acceptable pragmatic principles, the link between effective socio-pragmatic competency and theory of mind is less clear in the case of dementia. Theory of mind supports the mechanism for processing incoming information in order to correctly infer a speaker's 'actual' meaning or intentions. In order to anticipate another person's beliefs and intentions you need to have some concept of who they are – that is, you need to allocate them to a particular participant role. This initial stage of pragmatic processing relies on rapid recognition of the speech event and participant roles, and therein lies the difficulty for people with AD. They need to accurately assign identities, participant goals, and be able match a speaker's utterances (or actions) to the schemas and scripts they have stored in their mental lexicon. If a person with dementia fails to negotiate this level of processing, then the whole system depicted in Fig. 13.1 may break down. In addition, if the person with AD cannot inhibit potential linguistic or conceptual competitors that are activated in response to a stimulus (the fourth and fifth levels of processing in Fig. 13.1), he or she may be unable to hold verbal information long enough in working memory to complete the processing needed to extract a relevant inference. Because most of us use language so seamlessly in our everyday lives, it would be easy to assume pragmatic processing is straightforward. But it involves many levels and relies on several other cognitive systems in addition to the language system. It is important to be aware of the complexity of pragmatic processing and the difficulties it presents for people with AD. By focusing on the range and complexity of pragmatic skills in people with AD, this chapter is a step towards achieving this goal.

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Chapter 14
Non-Alzheimer Dementias

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Abstract Dementias, not attributable to Alzheimer's disease, include a varied group of neurodegenerative disorders with myriad and diverse neuropathology and clinical features. Collectively, these disorders are often referred to as 'non-Alzheimer's dementias' (non-AD dementias). Language impairments, at the single word and discourse levels, are becoming well documented in non-AD dementias and are recognized as having great impact on the use of language for social purposes. However, an emerging body of literature suggests that in addition to impairments in language form and content, social cognition deficits may manifest downstream as pragmatic language impairments. Moreover, socially inappropriate and disinhibited behaviours that are core to several subtypes of non-AD dementias may contribute significantly to pragmatic communication impairments. Given the importance of social communication and language use to quality of life for persons with non-AD dementias, their families, and carers, increasing our understanding of how discrete impairments in cognition, language, and behaviour affect pragmatic communication abilities is of paramount importance for both clinicians and researchers in fields of communication and dementia. This chapter undertakes a wide-ranging examination of the pragmatic communication abilities of persons with non-AD dementias, which is informed by research evidence and clinical experience.

Keywords Communication • Conversation • Dementia • Discourse • Frontotemporal dementia • Huntington's disease • Language • Non-Alzheimer's dementia • Pragmatics • Social cognition

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14.1 Introduction

There is little published research describing the social and pragmatic communication performances of persons with non-Alzheimer's disease (non-AD) dementias. The development of these profiles in non-AD dementias has been challenging, and has been plagued by disease heterogeneity, complexity of symptoms, and myriad diagnostic assessment protocols. However, there is a growing imperative to develop cohesive and comprehensive profiles of pragmatic performances in non-AD dementias given the rising prevalence of non-AD dementias worldwide. Identifying the characteristic social cognitive, behavioural, and language impairments of non-AD dementias can contribute to our understanding of the complex inter-relationships among language performance, communicative competence, cognitive systems and processes, and social and pragmatic forces.

Language impairments at the single word and discourse levels are becoming well documented in non-AD dementias and are recognized as having great impact on the use of language for social purposes. However, an emerging body of literature presented herein suggests that pragmatic communication abilities may also be affected by impairments in social cognition and comprehension of non-literal language that are independent of language form and content. Moreover, socially inappropriate and disinhibited behaviours that are core to several subtypes of non-AD dementias may contribute significantly to pragmatic communication impairments. The impact of these impairments on pragmatic communication is complicated, especially when considered within a dynamic and evolving communication context created as conversation partners and individuals with non-AD dementias adapt to cognitive, language, and behaviour changes over the progressive course of these illnesses.

When viewed from an interactive perspective, and as shown by the data from dyadic conversations in non-AD dementias presented in Sect. 14.4, reactions to and adaptations by conversational partners to cognitive-communication and behaviour impairments may, ironically, contribute to pragmatic challenges. For example, communication behaviours that appear at first consideration to be violations of typical pragmatic conventions in the context of topic management, may actually serve the purpose of facilitating interactional and transactional communication. While there is a growing body of research exploring domains such as social cognition, behaviour, and language form/content abilities in non-AD dementias, very little research has focussed directly on the manifestation of these abilities in conversation contexts and in social language use per se.

The aim of this chapter is to present converging evidence from a variety of investigative disciplines, as well as the authors' research and clinical experiences, to describe the features of pragmatic communication impairments in persons with non-Alzheimer's dementias. The chapter explores how knowledge of social cognitive, behavioural and language impairments informs profiles of pragmatic communication in non-Alzheimer's dementias. We also consider briefly the impact that pragmatic communication impairments can have on the families of individuals with non-AD dementias. Throughout this chapter, we identify key gaps in the literature and critical research needs.

14.2 Non-Alzheimer's Dementias

Alzheimer's disease (AD) is the most common cause of older-onset dementia, accounting for approximately two-thirds of clinical cases (Jefferies and Agrawal 2009; Knapp and Prince 2007; Sampson et al. 2004). In contrast, estimates suggest that in young-onset dementia, AD accounts for only one-third of diagnosed cases (Jefferies and Agrawal 2009; Knapp and Prince 2007; Sampson et al. 2004). The remaining cases are largely attributed to a group of dementia subtypes that present with a wide range of neuropathological and clinical features, which are often referred to collectively as 'non-Alzheimer's dementias', 'atypical dementias', or 'Alzheimer's disease related dementias'. The majority of conditions falling into this category are neurodegenerative processes that result in a progressive and irreversible dementia, notwithstanding the potentially reversible conditions such as normal pressure hydrocephalus or depression. Of the non-AD dementias, vascular cognitive impairment, Lewy body spectrum disorders (e.g. Lewy body dementia, Parkinson's disease and Parkinson's disease dementia), and frontotemporal dementia are the more common subtypes. Consequently, with the exception of Parkinson's disease which is addressed in Chap. 15, these dementias are the focus of this chapter.

The term 'frontotemporal dementia (FTD)' is a collective term referring to a variety of dementias with variable pathologies, genetic aetiologies, and clinical presentations. These dementias are linked structurally by atrophy, hypoperfusion, and/or hypometabolism which affect the frontal and temporal cortices (Snowden et al. 2007). To date, the majority of research on language, cognition, and pragmatic communication impairments in the non-AD dementias has focussed on FTD. The dementias that comprise the FTD spectrum are not without debate. For the purpose of this chapter, we have assumed a more inclusive perspective and included in the FTD group those subtypes with primary behaviour, cognitive-communication, and/or language manifestations. This includes behavioural variant FTD (bvFTD), sometimes referred to as frontal variant, and the primary progressive aphasias (PPA) including semantic variant (SD), agrammatic/nonfluent variant (PNFA), and logopenic variant. However, we have also included variants of FTD that occur in the context of motor syndromes or have prominent motor features: corticobasal degeneration; FTD in progressive supranuclear palsy; and motor neurone disease with FTD (MND-FTD) (Snowden et al. 2007). There is growing recognition in clinical care and research domains that cortical changes and genetic phenotypes associated with cognitive decline and dementia in amyotrophic lateral sclerosis (ALS; a subtype of motor neurone disease) are in keeping with FTD. As such, there is an emerging consensus that ALS and MND-FTD may exist on a single spectrum (Snowden et al. 2007; Woolley and Strong 2015). For this reason, we have included ALS under

Table 14.1 Examples of non-Alzheimer's related dementias

Vascular dementia (vascular cognitive impairment)	Huntington's disease
	AIDS dementia complex
Mixed dementia	Creutzfeldt-Jakob disease
Dementia with Lewy bodies	Wernicke-Korsakoff syndrome
Parkinson's disease dementia	Binswanger disease
Frontotemporal dementia including:	Normal pressure hydrocephalus (potentially reversible)
Primary progressive aphasia (PPA)	
Progressive nonfluent aphasia (PNFA)	Syphilis
Semantic PPA	Multiple system atrophy – cerebellar subtype
Logopenic PPA	Multiple sclerosis with dementia
Behavioural variant (bvFTD)	Dementia lacking distinct pathology
Corticobasal syndrome	
Progressive supranuclear palsy with FTD	
Motor neurone disease with FTD	

the heading of FTD in the current chapter. In addition to these, there are a number of other non-AD dementias that, although less well understood from language and communication perspectives, have the potential for devastating and unique impacts on pragmatic communication.

While a detailed discussion of the diagnostic criteria and underlying pathological and neuroanatomical features of the non-AD dementias is beyond the scope of this chapter, a summary listing of examples of non-AD dementias is presented in Table 14.1. Although of great importance, the majority of these dementias will not be discussed in detail in this chapter due to the scant or non-existent research available. This fact, and the compelling results from the studies discussed herein, highlight the importance of accelerating research in the area of pragmatic communication abilities across a broader spectrum of non-AD dementias.

14.3 Constitutional Factors that Contribute to Pragmatic Abilities in Non-AD Dementias

The term 'constitutional factors' refers to a collection of key cognitive, behavioural, and language features that constitute the profile of non-AD dementias and which contribute to and/or overlap with pragmatic communication impairments. In the following sections, we consider key features such as theory of mind (ToM) impairments, behavioural disruptions, impairments of language form and content in non-AD dementias that impact pragmatic communication abilities, either independently or in interactions with one another.

14.3.1 Social Cognition

The study of social cognition is a rapidly expanding area of research in non-AD dementias (Elamin et al. 2012). Research conducted in the field of social cognition converges on 'the neural processes supporting effective social interactions in everyday life' (Elamin et al. 2012: 1071). Many of the research questions posed in social cognitive neuroscience address behaviours and skills that are integral to pragmatic language performances. Social cognition studies are conducted normally under tightly controlled experimental conditions. Consequently, the ecological validity of these research findings relative to everyday language use can be viewed with a modest level of scepticism. Notwithstanding this, the current body of social cognition research in non-AD dementias offers valuable insights into variables that may contribute to pragmatic language impairments in non-AD dementias. These insights may also help inform our understanding of the expressions of pragmatic impairments in conversation.

14.3.1.1 Theory of Mind and Social Awareness/Knowledge Deficits

Defined narrowly, ToM refers to an individual's ability to attribute mental states both to one's own mind and to the minds of others (Premack and Woodruff 1978). ToM is believed to be an important component of an individual's ability to adapt to his or her physical, social, and communicative environments. In the context of everyday communication this may include an interlocutor's perspective, physical environments, and communication contexts – key components of pragmatic communication. As highlighted by Hughes and Leekam (2004), the link between performance on ToM tasks and social communication/skills is complex and multifaceted, with some studies showing high congruence in abilities and others showing dissociation between ToM and social skills development. Many tasks used to evaluate ToM require a high level of social awareness along with the ability to access and to apply social morals (e.g. politeness, sarcasm, etc.). As such, ToM and social awareness impairments may overlap with and/or contribute to pragmatic communication impairments in non-AD dementias.

ToM and social knowledge/awareness have been explored extensively in non-AD dementias. A variety of tasks have been used to evaluate ToM and social awareness abilities in the non-AD dementias including faux pas and false-belief tasks, the Mind in the Eyes Test (Lough et al. 2001), and judgment of preference tasks. This latter task requires individuals to inhibit their own preference for a visual object on a screen in favour of the object cued visually by a face in the middle of the screen with a directed gaze toward a specific object. Other assessment tasks specifically measure moral judgments and social violations. These include cartoons and stories depicting ToM conditions. Tasks requiring judgments of permissibility/impermissibility based on moral versus social conventions using scenario-based judgments have also been reported in non-AD dementias.

Lough and colleagues used a large battery of ToM and social judgment measures in their study of 18 individuals with bvFTD and 13 controls. They carefully controlled for differences in executive function abilities shown previously to contribute to ToM task performance differences between individuals with cognitive impairment and controls (Lough et al. 2006). They concluded that individuals with bvFTD possess preserved knowledge of social rules. However, they have impaired judgment, relative to controls, in distinguishing morally permissible and impermissible actions. Le Bouc et al. (2012) expanded these findings by using a three-option false belief task that dissociated the performances of individuals with bvFTD versus those with AD. They reported that individuals with bvFTD exhibited difficulties inhibiting their own mental perspective for that of another. In contrast, individuals with AD demonstrated difficulty inferring another's beliefs. Le Bouc et al. also showed that hypometabolism of the right lateral prefrontal cortex is associated with inhibiting one's self-perception, whereas hypometabolism of the left temporal-parietal junction is associated with inferring another's belief.

Bora et al. (2015) reported similar ToM deficits using false belief tasks in bvFTD. They confirmed involvement of the ventromedial prefrontal cortex in ToM impairments. They also expanded Le Bouc et al.'s (2012) findings, reporting declines in ToM tasks as a function of longer disease duration and more severe cognitive impairment in both bvFTD and AD. The robust finding of ToM impairments and challenges applying social norm rules in bvFTD is confirmed by reports from multiple investigators using converging evidence from a variety of experimental tasks (Baez et al. 2014; Bora et al. 2015; Le Bouc et al. 2012; Lough et al. 2001, 2006). For a comprehensive review of this literature, the reader is referred to Elamin et al.'s (2012) recent meta-analysis of ToM research. From their meta-analysis of 121 studies they concluded that ToM deficits were prominent in bvFTD, were independent of specific cognitive and linguistic differences across ToM tasks, and more importantly, discriminated bvFTD from AD even in the early clinical stage (Elamin et al. 2012).

Research reporting ToM deficits in non-AD dementias extends beyond bvFTD. A recent meta-analysis reported that ToM deficits are not only symptomatic of Huntington's disease but may also be an early marker of disease, preceding the manifestation of diagnostic motor symptoms (Bora et al. 2016). Similar ToM deficits have been reported in amyotrophic lateral sclerosis (ALS). While the Mind in the Eyes task has not typically demonstrated sensitivity to ToM deficits in ALS (Jelsone-Swain et al. 2015), other tasks (e.g. ToM cartoons, interpretation of mental states from scenes) revealed significant impairments among persons with ALS (Cavallo et al. 2011; Gibbons et al. 2007; Girardi et al. 2011). Cavallo et al. (2011) compared performances across multiple ToM tasks and reported that individuals with ALS may have specific difficulty with tasks that require processing information from social contexts. Importantly, there is evidence to suggest that social cognition impairments may not be ubiquitous in ALS, but may occur in a large subset of individuals who develop frontotemporal dementia in the context of ALS (i.e. MND-FTD) (Goldstein and Abrahams 2013; Lillo et al. 2012). Consistent with these findings, Meier et al. (2010) reported ToM deficits in ALS but only for 50 % of their participants, specifically those with orbitofrontal involvement. A subgroup effect in ALS, with suspected correspondence to frontotemporal degeneration, has also been reported for the judgment of preference task and the Reading the Mind in the Eyes task (Girardi et al. 2011).

Collectively, the current literature suggests that ToM deficits are a prominent feature of those non-AD dementias with disruptions to frontotemporal neural networks. ToM deficits are important because they are a potentially important marker of social cognition impairments that may play a discriminative role in the accurate diagnosis of specific subtypes of non-AD dementias. The findings from ToM studies underscore the diagnostic and clinical importance of focussing on ToM and social knowledge/awareness impairments in the context of pragmatic communication abilities in non-AD dementias.

14.3.1.2 Use of Paralinguistic and Contextual Cues to Disambiguate Intent

Tests that use actor-portrayed scenes in an audio/video-vignette format such as The Awareness of Social Interference Test (TASIT; McDonald et al. 2006) arguably possess higher ecological validity than less dynamic, static tasks (e.g. cartoons, stories) (McDonald et al. 2004). As such, the TASIT may reflect more accurately the pragmatic demands of social communication such as inferring emotions and the communicative intent of others based on multiple physical, linguistic, and auditory cues (McDonald et al. 2004). A number of researchers have used the TASIT to assess how well individuals with non-AD dementias are able to infer sarcasm versus sincerity using paralinguistic and contextual cues. Kipps et al. (2009) reported that individuals with bvFTD, who exhibited disruptions of right hemisphere networks including lateral orbitofrontal cortex, insular, and temporal poles, were selectively impaired in recognizing sarcasm. In contrast, bvFTD participants without disruption to this network performed similarly to controls. Kipps et al.'s work suggests that performance on such tasks, which are central to pragmatic communication, may predict specific patterns of frontotemporal degeneration important to social cognition and communication. Interestingly, these findings are in agreement with a number of investigators who have reported that individuals with non-AD dementias have difficulties optimizing paralinguistic cues to discriminate sarcastic versus sincere statements, including in bvFTD (Downey et al. 2015; Kipps et al. 2009; Kumfor et al. 2014a; Shany-Ur et al. 2012), in semantic dementia (Downey et al. 2015; Rankin et al. 2009), in progressive supranuclear palsy (PSP; Shany-Ur et al. 2012), in corticobasal degeneration (CBD; Kumfor et al. 2014b), and in ALS (Staios et al. 2013).

Of note, while Shany-Ur et al. (2012) reported impaired discrimination in sarcasm and sincere statements using paralinguistic cues in individuals with PSP, Rankin et al. (2009) provided conflicting evidence to this finding, reporting no differences in performance on the simple sarcasm subtest of the TASIT among individuals with CBD, primary progressive non-fluent aphasia (PNFA), and controls.

Notwithstanding their different behavioural results, the Rankin et al. (2009) study reinforces the importance of the bilateral parahippocampal gyri and the right superior frontal gyrus in interpretation of sarcasm using paralinguistic cues. Collectively, the studies in social cognition underscore the importance of the right frontal and prefrontal cortices in ToM, application of social knowledge, and use of paralinguistic cues to disambiguate meaning. Further, collectively these findings suggest the possibility of a greater risk for pragmatic communication impairments in the context of ToM deficits in non-AD dementias with involvement of frontal regions and specifically right frontal regions (Kipps et al. 2009; Rankin et al. 2009).

In non-AD dementias, difficulties observed in comprehending paralinguistic cues appear to be relatively independent of language processing issues (Downey et al. 2015; Rankin et al. 2009; Shany-Ur et al. 2012). As with other measures of ToM and social cognition, difficulty using paralinguistic and contextual cues to disambiguate speaker intent may differentiate non-AD dementias with frontotemporal degeneration from those without such degeneration and also from individuals with AD. This comes from studies which show that individuals with vascular cognitive impairment and AD perform similarly to controls on ToM and social cognition tasks (Kumfor et al. 2014a, b; Rankin et al. 2009; Shany-Ur et al. 2012).

Despite the impressive body of evidence in this area of social cognition in non-AD dementias, the significance and meaning of results relative to pragmatic communication impairments are less clear. The ecological benefits of using video-vignette tasks such as those in the TASIT come with a trade-off of difficulty in disambiguating which discrete variables are mediating overall abilities to infer the intent of another from paralinguistic cues. Multiple possible independent and/or overlapping interpretations of these data have been reported in the literature including:

• Failure to interpret correctly information from facial expressions and/or vocal prosody is due to primary deficits in recognition and processing facial emotions and/or vocal prosody. Difficulty recognizing and processing facial expressions and vocal prosody are reported commonly in the non-AD dementia literature and likely overlap with and/or contribute to pragmatic communication impairments (Downey et al. 2015; Kumfor et al. 2014a, b; Lough et al. 2006; Shany-Ur et al. 2012; Rankin et al. 2009; Girardi et al. 2011). However, it is important to note that Lough et al. (2006) concluded that dissociations between performances on faux pas tasks and emotional recognition tasks suggest that the ability to mentalize perspectives of others may be independent of the ability to process emotions from visual information in non-AD dementia.

• There is a failure to attend to and/or process paralinguistic information as a cue that the speaker's language should not be interpreted literally, but instead requires processing at a deeper level for non-literal meaning (Rankin et al. 2009). This could happen for a variety of issues related to attention and executive function deficits in non-AD dementias (Rascovsky et al. 2002; Sachdev et al. 2004; Strong et al. 1999). While multiple investigators have reported that significant findings of difficulty interpreting sarcasm on the TASIT persist even after controlling for performance on executive function measures (Rankin et al. 2009; Shany-Ur et al. 2012), this is an area that requires more investigation.

• Failure to process or to interpret the alternative meanings of words or semantic connections is due to primary language impairments. High-level semantic deficits may disrupt access to conceptual or to event knowledge in FTD, hindering non-literal interpretations of statements. Alternatively, language impairments, even subtle impairments, may tax lexical and syntactic processing abilities, demanding more resources to parse the initial literal meaning and consequently limiting the available resources for processing paralinguistic cues for interpretation of the non-literal meaning.

Ecologically valid tasks such as those included in the TASIT are of considerable value for disambiguating the presence and nature of pragmatic communication abilities in non-AD dementias. There is the compelling need to control for variables such as cognitive ability, language ability (specifically semantic and event knowledge), and emotional recognition/processing in order to achieve sound interpretations of performance outcomes. Researchers need to discern whether or not deficits observed in this aspect of social cognition reflect primary pragmatic communication impairments, primary deficits in ToM or, as we and others suspect to be the case, likely result from a combination of cognitive, language structure, language meaning, and pragmatic communication impairments. The reader is directed to Elamin et al. (2012) for an excellent summary of variables affecting the interpretation of social cognition research in neurodegenerative conditions. Notwithstanding these challenges, the studies described herein highlight the potential for pragmatic communication impairment in FTDs to occur as downstream effects of social cognition impairments, and underscore the need for more research in this area.

14.3.2 Behavioural Disruptions in Non-AD Dementias

Behavioural disruptions are the salient feature of bvFTD. The loss of emotional empathy, apathy, loss of social comportment, and loss of insight are core criteria for the diagnosis of bvFTD (Piguet et al. 2011). These disruptions have the potential to affect social interactions and language use. They also often have devastating effects on relationships and quality of life for care partners (Armstrong et al. 2013; Wong et al. 2012). While core to bvFTD, loss of empathy and social comportment also occurs in the semantic dementia variant of FTD, in cases where the locus of atrophy extends to the temporal lobes in the right hemisphere from its primary locus in the left cerebral hemisphere (Rosen et al. 2006; Thompson et al. 2003). While neurobehavioural symptoms manifest commonly in behavioural and semantic variants of FTD, they have also been reported in other non-AD dementias, including loss of empathy and disinhibition in Huntington's disease (Craufurd et al. 2001) and loss of insight in corticobasal degeneration and progressive supranuclear palsy (O'Keeffe et al. 2007). While the behavioural manifestations of non-AD dementias are relatively well understood, little published research explores systematically the influence of these behavioural disruptions on conversation and pragmatic abilities.

Based on the collective clinical research in our shared laboratories, disinhibition, loss of empathy, diminished social awareness, and failure to identify rule violations for acceptable social behaviour are manifest among a wide range of participants with FTD. We note, anecdotally, the use of communication that fails to align with social contexts, culturally appropriate proxemics, and conveying/processing communicative intent. These mismatches between communication and social context are often distressing to, and may result in embarrassment for, care partners (Oyebode et al. 2013). Research from AD helps to inform the clinical impact of neurobehavioural disruptions in non-AD dementias, showing that interlocutors on the receiving end of inappropriate behaviours, who may be unaware that the individual has dementia, also suffer emotional distress (Montoro-Rodríguez et al. 2009). Moreover, the lack of knowledge regarding the source of the inappropriate behaviour or how to respond to such awkward moments leads both familiar and unfamiliar communication partners to encourage unwittingly or to be dismissive of the negative impact of these behaviours. For example, several family caregivers of participants with FTD who have attended our laboratory have summarily dismissed the negative social impact of inappropriate comments and behaviours of their relatives on the physical or social characteristics of the examiners (e.g. commenting on attractiveness, seeking to hug and kiss, etc.). Additionally, interlocutors may react strongly to such behaviours and incite an undesired reaction from the person with dementia (e.g. aggressiveness, anger, hurt feelings). With acknowledgment that contextual social appropriateness is culturally dependent, examples of mismatches between social context and communication use, observed regularly in our shared research practices, and reported frequently by care partners, follow:

- Use of harsh or critical comments which are not in keeping with the context of the conversation, pre-dementia pragmatic abilities, or relationship harmony
- Proxemics violations: standing/sitting too close to conversation partners
- Inappropriate expressions of affection: physical contact (hugging, kissing, hand touching/holding, head patting) or direct verbalizations of affection ('I love you') to casual acquaintances, strangers, professional service providers; patting unfamiliar children on the head or taking their hands as a sign of affection
- Overfamiliarity: making personal comments about clothing or appearance, direct inquiring about relationship status to casual acquaintances and strangers; self-disclosures of personal information with casual acquaintances and strangers; discussing topics normally considered inappropriate for social settings (e.g. bathroom habits, discrete medical issues, etc.)
- Walking away or wandering during conversation exchanges
- Verbal and non-verbal flirtations and/or direct verbalizations of a sexual nature made in public places to appropriate partners and/or inappropriate sexual comments made to strangers (e.g. restaurant servers)
- Inappropriate use of obscene words or swearing not in the context of copralalia (i.e. excessive or uncontrollable use of cursing/obscene language)
- Failure to engage in social greetings (verbally or gesturally) when initiated by partners in appropriate social settings

In these situations, the individuals with non-AD dementia often failed to detect appropriate social cues provided by others concerning inappropriate behaviours. In our research and clinical experiences, shifting the pragmatic communication burden to the communication partners who can intercede and employ distraction and re-direction techniques to manage these inappropriate communication behaviours can be an effective, if not overly burdensome, management technique. Direct counselling and correction of communication appropriateness may be of benefit in the early clinical stage of dementia. However, as awareness wanes in late clinical stages, candid approaches may be perceived as challenging and are certainly difficult to implement. Given the prominent behavioural features of some subtypes of non-AD dementias, deliberate and hypothesis-driven work regarding the impact of behaviour on pragmatic communication abilities in this population is warranted.

14.3.3 Spoken Language in Non-AD Dementias

The presence of language and cognitive impairments affecting executive functions, word retrieval, language processing, memory systems and attention processes are ubiquitous among the non-AD dementias. However, severity, progression of decline, and specific profiles of abilities across language and cognitive domains are unique to each dementia type, at least in the early to middle clinical stages. The contributions of impairments in language form and language content to pragmatic communication challenges in non-AD dementias should not be minimized. For example, increased pause time associated with word-retrieval challenges and slowed language processing can interfere with turn-taking signals in conversation. Moreover, difficulties in syntax production may result in lower quantity of language and increased difficulty expanding topics. Among the non-AD dementias, the following general trends emerge in the literature:

- The primary progressive aphasia variants of FTD present with greater language impairments relative to disruptions in discrete cognitive domains (e.g. memory) (Gorno-Tempini et al. 2004, 2011).
- Among the primary progressive aphasia variants, individuals with progressive nonfluent aphasia (PNFA) are agrammatic, with fewer severe lexical retrieval impairments and relatively preserved semantic concepts. Individuals with the semantic dementia variant exhibit eroding semantic concepts and relatively mild (although not absent) syntax processing impairments. Individuals with the logopenic variant show profiles that are more consistent with AD. However, there are more pronounced language impairments, particularly in repetition, relative to memory performances (Gorno-Tempini et al. 2004, 2011).
- Individuals with vascular cognitive impairment differ in their distribution of cognitive, language, and communication profiles dependent on the distribution of their vascular pathology. However, in general language deficits in vascular

cognitive impairment, with the exception of prominent morphosyntactic errors, are consistent with those observed in AD (Vuorinen et al. 2000).

- In Huntington's disease dementia, individuals present with difficulties in word retrieval (Tröster et al. 1989), sentence comprehension (Sambin et al. 2012; Teichmann et al. 2005), syntax production (Murray and Lenz 2001), and spoken discourse production (Jensen et al. 2006; Murray 2000) and comprehension (Murray and Stout 1999; Saldert et al. 2010).
- Language disruptions have also been reported in subgroups of individuals with ALS, including spoken discourse (Roberts-South et al. 2012; Strong et al. 1999), noun retrieval (Abrahams et al. 2004; Strong et al. 1999), verb retrieval (Bak and Chandran 2012), and syntax comprehension (Tsermentseli et al. 2015; Yoshizawa et al. 2014).
- Few systematic studies of language profiles in other subtypes of non-AD dementias have been conducted.

In the paragraphs that follow, we provide an overview of language impairments in non-AD dementias, with a focus on the manifestation of such impairments in spoken language elicited using structured tasks (e.g. picture description, narratives generated from wordless picture books). The overview is limited intentionally to spoken language tasks, given their direct relevance to conversation abilities and pragmatic communication.

Multiple investigators have demonstrated that language productivity is reduced in non-AD dementias in terms of the number of words and duration of language sample produced. Productivity deficits are evident in progressive non-fluent aphasia (PNFA), Huntington's disease, and ALS (Ash et al. 2006; Jensen et al. 2006; Murray 2000; Roberts-South et al. 2012). It is possible that productivity deficits result from motor impairments. However, previous work by Roberts-South et al. (2012) and Strong et al. (1999) showed that in non-AD dementias, productivity impairments can be dissociated from motor deficits, suggesting that such impairments occur, at least in part, secondary to cognitive and language changes. Word-finding difficulties manifesting as word-retrieval failures, verbal disruptions contextually attributed to word-retrieval challenges, and paraphasic errors (both semantic and phonemic) are well documented in the semantic variant of FTD, ALS, and PNFA (Ash et al. 2006; Garrard and Forsyth 2010; Orange et al. 1998; Roberts-South et al. 2012; Sajjadi et al. 2012; Strong et al. 1999). Disruptions in the fluency of spoken language are often difficult to interpret and can result from a variety of cognitive, language, and motor disruptions in contextual speech production. However, disruptions in the fluency of language can impact substantially pragmatic communication abilities and perceptions of communication competency. Verbal disruptions (e.g. filled and unfilled pauses, reformulations, incomplete and abandoned utterances, etc.) are found commonly in the spoken language of individuals with PNFA and ALS (Ash et al. 2006; Roberts-South et al. 2012; Strong et al. 1999).

Syntax and grammar impairments are salient characteristics of agrammatic variants of PPA, manifesting in both discrete (Thompson and Mack 2014) and spontaneous spoken language tasks (Ash et al. 2006). However, these impairments are not exclusive to this form of non-AD dementia, with an increased prevalence of syntax/grammar errors also reported in ALS (Ash et al. 2014; Tsermentseli et al. 2015) and in the spontaneous spoken language of individuals with Huntington's disease (Jensen et al. 2006; Murray 2000; Murray and Lenz 2001). Overall, researchers report that the spoken language of individuals with non-AD dementias is less informative than healthy adults in conditions such as ALS (Roberts-South et al. 2012), PNFA (Orange et al. 1998) and in semantic dementia (Garrard and Forsyth 2010). Moreover, Graham et al. (2004) reported reduced lexical diversity in the language of individuals with PNFA. The spoken language of individuals with non-AD dementias is also marked by impaired narrative organization as demonstrated by a variety of coherence and cohesion measures. Narrative organization impairments have been reported in PNFA (Ash et al. 2006), semantic dementia (Ash et al. 2006) and in ALS (Ash et al. 2014; Bambini et al. 2016). Collectively, the existing body of literature provides preliminary evidence that among several types of non-AD dementia spoken language is disrupted across multiple domains, including productivity, informativeness, syntax/grammar accuracy and content/completeness.

The use of structured discourse tasks is of considerable value in understanding the manifestation of language and cognitive impairments beyond single words and sentences. The structure of such tasks facilitates a high degree of experimental control and enables researchers to examine both higher-level and discrete impairments, and to correlate them with neuroimaging and measures of cognitive and language abilities. However, it is also important to understand how language, cognitive, and motor disruptions possibly manifest in the context of less structured, conversation tasks.

To this end, Knibb et al. (2009) conducted a study in which they evaluated 15–20-min samples of semi-structured conversation between a participant (15 individuals with PNFA and 15 non-disease controls) and a researcher. The researcher introduced topics using a topic directed interview elicitation task but allowed conversation to evolve without subversion of spontaneously generated topics. The investigators conducted a linguistic structural analysis of the discourse samples. The discourse samples produced by speakers with PNFA differed significantly from controls in productivity (decreased rate and phrase length), selected markers of syntactic complexity (lower proportion of subordinate clauses, passive constructions, and embedded constructions), grammar accuracy (higher proportion of syntax errors, and closed-class word errors), and content (higher proportion of elliptical phrases, open class words, semantic errors). Individuals with PNFA also produced significantly more speech production errors. Interestingly, the samples produced by participants with PNFA did not differ from controls in the proportion of verb arguments, inflected verbs, contracted word forms, or modifier phrases/word. The Knibb et al. study is of importance because it extends findings of language form and content disruptions from monologic discourse tasks to conversation in a subtype of non-AD dementia. Extending findings of linguistic and structural level disruptions from monologic discourse tasks to conversation will help inform how these deficits contribute to pragmatic communication difficulties in non-AD dementias.

In summary, studies of non-AD dementias using structured discourse provide strong evidence of language and cognitive-communication impairments at the spoken discourse level that may not always be apparent using single word and sentence tasks. However, much work remains to be done. To date, research in non-AD dementias in relation to spoken language are largely limited to a few dementia subtypes. As such, there remains the crucial need to understand more broadly, for the purposes of diagnosis and/or intervention planning, how spoken language disruptions contribute to and/or overlap with pragmatic communication impairments across the spectrum of non-AD dementias.

14.3.4 Comprehension of Non-Literal Language in Non-AD Dementias

The published literature to date on pragmatic communication abilities has focused primarily on production-related performances in non-AD dementias. In studies of the comprehension of sarcasm versus sincere statements in non-AD dementias, researchers have typically employed tasks that are dependent on paralinguistic cues for disambiguating literal from non-literal meanings. In contrast, linguistic devices such as metaphors, idioms, and proverbs rely on higher-level language skills in addition to contextual cues. Disambiguating non-literal meanings from semantically ambiguous statements requires preserved knowledge and access to alternate meanings for polysemous words, semantic knowledge of events, and links between and among concepts. It is important to point out that figurative language can be used to convey mental images of events or meaning more efficiently and more precisely, and in a more culturally contextualized way than lengthier, semantically laden descriptions dependent solely on literal meaning. As such, figurative and other non-literal forms of language are important linguistic devices in the context of comprehending social language and pragmatic communication.

Kaiser et al. (2013) reported that even after adjusting for age, individuals with bvFTD made more errors in proverb interpretation than those with AD. Interestingly, the tendency to produce concrete interpretations of proverbs in the bvFTD group was greater for familiar (common) proverbs versus unfamiliar (less common) proverbs. Kaiser and colleagues' findings that concrete responses to common proverbs correlated with performance on semantic tests and that concrete responses to uncommon proverbs correlated with performance on executive function tests underscores the complexity of figurative language impairments in non-AD dementias. Importantly, these findings also highlight the potential for semantically driven comprehension impairments in pragmatic communication, even in non-AD dementias such as bvFTD in which individuals do not exhibit language form and/or content impairments as a part of their core diagnostic criteria. Consistent with social cognition impairments, Kaiser et al.'s neuroimaging findings implicate disruptions to the frontotemporal network in figurative language impairments in non-AD dementias.

Very little published literature exists on pragmatic communication abilities in Huntington's disease (HD), a hereditary movement disorder that ultimately progresses to include dementia, neuropsychiatric, and/or behavioural disturbances. However, the available studies focus largely on figurative language comprehension. Unlike FTD, HD predominately affects subcortical structures and their thalamocortical connections. Consistent with FTD, individuals with HD suffer significant issues processing figurative language. Using the Test of Language Competence-Expanded (Wiig and Secord 1989), Chenery et al. (2002) found that individuals with HD differed from controls in their ability to interpret alternative meanings of sentences containing lexical and structural ambiguities, in making inferences based on causal relationships in heard narratives, and in interpreting metaphors. Their finding that individuals with HD experience difficulty in interpreting implied information from paragraphs presented aurally is consistent with findings reported by Murray and Stout (1999).

The profile of figurative language comprehension impairments in other non-AD dementias remains unclear, in large part due to a modest body of literature. However, collectively studies published to date suggest the possibility that disambiguating non-literal language that is both dependent and non-dependent on paralinguistic cues is problematic in non-AD dementias. Observed consistently across several subtypes, these findings suggest that impairments in non-literal language interpretation may contribute to pragmatic comprehension impairments in non-AD dementias. This is a critical area for future research in non-AD dementias.

In Sect. 14.3, we reviewed multiple factors that contribute to the presence of pragmatic language impairments in non-AD dementias. The findings from these studies underscore the importance of including pragmatic language impairments in the clinical diagnostic profiles of individuals with non-AD dementias, particularly those with frontotemporal involvement. These social cognition impairments (i.e. theory of mind, perspective taking), behavioural and neuropsychiatric disruptions (e.g. restlessness, inappropriateness, apathy), language structure and content impairments (e.g. word retrieval, syntax, coherence and cohesion in discourse), and non-literal language impairments (e.g. metaphors, idioms) can contribute to and overlap with impaired pragmatic communication abilities in the conversations of individuals with non-AD dementias. Such impairments at the conversation level impact substantially on the quality of life of individuals living with non-AD dementias and their families.

14.4 Pragmatic Abilities in Conversation in Non-AD Dementias

In contrast to the growing body of literature on social cognition and language form/content impairments in non-AD dementias, there is scant literature that addresses the expression of pragmatic language impairments, from a dyadic perspective, in the conversations of individuals with non-AD dementias. To date, this research has focussed almost exclusively on individuals with FTD variants of non-AD dementias, largely on those with bvFTD and semantic variant FTD. The majority of studies reported in the literature utilize one of two methodologies: (1) observer judgments of conversation behaviours using comprehensive rating scales or checklist batteries or (2) use of ethnographic discourse methodologies to understand conversation behaviours relative to the surrounding context and interlocutor behaviour. While a few larger, observational, comparator-group studies are published, many of the studies in the current literature are single case-study observations.

To our knowledge, only one study has published a comprehensive profile of pragmatic impairments within a single non-AD dementia cohort. Bambini et al. (2016) used a novel comprehensive test of pragmatic impairment, the Assessment of Pragmatic Abilities and Cognitive Substrates (APACS; Arcara and Bambini 2016) that evaluates conversation production (language and pragmatic perspectives), narrative comprehension, figurative language, and humour interpretation and produces a total pragmatic composite score. These researchers studied 33 individuals with ALS and reported that as a group they were significantly more impaired than healthy controls on all domains of pragmatic communication. Because studies such as Bambini et al. (2016) are limited in number, conducting a systematic, cross-study comparison is challenging. Notwithstanding these challenges, several impairment-based themes do emerge including difficulties in social engagement, mutual eye gaze, topic management/turn taking, and signalling and negotiating conversation breakdowns. Importantly, this modest body of literature highlights the immense complexity in understanding pragmatic language impairments in the conversations of individuals with non-AD dementias.

14.4.1 Social Engagement and Attentiveness

The collective clinical research experiences of the authors, reports from family members (Purves and Phinney 2013) and studies applying ethnographic discourse analysis (Mikesell 2009) suggest that individuals with non-AD dementias are motivated to engage in social and conversational exchanges with both familiar and unfamiliar partners. Despite this, research studies employing rating scales and observer judgments report consistently that individuals with non-AD dementias are often perceived as less socially attentive. That is, they do not demonstrate the expected verbal and/or non-verbal markers of social engagement to the same degree as healthy older adults.

Rousseaux et al. (2010) used the Lille Communication Test (Rousseaux et al. 2001) to evaluate pragmatic abilities of individuals with AD (n = 29), frontal variant FTD (i.e. bvFTD; n = 16), dementia with Lewy bodies (n = 13), and age-matched controls (n = 47). Conversation samples were elicited using a semi-structured interview between the participant with dementia and a researcher. Participants in the bvFTD group were distinguished from the AD and the Lewy body groups by the severity of their pragmatic impairments. Rousseaux and colleagues reported that the three disorder groups differed from controls along multiple domains of pragmatic language. However, only individuals with bvFTD were judged as less motivated for social conversation, with significantly lower ratings for 'level of engagement' and 'attentiveness' during conversation compared to the other disease groups and to healthy controls.

Rousseaux et al.'s (2010) findings are consistent with those of Gola et al. (2015) who evaluated social attentiveness during video-recorded, conversation-based, personal history interviews using a composite variable derived from the four subsections of a standardized measure of social engagement, the Two-Dimensional Social Interaction Scale (2DSIS; Tse and Bond 2001). The 2DSIS was used by independent observers to judge the quality of individual interactions along the dimensions of interpersonal indifference, attentiveness, reservedness, and detachment. Gola et al. (2015) reported that both individuals with bvFTD and those with semantic variant FTD were judged as significantly less socially attentive than their age-matched peers in both the healthy and in the AD groups. In contrast, the AD group did not differ significantly from healthy controls in the judges' perceptions of social engagement. These potential mismatches between actual and perceived motivation for social engagement can have negative impacts on communication relationships between persons with non-AD dementias and their interlocutors, leading to further social isolation for persons with dementia and their families.

One potential feature of conversations in non-AD dementias that may underlie perceptions of reduced social engagement is the finding that these individuals produce less language volume, less informative language, initiate fewer conversations, and engage in fewer exchanges of information within a conversation (Healey et al. 2015; Kindell et al. 2014; Mikesell 2009, 2010; Rousseaux et al. 2010; Taylor et al. 2014). Economy of language and reduced productivity can result from several factors in non-AD dementias. However, chief among these are the language challenges and neuropsychiatric impairments (e.g. apathy, depression) that often are a part of these dementias. The finding of lower language productivity in the context of conversation in non-AD dementias is consistent with reductions in language volume and productivity reported in studies sampling language using monologic (e.g. highly structured, non-dyadic) tasks (see Sect. 14.3.3). Therefore, it is possible that greater economy of language (Mikesell 2010; Rousseaux et al. 2010; Taylor et al. 2014), fewer conversational turns (Mikesell 2009, 2010; Rousseaux et al. 2010; Taylor et al. 2014), and less language content (Healey et al. 2015) contribute to the perception that individuals with non-AD dementias are less engaged in and/or are less motivated for conversation.

However, the study by Gola et al. (2015) calls into question the presumption that less language output contributes solely to the perceptions of reduced attentiveness. As part of their larger study, Gola et al. explored the use of storytelling as a linguistic device in personal history interview conversational exchanges between individuals with non-AD dementias (bvFTD, semantic variant FTD), individuals with AD, healthy age-matched controls and an unfamiliar interlocutor (i.e. the researcher). They reported that individuals with non-AD dementias were just as likely to use storytelling to convey messages in the context of conversation exchanges (i.e. 90 % of stories were characterized as autobiographical) as the AD and healthy adult participants. These researchers further reported no significant differences among groups in the total amount of language produced or in the number of stories produced within conversational exchanges. Despite no appreciable differences in language output or the types of linguistic devices (i.e. stories) used to convey information, the participants with non-AD dementias in Gola et al.'s study were rated consistently as less attentive during conversation. This suggests that perceptions of reduced social engagement may in part be dissociable from amount of language output, at least in the earlier stages of non-AD dementias.

Alternatively, the level of engagement and inattentiveness may also be topic dependent and/or interlocutor dependent. Using ethnographic discourse analyses, Mikesell (2009) reported on the conversation patterns of an individual with bvFTD and his interlocutors. Conversations were recorded during mealtimes in the home. Conversation exchanges involved a variety of interlocutors including a spousal communication partner and a familiar, professional, caregiver communication partner. A review of Mikesell's data suggests that engagement and attentiveness levels were highly variable across conversation partners and topics. Our own anecdotal observations are consistent with Mikesell's (2009, 2010) data. They suggest that level of engagement, attentiveness, and quantity of output are highly variable in bvFTD (and other non-AD dementias), with greater engagement/attention locally and briefly for topics of high interest/saliency and reduced engagement/attention globally over the entire conversation. As such, studies that employ global rating scales of engagement that evaluate social attentiveness for the conversation as a whole versus individual exchanges within a conversation sample may underappreciate the nuanced ways in which individuals with non-AD dementias demonstrate engagement. In other words, judging level of social engagement within individual conversational exchanges versus aggregating perceptions across all exchanges at a global level may be more representative of social attentiveness abilities in non-AD dementias (Mikesell 2009, 2010).

In non-AD dementias it is plausible that behavioural and gestural factors such as physical restlessness during conversations (e.g. wandering, fidgeting), reduced gestural use and facial expression (Rousseaux et al. 2010), and reduced eye contact (Rousseaux et al. 2010; Sturm et al. 2011) may contribute to the perceptions of reduced social attentiveness. The perceptions of reduced social engagement also may arise from neuropsychiatric symptoms such as apathy, a common feature of many of the non-AD dementias. Rousseaux et al.'s (2010) reports of hypomimia (e.g. reduced facial expression resulting from motor impairments and/or reduced emotional processing abilities) and reduced gestural responsiveness may reflect the downstream effects of emotional processing disorders in bvFTD (Kumfor and Piguet 2012; Savage et al. 2014). While there are limited systematic studies of gestural expression in conversation for other variants of non-AD dementia, the emotional processing disorders observed in other non-AD dementias (Kumfor and Piguet 2012; Mason et al. 2015; Savage et al. 2014) support the hypothesis that reduced gestural expression may contribute to perceptions of attention and engagement in the conversations of non-AD dementia, globally.

Collectively, these studies highlight several important points. First, they suggest that reduced social engagement/attentiveness may be a feature that discriminates some non-AD dementias from the dementia associated with Alzheimer's disease. This could be of importance, clinically, in the early stages of disease when diagnosis of non-AD versus AD dementia can be ambiguous. Second, these studies further highlight the potential complexity of reduced social attentiveness in that several factors such as reduced language output, reduced conversational turns, apathy, reduced eye contact, and impaired gestural/facial expression may be associated with perceptions of reduced engagement during conversation. Third, these studies point to the importance of focusing on engagement at a local level within a conversation turn/topic, in addition to globally, across the conversation as a whole. Because social attentiveness and engagement may be an important outcome measure for pharmaceutical interventions in non-AD dementias that target social cognition and emotional processing, optimizing how we measure social engagement during conversation has important implications for future research.

14.4.2 Eye Contact and Mutual Gaze in Non-AD Dementias

An important channel of nonverbal collaborative communication is eye contact and mutual gaze. Mutual gaze facilitates engagement during conversation, modulates physiological responses of arousal during communication, and facilitates nonverbal negotiations of dominance in conversation exchanges (Mazur et al. 1980). Reduced mutual gaze may signal lack of interest whereas excessive mutual eye gaze may influence perceptions of dominance in conversation (Mazur et al. 1980). Studies using caregiver report and pragmatic rating scales reveal that eye contact is altered in non-AD dementias (Rousseaux et al. 2010), yet few studies have explored this behaviour using physiological measures. Sturm et al. (2011) used temporally synchronized video and physiological recordings (e.g. heart rate, finger pulse amplitude, general somatic activity) to investigate differences in mutual eye gaze and in individual eye gaze during conversations between familiar conversation partners in which one of the partners had dementia (i.e. AD, bvFTD, semantic variant FTD). Performances were compared to healthy control dyads in which neither partner had dementia. Researcher ratings of mutual eye gaze in 5 s time epochs across 15 min of natural (i.e. non-directed, self-generated topics) conversation suggested that compared to control dyads, bvFTD dyads (i.e. dyads in which one member had bvFTD) exhibited less mutual eye gaze. This robust finding was driven by asymmetrical reductions in individual eye contact by the person with bvFTD versus their interlocutor.

An opposite pattern was seen in the conversations of individuals with semantic variant FTD and their interlocutors. The duration of mutual gaze was increased, a finding which was driven by symmetrical increases in individual eye gaze between interlocutors (i.e. both interlocutors increased in the proportion of individual eye gaze, equally). These results contrast with no differences in mutual eye gaze for dyads with AD versus dyads with two healthy adult interlocutors. Overall, individuals with semantic variant FTD were less responsive than controls during conversations as shown by the physiological data which suggested a state of lower reactivity or lower arousal during conversation. For the non-AD dementia participants, the degree of mutual gaze correlated negatively with scores on the Neuropsychiatric Inventory (Cummings et al. 1994), specifically the items for disinhibition and apathy. In other words, as disinhibition and apathy increased, mutual eye gaze decreased. These findings can be interpreted as evidence of a potential relationship between neuropsychiatric features of non-AD dementias and pragmatic language abilities.

To our knowledge, there are no published studies investigating mutual gaze in other variants of non-AD dementias. However, in our collective clinical research experiences we observed similar patterns of overly persistent mutual eye gaze and failure to disengage from eye contact appropriately in individuals with PNFA, an agrammatic variant of FTD. We observed that in conversations with multiple interlocutors, individuals with PNFA are slower to extinguish eye contact with one conversation partner and also to re-engage eye contact appropriately with a second interlocutor during changes in conversation turns. For example, we frequently observed that individuals with PNFA maintained their visual attention and eye gaze on one speaker even after that speaker's turn ended and a second interlocutor initiated their conversational turn. In participants with bvFTD, we observed greater variability, with some individuals showing prolonged mutual gaze and others demonstrating reduced eye contact/mutual gaze. The anecdotal observation from our clinical research data that individuals with PNFA display difficulty tracking multiple interlocutors across conversation turns using eye gaze behaviours may be an independent indicator of pragmatic impairment or may result from language and cognitive impairments affecting processing speed and accuracy. Overall, our anecdotal observations, studies of behavioural measures (Rousseaux et al. 2010), and physiological measures (Sturm et al. 2011) suggest that individuals with non-AD dementias may experience difficulty attending and/or responding to social cues provided by interlocutors for modulating mutual eye gaze.

Although more work is required, it is interesting to note that increased eye gaze may be a common communication feature of those non-AD dementias with prominent language presentations (i.e. semantic and agrammatic variants of frontotemporal dementia). Interestingly, reduced or highly variable mutual eye gaze may be more common in bvFTD. This raises the possibility that increased mutual eye gaze, and/or abnormal extinction of eye gaze, may be a necessary strategy to support conversation in the presence of declining language abilities. Thus, it is plausible that increased exposure to facial expression cues, facilitated by increased mutual eye gaze, may aid in resolving language form and content ambiguities that may interfere with conversation effectiveness in some non-AD subtypes. Given the importance of eye contact in conversation and its role in pragmatic communication, well-controlled, conversation-based studies are warranted to explore further the nature of mutual eye gaze impairments in non-AD dementias.

14.4.3 Topic Management and Turn Taking

In the Rousseaux et al. (2010) study that employed the Lille Communication Test (Rousseaux et al. 2001) as a basis from which to analyse conversation samples of individuals with non-AD dementias, individuals with bvFTD were significantly more impaired than controls in select aspects of topic management and turn taking. Individuals with bvFTD demonstrated greater challenges organizing discourse, responding to open-ended questions, adapting to interlocutor knowledge, adding expressive affective information to enhance or disambiguate meaning, and elaborating or adding new information to a topic. While individuals with AD also exhibited challenges in topic elaboration, the remaining topic management and turn-taking, pragmatic impairments were observed uniquely in the bvFTD group, distinguishing them from controls but also from the AD and dementia with Lewy bodies groups. The difficulties observed by Rousseaux and colleagues are also consistent with the finding of reduced conversational turns in individuals with FTD reported by Taylor et al. (2014). In her case study of a gentleman with bvFTD, Mikesell (2009, 2010) reported that overly efficient responses, lack of elaboration and contribution of new information, and insufficient details dominated the conversational discourse of her subject. Topic management difficulties also have been reported in a single case study of pragmatic language in corticobasal degeneration (CBD), a variant of non-AD dementia (Donovan et al. 2007). Donovan and colleagues used the Pragmatic Protocol (Prutting and Kirchner 1987) to evaluate conversation samples from a gentleman with CBD. In these samples, three trained judges rated 62 % of items on the pragmatic scale as ‘inappropriate’. Chief among these markers of pragmatic impairment in this case of CBD were challenges in topic management and turn taking.

In our collective clinical research practices, challenges in topic management and turn taking are frequently observed in non-AD dementias. However, the manifestation of these impairments can be variable both across subtypes but also within individuals of the same subtype. Variable initiation of conversation and reduced spontaneous introduction of topics has been reported by family members in semantic variants of FTD (Kindell et al. 2014; Purves and Phinney 2013) and in Huntington’s disease (Hartelius et al. 2010). Moreover, slowed responses and language planning deficits can contribute negatively to topic management and turn-taking behaviours in both fluent (i.e. semantic variant) and non-fluent or agrammatic variants of non-AD dementias (i.e. PNFA, progressive supranuclear palsy). However, turn taking in conversations can also be disrupted secondary to excessive but empty language production in subtypes of non-AD dementias. For example, anecdotal evidence from our research laboratories suggests that in early semantic variant FTD and in some bvFTD cases, individuals produce excessive language with reduced use of pauses for signalling conversation turns. This type of language pattern can result in a higher prevalence of interruptive behaviours and overtalk. As such, excessive language behaviours can be as disruptive to social language as economized language behaviours. These data and anecdotal observations highlight the complexity and variable presentations of topic management and turn-taking impairments in non-AD dementias.

There is growing evidence that a hallmark of the pragmatic language impairment in individuals with non-AD dementias lies in the realm of difficulties initiating, maintaining, and navigating changes in speaker turns within the context of conversation. However, most of this research has been conducted using global rating scales that evaluate conversation as a 'whole' versus by individual turns or exchanges. As such, these studies may fail to detect linguistic adaptations used by individuals with non-AD dementias to maintain topics, to prolong the duration of their conversational turn, and to propel the conversation forward (Mikesell 2010). Emerging work from researchers using ethnographic discourse analyses indicate that some individuals with non-AD dementias may develop a strategic approach for navigating difficulties in topic management resulting from language structure and content impairments. One such linguistic device is referred to as 'enactment'. Enactment is defined as the use of direct reported speech and gestures to demonstrate or to convey the words and events portrayed by the talk of another (Kindell et al. 2013). An example of enactment from one of our clinical research participants is presented below. In the following sample, JR, a 63-year-old retired salesman with early-stage semantic variant FTD, is asked about how he met his wife (italics are used to indicate language and nonverbal behaviour coded as enactment):

JR: I just happen to meet her one weekend.
JR: *She gone [stands up walks in place with exaggerated arm movement].*
JR: *She was [moves hands around in air] just somewhere else.*
JR: Where I was kinda living there [laughs].
JR: Anyways and I thought Oh wow [*gestures hand over heart in a heart beating motion*].
JR: *And she said "I like him very much.*"
JR: *"I want to be a you know wanted to be a I want to help...*
JR: *Work in a you know [gestures giving a shot in his upper arm]"*
JR: And as time…
JR: And she was only in grade 11 at the time when I was in University.
JR: *But then she said she wanted "I'm gonna be a nurse and go down in Hamilton"*.
JR: And I thought that was good 'cuz I knew where that was.

In this excerpt, JR is able to extend his conversational turn and to mark his place in the conversation for a longer duration of time via the use of enactment. Similarly, Kindell et al. (2013) reported on the use of enactment collected from naturalistic conversations reported in the home environment between their participant (a 71-year-old man with semantic variant FTD) and his spousal interlocutor. In these exchanges, Kindell and colleagues interpreted the use of enactment as a device that the participant used effectively to elaborate on topics, to convey content, and to maintain his conversational turns for longer durations than he could have otherwise done given the problems he experienced in word retrieval and spoken language.

Repetition is another compensatory linguistic device used spontaneously for conversation topic management in the presence of pragmatic impairments in non-

AD dementias. Saldert and Hartelius (2011) interpreted the use of repetition (e.g. repeating all or part of an interlocutor's preceding statement) as a linguistic strategy for initiating and maintaining conversational turns in Huntington's disease. The authors concluded that repetition, a linguistic behaviour often misinterpreted as echolalia, a pragmatically inappropriate behaviour in Huntington's disease, is a valuable adaptive strategy used to facilitate conversation flow and to mark/maintain conversational position.

En masse, the existing literature underscores the pervasiveness and complexity of topic management and turn-taking impairments in non-AD dementias. Furthermore, it highlights the need to consider not only pragmatic impairments but also the adaptations that both individuals with dementia and their interlocutors make in the context of declining language, cognitive, and behavioural abilities (Mikesell 2009, 2010). Using ethnographic discourse methods, the studies conducted to date emphasize importantly that considering the absence/presence of markers of topic management and turn taking is not sufficient in isolation and should be considered in the context of unique mechanisms that individuals with non-AD dementias may use to mark and to maintain their positions in conversational exchanges.

14.4.4 Indications of Trouble and Mechanisms of Repair in Conversation

There is a small body of literature on conversational breakdowns and repairs in non-AD dementias. Findings to date highlight the contributions of both the person with non-AD dementia and their conversational partner in creating trouble sources (i.e. misunderstandings) and enacting repairs. Taylor et al. (2014) explored the nature of conversation breakdowns and repairs for individuals with primary progressive aphasia (1 logopenic variant, 1 non-fluent variant, and 1 mixed profile) and their familiar conversation partners, compared to three healthy control dyads. Individuals with PPA were of different severity levels, but all were independent with activities of daily living, and two of the three were still driving (Taylor et al. 2014).

Taylor et al. (2014) focussed on the nature, type, and effectiveness of repair sequences among their dyads. They quantified both interactive and non-interactive conversation repair behaviours. Not surprisingly, their results suggest that control dyads were more likely to initiate and to engage in interactive repairs versus those with a PPA interlocutor. The interactive repair strategies used by control dyads (two healthy interlocutors) almost always yielded a successful and efficient repair sequence. In two of three dyads where the individuals with PPA exhibited early-stage disease, the individuals with dementia were able to engage actively in conversation repairs. While the conversation partner often had to assist with completing the conversation repair, the individuals with PPA initiated the majority of repair sequences. In the remaining PPA dyad with the more impaired PPA participant, the burden of initiating repairs fell predominately on the conversation partner.

These findings suggest that as PPA progresses and language problems become more severe, awareness of or the ability to initiate repairs decreases in these variants of non-AD dementia. In other words, Taylor et al.'s data indicate that as disease severity increases in non-AD dementia, the burden of identifying breakdowns and initiating repair sequences shifts toward the unaffected partner. Although there is a shift in the burden of conversational repair with increased disease severity, the majority of repairs in the PPA dyads in early/mid stages of disease were interactive. This work underscores the importance of considering dyad-based interventions that focus on mutual repair strategies in the early/mid stages of some non-AD dementias. These data also suggest that individuals with non-AD dementias remain engaged in conversational processes. This supports our earlier assertion that there may be a mismatch in the actual and perceived level of social engagement in non-AD dementias as a result of underappreciating strategic conversation adaptations.

Taylor et al.'s (2014) work in PPA highlights the importance of evaluating the fluid pragmatic dynamic between individuals with non-AD dementias and their conversational partners. Understanding this dynamic will facilitate a better understanding of how strategic adjustments made by partners in the context of changing cognitive and language abilities in the person with dementia can support or hinder the expression of communication competence in affected interlocutors. The findings from Taylor et al. (2014) also provide a window through which to observe this interplay. For example, when the non-impaired partner in one of the PPA dyads took on the conversation role of 'teacher' or 'therapist' and shifted the communication context to a 'testing' or 'therapeutic' context, repair sequences were less efficient and less effective. In contrast, when the partner in another PPA dyad created a communication context that was supportive, by filling in missing information or by providing choices when the person with PPA self-initiated repairs, the resultant repair sequences were more effective and efficient.

These findings and interpretations are consistent with Mikesell's (2009) case study in which she observed that the interlocutor with bvFTD was sensitive to pragmatic forces in the conversation. In exchanges where the conversation partner of an individual with non-AD dementia did not share or acknowledge his perspective of background knowledge, the individual with dementia produced a truncated output (Mikesell 2009, 2010). Additionally, Mikesell (2010) interpreted that the increased use of "I don't know" phrases and repetition behaviours by the person with dementia were attempts to assert agency or ownership of the information conveyed by the conversation partner or of the information assumed to be unknown by the person with dementia. In other words, the increased use of "I don't know" and repetition responses by the person with dementia were observed when communication partners used statements that were 'too obvious' or that assumed (erroneously) that the person with dementia had a lack of knowledge about a particular topic. This is an important observation because conversation partners of individuals with non-AD dementias may interpret the use of "I don't know" statements or repetition as signals of conversation breakdown. While in some contexts these linguistic devices may indeed be a signal for repair, in other contexts the misinterpretation of the intent to assert agency in the conversation may trigger an unnecessary repair sequence. A categorical approach to assigning the use of these linguistic devices as markers of conversation trouble versus considering their use in the dynamic context of interlocutor interactions can result in an overly penalizing view of conversation breakdowns in non-AD dementias. Consequently, researchers and clinicians should consider verbal and nonverbal signals of conversation trouble relative to the illocutionary intent of these conversation behaviours.

The findings from these studies illustrate the use of linguistic devices that could be interpreted as signalling repairs by interlocutors, but instead may reflect an illocutionary act of asserting agency or ownership of information. Moreover, the findings highlight the need to consider pragmatic dynamics in the context of conversation breakdown and to identify the compensatory pragmatic adjustments made by the partners of those with non-AD dementias. These considerations are particularly relevant within a systems-based approach to pragmatic performances, given that observations of pragmatic impairments in individuals with non-AD dementias may be primary deficits that can be categorized as more or less impaired as a result of their reactions to pragmatic shifts made by their partners. Understanding which strategies may be more or less helpful across the non-AD dementia subtypes, developing targeted education and training programs for communication partners, and enhancing social communication based interventions that are specific to the needs of individuals with non-AD dementias remain critical research needs steeped in person-centred care and evidence-informed perspectives. Increasing knowledge and competence relative to strategy use from the perspective of persons with non-AD dementias and communication partners may enhance partners' abilities to shift pragmatic perspectives and to create social contexts that support both interactive and transactional communication.

To date, there are no published estimates of how frequently pragmatic communication impairments occur in non-AD dementias. Moreover, pragmatic communication impairments are not routinely included in the salient features or diagnostic criteria of non-AD dementias. The relative oversight of pragmatic communication abilities in non-AD dementias is unfortunate, given the important role that social communication and conversation impairments play in the relationships of persons with non-AD dementias both within and external to their family units. Purves and Phinney's (2013) seminal article captures elegantly the impact of conversation challenges on family systems in a family living with a parent who suffers from PPA. Below is an excerpt of the data collected by Purves and Phinney from the family of Margaret, a woman with semantic variant FTD:

> For John and Margaret, difficulty in conversation was an ever-present part of everyday life, affecting the interaction between them and their joint interaction with others. (p. 293)

> … all family members also recognized and described how these changes in conversation presented challenges in their on-going relationships with Margaret and, for her children in particular, led to concerns about her becoming ever more isolated, even within their family. (p. 295)

These observations reinforce the need to maintain and to preserve social engagement and conversation in the presence of non-AD dementias. These observations also highlight the critical importance of increasing our understanding of the nature and impact of pragmatic communication abilities in non-AD dementias. Future research must address these critical issues.

14.5 Summary

The non-AD dementias, particularly those among the primary progressive aphasia variants of frontotemporal dementia, are defined clinically by symptoms of language form and content. Pragmatic language impairments are not included in these or any of the non-AD variant clinical profiles and/or diagnostic criteria. Although the research data to date are limited, there is emerging and convincing evidence to suggest that pragmatic language abilities are reduced in multiple subtypes of the non-AD dementias including primary language variants, variants with motor symptoms, and behavioural variants. For some conditions such as bvFTD, defined typically by its absence of language symptoms, pragmatic language impairments, manifesting as the downstream effects of social cognition impairments, may actually be a hallmark of the disease. Importantly, the profile of pragmatic language impairments in non-AD dementias may distinguish them from dementia associated with AD. Future research is warranted to develop distinctive profiles of pragmatic language impairments in non-AD dementias and to reveal the complex interplay and contributions of underlying cognitive, linguistic and social cognitive factors. Perhaps most importantly, future research efforts should address the development and testing of client-partner centred, evidence-informed, pragmatic communication education and training programs.

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Chapter 15
Parkinson's Disease Without Dementia

Thomas Holtgraves and Magda Giordano

Abstract Although viewed primarily as a motor disorder, Parkinson's disease (PD) is also associated with a variety of communication and cognitive deficits. In this chapter, we review research on pragmatic deficits in PD, as well as related cognitive processes that can contribute to those deficits. A variety of comprehension deficits have been demonstrated in PD, including deficits in the speed and accuracy with which non-literal meanings and speech acts are recognized, as well as an impaired ability to recognize emotions. These deficits overlap somewhat with various executive functions (e.g. working memory) and theory of mind abilities. Individuals with PD are also impaired in terms of language production, possibly in part because of their comprehension deficits. Major production deficits include reduced informational content, longer and more frequent pauses and associated turn-taking disruption, inappropriate levels of politeness, and deficits in various nonverbal accompaniments. The extent to which these production deficits are associated with general cognitive decline remains somewhat unclear. There is evidence that the severity of pragmatic deficits in PD is associated with greater disease severity, and that dopaminergic medication can reduce some of these deficits.

Keywords Comprehension deficit • Non-literal language • Parkinson's disease • Politeness • Pragmatics • Production deficit • Theory of mind

15.1 Introduction

Parkinson's disease (PD) is a neurodegenerative disorder which affects over 1 % of the elderly population aged 65 years and over (Driver et al. 2009; de Lau et al. 2004). Because of the increasing size of the elderly demographic, the absolute

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number of individuals diagnosed with PD is increasing and will continue to increase in the near future. Traditionally, PD has been classified as a movement disorder, one resulting primarily from the loss of dopaminergic neurons in the basal ganglia, particularly in the pars compacta of the substantia nigra. The primary motor deficits associated with PD include rigidity, bradykinesia, resting tremor, and postural instability. More recently, however, researchers have documented a myriad of non-motor deficits associated with PD including deficits in short-term memory and executive functions (see Tagliati et al. (2014) and Garcia-Ruiz et al. (2014) for reviews). Included in these non-motor deficits are pragmatic deficits which are the focus of this chapter. This is a relatively new area of research with most work being conducted in the past 20 years. We include in our review research on mechanisms that may underlie pragmatic performance in PD which may be relevant for understanding the nature of the pragmatic deficits in this population.

We structure this chapter as follows. We begin by summarizing research on comprehension deficits in PD. We consider pragmatic comprehension deficits as well as related language and cognitive processes that potentially contribute to comprehension deficits. We also consider the possible role played by executive cognitive functions and theory of mind (ToM) in these deficits. In the second half of the chapter we consider production deficits, again focusing primarily on pragmatic production deficits but considering as well other production deficits that may contribute to pragmatic production deficits. In the summary section we highlight the major findings in these areas, note certain patterns that have emerged, and discuss different possible theoretical mechanisms that may account for these pragmatic deficits.

15.2 Comprehension Deficits

In this section we review research on comprehension deficits in PD. We begin with a review of empirical research focusing explicitly on pragmatic comprehension deficits. This is followed by a section reviewing research on related deficits in language and cognitive processes, deficits that may contribute to pragmatic comprehension deficits. Finally, we consider more broadly two mechanisms – executive functions and theory of mind – that might partially account for pragmatic comprehension deficits in PD.

15.2.1 Pragmatic Comprehension Deficits

By pragmatic comprehension we are referring to the comprehension of meaning that cannot be derived exclusively from sentence meaning. It is, in general, what a speaker intends to convey with an utterance. Pragmatic comprehension involves multiple processes and there is disagreement regarding the specific nature of these processes. In this section we review research on the comprehension of speech acts and non-literal language (e.g. indirect replies, humor, metaphor and irony).

15.2.1.1 Non-literal Language

In terms of indirect meaning, Grice (1975) made an important distinction between generalized implicatures and particularized implicatures. The former (e.g. conventionalized idioms) are usually recognized independent of the context within which they occur. For example, people typically interpret the utterance 'She let the cat out of the bag' to mean she revealed a secret regardless of context. In contrast, particularized implicatures are completely context dependent and cannot be generated without reference to the context within which they occur. A classic example of a particularized implicature would be an indirect reply to a question, that is, a reply (e.g. 'It's hard to give a good presentation') that does not fully answer the question (e.g. 'What did you think of my presentation?') and hence triggers inferential processing (e.g. she didn't like my presentation) on the part of the recipient (Holtgraves 1998).

McNamara et al. (2010) investigated a potential deficit in PD in processing particularized implicatures, in this case indirect replies. Non-demented participants with PD and matched control participants read question-reply exchanges. On the critical trials the reply either did (indirect reply) or did not (control reply) violate the relation maxim (i.e. make your contribution relevant). After indicating comprehension of the reply, participants performed a sentence-verification task for sentences that were paraphrases of the indirect meaning of the reply. If the indirect meaning is activated at comprehension, then participants should be faster at making this judgment when the target follows an indirect reply than when it follows a control reply. Control participants did demonstrate activation of the indirect meaning of indirect replies, but the participants with PD did not. Correlation analyses indicated that the degree of activation of indirect meaning was not significantly related to disease severity and medication level, although there was a marginally significant correlation with a measure of executive function (the Stroop test).

Much humor is indirect in the sense that inferencing is required to 'get' the joke. And often times getting the joke involves generating a particularized implicature. The examination of humor comprehension in PD has been relatively rare. However, Thaler et al. (2012) did examine humor appreciation in medicated participants with PD and matched control participants. Overall, participants with PD were found to have a significantly poorer sense of humor than control participants. Importantly, this humor deficit was strongest for non-obvious humor content, that is, content which is most likely to require a particularized implicature for comprehension.

One class of non-literal language that has received a substantial amount of research is the comprehension of metaphor and irony. Berg et al. (2003) investigated 'high-level' language comprehension in individuals with PD who had normal cognitive status and matched controls. High-level language comprehension was assessed with a variety of subtasks including word definition, metaphor comprehension, sentence repetition, and making inferences. Although participants with PD performed more poorly than the control participants on all tasks, only two differences were statistically significant: making inferences and sentence analysis (name the number of words in a verbally presented sentence). The former is typically regarded as a pragmatic comprehension deficit. The Mini-Mental State Exam (MMSE; Folstein et al. 1975) was included in the test battery and was strongly correlated with overall language performance.

Monetta and Pell (2007) examined metaphor comprehension in medicated individuals with PD and matched controls. For this task, sentences taken from Gernsbacher et al. (2001) were presented on a computer screen and participants indicated whether or not the sentence made sense. Participants with PD committed more errors and were slower than the control participants. Follow-up analyses, however, indicated that this difference occurred only for participants with PD who had significant working memory impairment. Participants with PD whose working memory was equivalent to that of the healthy controls did not display impaired metaphor processing. In addition, metaphor comprehension deficits were related only to working memory capacity and not to other characteristics of PD (e.g. disease stage).

Monetta et al. (2009) investigated irony comprehension in PD and the possibility that any impairment in this domain might be closely associated with ToM reasoning capabilities (see Sect. 15.2.3). Non-demented participants with PD and control participants read narratives ending in either a lie or an ironic statement and were asked whether the final statement was a lie or a joke. Accurate irony identification, but not lie identification, was significantly lower for participants with PD relative to control participants. For the PD group, two measures of frontal lobe functioning, verbal working memory and verbal fluency, were related to ToM reasoning and irony interpretation, respectively, during the story task. Consistent with these authors' prior research on metaphor interpretation (Monetta and Pell 2007), this pattern supports the importance of working memory in pragmatic interpretation.

More recently, Papagno et al. (2013) examined processing of different types of idioms. Participants with PD and healthy control participants made plausibility judgments for literal and idiomatic sentences containing action verbs. In addition, there was a set of control sentences containing a non-action verb. Idiomatic sentences were relatively ambiguous (i.e. both the literal and idiomatic meanings were possible). Reading times for the section of the sentence disambiguating the verb and for plausibility judgments along with judgment accuracy were measured. Participants with PD performed the task both on and off medication, with the order counterbalanced. The performance of participants with PD and control participants was analyzed separately and no tests of differences between them were reported. Reaction time and paraphrase accuracy for participants with PD on medication were similar to those of the control participants. Both were faster and more accurate for non-action verbs relative to action verbs (both idiomatic and literal). For individuals with PD off medication, reaction times for the plausibility judgments for idiomatic sentences were longer than they were for literal action and non-action sentences. The authors suggest their results support the role of dopamine in modulating prefrontal activity which is critical for interpreting ambiguous idioms.

15.2.1.2 Speech Act Comprehension

One fundamental dimension of pragmatic meaning is illocutionary force, or what a speaker intends to accomplish with an utterance. Originally articulated by speech act theorists (Austin 1962; Searle 1969), this dimension is critical for successful language use as conversations simply cannot proceed unless there is some mutual understanding of a speaker's intention. Note that in contrast to non-literal meaning such as metaphors, speech act comprehension is pervasive and is not restricted to specific subtypes of language.

Holtgraves and McNamara (2010a) conducted several experiments to investigate potential deficits in speech act comprehension in PD. In one experiment, non-demented participants with PD and matched controls performed a speech act comprehension task. For this task participants read conversational snippets which ended with a target utterance that either performed a specific speech act (e.g. brag, beg, promise, etc.) or was a carefully matched utterance that did not perform that specific speech act. Subsequently, participants performed a timed lexical-decision task for target words naming the speech act performed with the prior utterance. For control participants, reading the speech act utterances did prime the speech act verb. In contrast, participants with PD did not demonstrate this effect, suggesting that speech act activation is slowed or is not an automatic component of comprehension for people with PD. Additional analyses indicated that this speech act processing deficit occurred only for PD individuals with greater disease severity (at least stage 3 on the Hoehn and Yahr scale) and was significantly correlated with executive function on the Stroop test (Delis et al. 2001).

In a second study the same participants read scenarios and utterances and were asked to provide a single word that they believed described the action the speaker was performing with a certain remark (Holtgraves and McNamara 2010a). Participants with PD correctly identified significantly fewer speech acts than did the control participants, demonstrating a deficit in speech act recognition in PD that is independent of temporal constraints. Moreover, the size of this deficit was related to disease severity and mental status exam performance but not to motor severity or Stroop test performance. Finally, the results of this study indicated some potential meta-cognitive awareness difficulties for people with PD. Specifically, separate analyses for control participants and participants with PD indicated that the former were significantly more confident when they were correct than when they were incorrect. In contrast, participants with PD were no more confident when they were correct than when they were incorrect.

Taken together, these two studies suggest the operation of two different language comprehension processes, both of which are impaired in PD. Speech act priming is a fast and automatic process that is associated with attentional processes (as evidenced via the substantial Stroop test correlations) and recruits some of the same neural circuits as those underlying the motor dysfunction in PD (as evidenced by the substantial correlations with UPDRS). Interpretation is a slower, non-automatic process that is associated with more general cognitive capacities (as evidenced by the correlation with mental status exam performance).

15.2.2 Processing Deficits Related to Pragmatic Impairment

It is unclear the extent to which pragmatic comprehension deficits in PD are a function of other cognitive deficits. This should be a focus of subsequent research. In this section, we review research on discourse comprehension, syntactic deficits, semantic priming and emotional prosody comprehension.

15.2.2.1 Discourse Comprehension

Some of the skills required for successful interactive language use are similar to those involved in successful discourse comprehension. Comprehension of discourse involves going beyond the text in order to generate inter-sentential representations. Murray and colleagues have conducted several studies examining possible discourse processing deficits in PD. For example, Murray and Stout (1999) had participants with PD and control participants complete a battery of standardized language and cognitive tests including the listening version of the Discourse Comprehension Test (DCT; Brookshire and Nicholas 1993). The latter test requires participants to listen to twelve stories and answer questions assessing comprehension of stated main ideas, implied main ideas, stated details, and implied details. In this study, patients with PD showed significant impairment on implied information, both main ideas and details, compared to their age-matched controls. Importantly, all patients with PD were assessed during the 'on' phase of their dopaminergic medications, suggesting greater deficits may occur when individuals with PD are unmedicated and conversations are occurring in less favorable listening conditions. In contrast, when Murray and Rutledge (2014) used a written version of the DCT the difference between the participants with PD and control participants was not significant. However, the participants with PD did display significantly less accuracy, and a lower reading level, than the control participants on the Gray Oral Reading Test (Wiederholt and Bryant 2001), a test that assesses higher-level reading skills than the DCT.

15.2.2.2 Sentence/Syntactic Comprehension

Several early studies suggested the existence of syntactic difficulties in PD. Lieberman et al. (1990, 1992) used the Rhode Island Test of Linguistic Structure (Engen and Engen 1983), a test containing several different types of simple and complex syntactic constructions. In both experiments, approximately one-half of the participants with PD demonstrated reduced syntactic comprehension, especially for complex constructions. Similar results were reported by Grossman et al. (1992). The question of whether this deficit is a function of impairment to automatic, modular processes or a reduction in cognitive resources was investigated by Grossman et al. (2000). Participants with PD were asked to name the agent in sentences varying in grammatical structure while performing secondary tasks of varying difficulty. For object-relative, center-embedded sentences (e.g. 'The boy that the girl hugged is friendly'), comprehension accuracy was sensitive to the secondary task demands, suggesting that syntactic comprehension difficulties in PD are in large part due to cognitive resource limitations. Similar conclusions were reported by Grossman et al. (2002).

Friederici et al. (2003) demonstrated that early automatic syntactic processes are unimpaired in patients with PD, but late syntactic integration processes are partially affected. Patients with PD and age-matched controls listened to sentences that were either syntactically correct or incorrect while event-related potentials were recorded. While N400 (early automatic processes) were present in the patients with PD, their P600 (late syntactic integration) was significantly reduced relative to control participants. This alteration which is caused by functional deficits in the basal ganglia may be responsible for the comprehension deficits observed in many patients with PD.

15.2.2.3 Semantic Priming

Successful interactive language use requires coordination and one influential model of conversation coordination suggests that priming mechanisms are a critical component of interactive alignment (Pickering and Garrod 2014). Priming – the automatic activation of concepts, syntactic structures, and so on – allows for relatively smooth conversational interactions. There has been a substantial amount of research examining possible priming deficits, especially semantic priming deficits, in PD.

Spicer et al. (1994) conducted an early priming study in order to examine the effortful and automatic aspects of semantic activation in non-demented individuals with PD. PD and control participants made lexical decisions following primes, and the target-prime relation and stimulus onset asynchrony (SOA) (i.e. interval between the beginning of the prime until the beginning of the target) were manipulated. Although reaction times were slower for participants with PD, relative to controls, they did demonstrate overall priming effects (i.e. facilitation of target recognition) at all SOA intervals, even when responses required some shift of cognitive focus away from the prime itself (i.e. unrelated prime – target relationship). Interestingly, the participants with PD displayed relatively larger priming effects (hyper-priming) than the control participants. In a follow-up study, McDonald et al. (1996) replicated this hyper-priming effect. Their inclusion of additional neuropsychological measures such as the Wisconsin Card Sorting Test (WCST; Heaton et al. 1993) allowed them to examine possible mechanisms for this effect. These authors concluded that the hyper-priming effect in PD is due to the difficulty individuals with PD have with set-shifting (i.e. switching strategies as a function of the prime-target relationship), an interpretation which was bolstered by the significant correlation between priming and perseverative errors and responses on the WCST. Similar hyper-priming effects at short SOAs were reported by Filoteo et al. (2003). Note that hyper-priming as a result of set-shifting difficulties may account for the perseveration that patients with PD sometimes display in conversation. This is discussed in more detail in Sect. 15.2.3.

Arnott et al. (2001) conducted a semantic priming study in which they attempted to isolate automatic and controlled processes by manipulating target composition and SOA. In contrast to non-impaired participants, participants with PD displayed slower than normal semantic activation as well as extended rates of decay (i.e. the decay of semantic activation was slower for participants with PD). Participants with PD were not affected by changes in the proportion of primes and failed to use strategic processing mechanisms. In short, strategic processing was lacking and the observed semantic priming was largely automatic and prolonged. The authors suggest that these findings reflect a drop in the signal (relevant prime) to noise (irrelevant prime) ratio for participants with PD as a function of a drop in their dopamine levels.

Angwin et al. (2005) used a multiple-priming procedure (combinations of related and unrelated primes precede the target) and different SOAs. They found different patterns of semantic activation for participants with PD and non-impaired controls. Particularly noteworthy was the lack of priming at 250 ms SOA for the related-unrelated prime condition, priming that was significant for non-impaired individuals. Consistent with Arnott et al. (2001), the authors speculate that this disruption of semantic priming is a function of a reduced signal-to-noise ratio due to reduced dopamine.

More recently, the direct relationship between strategic set-shifting and pragmatic abilities was examined by McKinlay et al. (2009). Pragmatic language status was assessed with the Test of Language Competence-Expanded (Wiig and Secord 1989). Measures of attentional set-shifting, working memory, and processing speed were assessed with the Cambridge Neuropsychological Test Automated Battery (CANTAB; Owen et al. 1991), the Daneman and Carpenter Reading Span test (Daneman and Carpenter 1980) and the Delis Kaplan Executive Function System (Delis et al. 2001), respectively. All three cognitive measures were significantly correlated with pragmatic ability. However, path analyses indicated that pragmatic deficits in PD were mediated by processing speed and working memory and not set-shifting. Regression analyses indicated that processing speed was a stronger determiner of pragmatic performance than verbal working memory.

15.2.2.4 Emotional Prosody

The comprehension of pragmatic meaning involves the integration of multiple sources of information including some sense of the emotional states of one's interlocutor. Multiple studies have been conducted examining possible emotion recognition deficits in PD. The results have not been entirely consistent, however, with some researchers reporting such deficits (e.g. Ariatti et al. 2008) and others failing to detect any significant differences (e.g. Pell and Leonard 2005). Still other studies report significant deficits in PD only for some emotions (Lawrence et al. 2007) and in some modalities (Clark et al. 2008).

Gray and Tickle-Degnen (2010) conducted a meta-analysis of 34 relevant studies and reported the existence of an emotion recognition deficit in PD with a medium effect size (overall Hedge's g = .52). They included in their analysis six possible moderators: task type; emotion type; depression status; modality (face, prosody); medication; and cognitive abilities. There were no significant differences in effect size as a function of depression or medication. However, there were significant differences for emotion (the deficit was larger for negative emotions), modality (the deficit was larger for prosody than for the face), and cognitive ability (larger deficits were associated with working memory deficits). The latter occurred for prosody and not the face, an effect that makes sense given the role of working memory in processing emotional prosody.

Lloyd (1999) conducted three experiments to investigate receptive prosodic loss in individuals with PD. Although the first experiment revealed no deficits in phonological discrimination or lexical access in these individuals, a second experiment revealed impairment on lexical stress discrimination tasks. A third experiment showed individuals with PD had significant impairment on tasks related to identification of utterance prosody, in addition to comprehension deficits of utterance prosody. Such deficits suggest patients with PD may have impaired ability to distinguish emotional and linguistic nuances, an ability that may be necessary when comprehending sentence meaning that is conveyed by tone of voice.

15.2.3 Possible Underlying Mechanisms

15.2.3.1 Executive Function

There is a relatively substantial literature documenting executive function deficits in PD. In general, executive function refers to the management of a cluster of cognitive processes (e.g. planning, prioritizing, remembering, etc.) that are involved to varying degrees in goal-directed action. Common executive function measures include the Wisconsin Card Sorting Test (WCST), Stroop test, Trail Making Test (TMT; Reitan and Wolfson 1985), Digit Span backwards (DIGSP-BW; Wechsler 1955), Word Fluency (WF; Benton 1968), Tower of London (ToL; Shallice 1982) and related tower tasks. Kudlicka et al. (2011) conducted a meta-analysis of 33 studies examining executive function in early stage, non-demented, unmedicated patients with PD. Patients showed significant impairment in the Stroop test, WCST, WF, TMT and DIGSP-BW. The effect sizes were roughly similar over the measures (Hedge's g between .43 and .94) though were slightly larger for the Stroop test and WF tasks.

A recent review of this area by Dirnberger and Jahanshahi (2013) contained several interesting conclusions about executive function in PD which have potential implications for pragmatic language deficits. First, attention deficits in PD occur primarily for tasks involving internally generated cues (e.g. WCST). When an external cue is available, attention deficits for individuals with PD relative to control participants are minimized (Brown and Marsden 1988a, b). As a result, individuals with PD will have difficulty with non-routine tasks that require effortful processing, a deficit that can be manifest in unusual forms of language (e.g. particularized implicatures). Moreover, this deficit in internal cue processing likely underlies the difficulty individuals with PD have with planning, where internal cues are required, as evidenced by their inferior performance on the ToL and related tasks (Owen et al. 1992).

Second, the effects of dopaminergic medication on executive function tasks vary, improving performance on planning tasks (Cools et al. 2001) but degrading performance on tasks such as reversal learning (Swainson et al. 2000) and risk-taking (Brand et al. 2004). The generally accepted explanation for this divergence, termed the dopamine overdose hypothesis, is that dopaminergic medication benefits task performance on tests mediated by the dorsolateral fronto-striatal circuit, but overstimulates limbic and orbitofrontal circuits (circuits which are spared the loss of dopaminergic neurons in the early stages of the disease) and hence impairs tasks for which those circuits are critical. Third, executive function deficits are associated with disease severity. However, different executive functions are affected to different degrees and with different time courses. For example, planning deficits occur later than attentional deficits, and spatial working memory declines more quickly than other types of working memory (Owen et al. 1992). Finally, there is some evidence that executive function performance varies as a function of PD subtype (Lewis et al. 2005). Given the prominent role played by executive function in pragmatic comprehension and production, it is likely that these differences in executive function will be associated with variability in pragmatic performance.

15.2.3.2 Theory of Mind

The ability to ‘read’ the mind of another person has been termed ‘theory of mind’. It is related to Dennett’s (1971) idea of the intentional stance in the sense that it involves the assumption that behavior is caused by mental states (Frith and Frith 2006). Since pragmatic comprehension deficits have been found in patients with PD, and since this type of language use would seem to require the ability to read the mind of the interlocutor, an important question is whether patients with PD have difficulties in reading the minds of others. Several researchers have pursued this question, along with the related issue of whether mind-reading may be a result of decreased functionality in general domain functions (i.e. executive functions).

Bodden et al. (2010a) define theory of mind (ToM) as complex neuropsychological functions that can be dissociated into cognitive and affective components. Cognitive ToM is the understanding of the difference between a speaker’s knowledge and beliefs and the knowledge and beliefs of the listener, while affective ToM is defined as the empathic appreciation of a speaker’s or hearer’s emotional state. Cognitive and affective ToM can be impaired independently (Bodden et al. 2010a). There are two general theories regarding the mechanism underlying the ability to take another person’s perspective. The first is simulation theory which states that one projects oneself imaginatively into another person's perspective, simulating their mental activity with one's own. The second is theory-theory: mental states of others are inferred rationally by a knowledge system that is independent of one's own mental states. Simulation theory seems to explain well the affective component of ToM and theory-theory the cognitive component, although these aspects could work in parallel and one or the other may predominate depending on the situation (Bodden et al. 2010a; Freedman and Stuss 2011).

Several tasks have been developed to assess ToM abilities including the Reading the Mind in the Eyes test (RMET; Baron-Cohen et al. 1997, 2001), a task which involves the recognition of emotions expressed in photographs of the eyes of actors (used to evaluate affective ToM); the Yoni test (Kalbe et al. 2010; Shamay-Tsoory and Aharon-Peretz 2007), a task that consists of choosing one of four pictures (of Yoni) that corresponds best to a sentence that is presented on each screen (used to evaluate both cognitive and affective ToM); and various versions of the False Belief test (used to evaluate cognitive ToM) whereby vignettes describe the unexpected transfer of a person or object while one character is absent, resulting in this character holding a false belief relating to the current location of the object (Eddy et al. 2013; Apperly et al. 2004). Additional ToM tests include the *Faux Pas* test in which participants are required to identify and indicate their understanding of a character's actions (assesses both cognitive and affective ToM) (Stone et al. 1998), and the Strange Stories task (Happé 1994) in which participants are asked to explain why a character says something that is not literally true (primarily assesses cognitive ToM).

Roca et al. (2010) examined patients in the early stages of PD who were assessed on their ability to infer others' mental states using both affective and cognitive ToM tasks. Results indicate that ToM impairment can occur early in PD, with the greatest impairment involving cognitive aspects. In addition, this impairment was present even when performance on neuropsychological tests assessing executive function was unaffected. Péron et al. (2009) examined ToM deficits in medicated and non-medicated patients with PD using the *Faux Pas* test and RMET. There were no differences found between medicated and non-medicated patients in the early stages of the disease, suggesting that dopaminergic systems do not contribute to ToM abilities. However, patients in the advanced stages of PD showed deficits in intention attribution on the *Faux Pas* test relative to non-medicated patients in early stages and healthy controls. The authors propose that ToM deficits become apparent once the neurodegeneration spreads beyond the dopaminergic cells. This proposal is consistent with the finding that ToM dysfunctions are accentuated by depressive symptoms, which are related to decreased function of monoamine neurotransmitters (serotonin, norepinephrine and dopamine) (Hamon and Blier 2013).

Poletti et al. (2012) reviewed a series of studies evaluating ToM in a variety of disorders including PD. They concluded that patients with PD may present cognitive ToM deficits, but affective ToM seems to be preserved in early and moderate stages of the disease. Conclusions regarding patients in advanced stages are difficult. In addition, the authors suggest that cognitive ToM deficits are due to a decline in inhibitory function (executive function), and to difficulties in updating information in working memory.

In one of the few studies to examine the relationship between pragmatic comprehension and ToM, Monetta et al. (2009) investigated the role of ToM in irony comprehension in PD. In addition to making judgments about whether the final statement in narratives was a lie or a joke, participants responded to a series of questions which were interspersed with the story. Questions interrogated participants' understanding of the facts of the story as well as their understanding of first-order and second-order beliefs. Accurate irony identification was significantly lower for individuals with PD relative to controls. In addition, participants with PD were less accurate in their responses to both first-order and second-order belief questions, but not to factual questions, than controls. Performance on the interpretation task was related to performance on second-order belief questions, suggesting that participants use their understanding of second-order beliefs in order to generate an appropriate interpretation of the utterance in these stories. For the PD group, two measures of frontal lobe functioning, verbal working memory and verbal fluency, were related to second-order belief reasoning and irony interpretation, respectively. In this case, working memory is playing a role in pragmatic (irony) interpretation. However, it is an indirect link via second-order belief generation. (Working memory was not significantly correlated with irony interpretation, although the number of participants was very small.)

Another study examining the relationship between pragmatics and ToM in PD was conducted by Vachon-Joanette et al. (2013). Their hypothesis was that pragmatic language may be affected by frontal lobe dysfunction. The tests included a comic strip task for ToM, a metaphor interpretation task (both new and idiomatic metaphors), and various measures of executive function (working memory, mental flexibility, inhibition). They found that patients with PD had fewer correct responses for both the ToM and metaphor interpretation tasks, although these differences were relatively small. No executive deficits in individuals with PD were observed. The authors did find significant correlations between the metaphor comprehension measure and the ToM measure.

The relationship between executive function and ToM has been investigated by several researchers. Saltzman et al. (2000) had participants with PD and control participants complete ToM and executive function measures. Participants with PD performed more poorly than control participants on both measures and there were moderate correlations between them. Santangelo et al. (2012) administered both cognitive and affective ToM tests to participants with PD as well as several executive function tests including the Frontal Assessment Battery (FAB; Dubois et al. 2000) and Apathy Evaluation Scale (AES; Marin et al. 1991). Participants with PD scored significantly lower than control participants on both affective and cognitive ToM, and affective and cognitive performance correlated with different executive function tasks (cognitive ToM with FAB and affective ToM with AES).

Eddy et al. (2013) evaluated patients with PD using the *Faux Pas* test, the vignette test for false beliefs, and measures of counterfactual thinking and verbal fluency. The authors found that patients with PD, relative to controls, had poorer fluency and poorer performance on factual questions, but not on *Faux Pas* or belief questions. In terms of false beliefs, patients made more errors but they were accompanied by memory errors. In a second experiment using a different group of patients, Eddy et al. (2013) studied the relationship between working memory and false belief errors. They found that reducing information contained in ToM vignettes can improve performance, although false beliefs and memory errors were not completely eliminated. The authors concluded that patients with PD may have difficulties when inferring false beliefs, and that this deficit is partly a function of memory deficits.

In contrast, other researchers have reported relative independence of ToM and executive function in PD. For example, Narme et al. (2013) found that patients with PD showed lower empathy, lower accuracy for facial emotion recognition and lower scores in a *Faux Pas* test, and that these deficits correlated with social behavioral disorders. Although patients also showed deficits in some executive measures such as information generation and shifting, the behavioral dysfunction was not associated with these cognitive measures. Bodden et al. (2010a) also suggest that executive functions may deteriorate independently of ToM in PD, and that alterations in ToM do not depend on executive dysfunction, at least not in early stages of PD (Bodden et al. 2010b).

In terms of the neural networks that are believed to regulate ToM, Abu-Akel and Shamay-Tsoory (2011) proposed on the basis of a literature review that the prefrontal cortex, the orbitofrontal cortex and the inferior lateral frontal cortex are involved in affective ToM processing, and that the dorsal medial prefrontal cortex and the dorsal lateral prefrontal cortex are uniquely involved in processing cognitive ToM. They also reported that the striatum is active during mentalizing tasks. This finding is particularly relevant for the discussion of deficits in PD, since in this condition there is loose dopaminergic innervation in the striatum as well as the cortex, leading to altered function in these areas. More specifically, the striatum receives afferent connections from most of the cortex, and from mesencephalic areas such as the substantia nigra compacta, the source of depleted dopamine in PD. The striatum also has efferent connections with the globus pallidus and substantia nigra reticulata. These nuclei send projections to the thalamus, which in turn send efferent signals to the cortex, creating complex feedback loops between cortical and subcortical regions.

In sum, there is a small literature indicating that ToM deficits are present in PD (Bodden et al. 2010a). These deficits seem to precede the development of dementia, at least according to the Mini Mental State Examination (Folstein et al. 1975) and the Mattis Dementia Rating Scale (Mattis 1988; Freedman and Stuss 2011). Some studies suggest that these deficits worsen as disease progresses, and that in general cognitive ToM deficits appear earlier than affective ToM deficits (Bodden et al. 2010a), although there are differences among studies (Freedman and Stuss 2011). Executive dysfunction may worsen deficits in ToM. However, executive measures do not always correlate with ToM abilities. Pragmatic deficits in irony and metaphor comprehension appear to be related to ToM deficits, but the evidence is somewhat weak at this point.

15.3 Production Deficits

By pragmatic production we are referring to the production of appropriate and comprehensible conversational turns. Relative to research on comprehension deficits, there has been less research examining production deficits in PD. Moreover, it is difficult if not impossible to know whether the ability to contribute to a conversation is a production deficit or is a result of a comprehension deficit. That is, failing to respond appropriately to the utterance of one's interlocutor may reflect a deficit in the ability to formulate a contextually appropriate utterance. Or it may reflect a comprehension deficit, a failure to comprehend completely what one's interlocutor has just said. There is also a significant issue in terms of separating pragmatic deficits from motor speech deficits. That is, delayed responding or hesitations by individuals with PD may reflect a motor speech deficit (dysarthria) rather than a pragmatic deficit. Finally, the extent to which non-pragmatic language production deficits contribute to pragmatic deficits is unclear, just as the dividing line between pragmatics and other areas of language (e.g. semantics) is unclear (Levinson 2000). In this section, we broadly review research investigating possible language production deficits in PD. In doing so, we place greater emphasis on research explicitly concerned with pragmatic deficits, but include also research on other aspects of language use that may underlie or contribute to pragmatic deficits.

15.3.1 Pragmatic Production Deficits

One of the earliest reports to examine pragmatic production deficits in PD was conducted by McNamara and Durso (2003). Male non-demented participants with PD engaged in a 10–15 minute structured conversation with a member of the research team who used a set of pre-scripted, open-ended prompts. All participants were tested while on some form of dopaminergic medication. A set of control participants without PD who were matched to the participants with PD (except for age) also participated in structured conversations. The conversations were coded by the examiner either during or immediately after the conversation using Prutting and Kirchner's (1987) pragmatic protocol. This protocol is a comprehensive scheme for detecting social language skills and is organized around verbal features (e.g. topic selection, topic maintenance, turn taking, lexical variation), paralinguistic features (prosody, vocal quality), and nonverbal features (e.g. gaze, gestures).

There was a large and significant difference in pragmatic performance between the participants with PD and control participants. Participants with PD were impaired on 20.4 % of the items relative to the control participants who were impaired on only 3.8 % of the items. Participants with PD and control participants did not, however, vary significantly on measures of mental status or verbal fluency (although the scores of the former were lower than the latter on both measures), suggesting that the pragmatic impairment was not simply reducible to global cognitive deficits or poverty of speech. At the same time, there were significant differences between participants with PD and control participants on the performance of tasks related to frontal lobe deficits (Stroop test and design fluency). Moreover, for the participants with PD there were significant correlations between pragmatic deficit scores and performance on the Stroop test and design fluency measures.

A second study by McNamara and Durso (2003) examined the extent to which people with PD might be unaware of the pragmatic deficits they exhibit. To do this, a separate group of male participants with PD were asked to rate themselves on dimensions derived from Prutting and Kirchner's protocol. The spouse or significant other of each participant with PD also rated the participant using the same items. Participants with PD consistently overestimated their pragmatic abilities, relative to the ratings provided by their spouse or significant other, and these differences were significant for speech acts, lexical selection, stylistics, and conversational appropriateness. It should be noted that this study relied on relatively subjective measures of pragmatic impairment (no inter-rater reliability was reported), and there is the possibility that age differences may account for some of the deficits displayed by participants with PD. Still, this study was important and influential in documenting the existence of pragmatic production deficits in PD.

A similar study was conducted more recently by Hall et al. (2011). Participants with PD whose dementia status was not reported and who had a mean Hoehn-Yahr score of 2.5 were interviewed along with control participants. (The Hoehn-Yahr scale is a widely used clinical rating scale consisting of broad categories of progressive motor dysfunction. Scores range from 0 = no sign of disease to 5 = bedridden. A score of 2.5 indicates mild bilateral dysfunction.) Interviews were taped and then scored using the Rehabilitation Institute of Chicago's Rating Scale of Pragmatic Communication Skills (RSPCS; Halper et al. 1996). This scale evaluates ten categories of pragmatic function, four nonverbal dimensions (intonation, eye contact, facial expressions, and gesture/proxemics) and six verbal dimensions (conversational initiation, turn-taking, topic maintenance, response length, presupposition, and referencing skills). Participants with PD were significantly impaired overall, and the impairment was greater for nonverbal dimensions than for verbal dimensions. Unfortunately, there was a sex confound as the participants with PD were primarily male and the healthy controls were female, a difference that likely accounts for some of the observed difference. However, the size of the difference was so large that this confound certainly would not explain all of it. In addition, substantial correlations were reported between degree of overall pragmatic impairment and MMSE, UPDRS, and disease duration.

Holtgraves et al. (2013) examined a more specific pragmatic production deficit, the production of uninformative utterances. Non-demented participants with PD and healthy controls were interviewed regarding family, work history, daily activities, and so on. Interviews were taped and each turn was later coded by two raters who were blind to group membership in terms of degree of utterance informativeness. Participants with PD produced a significantly larger number of under-informative turns than did control participants. Moreover, degree of informativeness was significantly correlated with automatic speech act recognition (as reported in

Holtgraves and McNamara 2010a). That is, the less participants with PD were able to recognize the intention behind another person's remark, the greater their degree of under-informativeness in the interview. In addition, both speech act recognition and informativeness were significantly correlated with cognitive abilities as assessed by MMSE and Stroop test interference scores. The correlation between speech act recognition and informativeness was eliminated when controlling for Stroop test interference scores. Hence, deficits in executive control as assessed with the Stroop test appear to disrupt both pragmatic comprehension and production. One limitation of this study was group differences in age and gender composition. However, these differences were not significantly related to the informativeness measure.

One promising approach to pragmatic production deficits in PD is politeness theory (Brown and Levinson 1987). In this approach, language users are assumed to be attentive to situationally-based interpersonal considerations and to structure their utterances so as to be responsive, to varying degrees, to these considerations. In general, speakers are assumed to use enhanced politeness as a function of the degree of face-threat in the situation, with degree of face-threat being a function of both the inherent threat implicated in the act (e.g. making a large request is more threatening to the recipient than making a small request) as well as interpersonal variables including relationship distance and any possible hearer-speaker power imbalance. In general, empirical research has demonstrated that successful language users are sensitive to these concerns (see Holtgraves 2010).

Holtgraves and McNamara (2010b) examined the possibility that individuals with PD might suffer a deficit in this regard. Using a role-playing methodology, participants with PD and healthy controls were asked to indicate what they would say in various situations in which request imposition and power were manipulated. In general, participants with PD produced lower levels of politeness. More importantly, participants with PD were less sensitive to variations in request size than were healthy controls. Participants with PD failed to modulate the politeness of their requests as a function of request size to the same extent that the control participants did. Insensitivity to power differences occurred also, but only for participants who were on large dosages of medication. Specifically, participants with PD who were on higher dosage levels, relative to those on lower dosage levels and control participants, did not vary their politeness as a function of the recipient's power.

More recently, researchers have begun to analyze the manner in which conversational interactants handle some of the pragmatic difficulties that may manifest in verbal interactions with individuals with PD. In this approach, pragmatic difficulties are typically viewed as an emergent phenomenon (Perkins 2007). When treating the interacting dyad as a system, considerable complexity emerges with PD deficits impacting that system in multiple and complex ways. The approach taken by these researchers – Conversation Analysis (CA) – is a rigorously empirical approach that attempts to uncover regularities in conversation. Although there is a substantial CA literature, attempts to use this methodology in the examination of pragmatic difficulties in PD are recent and rare.

Saldert et al. (2014) and Griffiths et al. (2012) examined in detail naturally-occurring conversations between individuals with PD and non-impaired individuals (see Griffiths et al. (2011) for a more general discussion of the use of CA for analyzing PD interactional difficulties). These interactions were recorded and analyzed using common CA techniques. Several consistent patterns emerged. Griffiths et al. (2012) focused on talk overlap. Although overlapping talk occurs in conversation, it is relatively infrequent and typically handled quickly and efficiently with repair (i.e. attempts to correct) sequences (Schegloff et al. 1977). But timing is critical for these sequences to function, and since individuals with PD produce more silent pauses (Illes 1989), the integrity of this system can be undermined.

There is a strong systematic preference for self-repair over other-repair (Levinson 1983). However, due to both speech production deficits (dysarthria) and cognitive deficits, speakers with PD are at a disadvantage in initiating repair sequences. And in fact, this difficulty appears to frequently result in the deletion of PD turns at talk. Saldert et al. (2014) focused primarily on trouble sources in conversations with individuals with PD. An important contribution of their work was the identification of cognitive difficulties as contributing to the initiation of repair sequences. Specifically, 70 % of the instances of other-repair in these conversations were related to the semantic content of a turn produced by the individual with PD, typically word-finding difficulty or use of atypical wording. The approach taken by these researchers is extremely important because it points specifically to the interactional difficulties that may occur in PD, and how speech and cognitive deficits associated with PD may be magnified in interactional settings.

There have been a handful of studies examining perceptions of individuals with PD as a function of their talk. In an early study by Pitcairn et al. (1990), participants rated speakers with PD and control speakers based on dialogue produced during a semi-structured interview. Participants with PD were rated more negatively than controls on a number of dimensions. They were judged to be more hostile, unhappy, tense, anxious, and others. In terms of acoustic analysis, individuals with PD did display less pitch variation and more pauses than the controls. However, acoustic variability was not significantly correlated with any of the perceptual dimensions.

Jaywant and Pell (2010) used a similar procedure but with a larger group of speakers with PD and control speakers who engaged in a picture description task that was recorded and played for participants. Consistent with Pitcairn et al. (1990), speakers with PD were perceived to be less friendly, happy, involved and interested than control speakers. Acoustically, speakers with PD displayed lower mean intensity, high variability of intensity, and shorter total discourse duration, relative to controls. Unlike Pitcairn et al. (1990), this acoustical variability was significantly related to several of the perceived personality dimensions. In terms of perceptions of the content of talk, there was an unexpected finding. The content of the talk of speakers with PD was perceived more positively (e.g. it was judged to be more coherent, comprehensible, interesting) than the talk of the control participants. The authors speculated that the briefer descriptions provided by the speakers with PD were more to the point, and hence resulted in greater perceived coherence. In any event, the authors emphasized the negative consequences of speech in PD in that speakers with PD tend to be perceived as less friendly, happy, and involved.

15.3.2 General Language Production Deficits

In a relatively early study, Cummings (1988) examined language production in individuals with PD, both with and without various types of dementia, using the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan 1983) and the Western Aphasia Battery (Kertesz 1982). Overall, the language of non-demented individuals with PD contained lower information content and simpler syntax relative to expected, norm-based performance. Illes (1989) examined spontaneous language production in individuals with PD, Alzheimer's disease, and Huntington's disease. Patients with PD exhibited fluency disruption in the form of long-duration silent hesitations and displayed open-class verbal paraphasia. However, individuals with PD were not significantly different from controls in terms of syntax.

In a related study, Illes et al. (1988) examined similar measures of linguistic production while participants read a passage and produced spontaneous speech. In this study, individuals with PD did display lower syntactic complexity, but only those who were moderately (and not mildly) impaired. Syntactic complexity correlated with dysarthria severity and PD severity. The authors suggested that reduced syntactic complexity is a function of motor speech impairment as well as difficulty with concept formation. In addition to syntactic complexity, individuals with PD again demonstrated more pauses and more pauses per word than the non-impaired controls, as well as a significantly decreased use of interjections. The frequent use of pauses by individuals with PD was also demonstrated by Hammen and Yorkston (1996) who used a reading paradigm to elicit discourse. In addition, individuals with PD also demonstrated a tendency to pause inappropriately (e.g. within a phrase or a clause) relative to controls.

Lewis et al. (1998) used a variety of measures, e.g. Boston Naming Test (Kaplan and Goodglass 1983) and WORD Test (Jorgensen et al. 1981), to examine high-level, complex language production in individuals with PD with and without dementia. In general, participants with PD performed more poorly on many of these tasks than controls. However, the authors attributed these deficits to cognitive impairment and argued that the language tasks on which participants with PD performed most poorly required organization, information integration, and abstract thought, in other words, functions associated with the frontal lobes. Berg et al. (2003) conducted a similar study using Swedish adults and measures of overall cognitive ability (MMSE). Consistent with Lewis et al. (1998), language impairment was significantly related to overall cognitive ability.

Other research programs have examined more spontaneous language production rather than using standardized tests. For example, Small et al. (1997) examined sentences generated by individuals with differing levels of PD (with and without dementia) and control participants. They found significant differences in sentence length, number of propositions, and grammatical complexity between non-impaired controls and the participants with PD who had moderate dementia. No significant language differences were found between the controls and non-demented and mildly demented participants with PD.

Murray (2000) used a picture description task to examine language production in participants with PD and Huntington's disease. Participants with PD produced fewer grammatical sentences, as well as sentences with reduced informational content, relative to controls. A related study conducted by Murray and Lenz (2001) examined language production in conversational discourse. These authors reported no impairment in syntax in the PD group, although degree of dementia was negatively related to syntactic complexity and sentence length.

An interesting variation on these sentence production studies was conducted by Zanini et al. (2010) who examined sentence production in bilingual participants with PD. More grammatical errors were reported in the PD group relative to the control group, but only for their first, and not their second, language. The authors argue that the participants' first language is more likely to reflect implicit, procedural processing and, hence, is more likely to engage basal ganglia structures. A participant's second language is more likely to reflect explicit processing and, hence, is more likely to engage neo-cortical structures.

Coleman et al. (2009) used a specific language production task to examine grammatical impairment in PD. Specifically, participants were asked to generate inflected verb forms for sentences that were biased toward the past (e.g. yesterday) or the present (no cue). Participants with PD displayed a deficit in terms of producing the correct verb form. This finding of a significant verb production deficit is consistent with other research demonstrating verb (but not noun) production deficits in general for people with PD (e.g. Bertella et al. 2002).

More recently, Troche and Altmann (2012) compared non-demented participants with PD and control participants on sentence repetition and sentence generation tasks. Multiple tests assessing cognitive abilities were also conducted. Fluency, grammaticality, and completeness were examined. Participants with PD produced more disfluent sentences and overall fewer acceptable sentences than the healthy participants in the sentence repetition task. For the sentence generation task, participants with PD were impaired relative to healthy participants on fluency, grammaticality, and completeness, although the impairment was largest for fluency.

Troche and Altmann (2012) examined the correlation between cognitive deficits and two versions of a language production task in PD. Findings showed impairment in PD in both the repetition task and sentence generation task. However, when cognitive ability was controlled, the impairment on the repetition task was no longer significant, although deficits on sentence generation remained. Such findings suggest cognitive decline alone cannot explain the reduction in informational content.

Bayles (1990) used four linguistically oriented tasks including oral object description, story retelling, the Peabody Picture Vocabulary Test (Dunn and Dunn 1981), and the similarities subtest of the Wechsler Adult Intelligence Scale (WAIS; Wechsler 1955) to examine language in patients with PD. When disease severity was controlled, PD was significantly associated with decreased information content in both the word and picture tests. However, when performance on the block design subtest of the WAIS was controlled, the association dropped to borderline significance. These findings reflect the common theme of identifying impaired language occurring in patients with PD, but failing to discern the source of this impairment.

Although Illes and other researchers have provided support for fluency disruption in patients with PD, the cause of that impairment was not identified. However, Lees and Smith (1983) provided evidence that fluency deficits are present in early stages of PD when cognitive impairments and motor deficits are not severe. Using neuropsychological tests, these researchers found an increased error rate by patients with PD on the modified WCST and the Benton's Word Fluency Test (Benton 1968), both of which measure the ability to shift conceptual sets. A relatively large number of studies have examined verbal fluency deficits in PD. On the basis of a meta-analysis of 68 studies, Henry and Crawford (2004) concluded that individuals with PD display significant impairment on measures of both semantic and phonetic fluency. Moreover, the semantic fluency deficit was significantly larger than the phonetic fluency deficit, and was independent of cognitive speed and effortful retrieval, suggesting that semantic memory is particularly impaired in PD. Furthermore, the relative prominence of semantic to phonetic deficits in PD with dementia is a feature that serves to differentiate it from other types of dementia such as Alzheimer's type.

Altmann and Troche (2011) provide a useful summary of high-level language production deficits in PD and identified the most likely language production stages (from Levelt 1989, cited in Altmann and Troche 2011) for the source of these deficits. Reduced informational content in PD has been demonstrated using a variety of tasks. Altmann and Troche (2011) suggest that this deficit represents primarily a limitation at the initial stage of production, that is, the message level (initial activation of to-be-generated idea or message). The commonly observed deficit of fluency may represent limitations at almost all stages of sentence production. Grammatical errors and reduced syntactic complexity are believed to originate from limitations in the functional (activation of abstract representation of words) and positional (phonological activation and generation of linear structure) stages of production. In addition, these authors conclude that language production deficits are partially, but not totally, accounted for by disruption to working memory and executive function limitations in PD.

The central motor deficits of PD – muscle rigidity and bradykinesia – can impair air flow and air pressure to the vocal apparatus and, as a result, overall speech quality can be reduced. Researchers who have examined this issue have reported that individuals with PD, relative to controls, display reduced vocal intensity as well as reduced variation in intensity and pitch (Canter 1963; Cheang and Pell 2007; Ho et al. 2001). This deficit has communicative consequences. Pell et al. (2006) found that the acoustic deficits demonstrated by Cheang and Pell (2007) resulted in naive listeners making more errors in identifying which words speakers with PD were emphasizing, and which emotions they were conveying. Similarly, in a study with a large sample of participants with PD, Miller et al. (2007) asked naive listeners to identify words spoken by participants with PD and control participants. Significantly fewer words were identified for the speakers with PD than for the control speakers. Speech intelligibility was not strongly associated with disease severity or with the dominant motor phenotype. In general, the speakers with PD in this study reported being aware of, and concerned about, their speech deficits. In a related study, Miller et al. (2008) reported ratings on a set of communication dimensions (control, confidence, etc.) that were made by participants with PD and, for a subset of these participants, by their caregivers. Participants with PD provided ratings of these dimensions both retrospectively (before the onset of PD) and currently (after the onset of PD). Participants with PD rated their communication to be significantly more impaired than did their caregivers, but only for their current communication (after PD) and not before the occurrence of PD.

15.4 Summary

Although PD is viewed primarily as a motor disorder, recent research demonstrates that it is also associated with multiple communication and cognitive deficits. In this chapter, we reviewed research on pragmatic production and comprehension deficits in PD, along with related cognitive and language deficits that may partially account for these deficits.

In terms of comprehension, there is evidence that some individuals with PD display impaired speed and accuracy of comprehension of various types of non-literal meaning (e.g. indirect replies, metaphors), as well as related types of meaning that involve inferential processing. In general, the comprehension of non-literal meaning that requires extensive inferential processing (e.g. Grice's particularized implicatures) appears to be more impaired than non-literal meaning that can be directly retrieved (e.g. conventional idioms). In short, the more indirect the meaning is, the greater the impairment for individuals with PD. The computational processes that are required for comprehending greater indirectness taxes various cognitive systems and some of the PD comprehension deficit is explained by deficits in these systems. In fact, in many (but not all) of the studies that demonstrate comprehension deficits, the observed deficits are correlated with executive function deficits.

Two executive functions in particular, working memory and set shifting, appear to be particularly important. Both are negatively affected by PD and both appear to play a role in comprehension. Complex constructions, both syntactic and pragmatic, require working memory for successful comprehension, and individuals with PD and intact working memory often do not display deficits in comprehending these forms. Set-shifting deficits in PD have been demonstrated in semantic priming studies. Specifically, individuals with PD display prolonged semantic priming and a corresponding failure to shift appropriately, a deficit that is likely to underlie perseveration tendencies when individuals with PD engage in conversations. Moreover, set shifting (e.g. as assessed by the WCST) involves the generation of internal cues, and it is this ability that appears to be particularly impaired in PD. The generation of internal stimuli is likely to play an important role in inference generation, especially particularized implicatures.

Deficits in executive functions do not give a complete account of pragmatic comprehension deficits in PD. Also playing a role in these deficits are impairments of ToM, the ability to infer the mental and emotional states of others. In a sense, pragmatic comprehension is mind reading. The successful recognition of a speaker's intended meaning requires the integration of multiple sources of information, including the speaker's emotional states, beliefs, and so on. Extant literature suggests that ToM is disrupted in PD, that this disruption precedes the development of dementia, and that cognitive ToM deficits appear to occur earlier than affective ToM deficits. Research has demonstrated a significant correlation between the comprehension of non-literal meaning (irony and metaphor) and ToM performance in PD. ToM overlaps somewhat with executive functions and in particular inhibitory functions, as the recognition of another's beliefs sometimes requires the inhibition of one's own beliefs. The extent to which these functions underlie ToM performance, and its relation to pragmatic impairment in PD, remains unclear. This should be a direction for future research.

Not everyone with PD demonstrates comprehension deficits, and there is a clear need to document the pervasiveness of these deficits in PD. However, researchers have examined some of the disease and medication correlates of these deficits. Dopaminergic medication has been demonstrated to improve some executive functions such as planning. In general, dopaminergic medication also improves performance on some comprehension tasks. In addition, there is some evidence that pragmatic comprehension deficits are positively related to disease stage and motor severity, although the extent to which these relationships are largely a function of increasing executive function deficits is not clear. Almost completely ignored is the possibility that pragmatic deficits may vary as a function of PD subtype, as well as asymmetric motor severity, even though executive functions have been found to vary as a function of both. Given the strong relationship between executive functions and pragmatic comprehension, this would seem to be an avenue for future research.

In contrast to comprehension deficits, there has been less research on pragmatic production deficits in PD. An observed production deficit may be due, at least in part, to a comprehension deficit when there is a failure to comprehend another person's utterance. Researchers examining both comprehension and production deficits in the same study have reported a substantial relationship between the two. In terms of overall language production deficits, there is fairly clear evidence of reduced informational content in the messages of individuals with PD. This deficit likely reflects dysfunction at the earliest stages of message generation (i.e. initial activation of a to-be-communicated idea) and/or a failure to comprehend the prior turn and/or understand its implications. There have also been numerous reports of verbal fluency deficits in PD. In particular, semantic fluency is a deficit that is largely independent of other cognitive functions and appears to be particularly impaired in PD. Note that impaired semantic fluency in PD may also contribute to reduced informational content. Additional reported production deficits in PD include abnormal pausing (i.e. longer, more frequent, inappropriate pauses) as well as the ability to generate syntactically appropriate sentences. All of these specific deficits (lowered informational content, dysfluencies, long pauses, impaired grammar) can contribute to pragmatic production deficits, that is, the ability to contribute appropriately to a conversation.

Researchers focusing specifically on pragmatic production have documented the existence of multiple deficits including verbal (e.g. topic maintenance), paralinguistic (e.g. vocal quality) and nonverbal (e.g. eye gaze) features. Role-playing studies demonstrate a politeness deficit in PD, and perhaps more importantly, a lack of sensitivity to variations in the social context that typically drive politeness variability. There is some research suggesting greater PD impairment for the nonverbal dimension of pragmatic production relative to the verbal dimension, although the metrics for making such a comparison are relatively imprecise. As with comprehension, these deficits are often found to be correlated with measures of executive function, although the extent to which these deficits are a function of general cognitive decline remains an open question.

More recently, researchers using conversation analysis have begun to examine some of the interactional consequences of pragmatic deficits in PD. Many of the PD deficits documented in laboratory studies can reverberate and have far-reaching consequences in actual interaction. For example, the longer pauses associated with PD may disrupt the turn-taking system and impact a variety of social and cognitive processes. Similarly, research suggests that individuals with PD may be perceived differently as a function of their talk, perceptions that can then influence how they are treated. Importantly, these effects may be exacerbated by the fact that individuals with PD are often relatively unaware of any decline in their pragmatic abilities. Clearly, more research on the interactional and perceptual consequences of pragmatic deficits in PD is needed.

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Part III
Pragmatic Disorders in Other Populations

Chapter 16
Hearing Loss and Cochlear Implantation

Louise Paatsch, Dianne Toe, and Amelia Church

Abstract Research has shown that cochlear implants have become a popular option for many families who have young children with severe-to-profound hearing loss. Findings show that while improvements in spoken language outcomes for children and young people who use cochlear implants are evident, there are large individual differences in performance. Studies that investigate spoken language outcomes for children with hearing loss typically report results based on measures of receptive and/or expressive language or in the subsystems of syntax, semantics, morphology or phonology. There is less research that focuses on the social use of language, that is, the specific pragmatic skills that are challenging for children and young people with hearing loss. Further research is needed to detail the context in which children develop pragmatic competencies in order to inform clinical practice.

This chapter provides an overview of studies of pragmatic development in children who have cochlear implants. It is illustrated throughout with data from our own research. We detail the CONVERSATION model of intervention (adapted from Paatsch and Toe 2016) as a framework for highlighting current research and informing clinical practice. The aim is to demonstrate how research and practice can support pragmatic development in children with hearing loss.

Keywords Child language • Cochlear implant • Conversation • Hearing loss • Interaction • Pragmatic skill

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16.1 Introduction

It is well established in the literature that hearing loss has a significant impact on the development of spoken language skills in children (Blamey et al. 2001; Ibertsson et al. 2009a). Typically, children with hearing loss who use spoken language are fitted with digital hearing aids or receive cochlear implants as soon as diagnosis is confirmed. These high-quality technological devices have provided greater access to spoken language and have enabled young children with hearing loss to be educated within mainstream settings. For example, in Australia it was estimated that in 2003, 83 % of the school-aged population of students with hearing loss were enrolled in inclusive settings and used spoken language as their main mode of communication (Hyde and Power 2003). Furthermore, in 2006 it was reported that at least 80 % of children with profound hearing loss in Australia receive cochlear implants, most bilateral (Hyde and Power 2006). Both trends have continued to rise within Australia and across other parts of the world. However, despite early diagnosis, early fitting of hearing devices, and improved access to spoken language through advancement in cochlear implant design and enhanced digital hearing aids, research shows that many young deaf and hard-of-hearing (DHH) children are still delayed in many aspects of spoken language when compared with their hearing peers (Geers et al. 2016).

Much of the research on children with hearing loss over the past two decades tends to characterise children's spoken language abilities in terms of expressive and receptive skills as reported from performances on formal speech and language assessments (Blamey et al. 2001; Paatsch et al. 2006; Yoshinaga-Itano et al. 2010). Many of these studies, however, do not detail children's pragmatic abilities but rather focus on the other subsystems of language including semantics, syntax, morphology and phonology. Studies that have explored young DHH children's pragmatic abilities tend to compare these skills with their hearing peers during interactions with adults (usually teachers, parents or clinicians) or during more structured tasks (Ibertsson et al. 2009a; Lloyd et al. 2001, 2005; Wood et al. 1982). Investigations of pragmatic skills have shown that young children who are deaf or hard of hearing are significantly older than their hearing peers when they demonstrate many complex pragmatic language skills. Goberis et al. (2012) found that even at 7 years of age, 75 % of the 126 children aged 3–7 years with hearing loss in their study had not mastered many of the pragmatic skills assessed on their 45-item Pragmatic Checklist. In contrast, 100 % of all hearing children had mastered these skills at 7 years of age.

More recently, the authors have conducted a number of studies investigating the pragmatic abilities of DHH school-aged children and young people during spontaneous conversations, in question-and-answer tasks, and during expository interactions with their age-matched hearing peers (Church et al. in press; Paatsch and Toe 2013, 2016; Toe and Paatsch 2010; Toe et al. 2016). Findings from these studies showed that these children displayed a wide range of pragmatic abilities. Typically, they were found to have good speech intelligibility and were generally understood by their hearing peers. In these peer conversations, children were able to ask and respond to questions, make personal contributions, and were able to take turns. They were also able to request specific and general clarification, and could convey the rules of a simple game to their hearing peers. However, it was also evident that there were still many challenges for children with hearing loss that arise from some of the more subtle pragmatic skills that are important for collaborative, co-constructed and satisfying conversations. These included their understandings of the subtle rules of eye gaze, the use of feedback throughout the talk, the ability to sustain topics, and the capacity to repair subtle breakdowns in communication.

As a result of these findings, the authors have developed a CONVERSATION model of intervention specifically for clinicians, classroom teachers and specialist teachers of the deaf to support children's pragmatic skills. This model extends the earlier CONVERSE model (Paatsch and Toe 2016), which identified key elements of **C**ontingency, **O**pportunities, **N**on-verbal cues, **V**erbal Cues, **E**ye gaze, **R**epair, **S**ustained conversation and **E**xtending the topic. Refining the earlier CONVERSE model allows for a more focussed clinical application and includes the importance of collaboration and the co-constructive nature of conversation. As such, the CONVERSATION model, along with the authors' recent research, draws on conversation analysis (CA) in understanding talk-in-interaction as socially situated and co-constructed (Schegloff 2007; Sidnell and Stivers 2013). In this chapter, the CONVERSATION model (see Fig. 16.1) is explained. The findings of current research and the importance of each of the twelve key elements in supporting DHH children's pragmatic skills are considered. The ultimate aim of this model is to improve the more subtle pragmatic skills of children and young people with hearing loss and to ultimately lead to enhanced communicative and social competence.

Figure 16.1 presents the 12 elements of the CONVERSATION model accompanied by a brief description of each element (adapted from Paatsch and Toe 2016). This chapter will discuss the importance of each element of the model in developing pragmatic skills in children and young people with hearing loss, with an emphasis on those who use spoken language as their main mode of communication. Each element is informed by current research with examples drawn from the authors' recent studies. The studies reported in the chapter draw on the use of language during extended sequences of talk: between children and their families; between children and their teachers or clinicians; and occasionally between children with hearing loss and their hearing peers. This chapter will also present some recommendations for further intervention for each of the elements included in the CONVERSATION model.

16.2 Collaboration

The starting point for a model of CONVERSATION is to emphasise the **C**ollaborative nature of talk-in-interaction. It is collaborative both in terms of the turn-by-turn co-construction of sequences of interaction. But it is also collaborative in terms of

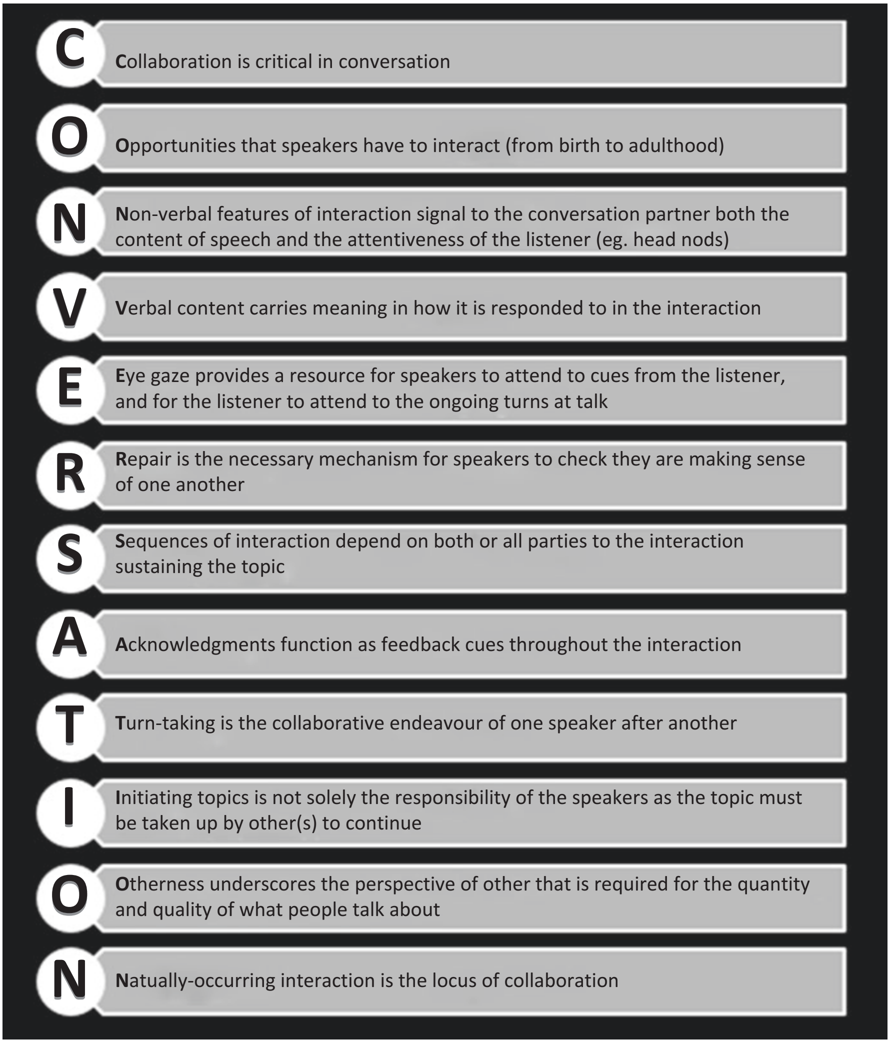

Fig. 16.1 The CONVERSATION model for supporting children and young people's pragmatic skills (Adapted from Paatsch and Toe 2016)

participation, where all parties share an orientation to the progression of the conversation. Collaboration, or co-construction, is the responsibility of all parties in the interaction. 'Collaboration' is not an intent or objective of speakers. Rather, the back-and-forth nature of language in use is a universally collaborative, co-constructed, and interdependent activity.

The discussion of clinical pragmatics is more productive when pragmatic skills are understood as invariably interdependent. A question needs an answer, a joke does better with laughter as a response, and so on. So understanding how children with hearing loss manage this collaborative work when talking with their hearing peers, enables a more accurate description of pragmatic abilities. It is in understanding pragmatic abilities within the collaborative endeavour of conversation that we see where particular support or interventions may be useful.

For example, a recent study by Toe and Paatsch (2013) investigated conversational balance in a group of 31 deaf and hard-of-hearing (DHH) school-aged children aged 7–12 years of age in conversation with their hearing (H) friends. These pairs of DHH/H children were compared with 31 pairs of hearing/hearing (H/H) peers. Conversational balance was measured by the number of turns per partner, number of topic initiations per partner, and mean length of turns in words per conversational partner. Results showed that children with hearing loss initiated more topics and took longer turns than their hearing partners. In contrast, the H/H pairs produced more balanced conversations with similar turns per partner, similar mean length of turn, and similar percentage of topic initiations. These findings suggest that the children with hearing loss were working harder to maintain the conversation with their hearing peers and that there appeared to be less collaboration by both parties throughout. This approach of breaking down discourse into isolated utterances in order to analyse children's pragmatic skills can often detail patterns that emerge across the entire interactions. However, a clinical approach to pragmatics must be wary of using isolated utterances as evidence, because we need to focus on how language is actually used in extended interactions. Therefore, it is important that individualised therapy highlights how and where language is used effectively with different partners during conversation.

This first element of the CONVERSATION model introduces the overarching critical feature of the entire model, namely, that conversation is distinctively collaborative and co-constructed by all parties in the interaction. The remaining 11 elements of the model are situated within this collaborative process of interaction.

16.3 Opportunities

This element of our model focuses upon the importance of providing rich **O**pportunities for infants, children and young people with hearing loss to engage with a variety of conversational partners. There is a large body of literature that outlines the reduced opportunities for interaction experienced by many children with hearing loss and the impact this has on their language development (Garton 1992). This is not the case for deaf children born with signing deaf parents. They have a shared visual language from birth, with ample opportunities for interaction with parents and, frequently, the wider deaf community. These children do not appear to have any pragmatic delay (Surian et al. 2010).

Ninety-five percent of children with hearing loss are born into hearing families (Hauser and Marschark 2008). Most hearing families are slow to develop sign language skills or choose to use spoken language for communication with their child. In past decades, children with severe or profound hearing loss had very limited access to spoken language input, resulting in significant language delay and very limited opportunities for many rich or varied conversations with a variety of partners. Rapid technological development has provided much improved access to speech through quality digital hearing aids and cochlear implants. Children with hearing loss are diagnosed soon after birth and fitted with hearing aids within a few months (Ching and Dillon 2013). Those with more severe hearing loss can receive bilateral cochlear implants before their first birthday. This vastly improved access should also equate to substantially increased opportunities for interaction. It has certainly resulted in improved language outcomes as measured by expressive and receptive language skills (Blamey et al. 2001; Caselli et al. 2012; Roland et al. 2009).

Many children with profound hearing loss now start school with a range of language skills that are similar to their hearing peers (Paatsch and Toe 2016). In particular, Yoshinaga-Itano et al. (2010) found that children who are DHH with normal cognition and who were identified and received intervention prior to 6 months of age developed language skills within the normal range at 7 years of age, as measured by tests of expressive vocabulary and auditory comprehension. However, it is also evident in the literature that many children with hearing loss are delayed in their pragmatic skills (Most et al. 2010; Paatsch and Toe 2014; Toe et al. 2016). While this delay is likely to be explained by a range of factors, the opportunities for interaction appear to be different to those experienced by hearing children. This might be related to the quality of the interactions. A study by Morgan et al. (2014) showed that parents of DHH children in both Sweden and the UK used far less cognitive state language with their infants and their conversations were characterised by less communicatively effective turn-taking than parents of hearing infants. These reduced opportunities for quality input and modelled turn-taking are very likely to impact on both the development of pragmatic skills as well as developing theory of mind (see ‘Otherness’ in Sect. 16.12 below).

Children and young people with hearing loss also experience reduced opportunities for a diverse range of interactions at school age. Pragmatic skills and social skills are closely linked. Students who start school in mainstream settings with delayed pragmatic skills may struggle to engage their hearing peers, reducing their opportunities for further development of their conversational competence (Cawthon et al. 2015). Our own studies show that hearing peers can be reluctant conversational partners, leaving much of the conversational effort to their deaf partner and responding with minimal answers and asking few questions (Paatsch and Toe 2014). As a consequence, the opportunities for both the quantity and quality of conversation needed to develop strong skills in school-age students may well be absent.

Clinicians and teachers who aim to support pragmatic development in infants, children and young people with hearing loss need to focus on access to, and participation in, diverse conversational opportunities they experience. Parents may need support to increase their conversation about mental states and to improve their turn-taking skills (Cawthon et al. 2015). According to Mancini et al. (2015), ‘the habilitation of deaf children must be considered more and more as a systematic process aimed at optimising the environment around CI recipient children and at orienting natural communicative relationships between them and their parents (603)'. They suggest that adults need to be guided to use rich exchanges to express desires, thoughts and knowledge.

We also recommend that additional opportunities are provided for interaction for pre-school and school-age children, both with and without hearing loss. These need to be well planned activities that motivate young people to participate and might include games, special interest groups and even virtual conversation opportunities. The use of videotaped conversation for reflection has recently proved effective as a teaching resource with students learning English as a foreign language (see Wong and Waring, 2010). This may provide both deaf and hearing children the opportunity to learn about key pragmatic skills that will, in turn, enhance further opportunities for conversational experience.

16.4 Nonverbal Cues

The next element of the CONVERSATION model acknowledges the importance of **N**onverbal cues as essential components of a collaborative conversation. Listeners use a range of verbal and nonverbal cues to indicate to the speaker that they are engaged in the conversation. These 'listener tokens' include the use of verbal signals such 'yeah', 'really' or 'cool' and nonverbal cues such as moving forward in the chair, intake of breath, head nods and facial expressions. Speakers rely on these cues to gauge the interest of their listener and to help them to plan the next move in the conversation (Gardner 2001). Speakers also use a range of nonverbal cues to support their verbal contributions. These include facial expressions perhaps for emphasis or to indicate sarcasm, hand gestures for emphasis or clarification and paralinguistic cues such as pausing. Subtle cues such as posture and posture changes, and movement in directions in eye gaze can signal interest or a lack of enthusiasm, shaping the way the conversation develops and contributing to contingency. (Contingency involves the ability of the listener to integrate and acknowledge their partner's previous utterances in subsequent turns throughout the conversation.) Nonverbal cues support both the conveying of a message and the way it is interpreted by a speaker (Knapp et al. 2013).

There have been few studies that have focussed on the way adults and children who are deaf or hard of hearing use non-verbal cues to facilitate conversation. Pajo and Klippi (2013) used conversation analysis (CA) to explore interactions between two adults with hearing loss while in conversation with very familiar adults. Their focus was on the way that the adults with hearing loss used nonverbal cues such as gaze shifts, leaning forward, turning one ear toward the speaker, and facial expressions to indicate to their speaking partners how well they were following the talk. These cues were interpreted by the speaker in different ways but appeared to serve to strengthen the collaboration and avoid conversational breakdown. Pajo and Klippi suggest that the familiar hearing adult partners in these conversations were highly tuned to their partner's nonverbal signals. In addition, the adults with hearing loss used a range of listener tokens suggesting that they had a well-developed understanding of their importance for conversational flow and contingency.

In our own research, we used conversation analysis to explore conversations between ten upper primary children (age 9–12 years) with cochlear implants with a self-selected hearing friend (Paatsch and Toe 2016). The analysis showed that for the majority of these pairs, eye contact was poor and many of the children with cochlear implants provided very little feedback through the use of either nonverbal or verbal listener tokens for their hearing partners. They frequently missed nonverbal cues from the speaker such as pauses accompanied by intentional glances designed to check for interest in the story being told. The poor use of listener tokens by these young people who are deaf or hard of hearing suggests they may have missed out on opportunities to develop these skills as younger children, perhaps because of the unisensory approaches experienced in early language intervention. Some of these findings may explain the poor contingency and difficulties with following up on the third turn that has been observed to be a feature of conversations between deaf children and young people with a range of partners (Ibertsson et al. 2009b; Most et al. 2010).

Nonverbal conversational cues would appear to be an important focus for teachers and clinicians who wish to support the development of pragmatic skills in children and young people who are deaf and hard of hearing. Through modelling, reciprocal teaching and the observation of videotaped conversations, teachers and clinicians can build awareness of the different cues that are used to create a truly collaborative conversation. Children may need to practice their 'listener skills' to ensure they can send clear messages to help co-construct sustained conversations. Positioning for enhanced eye gaze and highlighting the fundamental role of appropriate eye contact for productive and satisfying conversation will also provide many natural opportunities for children with hearing loss to tune into the listener tokens of their conversational partners and then, hopefully, to add some of these to their own conversational repertoire.

16.5 Verbal Cues

The CONVERSATION model identifies the importance of developing the **V**erbal content of language, including syntax, morphology, semantics, and phonology, in social interaction. As such, we recommend that parents, teachers and clinicians continue to work on developing all subsystems of language concurrently but also to provide rich opportunities for how these skills can be used in everyday social contexts with peers.

The spoken language skills of children with hearing loss have improved significantly over the past 40–50 years (Spencer 2016). Goberis et al. (2012) reported that children with hearing loss who have experienced high-quality early intervention and who are without other reported disabilities can develop language at a rate of about 80 % compared with their hearing peers. Previously, this rate has been reported to be much lower. For example, Blamey et al. (2001) followed spoken language performances of a group of school-aged children with hearing loss who used hearing aids and/or cochlear implants. Findings showed that despite an improvement in spoken language, essentially measured by verbal content, over a period of 3 years, the rate was approximately 60 % of that in hearing children of the same age.

It is also well established that in general, children with cochlear implants develop better spoken language skills compared with children with similar levels of hearing loss who use hearing aids (Blamey et al. 2001; Yoshinaga-Itano et al. 2010). Furthermore, results indicate that on average, children who were implanted early (prior to 18 months of age) and who experienced longer periods of auditory stimulation performed better on tests of expressive and receptive language compared with those children implanted later (Nicholas and Geers 2007; Niparko et al. 2010). Such improvements in spoken language have been reported to be related to many factors including earlier detection through universal newborn hearing screening, advances in sophisticated listening devices, implementation of effective language intervention, development of family-centred practices, and children's overall earlier experiences with spoken language. However, despite these reported improvements in certain aspects of spoken language, it is evident that parity has not yet been achieved and many challenges still remain for children with hearing loss in the twenty-first century.

In a recent study by Tobey et al. (2013) involving 160 children who were implanted between the ages of 6 months and 4 years 11 months, delays in pragmatics, syntax and vocabulary were evident. Specifically, some children implanted before 2.5 years as well as some implanted between 2.5 and 5 years performed more than two standard deviations below the standardisation group mean. Further results showed that there was large variability in individual scores for vocabulary, syntax and pragmatic judgements. Similar findings of delays in syntactic and morphological knowledge have also been reported in other studies of children with cochlear implants even when children are implanted at an early age (Duchesne 2016). For example, Hammer et al. (2014) reported difficulties with expressive and receptive grammatical knowledge in children with cochlear implants, while Geers et al. (2003) reported that some children in their study produced a lower number of bound morphemes compared with their hearing peers. Similarly, Paatsch et al. (2006) found that there was wide variation in vocabulary scores in a group of 21 school-aged children with hearing loss as measured in a test of 109 monosyllabic commonly used words.

In our own research, we found that while most children with hearing loss in our studies were reported to be at or above standard on a global standardised language test and were rated with intelligible speech, there were many challenges for these children in using language within the contexts of everyday communication. Specifically, in our recent study that investigated the interactions between a group of school-aged children with hearing loss and their hearing peers while teaching each other how to play a game (Paatsch and Toe 2016), there were no differences evident in the broad language measures (i.e. number of complete words [a broad measure of semantic knowledge] and Type Token Ratio [an index of lexical diversity]). However, the biggest difference between these two groups of children related to their use of referents. The group of children with hearing loss frequently used pronouns with unspecified referents (e.g. 'find this under that' unsupported by a visual referent) or deleted pronouns. These children also used terms with nonspecific referents (e.g. 'so you say is it something'), visual referents (e.g. pointing) or incorrect referents. The extract below presents an example of one 9-year-old DHH child's instruction to their hearing friend on how to play the game of Secret Square® (a simple game with only five rules).

21	We have twenty-five out (gets squares out)
22	Okay, so we got twenty-five out and then we get a counter and then you got to turn around
23	Okay, now you turn back around and you say **any kind** of questions. So you say is it **something** or what is it and I say yes or no.
24	you say is it **like**, just say I had this (picks up a square from the box) is it in the sea or out of the sea, or if you're eating **something** or if it's an animal or **whatever**

In Lines 21 and 22 we see an example of the child deleting the specific referent of 'squares', while in Lines 23 and 24 there are five occurrences of this child using terms with unspecified referents. The challenges presented here were typical of the other DHH children in the group (but not their hearing peers) and suggest that there is a need for clinicians and teachers to work on the more subtle verbal language skills that enable children to communicate effectively in a variety of contexts with their hearing peers. Furthermore, it highlights the importance of collecting a more complete language profile of children with cochlear implants that moves beyond the results from global standardised language tests. Observing DHH children's language use in social contexts with hearing peers will provide a more comprehensive profile to support targeted intervention for these children. Clearly, further research is warranted that specifically investigates the efficacy of interventions that focus on improving the more subtle pragmatic skills of children and young people who are deaf and hard of hearing.

16.6 Eye Gaze

A key nonverbal feature of interaction is **E**ye gaze. This element of the CONVERSATION model recognises the centrality of eye gaze as a key skill in monitoring and maintaining conversation. Kendon's (1967) early work on the role of gaze in social interactions showed that speakers are more likely to direct their gaze to a conversational partner towards the end of their turn. Indeed, gaze is prominent in managing turn allocation in conversations, as speakers usually return to mutual gaze at turn transition relevant points (see Sacks et al. 1974), that is, the point at which a new speaker might take a turn. While invariably a resource for maintaining transition between turns and between speakers, eye gaze is also important in monitoring the emotional cues of other participants. Research that has investigated emotional perception of children with hearing loss has shown that many children using cochlear implants may find this challenging. For example, Most and Aviner (2009) investigated normally hearing adolescents and three groups of adolescents with hearing loss: hearing aid users; cochlear implant users who were implanted before 6 years of age; and cochlear implant users implanted after 6 years of age. Results showed that emotion perception in the auditory mode by individuals with normal hearing surpassed that of the groups of adolescents with hearing loss. In contrast, results showed that all groups received comparable emotion perception scores through the visual mode alone. However, these scores were lower than those achieved through the mixed mode, suggesting the importance of both the visual and auditory cues in understanding emotion.

Findings from Sandgren et al. (2014) show that children with hearing loss are more likely to gaze at their hearing peer 'when asking questions, when making statements, [and] when providing the speaker with back-channelling responses' (949). Directing eye gaze towards the hearing child was also more likely when new instructions were provided during a game activity (Sandgren et al. 2014). Given that eye gaze is one resource for managing turn-taking, not surprisingly mutual gaze is observed when repair has been initiated, in other words, when the speakers orient to resolve some sort of miscommunication (Pajo and Klippi 2013). In his study of children with cochlear implants interacting with their implanted peers, Dammeyer (2012) found that responses were less likely when the child speaker does not make eye contact with the other child. One explanation for this is that speech perception improves when the message has more than one modality, that is, has an audiovisual modality rather than relying solely on auditory input (Woodhouse et al. 2009).

Interestingly, in conversations between adults, interactional partners with normal hearing are less likely to compete for a turn, that is, continue with overlapping talk, when there was an absence of gaze from their deaf and hard of hearing conversational partner (Skelt 2013). In essence, mutual gaze was a requirement to compete for a turn at talk. This type of accommodation is not evident in interactions between DHH children and their hearing peers.

Our own data of conversations between children with cochlear implants and their hearing peers is not a large enough sample to make generalised claims about frequency and distribution of eye gaze in interaction, but our observations of *atypical* eye gaze behaviour are worth noting here. Conversations which were markedly less fluent, that is, contained extended pauses between turns, two-turn topics, and explicit reference to the difficulty of maintaining the conversation (e.g. seeking support from the researchers by stating 'I don't know what else to say') were more likely to include *limited* eye gaze. For example, one interaction of limited eye gaze that was typical for this group of school-aged children occurred in a conversation between Emily and Penny, both aged 10. Penny has a cochlear implant. The girls produce a stilted series of question and answer pairs, with Penny asking most of the questions. As the pauses between turns become longer, there is less eye contact or unilateral gaze between the girls. By the time Penny asks 'so are you bored right now?' she is looking towards the ceiling with no gaze directed towards Emily.

The absence of mutual eye gaze is not always on the part of the child with hearing loss, but it is always a feature of awkward and laborious conversations between the children. Whatever the distribution of visual cues used by people with cochlear implants, research in this field provides further evidence for the importance of eye gaze in managing turn-taking and demonstrating attention to – if not interest in – what the speaker is saying. Clinicians and teachers working with children with hearing loss need to draw explicit attention to the importance and use of subtle cues of eye gaze to develop pragmatic competencies in interaction.

16.7 Repair

Another element of the CONVERSATION model acknowledges the importance of **R**epair in sustaining conversation. Repair describes the ways in which speakers manage to point out, clear up or resolve any misunderstanding in conversation. Ordinarily, speakers need to fix problems of understanding in order to continue the interaction, the repair functioning as a side-sequence or detour on the way back to the topic. These problems in communication can be described as communication breakdown (Jeanes et al. 2000; Most et al. 2010; Toe et al. 2007; Yont et al. 2002), mishearing or misunderstandings (Skelt 2013), or trouble sources or repairables (see Kitzinger, 2013, for review). Research shows that children with cochlear implants make more requests for clarification than their hearing peers in most types of interaction (e.g. Ibertsson et al. 2009a). Not surprisingly, these requests for clarification are more often than not because the child has not heard (enough of) the prior utterance (see Church et al. in press).

Research has shown that children with hearing loss are more likely to revise an utterance after a request for clarification, as they are less sure of the intelligibility of what they first said (Ciocci and Baran in press), whereas children with normal hearing will repeat verbatim after a non-specific request for clarification from a child with cochlear implants (e.g. Huh?) (Church et al. in press). In a recent study by the authors (Toe et al. 2016), it was also evident that there were differences in how school-aged children with cochlear implants went about resolving trouble sources in their interactions with their age-matched hearing peers. These differences were not evident when compared with pairs of hearing peers. Results from the analyses that used conversation analysis (CA) showed that atypical practices of repair, including absence of repair, were evident in the pairs of DHH and hearing children.

The extract below provides an example of where the children seem to get stuck (see CA transcript conventions in the Appendix). The repair is slow and unusual. The girls, Pina (a cochlear implant user) and her hearing friend Rebecca, have been talking about a film they have both seen, which has been popular; the movie theatre was ‘so busy that time’ (line 69). Then Pina suddenly introduces a new, unrelated topic with the question ‘what’s your favourite band?’ Rebecca does not provide an answer. Instead, there is a lengthy pause and nodding from Rebecca (lines 73–76).

Pina doesn't attempt to repeat the question, but fortunately Rebecca realises that the nodding is not the answer to the question ('Oh! My favourite band', line 77). This tardy repair of conversation was greeted with an enthusiastic 'yeah!' by Pina, indicating that she was relieved that the breakdown had been repaired by her friend.

69	PINA:	it was [sO busy; that time.
70	REBECCA:	[y:eah.
71	REBECCA:	°ye:ah°=
72	PINA:	=what's your favourite band.
73		(1.2)
74	REBECCA:	((nods))
75	REBECCA:	mm.
76		(0.6)
77	REBECCA:	>OH. (.) my favourite band.<
78	PINA:	=>YEH<
79	REBECCA:	>yeh um< (.) black eyed peas¿=hh °↑ha.° .h yours?
80		(0.6)

Examples such as this highlight the need for clinicians and teachers to work with children and young people with hearing loss to develop the necessary skills to repair the talk when there are troubles. A specific set of skills are required to support students to understand that 'when people talk together they frequently encounter problems of hearing, speaking, and understanding' (Sidnell 2010: 110) and that resolving problems is part of everyday conversation. Video recording interactions and pointing out these varied and complex sources of trouble may assist with identifying 'what they may not know' in sustaining conversations and repairing any breakdowns.

16.8 Sequences to Enable Sustained Interaction

Our CONVERSATION model also identifies the importance of developing extended **S**equences of talk beyond the two-turn sequence to enable sustained interaction. The minimal conversational sequence comprises of two related turns at talk in 'which the occurrence of the first makes the occurrence of the second 'expectable.' (Terasaki 2004: 172). These adjacency pairs (Schegloff 2007) are the foundation of everyday talk-in-interaction. For example, when a person initiates a turn with a greeting then it is expectable that the second part would often consist of a greeting in return. Similarly, an open question would expect an extended response and an extension of the topic. Sequences of interaction extend beyond these adjacency pairs to establish contiguous topics of conversation (a series of many pairs, e.g. assessment followed by agreement), opportunities for telling stories (where speakers use particular conversational devices to hold many turns), and extended sharing of news, opinions, thoughts and so on. Yet, there is very limited evidence of how children with hearing loss might maintain sequences of interaction with their hearing peers.

In a recent investigation of three children with cochlear implants over a period of 4 years, Dammeyer (2012) reported that there were very few occurrences of these children elaborating on a particular theme. Specifically, it was noted that most of the responses to questions in these sequences involved minimal answers like ‘yes’ and ‘no’. These three children were reported to have difficulties responding to their hearing peers and it was only in the final year of observations when the children were 8 years of age that their responses led to sustained dialogue.

In our research (Paatsch and Toe 2014) involving 31 pairs of DHH and hearing children aged between 7 and 12 years, and 31 pairs of hearing children matched by age and gender, difficulties with balanced conversations were evident. Specifically, children with hearing loss tended to initiate more topics, ask more questions and took longer turns compared with their hearing peers. In contrast, the hearing partners in the DHH and hearing pairs tended to provide minimal answers to their DHH peers’ questions. Often conversations involved a sequence of questions and minimal answers that represented an interview-type format. This can be explained as DHH children tending to control the conversation in order to prevent the introduction of topics that they were unfamiliar with and which, in turn, may have resulted in communication breakdown. Furthermore, these awkward sequences in conversation may also be a result of the DHH children being unaware of the various and interdependent skills required to sustain conversations (i.e. all aspects of the CONVERSATION model). The extract below shows an example of these sequences that were frequent in the conversations between children with hearing loss and their hearing peers. Using the conventions of conversation analysis, this extract illustrates the interview-type format with very few opportunities for extended responses, resulting in stilted and awkward interactions. The pause lengths between turns (measured in seconds, shown in brackets) are atypical, in that one turn usually follows the next without delay in normal conversation. The sequences here are not extended, and are seemingly difficult to initiate.

135	PENNY:	what your favourite subject at school. ((staccato))
136		(0.9)
137	EMILY:	erm:¿
138		(3.2)
139	EMILY:	i don't know¿ ((very breathy voice))
140		(1.1)
141	PENNY:	[oka:y.]
142	EMILY:	[(doing the] easiest)¿
143		(1.1)
144	PENNY:	mkay.
145		(2.7)
146	EMILY:	HUHhhh huhh

(continued)

147		(4.0)
148	EMILY:	um.
149		(1.8)
150	PENNY:	who’s your best friend.
151		(1.2)
152	EMILY:	um,
153		(2.1)
154	EMILY:	<probably, emily:¿>
155		(1.4)
156	PENNY:	m°kay.°
157		(1.4)
158	PENNY:	so::.
159		(2.7)
160	PENNY:	why is rachel away¿
161		(1.0)
162	EMILY:	she's on (.) holidays¿
163		(0.6)
164	EMILY:	hh=
165	PENNY:	=o:kay.
166	EMILY:	Queenscliff.
167		(0.9)
168	PENNY:	okay.
169		(1.8)
170	PENNY:	so: are you bored right now.

We recommend that clinicians and teachers need to support the conversational skills of children and young people with hearing loss by providing opportunities to understand the types of sequencing formats in conversation. This should involve providing specific intervention that targets question type (open and closed), response type (minimal and extended), and understanding and use of the third turn (i.e. an extension of the two-turn sequence). It should also involve working on issues of contingency whereby children are given opportunities to develop strategies for following up on previous utterances, topics and information. Results from our studies between DHH and hearing peers also indicate that targeted intervention should focus on working with hearing peers to help them to understand how they can support the development of sustained conversation with their DHH peers.

16.9 Acknowledgement

The next element of the CONVERSATION model identifies the role of **A**cknowledgement in interaction. In studies of the pragmatic skills of children with cochlear implants, minimal response tokens, such as ‘hmmm’, ‘yeah’, ‘u-huh’, are described as feedback to the listener (Prutting and Kirchner 1987), included as non-verbals (Toe et al. 2007), or more generally as minimal responses (see Gardner (2001) for thorough review). In the conversation analytic literature the term ‘acknowledgment tokens’ is used (Jefferson 1988) which serves our model of CONVERSATION. These minimal responses actually achieve a range of functions in talk:

> They are ‘neutral monitoring responses and generalized acknowledgers’ (Müller 1996: 136), claiming that talk by another has been heard, acknowledged, perhaps understood or agreed with or treated as news, or not news. In some cases, they are uttered instead of something more topical or substantial, or used to pass the turn back to the prior (or to another) speaker, and sometimes to indicate incipient speakership, or if shaped with certain prosody, such as marked rise-falling tone or high pitch, to utter encouragement or appreciation (in which case they have affinities with assessments), or if low and level in tone, indifference. They include *Mmhm, Uh huh, Mm, Yeah, Oh, Right, Okay* and *Alright* (Gardner 2001: 13).

For children with cochlear implants, these acknowledgment tokens are typically studied in quantitative measures – how often children with cochlear implants use acknowledgement tokens in comparison with their hearing peers. Research has found that hearing children used significantly more conversational devices (e.g. phatics such as Oh, Really, Cool, etc.) and tended to respond with a higher proportion of minimal answers (Most et al. 2010).

For the purposes of clinical pragmatics, we would make a case for paying closer attention to *how* children use these acknowledgement tokens. *How often* they are used provides only part of the picture because *when* and *why* are perhaps more important in the ongoing talk. In developing pragmatic competencies it is not only the production of acknowledgment tokens that demonstrates competent listening. Speakers also need to orient to the placement and production of these tokens in order to monitor the stance of the listener as a way of monitoring their own contribution to ongoing talk. The following extract is drawn from our own data of conversations between primary-school children with cochlear implants and one of their hearing peers (see Paatsch and Toe (2016) for details of the participants and method of the study). This extract is taken from a longer conversation between two friends, Lucy and Rani, who are both 11 years old. Lucy has a cochlear implant. The fluency of this conversation and the expansion of topics made it unusual in the dataset as a whole. Both features can be attributed in part to the enthusiastic listening by Rani and the attention Lucy pays to cues from Rani.

27	LUCY:	U:m,
28		(0.8)
29	LUCY:	there is this bun- (0.9) bungee challenge?
30		(0.6)
31	LUCY:	that=okay=I’ll explain this, (0.3) so you'd- there's a:h
32		[four people go,[(0.2) like across?=

(continued)

33	RANI:	[°yeah,° [yeah,
34		[((nod))
35	RANI:	=yeah?
36	LUCY:	'n then it's, you're all connected to the same ro:pe?
37		(0.2) from that e:n[d,
38	RANI:	[so all FOUR people a::[re,
39	LUCY:	[nO.
40	RANI:	ah.
41	LUCY:	that you fit >two people a<ro:und the same hei:ght¿
42	RANI:	[°oh yeah.°
43	LUCY:	[b't they can't do it. little (0.2) tall¿
44		(0.4)
45	LUCY:	sO. (0.6) if one here? and one there¿ you're connected
46		to one r:ope?
47	RANI:	°yeah,°
48		(0.3)
49	LUCY:	and one to: another one?
50	RANI:	h=yeh.
51	LUCY:	=and then, over here there there's a basket?
52		(0.3)
53	RANI:	°yeh,°
54		(0.8)
55	LUCY:	a:nd (0.3) there was this, (0.3) cushion
56		thi:ng and you put it in the ba:sket?
57	RANI:	yeah.
58	LUCY:	and you have to try:: >and pull it¿< but the other
59		person might be pulling you¿ (0.2) (b't) you try:ing to
60		get to the basket one? .hh
61	RANI:	((smiling)) O[h ye ye ye ye yeah;]
62	LUCY:	[but (.) the (.) same ro]pe so you don't
63		have two?
64		(0.3)

Throughout, Rani provides a series of acknowledgement tokens, which function as continuers (line 33, nods at the same time) and then upgraded as assessments with the rising intonation (line 35) 'yeah?', hearable and treated as a go-ahead 'oh really?'. Notably, Lucy not only tells a good story, she is able to reciprocate, using a range of acknowledgement tokens. For example, she laughs at just the right time (line 84), and provides a positive assessment (‘woah!’, line 91) as this conversation continues, with Rani explaining a similar experience with bungee ropes:

79	RANI:	there was like a knot in the middle?
80		(0.5)
81	RANI:	and we were all connected to one rope?
82		(0.5)
83	RANI:	so: like six strings¿
84	LUCY:	=hahaha.
85	RANI:	and then like say¿ (0.2) you here, the trampoline’s
86		the:re >and you you have to get< reach (.) there,
87		(0.3)
88	RANI:	and we had to re (0.2) reach there in like about ten
89		seconds°(max.)°.
90		(0.7)
91	LUCY:	wOah.
92		(0.4)

16.10 Turn-taking

The CONVERSATION model identifies **T**urn-taking as one of the primary aspects of conversation. Knowing how to take turns in conversation is the predominant pragmatic skill and is central to participating in interactions with others. The rules of turn-taking prove to be universal across languages (allowing for different cultural norms, such as unmarked pause length between turns) and across modalities (see Willoughby et al. 2014). McTear and Conti-Ramsden (1992) suggest that efficient turn-taking depends on precise timing so that only one speaker talks at a time and that there are no lengthy gaps between turns. Turn-taking requires the listener to monitor the turn closely so that they can predict when the speaker may stop and when the next turn may start without delay and without prolonged overlaps. Such understandings also involve knowledge of the syntactic structures of language (e.g. questions, statements, etc.) as well as the ability to identify the nuances of prosodic features of language including rising and falling of utterances to mark end of turns as well as pausing.

Research shows that children with hearing loss are able to take turns during a variety of contexts including structured tasks, question-and-answer tasks, expository interactions, and during spontaneous conversations (Ibertsson et al. 2009a, b; Lloyd et al. 2001, 2005; Paatsch and Toe 2013, 2016). Specifically, Lloyd et al. (2001) investigated the pragmatic skills of 12 children with hearing loss when constructing a Lego model with two different partners (their teacher and their peers). Results showed that the frequency of total turns was significantly higher when these children were interacting with their teachers compared with when they conversed with their peers. However, the length of turns was longer when conversing with their friends, suggesting that they talked more compared with their interactions with their teachers. Further findings showed that there was a higher proportion of question-answer sequences in interactions with their teachers and a higher proportion of conversational devices and personal contributions during interactions with their peers.

The authors' research investigated the number and types of turns in a group of DHH school-aged children in conversation with their hearing peers. These pragmatic skills were compared with 31 pairs of hearing/hearing children during conversation (see Paatsch and Toe (2013) for further details). Findings showed that the children with hearing loss appeared to take longer turns, ask more questions and make more personal contributions (e.g. comments and statements) than their hearing partners. In contrast, their hearing partners tended to give more minimal responses to questions and to use more conversational devices (e.g. phatics such as 'yeah' and 'ok', and filled pauses such as 'um' and 'like'). These differences in turn types were not evident in the pairs of hearing/hearing children, suggesting a more balanced conversation. It was also evident that while the children with hearing loss dominated the conversation with their hearing peers, it is possible that these children have developed useful strategies to avoid communication breakdowns. These children may take control of the conversation so that they do not encounter unfamiliar content, or situations where they are required to listen for longer, extended sequences of interaction, or repair any breakdown.

Further challenges in conversational turn-taking have also been reported in studies that have investigated signing deaf children with hearing loss in group interactions. For example, Keating and Mirus (2003) reported that signing deaf students experienced difficulties with interacting with their hearing peers during multiparty conversations. Findings showed that many of the interactions contained 'little real language and few of the complex communication skills vital to cognitive and social development' (115). Very few studies have investigated the turn-taking skills of children with cochlear implants while interacting with groups of hearing peers in social situations. As such, we recommend that clinicians and teachers support children with hearing loss to become competent turn-takers with a range of partners both during one-to-one interactions and during group conversations. This may involve encouraging the subtle pragmatic skills that enable these children to avoid domination in the talk and to develop the use of skills such as repair, extension, and eye gaze to denote turn-taking. In addition, teachers and clinicians may model these skills during group interactions or may invite hearing peers into the sessions to encourage group conversation.

16.11 Initiating Topics

Our CONVERSATION model identifies the importance of the pragmatic skill of topic **I**nitiation and the need to target this skill in individualised intervention for children and young people with hearing loss. Bedrosian (1993) describes conversational topics as 'the meat of conversation' (36). All conversations must have a focus or topic, which is ideally of mutual interest to the conversational participants. Understanding how to initiate a new topic of conversation is an essential pragmatic skill that is acquired in the early years (Schley and Snow 1992) and is then progressively refined in adolescence and adulthood (Duncan and Fiske 1985). Several studies have shown that adults with hearing loss often initiate more topics and take longer conversational turns when conversing with a hearing partner (Caissie et al. 1998; Tye-Murray and Witt 1996). Researchers suggest that adults use these strategies to control the conversation, ensuring that the topics discussed are familiar and, therefore, avoiding conversational breakdown (Caissie et al. 1998). Topic control appears to be even more evident when adults with hearing loss chat with unfamiliar partners, providing further support for the claim that this approach is intentional.

The authors' studies have identified similar patterns in school-aged children in conversation with their peers. Our study of 20 children with cochlear implants conversing with a hearing peer (aged 9–12 years) and 20 pairs of age- and gender-matched hearing children showed that the deaf children were much more likely to initiate new topics in their conversations than their hearing conversational partners. In contrast, the hearing pairs evenly shared topic initiation and overall their conversations were more balanced (Toe and Paatsch 2013). We contend that by the age of 9 years, children with hearing loss appear to have already learned that controlling the conversation topic can be advantageous.

There may, however, be other explanations as to why DHH children initiate more topics in their conversations. This chapter emphasises the collaborative nature of conversation. Conversational partners co-construct a conversation with both partners playing a critical role. Review of videotaped conversations using conversation analysis indicates that the hearing friends of these children may not have been as willing to share the conversation with a deaf friend as they were with a hearing partner. With their deaf friends, they appeared to take a more passive role in the conversation by asking less questions, taking shorter turns and initiating less topics (Toe and Paatsch 2013; Paatsch and Toe 2014). We query the impact of the depth of friendship on the way topic is initiated between the deaf/hearing partnerships. Although the participants in our studies self-selected their friends for the conversation, it was not possible to test the level or depth of friendship. It is possible that the hearing pairs were just better friends and, hence, were more inclined to participate equally in the conversations.

Findings from studies of other special populations also provide some insight into topic initiation and the way that it can impact on conversation flow and contingency. Children with pragmatic disorders have been frequently reported in the literature to initiate topics more than their peers (Adams and Bishop 1989; Bishop and

Rosenbloom 1987; Bishop et al. 1994) with a tendency towards verbosity. It may be, however, that the quality of the topic initiation is more important than the quantity. A study by Radford and Tarplee (2000) investigated the management of conversation topic by a 10-year-old child with pragmatic disorder called David. Conversation analysis was used to explore topics that he initiated while in conversation with typically developing peers. Radford and Tarplee also compared David's topic initiations with conversations between two aged matched, typically developing peers. All conversations were videotaped.

Radford and Tarplee propose that the type of topic initiation used can act as a mechanism for limiting future turns in the conversation. As an example, David frequently opens the conversation with a question such as 'what did you do on the weekend?' Radford and Tarplee argue that this kind of enquiry 'imposes limits on the range of possible next turns available to David's conversational partners' (395). In contrast, similar aged, typically developing peers might ask a much more open-ended question such as 'what have you been up to?' which is more likely to encourage their conversational partner to freely choose to report on any activities they deem to be of interest. In David's case the conversation becomes more of an interrogation rather than a free exploration of recent events. Examples from our data are very similar to David's approach to topic initiation. The extract below shows the way topic initiation between a deaf 9-year-old girl and her friend limits the following turns:

DHH:	Okay, what's your favourite holidays?
H:	When I went to Sydney for three days.
DHH:	Okay.

In their paper, Radford and Tarplee show that David also frequently initiates topics using an 'itemised news enquiry' (396). Typically, these are closed questions which are aimed at extracting quite specific responses from his conversational partner. In the authors' data there are many examples of the use of 'itemised news enquiries' to initiate topic (see the extract above).

The *type* of topic initiation used by a child has a substantial impact on topic maintenance and opportunities for contingency. In their discussion, Radford and Tarplee (2000) suggest that one of the reasons that David adopts such conversation-limiting topic initiations is because these devices have been modelled in his interactions with his teachers and speech and language therapists. They note that David is frequently asked the question 'what did you do on the weekend?' during circle time in the language unit he attends. Closer attention must be paid to the possible impact or influence of previous interactions between teachers and deaf and heard of hearing children on the children who have participated in studies. It is important to consider the extent to which interactions with teachers and speech pathologists have shaped the way children with hearing loss in studies interact with their peers.

Several important aspects of topic initiation have emerged from this discussion. To support children and young people with hearing loss to develop more effective conversational skills, we need to attend to the topics initiated in their conversations with a range of partners. We need to encourage them to work toward more balance and relinquish some of the control gained through topic initiation, perhaps initially with familiar peers and adults. This approach needs to be tempered by the understanding that topic initiation may be a productive conversational strategy, helping DHH children to avoid conversational breakdowns and to keep the conversation flowing. Possibly even more importantly, clinicians and teachers need to pay close attention to the types of topic-initiating sentences they use with children and young people who are deaf and hard of hearing. By modelling topic initiators that open up the conversation and encouraging partners to offer a third turn, teachers and clinicians might have a profound effect on the opportunities that children and young people who are deaf have for more sustained and rich conversational exchanges.

16.12 Otherness

The interdependence and collaborative nature of conversation requires speakers to consider what it is that their conversational partner already knows or might reasonably know. Theory of Mind (ToM) is the capacity to attribute mental states, such as beliefs and emotions, to one's own mind and to the minds of others, and to understand that people may have mental states that differ from one's own states. A form of empathic intelligence, theory of mind is often characterised as the ability to see the world from another person's perspective and 'put yourself in their shoes'. Normally hearing children and deaf children with deaf parents (whose first language is sign) develop ToM around age 4–5 years but many children with hearing loss with hearing parents exhibit significant delays. One would expect that such a delay in ToM would also result in difficulties with the development of these children's pragmatic skills, particularly when collaborating with their peers to co-construct their conversation. One of the many pragmatic skills required during conversation is the ability to understand conversational partners and to take the perspective of the other. Children who are unable to develop these skills are highly likely to present with many pragmatic difficulties.

Delays in ToM are not reported for deaf signing children of deaf parents (Courtin 2000). However, children with cochlear implants who use oral language have displayed some marginal differences on theory of mind tests (Peters et al. 2009), but no significant differences in other studies (e.g. Ziv et al. 2013). As summarised by Jones et al. (2015), drawing conclusions about the development of theory of mind for children with cochlear implants is difficult given the variations in language experience of children with hearing loss (e.g. age of implantation), differences in language skills, and the range of mastery for all children. However, models of clinical pragmatics for this group of children with hearing loss need to take into account possible delays, and the opportunities children have had to talk about what other people think (Lecce et al. 2014; Peterson and Siegal 1995).

'Otherness' involves not only theory of mind, 'the ability to make inferences about the psychological states of others and to predict or explain their behaviour' (Jones et al. 2015: 47), but also the ability to enact assumptions about the conversational partner. These assumptions are best summarised by Grice's (1975) maxims of conversation which govern co-operation in conversation. The four maxims are that the speaker should provide enough, but not too much information (*quantity*); be truthful (*quality*); ensure that the contribution is relevant (*relation*) and that the contribution is orderly and unambiguous (*manner*). Invariably, the rules outlined in Grice's lectures are context dependent in that 'too much information' is relative to the intimacy or interests of the speakers. The appropriacy of contributions to the ongoing talk requires the speaker to be mindful of the listener's point of view.

As pointed out by Most et al. (2010), 'a difficulty in relating to the communication partner's point of view during discourse may impair the child's ability to respond appropriately according to the partner's needs' (432). There are debates surrounding the parallel development of language and ToM. Research with children with cochlear implants has similar tensions in establishing whether there are delays in developing ToM when compared to hearing children of the same age. This becomes increasingly difficult the further the other person's needs are from the child with cochlear implants. Anticipating responses from peers is in the immediate realm of the child's experience, but less so for older speakers who are not part of the family, and with whom the child has had no regular contact.

16.13 Naturally-Occurring Interaction

The final element of our CONVERSATION model highlights the importance of conversation as **N**aturally-occurring interaction between partners. With some exceptions (e.g. Keating and Mirus 2003; Pajo and Klippi 2013; Skelt 2013), most research on the pragmatic abilities of children with cochlear implants has studied talk in clinical or structured task settings. Yet, we learn more about opportunities for development, or indeed challenges in pragmatic development, by studying naturally-occurring interaction. The home environment varies for all children. For children with cochlear implants, those that have greater volume of child-parent interaction have greater opportunity to develop expressive language including pragmatic skills. In any account of language development, insight into the quality of naturally-occurring interaction at home – through observation rather than parent-reporting – provides further depth to our understanding of early experiences which inform not only children's linguistic growth, but self-efficacy and developing assertiveness (see Rinaldi et al. (2013) for discussion of parent-toddler interactions).

Much of the research conducted in the pragmatic abilities of children with cochlear implants is based on interaction recorded between adults (typically a clinician, research assistant or parent) and children. The contrived context of the data provides challenges in studying fluency as usual motivations for maintaining topics and alignment with the other speaker may not be present. We know that in peer interactions, children with cochlear implants do more of the conversational heavy lifting in terms of increased topic initiation, number of turns, and so on (Ibertsson et al. 2009b; Jeanes et al. 2000; Toe and Paatsch 2013). Yet, little of the research reported in this chapter draws on naturally-occurring peer interactions. Even where researchers aim to create least clinical contexts for video-recording, such as the 'relaxed and safe atmosphere' of Dammeyer's (2012: 221) study and the authors' work where children are encouraged to 'just have a chat' (e.g. Paatsch and Toe 2014), these are still not examples of children interacting with peers in everyday settings, such as the playground at lunchtime, where all children have to navigate the ongoing dynamics of their social worlds.

Any research that seeks to understand the pragmatic abilities of children with hearing loss needs to be mindful of the context in which evidence of these abilities is collected. Patterns of interaction invariably change for *all* children when talking with parents, siblings, friends, peers, teachers or unfamiliar adults. We should be wary of making claims about competence of individuals based on short samples of contrived conversation, with small participant groups, recorded for short periods of time. Future research should endeavour to better understand how children navigate the very settings which depend on pragmatic skills, for full participation in their school and social lives. The call for naturally-occurring interactions is not only for the purposes of research, but also for opportunities for 'pragmatic language instruction to occur within the context of social situations … [highlighting] the importance of learning in context so that learning is meaningful, remembered, and generalized' (Thagard et al. 2011: 528). Research could be most productive where the stakes are high, when talking with peers at school, with data that seeks to understand which particular pragmatic skills prove to be most important in opening and sustaining interaction with peers.

16.14 Summary

The studies presented in this chapter show that children with hearing loss are able to use a wide range of pragmatic skills including topic initiation, turn-taking, and topic extension. However, many children with hearing loss have difficulty with developing some of the more complex and subtle pragmatic skills required for social interaction. Given the importance of peer relationships to school-aged children's sense of self, social competencies and engagement in school, early intervention that supports children's language in use is critical.

The CONVERSATION model has been presented as a way to support clinicians and teachers in developing children's pragmatic skills. The model recognises that pragmatic skills are not limited to linguistic competence but rather it is the way that language is used in different contexts that impacts on children's own confidence, motivation and social adjustment (Tye-Murray 2003). All elements of the CONVERSATION model are interrelated and should not be treated in isolation. It is anticipated that providing support in each of the twelve elements will ultimately result in improved conversational skills in children and young people with and without hearing loss. However, further research is warranted to investigate the effectiveness of specific pragmatic intervention on the development of these skills in everyday social interactions.

16.15 Appendix: Transcription Conventions

The transcription conventions used in this chapter follow the original work of Sacks et al. (1974).

.	falling intonation
,	continuing intonation
?	rising intonation
¿	intonation that rises more than a comma but less than a question mark
:	lengthened syllable
↓	sharp fall in pitch
↑	sharp rise in pitch
[ ]	overlapping talk
( )	unintelligible stretch
(0.5)	length of silence in tenths of a second
(.)	a micropause (i.e. less than 0.2 of a second)
> <	increase in tempo
< >	stretched out or slower talk
hh	audible outbreath
.hh	audible inbreath
° °	passage of talk quieter than the surrounding talk
(( ))	description of accompanying behaviour
=	latched utterance, no discernible silence or pause
_	underlining indicates stress or emphasis

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Chapter 17
Congenital Visual Impairment

Rebecca Greenaway and Naomi J. Dale

Abstract Language is assumed to have particular importance for the child with visual impairment (VI), serving a facilitative role in developing understanding. Children and young people with VI often demonstrate very good structural language ability but have greater difficulty in pragmatic language, which involves the flexible use of language within the social context. Differences in early social responsivity, communication and language skills between children with VI and their sighted peers are evident from infancy, and subsequently the developmental trajectory to fluent language appears to differ in children with VI. In developing pragmatic language and social communicative skills, the importance of conceptualisation of the environment, play, parent-child interaction, shared attention and theory of mind has been highlighted. These areas of research are discussed and it is argued that there is a broad impact of VI on development. There is controversy over the degree to which pragmatic language difficulties in children with VI can be explained by the child's limited visual input rather than by a true pragmatic difficulty per se. We argue that there is individual variability, with some children appearing to overcome the challenges of developing social communication and pragmatic language in the absence of visual input, but with a significant proportion showing greater difficulty.

Keywords Blindness • Communication • Language • Pragmatics • Social development • Visual impairment

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17.1 Introduction

Vision is often considered to be the dominant sense with which humans interact and develop meaningful representations (Posner et al. 1976; Ricciardi et al. 2014). Vision allows us to access a whole scene simultaneously and plays a central role in integrating information from the other senses in order to form a coherent sense of the environment (Warren 1994). It follows that the perceptual experience of children with visual impairment (VI) is very different from that of their sighted peers and that they are much more dependent on aural and haptic modalities to understand the world. It is, therefore, unsurprising that congenital VI impacts on the developmental trajectory of the young child. As the foundations of social responsivity and communication begin early in infancy, the experience and development of children with congenital VI is likely to differ from that of the child who acquires VI later in childhood. The focus of this chapter will be on children with congenital VI in order to understand the impact of absent or impoverished visual input from birth on communication development (from here on the term VI will be used to refer to congenital VI).

The aetiologies of childhood VI are mixed and heterogeneous. Congenital VI can be categorised on site of origin, with a distinction between *cerebral* VI (damage to the posterior optic pathway and visual cortex) and *peripheral* VI (damage to the eye globe, retina or anterior optic nerve). Peripheral VI can be further categorised as *complicated* (with known brain involvement in the paediatric diagnosis, e.g. cataracts in Down Syndrome), and *simple* (where there is no known brain involvement in the visual diagnosis) (Sonksen and Dale 2002). A growing consensus from the research literature indicates that even a small amount of form vision can lead to better developmental outcomes (e.g. Dale and Sonksen 2002; Hatton et al. 1997). Therefore, another important distinction is between children with *profound* VI (PVI: no vision or light perception at best) and *severe* VI (SVI: significantly impoverished vision, but with the ability to detect form).

17.2 Methodological Issues

Childhood VI is rare. In the UK, the incidence of SVI/PVI is 4 per 10,000 among infants under 1 year (Rahi et al. 2003). Therefore, many of the studies of language development in this population have small sample sizes. In particular, several studies of language development in VI have gathered rich longitudinal data, following a very small number of infants or young children (e.g. Landau and Gleitman 1985). Longitudinal studies allow the documentation of developmental stages over time, which is important in children with VI as early language development may follow a different trajectory. However, given this is a heterogeneous population, when conclusions are based on just two or three children, it is not surprising that studies have produced contradictory results (Norgate 1997). Another methodological challenge is the high rate of children with VI who have additional brain involvement and/or additional needs (Morris and Smith 2008; Rahi et al. 2003). Several early reports of language development in the literature have studied children with PVI secondary to significant prematurity, which is also known to impact on development (e.g. Landau and Gleitman 1985).

Pragmatic language and social communication ability are difficult to measure as they are context-dependent human behaviours, which are more readily observable in naturalistic rather than in structured settings (Norbury 2014). Pragmatic language abilities, as opposed to structural language or cognitive abilities, cannot be measured in a standardized way based on performance on a single measure (Adams 2002). This is further complicated by the fact that traditional approaches to the assessment of language, pragmatic language and social communication have not been designed for use with children with VI (De Vaan et al. 2013). For example, it has been argued that traditional false belief tasks, which are used as a measure of theory of mind, are visually biased and overestimate difficulties among children with VI. Studies utilising theory of mind measures adapted for VI have found smaller differences between children with VI and their sighted peers (Brambring and Asbrock 2010). Thus, caution is required when comparing children with VI to their sighted peers and observations need to be interpreted from the perspective of how the child with VI learns and makes sense of their environment (Norgate 1997).

17.3 Precursors to Pragmatic Language Development

17.3.1 Early Development and Play

> Without vision, infants cannot see how their actions make objects move, nor that objects continue to exist when dropped, nor how other people act with objects. (McConachie and Moore 1994, p. 230)

The impact of VI on development is wide reaching, with research indicating delays in the preschool years across developmental domains, including sensorimotor understanding, play, language and gross motor skills (e.g. Hatton et al. 1997; Reynell 1978). These difficulties can have a cumulative effect during infancy and early childhood (Sonksen 1983). For example, infants with VI take longer to understand that they can reach for objects and that objects have permanence. This in turn may account for why infants with VI are often more passive and less explorative than their peers which may have a subsequent impact on gross motor, sensorimotor and play development (Fraiberg 1977; Sonksen 1983). Symbolic play, the use of one object to represent another object, is a prelinguistic skill that is thought to support later language development. Symbolic play and language both require understanding of the concepts involved and that one thing can symbolise another (Lewis et al. 2000). Studies with children with VI have indicated a relationship between symbolic play and language level (Lewis et al. 2000; Rogers and Puchalski 1984).

The potential impact of VI on symbolic play development is highlighted by Lewis et al. (2000) who suggest that children with normal sight learn symbolic play via imitation and observation of others, as well as seeing how toys (e.g. a toy car) resemble actual objects. Studies have generally reported delays in symbolic play in children with VI (Rogers and Puchalski 1984; Tröster and Brambring 1994). However, two studies have highlighted individual differences, with children with VI and good social competence showing age-appropriate symbolic play, whilst those with social communication difficulties showing weaknesses in symbolic play (Bishop et al. 2005; Lewis et al. 2000). Urwin (1979) carried out longitudinal naturalistic observation of three children with VI. She described how a child with SVI could engage in early symbolic play with objects. However, in line with other studies (e.g. Andersen et al. 1984) she reported the play of the two children with PVI to revolve around verbal role-play sequences. Urwin gave the following example of a 4 ½ year old child with PVI:

Father: “Are you sure?”
Child: “I sure Dad”
Father: “Are you sure?”
Child: “I sure Dad”
Father: “You sure?”
Child: “I sure Dad. I sure Dadda” (and bursts of hysterical laughter)
(Urwin 1979, p. 124)

Such verbal play routines may serve a social and communicative function for the child with VI (Norgate et al. 1998). However, reduced play with physical objects is likely to have a subsequent impact on the child’s development of sensorimotor and conceptual understanding.

The preschool years are an especially vulnerable time for children with VI and a subgroup of young children with PVI appear to be particularly at risk of ongoing developmental difficulties (Dale and Sonksen 2002). However, as children approach school age the developmental gap between some children with VI and their peers with normal sight begins to reduce (particularly in verbal reasoning and structural language development) as more abstract thought processes develop and the child is more able to use their language and haptic skills to compensate for their lack of visual perception (Reynell 1978).

17.3.2 Parent-Child Interaction

Children with VI have less opportunity for incidental learning (Warren 1994) and it has been hypothesised that a supportive learning environment may have a more critical role in their development compared to peers with normal sight (Pérez-Pereira and Conti-Ramsden 2013). The social context in which a child is reared is widely understood to help shape the child’s language development and thus different interaction styles and family environments are argued to lead to individual differences in language development (Hoff 2006). Parent-child interaction has particular relevance to the development of pragmatic language given the posited role of parent-child joint attentional focus on early language development (Tomasello 1988). When parents are well attuned to the infant with VI, vocal and tactual communicative behaviours can compensate for the lack of shared gaze (Bigelow 2003; Rattray and Zeedyk 2005). Indeed, research with mothers with VI interacting with their infants with normal sight, has indicated that the absence of eye gaze does not necessarily impact on social or developmental outcomes and may in fact lead to greater communicative flexibility in the infant (Rattray and Zeedyk 2005; Senju et al. 2013). However, research suggests that developing shared attention with the infant with VI can pose a greater challenge and consequently parent-child interaction may in turn further influence language development in children with VI. For example, there is evidence that infants with VI, particularly infants with PVI, can be less expressively responsive, less likely to initiate social interaction and less likely to share meanings during play (Preisler 1991; Tröster and Brambring 1992). Furthermore, the absence of eye gaze can make it harder for the parent to interpret their child's communicative intent and focus of attention (Baird et al. 1997).

Moore and McConachie (1994) compared parent-child interaction in mothers of infants with SVI and mothers of infants with PVI (aged 18 months). Mothers of children with PVI initiated interaction more frequently, were more likely to talk about objects which were not at the child's current attentional focus and more frequently requested verbal information. The authors suggest that even a small amount of vision can have a substantial impact on the interaction between the parent and infant. They highlighted the challenge in initiating and sustaining interactions faced by parents of children with PVI.

Other studies have looked at individual differences in parent-child interaction styles and how these relate to developmental factors. In the largest study of parent-child interaction in the VI literature to date (Optimum cohort, Dale et al. 2013), Sakkalou et al. (2013) observed play sessions between 57 mother-infant dyads (infants aged 13 months) to explore whether the attention-directing strategies used by mothers related to the infant's sensorimotor understanding and socio adaptive behaviour. The amounts of introducing (mother introduces a focus of attention when the child is not engaged with something), maintaining (mother follows and maintains the child's current focus of interest) and redirecting (mother attempts to redirect the child's current focus onto something else) during play sessions were coded. Transcripts of mother-child interactions with infants with VI are shown below. The results indicated that mothers of children with more vision showed more 'maintaining' and this was related to both social adaptive behaviour (assessed through infant accepting and rejecting responses) and sensorimotor understanding.

Child 1, PVI, aged 15 months Child is playing with a toy piano that has tactile numbers on the buttons. Mother is joining child in play.

Mother (Maintain): "Oops, mummy pressed the [*red button*]. Mummy's feeling the numbers on them."

Mother leaves the toy piano and finds a different toy to play with, a spinning wheel. The child is still engaged with the toy piano.

Mother (Redirect): "Mummy's playing with the wheel."

Mother puts the spinning wheel aside and finds a book. Child is still playing with the toy piano.

Mother (Redirect): "Shall we read a book, baby?" [*Mother moves the book and touches it against the child's arm. Child is still manipulating the toy piano*]. "Shall we read a book? That is a book. This is a different book to your books. It is called "that's not my monster". Can you feel his nose? In the middle. That's his nose."

Child 2, SVI, 15 months Child is playing with a pull-along-duck and has tipped it over.

Mother (Maintain): [*Mother helps the child turn the duck the right way up – without vocalising*]

Mother (Redirect): [*While the child is still playing with the duck, his mother is trying to get the child to stop and move close to her*] "Ok. Shall we get? Come round here."

The child lets go off the duck and starts to bend his knees and move in an up and down motion.

Mother (Maintain): "Are you going up and down? Up down, up down, up down, jump jump jump!"

The child goes back to playing with the duck.

Mother (Maintain): [*Mother pulls duck in order for the child to pull the string and pull duck towards him*] "Pull!"

After a few seconds of watching the child play with the duck, his mother picks up the duck and brings it close to the child's face.

Mother (Maintain): "Oh! It's a duck! And the duck says hello baby" [*Mother makes a kiss sound*] "Mwah!"

The child starts to bend his knees and move in an up and down motion.

Mother (Maintain): "Up down, up down, up down, up down, up down, jump jump jump! Are you jumping? hhhm. Up you go."

After a short period of just watching the child

Mother (Maintain): "Up down, up down, up down. Are you jumping? Baby is jumping! Baby is jumping up and down. Up! Up!"

The child stops jumping and reaches and walks towards the mother.

Mother (Maintain): "Ok"

In another study, Hughes et al. (1999) explored individual differences in parent-child interaction styles with older preschoolers (2–3 year olds) and the relationship with language development. They found that quality of responsiveness and quality of directive or goal-setting behaviours by mothers positively correlated with the child's receptive and expressive language, whilst the amount of control and directive behaviors were negatively correlated with the child's pragmatic language. Thus, there is some evidence to indicate a relationship between parent interaction styles and the child's language and communication ability. It is important to note, however, that these cross-sectional correlational studies do not indicate direction of effects between parent interaction style and the child's development.

17.3.3 Early Communication and Joint Attention

O'Reilly et al. (2015) measured event-related potentials in response to basic social stimuli (hearing subject's own name versus a control name) in the Optimum cohort of 23 infants with VI compared to 14 infants with normal sight aged 8–15 months. The infants with VI showed no significant name effect (N500 component) compared to the sighted group who showed a greater N500 waveform to their own name at frontal and central sites. The authors concluded that infants with VI showed an early difference or lack of responsiveness to social stimuli that are salient to infants with normal sight. Observational research with infants has also indicated prelinguistic differences in early socially-directed communication in children with VI. Tröster and Brambring (1992) explored social-emotional development in 22 infants aged 9–12 months with congenital PVI. Compared to infants with normal sight, infants with VI showed limited facial expressions and reduced attempts to initiate contact with their mothers. Using a social communication interview developed to assess these abilities in young children with VI, Dale et al. (2014) found that questions to parents on joint attention behaviours distinguished children with PVI (n = 17) from children with SVI (n = 15) and normal sight (n = 23). In particular, parents of children with PVI were less likely to report that their child 'shares experience with toy' and 'shares interest in event'. This suggests that of the early social communicative skills demonstrated by children with PVI, developing joint attention may be a particular challenge. This is consistent with other research indicating delays in joint attention. It is generally agreed that without visual input it is harder for the child to learn that their experience of objects can be shared with others (Bigelow 2003).

17.3.4 Theory of Mind

Theory of mind (ToM) is the social cognitive ability to understand that others have mental states that differ from one's own. ToM has been extensively explored in children with social communication difficulties. There is evidence for an association between ToM and pragmatic communication skills (Happé 1993; Martin and McDonald 2003), and deficits in ToM have been argued to affect the ability to interpret intended meanings during conversation (Sak-Wernicka 2016). As precursors of ToM development include those that are visually oriented, for example joint attention, recognition of facial expressions and non-verbal communication (Korkmaz 2011), it is not surprising that this has been posited as a potential area of vulnerability among children with VI.

Using traditional ToM tasks, Minter et al. (1998) found that children with VI had greater difficulty on these tasks compared to their sighted peers. Similar delays have been reported in other studies (Green et al. 2004; Peterson et al. 2000). In summarising these three studies, Brambring and Asbrock (2010) argue that the findings are suggestive of a delay in ToM development of at least four years. However, they attribute this delay to the use of false belief tasks that disadvantage children with VI, arguing that the materials and actions performed in the tasks are visually biased and not representative of how the child with VI perceives the world. Brambring and Asbrock utilised adapted false belief tasks based on tactile or auditory experience and found a smaller overall delay of 19 months in their sample of children with VI (n = 45). A more recent study using adapted false belief tasks found weaker performance in a sample of children with complicated peripheral VI (n = 22), but not those with simple peripheral VI (n = 9) compared to a comparison group with normal sight (Begeer et al. 2014). These authors suggested that neurological differences rather than VI per se may account for ToM delays in this population. However, this should be interpreted cautiously as the sighted comparison group were younger than the VI groups and the peripheral VI group had a small sample size.

Pijnacker et al. (2012) considered advanced ToM performance using second-order false belief tasks in children with varying degrees of visual impairment. Whilst first-order beliefs concern awareness of others' beliefs about a situation, second-order tasks assess understanding of others' beliefs about beliefs. They found that their group of children with VI (n = 24) performed similarly to the comparison group of children with normal sight. The authors highlighted that compared to previous studies, which have often relied on tactile ToM tasks, their tasks were primarily story-based, which may have drawn on the auditory short-term memory advantage reported for children with VI (Hull and Mason 1995). However, differences between this study and previous studies may also relate to the inclusion of those with more moderate degrees of VI and to an older sample. In Pijnacker et al.'s study the majority of the participants were aged 8 years or above, so early delays in developing ToM may have been overcome.

17.4 Social Communication

Pragmatic language difficulties form part of the core communication deficit observed in children with autism spectrum disorder (Tager-Flusberg et al. 2005). Furthermore, cognitive theories of autism (including ToM and weak central coherence) have been utilised as possible causal explanations of pragmatic language deficits (Martin and McDonald 2003). However, it is argued that social communication and pragmatic language difficulties can be differentiated, as some children can comprehend and use language appropriately within context (for example, inference or metaphor), but struggle specifically with the subtleties of social nuance and the flexible use of language for social purposes (Norbury 2014).

The disruption to visually-directed precursors of social communication development, including eye contact, gaze following, use of gestures and joint attention, in young children with VI has been theorised to explain early delays in social communication and the higher prevalence of autism in this population (Hobson 1993). Research from our group identified that children with VI are at greater risk of developmental plateau'ing or regression ('developmental setback') associated with ongoing social communication difficulties (Cass et al. 1994; Dale and Sonksen 2002). This occurs in the second year of life following what appears to be initially advancing development, and has been observed in up to a third of children with PVI in a clinical sample. Other studies with older children with VI have similarly reported rates of autism spectrum disorder as high as 30 %, with children with additional neurological involvement, intellectual disability and PVI being most at risk (e.g. Mukaddes et al. 2007; Parr et al. 2010).

An ongoing challenge is the accurate detection and diagnosis of autism among children with VI as traditional screening and assessment measures have not been designed for this population. This is particularly relevant, because as well as the obvious challenge in using nonverbal communication, children with VI can often show behaviours, such as echolalia and mannerisms, which can reflect typical early developmental phenomena in this population. Consider the following example. This three-year-old child with PVI presents with frequent head turning and flapping, particularly when excited or not engaged in an activity. On initial observation there may be significant concern about possible autism. However, the child shows pleasing play skills and uses their language flexibly to comment on play and engage with the assessor:

Child and assessor playing with a pretend tea set
Child: "Look I did it"
Assessor: "You did"
Child: "Now I need to just pour some more in the cup"
Assessor: "Here's something for you to use in your tea"
Child: "What's that? A spoon!", "Stir the tea"
Assessor: "Good job!"
Child: "There, all finished. Now we drink it"
Assessor: "Enjoy your tea"
Child: "I will"
Assessor: "You drank all your tea"
Child: "Yes!"

In the above example, the child uses language to initiate joint attention, to maintain the interaction, to make social overtures and to respond to the assessor. Therefore, alongside very evident stereotypic behaviours the child is showing pleasing early social communication development.

Assessment of autism in children with VI should be carried out by professionals with expertise in this population so that the child's abilities can be compared to typical expectations for the child's developmental and visual level. Given the early delays in social communication typically seen in this population, diagnosis of an autism spectrum disorder would typically occur later than in children with normal sight, to delineate what represents a delay compared to a persisting social communication deficit. Our group is currently in the process of designing and validating measures with this goal in mind (Absoud et al. 2011; Dale et al. 2014; Sakkalou et al. 2015). It is important to highlight that, without access to professionals with expertise in VI and suitable assessment materials, there is a risk of both over-diagnosis and under-diagnosis (De Vaan et al. 2013).

17.5 Structural Language

In individuals with normal sight, structural language ability has been found to predict performance on pragmatic language tasks and some studies have found that for certain aspects of pragmatic reasoning, such as inference and metaphor, structural language may be just as important or even more important than social cognition (Norbury 2005; Volden et al. 2009). Therefore, prior to discussion of pragmatic language it is useful to understand how structural language develops in children with VI.

> Blind children seem to approach the task of language learning deprived of many opportunities to observe the world that language is describing. (Landau and Gleitman 1985, p. 13)

All young children will have the experience of hearing words (e.g. “you’ve got new shoes”) that do not relate to what they are currently attending (e.g. “a teddy”). Given the restricted perceptual access that the young child with VI has to their environment, particularly their distal environment (e.g. a dog running in the park, a plane flying in the sky), we may presume that this mismatch between spoken words and perceptual experience to be a more frequent occurrence for the young language learner with VI. Given these challenges, alongside the early developmental and social communicative challenges already highlighted, it is striking that language learning proceeds with apparent ease in many young children with VI. It has been suggested that the particular utility of language to the infant with VI will lead to greater attentional resources being allocated (Pérez-Pereira and Conti-Ramsden 2013). Landau and Gleitman (1985) highlight that children do not only rely on perception of the external environment to learn language, they emphasise the contribution of the organisational regularity of the language system in language development: “in short, a critical contextual cue to language learning is language itself” (p. 20).

17.5.1 Early Language Development

The evidence regarding the timing of first words among children with VI is inconsistent, which is likely to reflect a high degree of individual variability in this heterogeneous population. Studies with larger numbers of children tend to indicate that children with VI develop their first words later than their sighted peers (Brambring 2007; Hatton et al. 1997; Reynell 1978), though some have argued that there is no difference in timing (Mulford 1988). Once first words have developed, children with VI tend to show the typical pattern of rapid vocabulary expansion (McConachie and Moore 1994).

Research into the content of first words of children with VI has found that their differing perceptual experience is subtly evident. Some studies have found that young children with VI have relatively more action words and relatively fewer object labels in their early vocabularies compared to their sighted peers (McConachie and Moore 1994; Mulford 1988; Norgate 1997). Norgate attributed this difference to the typical learning of object labels via ‘point and look’ activities by the child with normal sight. Similarly, Bigelow (1987) reported a reduced vocabulary for outdoor objects and animals (which the children with normal sight may experience from a distance or learn via picture books) among the first words of two children with VI in a longitudinal study. There was also a trend for the early words of the children with VI to relate more to their auditory, tactual and olfactory experience.

Despite a lack of agreement in the literature regarding when early language milestones are met by children with VI, there seems to be a consensus that there is an impact of the differing perceptual experience of the child with VI on language development. There is also agreement that by the late preschool years, children without additional intellectual disability have typically acquired structural language skills in line with their sighted peers (Landau and Gleitman 1985; Reynell 1978).

17.5.2 Language Expression Versus Comprehension

In typical language development, comprehension of language develops ahead of language production and the young child typically understands significantly more words than they can produce (Fenson et al. 1994). In the initial stages of language development, there is some research indicating that expressive language skills among children with PVI may be relatively in advance of their language comprehension (McConachie 1990; Reynell 1979). McConachie explored receptive-expressive language discrepancies relative to norms for children with normal sight among 20 children with PVI and 20 children with SVI, based on the Reynell Zinkin Scales, which are developmental scales for assessing young children with VI (Reynell 1979). A subgroup of the children with PVI showed expressive language skills ahead of comprehension based on norms. Interestingly, this profile was not present among children in the SVI group suggesting that this may be specific to a subgroup of children developing language in the absence of form vision. There was also however a subgroup of children in the PVI group who showed an initial expressive language lag, indicating that there can be very varied language trajectories in this population. In the PVI group, the discrepancy relative to sighted norms ranged from a 13-month expressive language advantage to a 3-month expressive language lag. A case example of a child showing an expressive language advantage is described below:

On the Reynell Zinkin Scales, this 3-year-old boy with PVI, demonstrated skills at an age equivalent level of 3 years for Vocalisation and Expressive Language compared to norms for children with partial sight. On the Verbal Comprehension and Sensorimotor scales he was relatively weaker, demonstrating skills around an age equivalent level of 2 years. The child's language comprehension was at the stage where he was able to follow short familiar instructions (e.g., "give it to me") and to select very familiar objects from a choice of three (e.g., "where's the ball?"). His expressive language did appear somewhat formulaic and use of delayed echolalia was evident. However, he was also able to use short phrases flexibly and appropriately in context, examples are given below:

"So where is Jess? She go?" [*asking after sister*]
"I'm going to give it to mummy" [*exploring everyday objects*]
"Where's it gone? Get it for me. I want to play with it. I do it again." [*during ball play*]
"I can put it on my shirt" [*when given a sticker*]

Fenson et al. (1994) describe children who show relatively stronger expressive language compared to comprehension as more imitative and less cautious in their speech. This pattern of language development has also been reported in large scale studies of children with autism (Hudry et al. 2010; Luyster et al. 2008) and may relate to a more 'gestalt' language processing style, see below for further discussion.

17.5.3 Language in Older Children and Adults

There has been less research interest in the structural language ability of older children and adults with VI, possibly because language assessment material for this age range is often pictorial. Tadić et al. (2010) explored language skills in 15 children with VI relative to a sighted comparison group using the Clinical Evaluation of Language Fundamentals – Third Edition (using only the subtests without visual stimuli) (Semel et al. 1995). The children with VI outperformed the comparison group on derived language quotient ability despite being matched on age and verbal intelligence. Some research with adults has also indicated potentially stronger performance among individuals with VI, with studies indicating faster speech processing which has been explored in the context of cerebral reorganisation of the language system (Röder et al. 2000; Röder et al. 2002). Therefore, there is some evidence, albeit sparse, of relative strengths in structural language among school age children and adults with VI, lending support to the supposition that language holds special importance for individuals with VI. However, aspects of grammatical structure, which is usually measured using assessments with pictorial stimuli, have not been easily assessable.

17.6 Pragmatic Language

17.6.1 Nonverbal Communication

Given the visual nature of nonverbal communication, this would be expected to be an area that is not readily utilised by individuals with VI. Eye contact and gaze following are generally not feasible so a key component of joint intersubjectivity is missing (Hobson and Hobson 2007). Skills such as orienting in the direction of one's communication partner do not develop as naturally in the young child with VI compared to sighted peers. Children with VI may require explicit teaching to develop these skills (Warren 1984). In contrast to children with autism, it has been argued that children with VI can respond well to explicit teaching regarding nonverbal social behaviours (Gense and Gense 2005). Individuals with VI are reported to produce a similar range of spontaneous facial expressions as individuals with normal sight, though with subtle differences in voluntary expressions (Galati et al. 2003). Roch-Levecq (2006) found that children with VI were similar to children with normal sight in their ability to identify verbally basic emotions that would be evoked in specific situations, but they had more difficulty in accurately conveying these emotions facially.

Iverson et al. (2000) compared gesture use in free play in five children with VI and five children with normal sight followed up longitudinally between 14 and 28 months. All of the children in the VI group used some gesture during the early stages of language development, though the frequency was low relative to their peers with normal sight. The authors suggested that the reduced frequency could be because this is a less efficient means of communication for young children with VI. For example, unlike the child with normal sight, the child with VI cannot follow the gaze of their communication partner to determine that the gesture has been understood. Both groups showed a similar range of gestures, including deictic (e.g. pointing or showing), conventional (e.g. nodding) and reach/ request gestures. Differences were noted in that the children with VI tended to point using their palm rather than index finger and this was almost exclusively to refer to objects in close proximity. There were individual differences in the amount of gestures used. However, interestingly in the VI group there was no relationship between gesture use and communicative competence. The authors highlighted caution in generalising from this small sample, but suggested it is possible that gesture plays a role in language development for children with normal sight but not children with VI. Given children with PVI do not have visual experience of gesture, what is perhaps more remarkable is that these children gesture at all. Iverson et al. argue that this demonstrates the resilience of gesture in communication. Supporting this conclusion, Iverson and Goldin-Meadow (2001) also found similarities in gesture use by individuals with PVI and individuals with normal sight in a study of older children and adolescents.

17.6.2 Pragmatics of First Words

Whilst there are surface similarities in the first words of children with VI compared to their peers with normal sight, it has been argued that there are subtle pragmatic differences (Andersen et al. 1984). For example, based on small-scale longitudinal research there is evidence during the initial stages of language development that young children with VI are less likely to overextend or generalise their first words than their sighted peers (Andersen et al. 1984; Bigelow 1987), so that the use of the word is more closely linked to the original referent. This has been related both to perceptual experience, as the child with VI has less opportunity to observe similarities between objects (Bigelow 1987), and to weaker category formation skills secondary to delayed sensorimotor understanding (Andersen et al. 1984).

17.6.3 Word Meaning

Meaning is central to communication and there has been interest in the development of word meaning in the language of children with VI given their different perceptual experience. One area of particular interest is the use of verbalisms, which refers to the use of words for which the speaker does not have concrete experience of the referent. In the context of congenital PVI, verbalisms refer to the use of words that describe visual qualities or behaviour. Landau and Gleitman (1985) describe how Kelli, a young child with PVI, was able to understand and use the terms 'look' and 'see'. The authors reported that when told "look up", a blindfolded child with normal sight raised her covered eyes upwards, whilst Kelli responded by raising her hands, indicating that Kelli had learnt that "look" means to perceive. They concluded that such examples indicate the resilience of semantic development across sensory modalities (Gleitman and Landau 2012). In a study of the narratives of 62 children aged 7–14 years with PVI compared to a group of children with normal sight, there were no group differences in the number of visually-oriented verbalisms (Rosel et al. 2005). The use of verbalisms by the children with PVI was judged to be semantically and syntactically correct and were more frequent among the older children. The authors concluded that this indicates the ability of children with PVI to adapt their language to their social environment.

Vinter et al. (2013) explored the verbal definitions of objects given by children with VI (n = 96, 6–14 years). In contrast to Rosel et al.'s findings, they reported visually-oriented verbalisms were infrequent among the children with VI. They found that children with VI described more tactile and auditory characteristics, whilst the children with normal sight (n = 32) gave more visual descriptions. The authors suggested that these group differences reflect the particular experience of the two groups and are consistent with embodied theories of language that perceptuomotor and concrete experience helps ground word meaning. Other authors have, however, expressed concern that the development of word meaning may be an area of vulnerability for children with VI, as more limited opportunities for exploration of the environment may impact on concept development (Vervloed et al. 2014; Warren and Hatton 2002).

17.6.4 Echolalia and Formulaic Language

A pragmatic difference that appears more frequently in the expressive language of young children with VI compared to their normally sighted peers is echolalia (Fay 1973; Prizant 1987). Echolalia has typically been used to refer to non-meaningful repetition of language and is also more commonly observed in children with autism. Over time, the view of echolalia as 'non-functional' has been challenged among both children with autism and children with VI (Prizant 1987; Prizant and Duchan 1981; Sterponi and Shankey 2014). Fay (1973) studied three children with VI and echolalia. He argued that the acquisition of language meaning is delayed due to lack of visual experience and that echolalia occurs due to the child's drive to communicate. Since then, there has been a move to categorise echolalic utterances according to a range of functions (Schuler and Prizant 1985; Kitzinger 1984). Kitzinger (1984) identified the following functions of echolalia in VI: to question, to request, to comment or as self-direction, for play and organising and mastering past experiences. Prizant and colleagues have highlighted functional categories that fall along a continuum, from rote and automatic forms of echolalia to clearly intentional communicative forms (Schuler and Prizant 1985). They highlighted both the communicative (e.g. turn-taking, request, affirmation) and cognitive functions (e.g. rehearsal, self-directive) of echolalic utterances. However, there has been little research comparing the function of echolalia between children with autism, children with VI and children with normal sight without additional needs. Given the heterogeneity of these populations, it is likely that there are substantial individual differences between as well as within groups, and indeed the same child may use echolalia for a range of differing functions.

Some children with PVI also use frequent delayed echolalia, leading to a more stereotyped or formulaic language style (Urwin 1984). The child may use language learnt in chunks whilst still struggling to use language flexibly at the single-word level. Consider the following two examples of speech from a 3-year-old girl with PVI whose speech mainly consists of delayed echolalia:

Assessor: "Where's your head?"
Child: "Mind your head"
Assessor: "What's this?" [*assessor hands child a spoon*]
Child: "Do you want yogurt?" [*note: the child is not yet naming a spoon and this utterance is not directed as a question to anyone in particular*]

This child is struggling to respond to simple questions and is not yet labelling objects. However, the second utterance relates to the object presented, suggesting some meaningful understanding and use of language. Typically, young children with normal sight use an ‘analytic’ style of language learning, starting with single words and moving on to two-word combinations and short phrases (Bloom and Lahey 1978). However, the more imitative and stereotyped language often observed among young children with VI has been argued to reflect a predominantly ‘gestalt’ language processing style (Peters 1987; Pérez-Pereira and Conti-Ramsden 2013). Peters describes this as a ‘use first, analyse later’ strategy, whereby the child first memorises and practices language in unanalysed chunks, which are later segmented and analysed as the child’s language skills develop. Similar to Landau and Gleitman’s (1985) perspective that the syntactic structure of language itself is an important context for language development, it is suggested that rote-learned chunks of language provide a basis for learning about language and in time the child can move towards more generative and flexible language (Schuler and Prizant 1985).

This proposal of a ‘gestalt’ language learning style has been applied to other groups of children who show use of formulaic language, including children learning a second language and children with autism (Perera 2001; Prizant 1983). A ‘gestalt’ language learning style in children with VI may occur due to the greater dependence on language input given their more limited sensory experience of the environment (Moore and McConachie 1994). Explanations have been put forward by Schuler and Prizant (1985) to explain a ‘gestalt’ language style in children with autism and may be relevant to children with VI. They suggest that joint attention is important in attributing meaning and segmenting language and thus a deficit or delay in joint attention may impact on language style. They also suggest that in early language development, if the child has stronger speech imitation and memory relative to their communicative ability, they may be more likely to use imitations and formulaic language. This latter explanation is relevant to children with VI, given that research has highlighted superior auditory verbal short-term memory in this population (Hull and Mason 1995).

Pérez-Pereira (2014) proposes that the formulaic language of children with VI, when considered from a functionalist perspective, indicates that a ‘gestalt’ language processing style is a functional mechanism in developing and analysing language and should not be considered ‘autistic-like’ or reflective of pragmatic difficulties in this population. Indeed, given the impact of VI on the precursors to language development discussed thus far, it is not surprising that there are differences in language learning style. However, further research is needed to understand individual differences in language style in children with VI and in particular whether children who persist with this processing style for longer are more likely to present with comorbid social communication difficulties. This is certainly our clinical experience that a persistent use of echolalia in the later preschool years is a source of concern (Dale 2005). It has been suggested that some normally sighted children with autism may show a persistent ‘gestalt’ language style that is associated with less flexibility and creativity in language use (Schuler and Prizant 1985).

17.6.5 *Personal Reference Terms*

A difficulty in the acquisition of pronouns and a tendency to produce pronoun reversals has been reported to be characteristic of young children with VI (e.g. Dunlea 1989; Fraiberg 1977). However, there has only been limited research in this area and these conclusions are usually not derived from quantitative data (Pérez-Pereira 1999). Most of the research is drawn from longitudinal studies of language development in children with VI, based on very small sample sizes. Of three young children with PVI followed up longitudinally by Pérez-Pereira (1999), two of the children did not show any greater difficulty with pronouns than a child with normal sight, whilst the third child with PVI did show a significant proportion of reversal errors (41 %).

Difficulties with accurate pronoun usage in some children with VI have been attributed to a lack of visual input leading to a more general difficulty with perspective taking and distinguishing between self and others (Dunlea 1989; McGinnis 1981). Research with young children with normal sight has found a relationship between the ability to pass perspective-taking tasks and accurate personal pronoun usage (Ricard et al. 1999) and between accurate use of pronouns and the ability to express own and others' mental states (Markova and Smolík 2014). Others have attributed difficulties with deictic terms (including 'I and you', but also 'here and there') to the direct impact of the absence of vision on understanding the relative spatial position of the speaker and the tendency of children with VI to adopt an egocentric frame of reference (De Vaan et al. 2013). An experimental study that explored whether adults with normal sight simulated an internal or external perspective on hearing sentences containing pronouns (e.g. "I am peeling a banana", "you are peeling a banana") concluded that this is dependent on an interaction between the individual's spatial frame of reference bias (egocentric versus allocentric), linguistic context and environmental context (presented visually in this study) (Vukovic and Williams 2015).

Pérez-Pereira (1999) explored whether the more imitative language of children with VI could account for pronoun reversals. Interestingly, in this study the two children with PVI who did not show a tendency to use reversals, did sometimes use reversals in imitations. Conversely, the child who showed more frequent pronoun reversals showed a lower proportion of reversals due to imitations, indicating that echolalia cannot fully explain pronoun reversals by young children with VI. Pérez-Pereira concluded that there is no single explanation for pronomial errors in this population and that it is likely that various factors are involved, including imitation, difficulty in perspective taking, greater use of a 'gestalt' language style and lack of access to contextual information in making sense of pronouns addressed to another person.

Pérez-Pereira (1999) also highlighted that as some children with PVI do not have difficulties with pronouns then this should not be considered a general feature of language among young children with VI. Furthermore, pronoun reversals are not specific to children with autism or VI and there are reports of pronoun reversals among typically developing children (Dale and Crain-Thoreson 1993). There is some evidence, albeit limited, that among typically developing children this may be more common among precocious talkers (Dale and Crain-Thoreson 1993; Evans and Demuth 2012). Dale and Crain-Thoreson have posited that this may be the result of pronouns being used prior to the acquisition of the cognitive ability to use them correctly. This is interesting because, as discussed previously, some children with VI can show expressive language ability in advance of their comprehension.

17.6.6 Parent-Reported Pragmatic Language Ability

As highlighted in Sect. 17.2, direct assessment of pragmatic language is not straightforward. Therefore, in clinical practice, parent- or teacher-reported checklists are commonly used to explore use of language in everyday contexts. One highly regarded measure is the Children's Communication Checklist-2 (CCC-2; Bishop 2003) which allows a comparison between structural and pragmatic language skills. It includes scales for language functions (Speech, Syntax, Semantics and Coherence), for pragmatic language (Inappropriate Initiation, Stereotyped Language, Use of Context and Nonverbal Communication) and for social communication behaviours (Social Relations and Interest).

The CCC-2 has been used in three studies with children with VI (James and Stojanovik 2007; Pijnacker et al. 2012; Tadić et al. 2010). James and Stojanovik found that among eight young people with VI aged 12–17 years with no known additional needs, five had a communication profile warranting further investigation based on parent report. These investigators did not employ a sighted comparison group, but scores for the children with VI in the study fell outside of the normal range of the sighted norms (< 15th percentile) for the following scales: Context, Nonverbal Communication, Social Relations and Interest. In Tadić et al.'s study, the VI group (n = 14, aged 6–12 years, all normal verbal intelligence) received significantly weaker parent-reported scores than the sighted comparison group (n = 26) on the Semantics scale and all of the pragmatic and social communication behaviour scales. However, based on the mean scores of the VI group the only two scales falling outside of the normal range were Social Relations and Nonverbal Communication. In Pijnacker et al.'s study, the mean scores of the VI group (n = 24, aged 6–13 years, no additional disabilities) were within the normal range on all scales, but parent-reported scores were significantly weaker for Inappropriate Initiation and Nonverbal Communication compared to scores for the sighted comparison group (n = 24).

The CCC-2 includes a Social Interaction Deviance Composite (SIDC) score which distinguishes children who have relatively greater difficulty with aspects of pragmatic language and social communication relative to their structural language. At a group level, James and Stojanovik (2007) found the children with VI had a mean SIDC indicative of this pattern. Tadić et al. (2010) explored the SIDC at an individual level. They found five out of the 14 children with VI had scores which were clinically significant and indicative of an unusual communicative profile typical of Asperger's syndrome. A further four out of the 14 had communicative profiles suggestive of autism. Pijnacker et al. (2012) did not report SIDC scores, but they did find a near significant difference between the VI group and sighted group on a pragmatic composite score. Overall, when considered at a group level the results suggest subtle pragmatic language difficulties in children with VI with relatively stronger structural language ability.

It is, however, important to note that many of the group mean scores in these studies fell within normal limits and were higher than may be expected in samples of normally sighted children with autism spectrum disorder or pragmatic language impairment. Less difficulties were reported in Pijnacker et al.'s study which may relate to the inclusion of children with more moderate degrees of VI, as studies have typically indicated that children with more profound degrees of VI are at greater risk of social communication difficulties (Dale and Sonksen 2002; Mukaddes et al. 2007). Tadić et al.'s study indicates that there may be significant individual differences, highlighting the importance of not relying on group-level analysis alone. Her results, which are based on children with 'simple' peripheral VI and average to high average structural language ability, suggest that there may be a subgroup of children with VI who have much greater difficulty with pragmatic language and social interaction.

17.6.7 Non-literal Language

In order to make sense of non-literal language, the listener needs insight into the underlying intention of the speaker, thus drawing on ToM ability (Happé 1994). A link between ToM performance and comprehension of non-literal language has been demonstrated (e.g. Happé 1993). However, more recently research has highlighted the importance of structural language ability in making inferences and resolving ambiguity in language (see Norbury 2014).

In a study comparing the ability to draw inference and respond to literal questions following presentation of short stories, children with VI were found to be equal to their sighted peers in drawing inference (Edmonds and Pring 2006). When children were required to listen to the stories, there was, however, a difference between the groups with the children with VI (n = 17, aged 7–11 years) showing relatively stronger performance in answering literal questions. The authors suggested this may relate to the auditory short-term memory advantage in children with VI. This favours literal information as it can be stored verbatim and requires relatively little additional processing.

Pring et al. (1998) compared children with PVI (n = 16) to children with normal sight (n = 16) in their ability to understand non-literal statements made by characters in stories. The children with VI made a similar amount of mental state justifications to the children with normal sight when asked why the characters said what they did. However, the VI group gave fewer correct justifications. Children who were assessed to have higher intelligence quotients were more likely to produce correct responses. In contrast to this study, Pijnacker et al. (2012) reported similar levels of comprehension of non-literal language between children with VI (n = 24, including children with moderate VI) and a sighted comparison group. Using story-based tasks, they assessed understanding of lies, white lies, jokes, figure of speech and irony or sarcasm. The ability to infer accurately the mental states behind non-literal language was not related to vision level, but was related to age, verbal intelligence and ToM skills. The authors suggested that the discrepancy between their results and Pring et al.'s (1998) findings may be due to the inclusion of children with more profound levels of VI and also potentially more difficult story types (persuasion, misunderstanding, contrary emotions and double bluff) in the latter study.

17.6.8 Conversation and Discourse

In individuals with normal sight, research indicates that eye gaze is an important predictor of whether or not unacquainted persons will engage in conversation. It is also argued that eye gaze is used to determine if the other person is interested in starting a conversation (Cary 1978). In face-to-face interaction, a conversation is typically more than the exchange of verbal utterances. It also involves tone of voice, facial expressions, eye contact, gesture and posture. Without access to the non-verbal context of the conversation, the child with VI has less information about their conversational partner's emotion, motivation, level of interest and intended meaning. This affects the ability of the child with VI to initiate or sustain conversations. Research with adults with VI suggests that the linguistic information available to individuals with VI during naturalistic communication may not always be sufficient to compensate for visual cues when interpreting mental states (Sak-Wernicka 2016). Furthermore, it may be assumed that children with VI will rely more heavily on tone of voice than their sighted peers during conversation. However, one study has found that children with VI have more difficulty recognising emotions from tone of voice cues than children with normal sight (Dyck et al. 2004).

There has been very little research into naturalistic conversation in children with VI. There is some evidence from studies of parent-child interaction showing that young children with PVI produce relatively fewer initiations than their mothers during interaction compared with children with SVI or normal sight (Kekelis and Andersen 1984; Moore and McConachie 1994). However, Pérez-Pereira and Conti-Ramsden (2005) pointed out that as these data are presented as proportions, this masks the actual frequency of child initiations. In their data comparing three child-parent dyads (including one child with SVI, one child with PVI and one child with normal sight studied longitudinally from 22 to 25 months), the mother of the child with PVI showed more initiations than the other mothers, but the overall frequency of child initiations was the same. Pérez-Pereira and Conti-Ramsden (2005) suggested that children with PVI do not produce fewer initiations, but their mothers produce significantly more initiations.

There is some evidence that children with VI tend to use more questions in their conversational interchanges than their peers with normal sight (Erin 1986). Use of questions for the child with VI can be an adaptive strategy to find out more about their environment given their greater dependence on language to make sense of the world. However, a questioning style is also seen in children with pragmatic difficulties, maybe due to a difficulty in initiating or sustaining a conversational topic or in order to shift a conversation to the child's favoured topics (Bishop and Adams 1989; Hurtig et al. 1982). Consider the example below of a conversation with a 10-year-girl with PVI and comorbid autism spectrum disorder:

Assessor: "Oh, I've been to that theme park too"
Child: "What ride did you go on?"
Assessor: "I went on lots of rides"
Child: "Yes, what rides?"
Assessor: "Did you have a good time at the theme park?"
Child: "Yeah – did you have a good time when you went?"
Assessor: "Mm, I did, it was good fun"
Child: "Did you see any animals there?"
Assessor: "I don't remember any animals there"
Child: "Did you see any goats?"
Assessor: "No I didn't. When I went I lost my hat when I was on one of the rides."
Child: "Were you a kid?"
Assessor: "No, it was a couple of years ago. I felt really sad as it was my favourite hat."
Child: "Did you find it?"
Assessor: "Yes, I found it after"
Child: "Where was it? Did you say the hat fell?"
Assessor: "It was in lost property, someone had handed it in"
Child: "What did the ride do? What things did the ride do?"
Assessor: "It was a fast ride that went around and around"
Child: "What was the seat like at the ride? What was it called?"

In the above example, the child is able to use questions to engage the assessor and maintain the assessor's attention. The child appears interested in the assessor's experiences and is attentive to the information she gives. However, the questions impact on the flow of the conversation and lead to a one-sided interaction. Notably, this example comes from a child with PVI and comorbid autism and, as such, her conversational style might be attributable to her social communication difficulties rather than her VI.

Other studies have not highlighted concerns regarding conversational skills in children with VI. For example, observational data on a small number of children studied longitudinally indicate only very infrequent conversation breakdowns in children with PVI conversing with their mothers. These children produce a similar level of breakdowns compared to children with normal sight and also compared to their mothers (Kekelis and Prinz 1996; Pérez-Pereira and Conti-Ramsden 2005). Pérez-Pereira and Conti-Ramsden argue that this indicates that children with VI do not have difficulty engaging in conversation. Notably, however, the research in this area has focused on young children's conversation. Very little research has been carried out exploring the conversational ability of older children with PVI. One study with school-aged children (aged 6–12 years) has explored parent-child discourse during shared reading of a storybook (Tadić et al. 2013). During the story task, the children with VI (n = 12) made a similar amount of overall elaborations and elaborations about the story characters' mental states when compared to a sighted comparison group. Notably, however, there was a group difference in the elaborations made by the mothers. Mothers of children with VI referred more often to the story characters' mental states and offered more descriptive elaborations compared to mothers of children with normal sight.

This is similar to the finding reported by Pérez-Pereira and Conti-Ramsden (2005) that mothers of children with PVI produce relatively more initiations and longer mean length of conversational turn. This is interpreted to be a compensatory strategy used by mothers to support the engagement of their child with PVI and to provide them with more information about the visual environmental context (Pérez-Pereira and Conti-Ramsden 2005; Tadić et al. 2013). The majority of research in this area has explored children's conversations with their mothers. Currently, very little is known about their conversational skills with peers. Given evidence that mothers of children with PVI adapt their conversation to accommodate their child's needs, conversations with peers, which are likely to be less scaffolded, may represent a greater challenge. Although there is little research evidence, anecdotal information reported by parents and teachers of the children seen in our clinic suggests this may be a particular area of vulnerability for some children and young people with VI.

17.7 Summary

In summary, the impact of VI on early development is well documented. The visually-oriented nature of early social communicative skills makes this a particularly vulnerable area in children with congenital visual disorders. In spite of these early difficulties, many children with VI do overcome early challenges and in time develop relatively fluent structural language skills, possibly as a result of the saliency and importance of language for the child with VI in learning about the world. Evidence for catch up of language skills in the preschool years alongside evidence for a more 'gestalt' processing style indicates that the language trajectory in the child with VI may differ from that observed in children with normal sight. There is a growing body of research indicating that pragmatic language presents a greater challenge for the child with VI. The extent to which this is a result of an underlying difficulty in pragmatic language rather than a more direct impact of limited access to contextual information remains a subject of debate.

This is an area of inquiry fraught with methodological challenges. However, what is clear across many of the studies reviewed (e.g. Bishop et al. 2005; Dale and

Sonksen 2002; Lewis et al. 2000; Pring et al. 1998; Tadić et al. 2010) is that there are group trends indicating areas of weakness but also wide individual variability. Some children show the ability to develop good social communication and pragmatic language in the absence of vision, whilst others show significant impairment in these areas. A broader group may show a mixed presentation of both strengths and weaknesses. The population is also very heterogeneous and greater difficulties are generally seen in those children with the most profound degrees of visual impairment or additional learning difficulties. This mirrors our clinical experience of individual variation within a generally vulnerable clinical population. An important issue that should now be the focus of clinical and research interest is delineating the factors that lead to different outcomes in order to inform early specialised intervention and to support needs. Future insights will be gained from a new longitudinal study which follows a national cohort of infants with 'simple' peripheral VI from infancy to early school age. This study will allow the analysis of multivariate factors that may predict variation in outcome, including language and communication skills (Optimum cohort, Dale et al. 2013).

For clinicians, it is currently difficult to predict which children with VI are most at risk of poorer outcomes. Thus, early intervention aimed at promoting communication, language, social development and shared attention should be provided to all infants and young children with VI. The Developmental Journal for babies and children with VI (Dale and Salt 2007) is the most up-to-date, systematic, early intervention framework for this population. The Developmental Journal is now undergoing further development and revision in response to findings from the Optimum research project (Dale et al. 2013). Research indicates that the infancy and preschool period is a particularly vulnerable time for children with VI. Assessments and monitoring should be carried out and guidance given to parents at regular intervals from as early as possible and throughout the early years. Vulnerabilities also continue to exist for older children and adolescents with VI. Whilst there is less research in this age group, it is important that support is provided to promote social inclusion and to help them reach their full potential (Greenaway et al. 2016; Roe 2008).

Given the methodological challenges that exist both in research with children with VI and also in the clinical assessment of pragmatic language ability, many questions remain unanswered. In particular, it is as yet unclear whether pragmatic language difficulties, when they do occur, are secondary to social communication weakness in children with VI. As there is evidence that pragmatic language ability is related to both structural language and social communication (Norbury 2014), the albeit mixed and somewhat limited research reviewed in this chapter indicates that children with VI may have more difficulty with pragmatic skills related to social communication ability, but may have relatively stronger skills in linguistic aspects of pragmatics. This would fit with the research and clinical perspective of a notable subgroup reaching clinical threshold for autism spectrum disorder. However, in order to understand more fully the development of language, pragmatic language and social communication skills, it is important that there is accurate assessment of these skills. The development of measures, which are suitable for children with VI and are normed specifically on this population, is of particular importance to further our understanding and ensure that all children receive the optimal support.

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Chapter 18
Stuttering and Cluttering

Kathleen Scaler Scott

Abstract Fluency disorders have the potential to cause difficulty with social interaction. This may be due to the fact that disorders of fluency, including stuttering, cluttering, and atypical disfluency, may co-occur with other disorders whose features include pragmatic symptoms. Co-occurring disorders include autism, attention deficit hyperactivity disorder, genetic syndromes, and language-based learning disabilities. In these cases, pragmatic difficulty may be related primarily to difficulties with knowledge of social rules or executive function features such as impulse control. The potential negative impact of the fluency disorder itself on social interaction is often underestimated. Affective and cognitive components of fluency disorders may lead to avoidance behaviors, such as decreased eye contact or limiting verbal output. Although these behaviors are rooted in fear, they can be misinterpreted as true pragmatic difficulties. Regardless of the cause, fluency disorders may result in difficulties with social interaction. This chapter provides information and strategies to help the practicing clinician effectively identify, evaluate, and treat disorders of social communication in clients with fluency disorders.

Keywords Atypical disfluency • Cluttering • Covert characteristic • Disfluency • Pragmatics • Social interaction • Stuttering • Word-final disfluency

18.1 Introduction

When we communicate with another person, our goal is to convey a message. That message may be a request for something tangible or for information, a demand, or a comment. Our goal as speaker is to convey our message as clearly as possible. There are several practical reasons for wanting to be clear the first time we speak. The ability to transmit a message effectively the first time saves the speaker time and effort. It also helps to ensure that the conversation will keep moving from topic to topic. If communicating a message becomes too difficult for the speaker and/or

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the listener, either or both may give up, resulting in a communication breakdown. Depending upon the topic or situation, that breakdown may lead to termination of the topic (and moving on to another) or termination of the interaction altogether.

There is much that can happen during a communication breakdown that can cause frustration on the part of the speaker and/or listener. The speaker may be unaware of what the listener does not understand, and may become frustrated as to how to further repair the message so that its meaning is conveyed. The speaker may think that they are communicating clearly and may be frustrated by their perception of the listener's inability to comprehend the message that is crystal clear in the speaker's mind. The listener may be frustrated by missing background information, lack of referents for pronouns, and/or having to ask the speaker to repeat or clarify multiple times. While the speaker may lack the persistence to keep trying to convey their message, the listener may be unsure how many times to ask for clarification. At times, the listener may feign comprehension to avoid embarrassing the speaker.

As these descriptions of communication breakdowns illustrate, the ability to communicate clearly and effectively directly impacts the outcome of conversation. Conversation forms the basis for much social interaction, especially as children move into adolescence and adulthood (Roffey et al. 1994). If one has difficulty communicating clearly due to a speech and/or language disorder, the disorder has the potential to negatively impact social interaction. In this chapter, we will explore how disorders impacting the fluency of communication can have a negative impact upon pragmatics. Specifically, we will focus on the speech fluency disorders of stuttering, cluttering, and atypical disfluency, and how the inability to move fluidly forward in a conversation can impact pragmatics. As there is suspected to be some overlap between disfluency in cluttering and disfluency in language disorders (see Bretherton-Furness and Ward 2012, for review), we will also explore the impact of fluency of language on pragmatics.

18.2 Definition of Stuttering

Stuttering is a disorder of speech fluency wherein the speaker knows the words they want to say, but has difficulty moving forward with production of the speech sounds. When a speaker experiences a moment of stuttering, something is getting in the way of the words coming out fluently. Stuttered speech is characterized by any or all of the following: repetitions of sounds (e.g. m-m-maybe), syllables (e.g. na-na-na-napkin), or single syllable whole words (e.g. I-I-I); prolongations of sounds (e.g. ssssimple, whaaaat); or blocks. During stuttering blocks, a speech sound becomes 'stuck'. Blocks may be produced with or without sound. In the audible forms, some sound is escaping but the speaker is still not moving forward with production of the word. For example, a speaker may become stuck on the first sound of 'candy'. But rather than hearing consistent repetitions of the initial/k/sound (as would occur in a part-word repetition), one may hear some air and sound escape combined with periods of silence. In the inaudible form, there may be visible tension and/or struggle, but no sound or air escapes.

Repetitions, prolongations, and blocks make up the overt characteristics of stuttering. Also part of the overt features of stuttering are any types of tension, struggle, or other physical behaviors which are observed along with the stuttering. These behaviors are known as secondary behaviors. Secondary behaviors are thought to be classically conditioned responses to moments of stuttering (e.g. eye blinks, stomping foot). The speaker may have first engaged in a secondary behavior and perceived that this behavior helped them get over a moment of stuttering. The speaker then continues these behaviors (not always consciously) in response to moments of stuttering due to the perception that they enhance fluent speech.

In addition to the outward characteristics of stuttering (also known as the 'behavioral' components of stuttering), many who stutter also present with affective and cognitive components of stuttering as a significant feature of their fluency disorder (Yaruss and Quesal 2006). Affective components are the emotions a person may feel because of their stuttering, such as shame, embarrassment, nervousness, etc. Cognitive components are the beliefs a speaker has about their stuttering such as that they are incapable of being employed in a job that involves speaking, or that they will always stutter around a specific person. Affective and cognitive components lead to reactions that can feed a speaker's behavioral components of stuttering. For example, if a speaker feels embarrassed by their stuttering, and feels that they will always stutter around a particular person, then they may experience greater tension or struggle in their speech while speaking with that person. The increased tension and struggle may result in more frequent blocks and/or blocks with more significant levels of tension. This is not to say that nervousness or other feelings are the initial cause of stuttering, but that any of these feelings or perceptions can negatively impact the severity of overt stuttering symptoms. Affective and cognitive components are often referred to as 'under the surface' components (Hicks 2003). These components are often not the ones we see when we speak with someone who stutters, but the ones a speaker experiences inside. Yet these components have the potential to create a negative impact upon pragmatics and social interaction.

18.3 Definition of Cluttering

Cluttering is a fluency disorder which negatively impacts a speaker's intelligibility of speech and/or message. The speaker's rate sounds fast to the listener. One proposed explanation of cluttering is that the speaker is talking at a rate that is too fast for their system to handle (St. Louis et al. 2007), resulting in at least one of three possible communication breakdowns: (1) excessive repetitions of phrases or multisyllabic words, revisions of speech and/or interjections; (2) excessive over-coarticulation of speech, resulting in sounds or syllables being left out or 'pushed' together; (3) pauses in places that one would not expect grammatically (e.g. 'I went to the (pause) store and picked up some things for dinner'). For a diagnosis of cluttering to be made, the speaker must sound fast to the listener, and have at least one of these communication breakdowns during this rapid-sounding speech (St. Louis and Schulte 2011). Often, when a speaker with cluttering slows their rate to one which their system can handle, their cluttering symptoms either dissipate greatly or disappear altogether.

In the past it was believed that all people with cluttering had no awareness of their difficulties with speech. It is now known that this is not true in all cases. Just as in stuttering, those with cluttering have reported affective and cognitive components which may shape their outward communication behaviors (Scaler Scott and St. Louis 2011). If a person with cluttering, for example, is embarrassed by their speech, and always perceives that they will be viewed negatively by co-workers when speaking, they may speak even more rapidly to get through their message as quickly as possible. Because increased speed tends to result in increased cluttering symptoms, even though negative feelings are not the root cause of cluttering, these feelings can directly impact the appearance of cluttering symptoms. Adults with cluttering have also reported such cognitive components as devaluing their own message due to cluttering (see Case Example 18.2).

18.4 Definition of Atypical Stuttering

The last form of fluency disorder is one which is mentioned with gradually increasing frequency in the literature on fluency disorders. Whereas stuttering repetitions and prolongations tend to occur at the beginning (e.g. s-s-sunny, ssssunny) or in the middle (e.g. pap-p-p-perless, increassssing) of words, atypical disfluencies have been noted to occur at the ends of words. The disfluencies are often characterized by sound (e.g. light-t-t) or syllable (e.g. light-ight) repetitions, or prolongations (e.g. lifffff for 'life'). When disfluencies occur at the ends of words, they are known as word-final disfluencies (WFDs; see Scaler Scott et al. 2013a, for review). Other forms of atypical disfluencies include sound insertions in the middle of words (e.g. way-***h***ay) or mid-word breaks (e.g. bir—thday) (Sisskin and Wasilus 2014). Atypical disfluencies tend to differ from stuttered disfluencies in that little tension is seen in either repetitions or mid-word breaks (MacMillan et al. 2014). Many speakers have been reported to be unaware of their disfluencies, and have a difficult time picking them out, even when recorded. Some are aware but are not aware at the moment they are occurring (Scaler Scott et al. 2013b; Scott et al. 2007). Negative affective and cognitive components have thus far been reported in one school-age child, who avoided speaking because he thought he might 'echo' (Scaler Scott et al. 2013b). Culturally, some people who stutter may hold cognitive misperceptions such as that their stuttering is caused by a curse or other act of spirits (see Al-Khaledi et al. 2009, for review). In the same way, this student with WFDs held the perception that his WFDs were initially 'caused' by his owning an 'Ecco' lunch box (Scaler Scott et al. 2013b).

18.5 Fluency, Stuttering and Pragmatics

18.5.1 Language Fluency and Pragmatics

Individuals who have difficulty communicating a message fluently may have difficulty organizing and sequencing language. This might include speakers with language-based learning disabilities (LLD; see Gerber et al. 2012, for review), attention deficit hyperactivity disorder (ADHD; see Sagvolden et al. 2005, for review) and/or autism (see Simmons et al. 2014, for review). Although sometimes in these populations there are difficulties with pragmatics related to understanding social rules, any difficulties with organization of language can make conversation challenging. Often speakers have age-appropriate vocabulary and syntactical skills. Although there is a question about whether issues stem from true language or executive functioning deficits (Cohen et al. 2000), one explanation of communication breakdowns in these populations is that executive functioning is impaired enough to make organizing and sequencing thoughts difficult (Singer and Bashir 1999). Speakers may leave out necessary background information, use nonspecific pronouns, and/or tell a story out of order. They also may have difficulty communicating the main message, and become bogged down in details, making their message burdensome for the listener.

As early as preschool years, there is documentation in the literature of children judging peers negatively due to communication disorders (Gertner et al. 1994). Those who experience difficulties communicating with others may be left out of early childhood interactions with others. In normal development, children learn social rules from experiencing social interaction. Likewise, the more practice they have in creating a coherent message, such as relating a narrative as part of social interaction, the more cohesive their language becomes. Practice with narrative skills has been shown to improve narrative skills (Hayward and Schneider 2000; Klecan-Aker 1993; see Petersen 2011, for review). Children with disorders such as ADHD, autism and LLD may be left out of social interaction due to difficulties with social rules or difficulties with effective communication. Regardless of the initial reason for being left out of interaction, these children are clearly at risk of not having enough exposure to situations which might enhance their use of fluent communication. In this way, the gap between what they can achieve in terms of fluency of message and effective communication skills compared to same age peers grows wider with age.

18.5.2 Speech Fluency and Pragmatics: Stuttering

The incidence of stuttering in school-age children is currently averaged to be 1 % or less of the population (Bloodstein and Bernstein Ratner 2008; Yairi and Ambrose 2013) and the prevalence can be as high as 8 % (Yairi and Ambrose 2013). Many of these children have no other communication disorders aside from stuttering. However, disorders such as autism (see Scaler Scott et al. 2013a, for review), learning disabilities, and ADHD may occur concomitantly with stuttering (Blood et al. 2003). In fact, it has been documented that disorders of fluency may occur more in individuals with genetic syndromes such as Tourette, Prader-Willi, and Down syndrome than in the general population (Van Borsel and Tetnowski 2007). At times this disfluency appears like stuttering, other times like cluttering, and still other times like an atypical disfluency or a disfluency pattern unique to subtypes of individuals with the syndrome itself. When stuttering occurs with other diagnoses, there is an increased risk of difficulties with pragmatics.

For some, regardless of severity, stuttering may have no impact upon one's ability to engage effectively in conversations with others. The person who stutters may have no difficulty with interpretation of social rules, turn-taking, topic maintenance, and so on. The only difficulties will be that the listener may have to wait longer for words to be completed due to repetitions, prolongations and/or blocks. Yet, even this waiting may raise questions about appropriate social response. As all listeners do not know how to respond when someone is stuttering, the speaker may need to provide some education about helpful and unhelpful reactions. There is much variability in a speaker's perception of what type of response is helpful (Rodriguez et al. 2015; Weidner et al. 2015). Therefore, communicating what types of responses are and are not helpful to their listeners requires some assertiveness on the part of the person who stutters.

18.5.3 Stuttering Features and Pragmatic Difficulties

Certainly those who experience stuttering and diagnosable language disorders are at risk for inefficient communication. The suggestion has been made that perhaps those who stutter but do not have diagnosed language disorders are not as efficient in communication as their fluent controls. Such lack of efficiency could lead to a detail focus in conversation, which may be off-putting to the listener. A recent study showed event-related brain potentials (ERP) which reflected decreased syntactic processing in six- and seven-year-old children whose stuttering persisted versus those who recovered and fluent controls (Usler and Weber-Fox 2015). Another ERP study conducted by Weber-Fox et al. (2013) revealed decreased efficiency of semantic and syntactic processing in a group of four- and five-year-olds. None of the children in either of these studies had diagnosed language disorders. It should be noted that these studies reflect verbal *processing* and there are currently no studies reflecting inefficiency in verbal *speech output* among school-age children. It has been suggested, however, that those who stutter may exhibit subclinical language differences, which may not be reflected by results of decontextualized formal language testing (Boscolo et al. 2002). Rather, these subclinical difficulties may surface in excessive nonstuttered disfluency (Boscolo et al. 2002). Although further investigation is needed, given that increased fluency disorders have been found in those with ‘subclinical’ language disorders, it is important to consider the potential for inefficiency of communication to result in difficulties with conversation skills in some children who stutter.

Although true pragmatic difficulties are not always present in stuttering, some of the behaviors speakers may exhibit in response to stuttering may be misinterpreted as pragmatic issues. For example, many people who stutter do not engage in eye contact with their communication partner during moments of stuttering. This is often due to feelings of fear of seeing the listener’s reaction. The person who stutters may look down or look at another listener in the room. In the former case, listeners may interpret the behavior as related to being untruthful, while in the latter case, listeners may interpret this as instigating problems with other listeners (see Case Example 18.1). Speakers may need to be directly trained and desensitized to maintaining eye contact during moments of stuttering. Speakers may need to be educated as to how listeners may be perceiving them inaccurately, causing their skills to be underestimated.

It is important to note that those who stutter may not yet be ready to quell cognitive misperceptions. Some speakers are at a point on their ‘journey’ with stuttering where they would rather be perceived as less competent than reveal their fears and difficulties with stuttering to others. At times the speaker will go to great lengths to conceal their stuttering from others. In these cases, the root issue which will ultimately address pragmatic concerns, is to help the person who stutters gain acceptance of stuttering. That is, before outward pragmatic behaviors can be addressed, affective and cognitive components of stuttering need to be tackled. This may take time and persistence on the part of both the speaker and clinician. Speakers sometimes report they are ‘tired’ of hiding their stuttering and being misperceived, and this indicates a key turning point in which acceptance is developing (Scaler Scott and Boyer 2015). Because the root cause of the inappropriate pragmatic behaviors is *not* knowledge of what is appropriate in social interaction, addressing the affective and cognitive components will often be enough, and appropriate pragmatic interaction will emerge on its own.

In cases where decreased eye contact may be observed in someone with autism who is also stuttering, sensory integration issues should also be explored. Individuals with autism often have difficulty maintaining eye contact due to difficulties with visual social attention (Klin et al. 2015). The clinician must do some detective work to determine if such difficulties are the root cause of difficulties with eye contact in the speaker with autism who is stuttering. If the difficulties with eye contact are related to a sensory integration disorder, then treatment becomes very different than if they are related to affective and/or cognitive components of stuttering.

18.5.4 Stuttering Avoidance and Its Manifestations

For those negatively impacted by affective and cognitive components of stuttering, avoidance of speaking and/or communication situations may make interaction difficult if not impossible. There is documentation in the literature of stuttering avoidance leading to complete social isolation (Laday 2010). Additionally, avoidance of words or phrases may cause a communication partner to have an inaccurate interpretation of the speaker. For example, if a speaker is afraid to name their hometown, then avoidance of that word in response to the simple question, 'Where are you from?' may give the listener the impression that the speaker has limited knowledge about their personal information (Manning 2001). It is important when treating stuttering to differentially diagnose the root cause of conversation difficulties. This takes careful exploration of whether a speaker's difficulties interacting in social situations are caused by difficulties with knowledge of social rules, impulse control, or simply avoidance of stuttering. In some instances, the negative impact of stuttering upon pragmatics may be related more to fear (of negative reaction or other consequences) than to actual difficulties with pragmatics.

It is also important to note that stuttering has been shown to increase in both children (Bernstein Ratner and Sih 1987; Gaines et al. 1991; Logan and Conture 1995; Sawyer et al. 2008; Zackheim and Conture 2003) and adults (Kleinow and Smith 2000) with increase in linguistic length and complexity. For some people stuttering will have no negative impact upon social communication regardless of its severity. Thus, regardless of speaking context, pragmatic interaction may not be impacted. For others who are more sensitive to increased stuttering, there may be a purposeful attempt to decrease linguistic length and/or complexity to avoid stuttering. The resulting impact may be a failure to assert ideas or express complex opinions. This behavior may restrict the ability of a person who stutters to participate fully in a higher-level conversation with peers.

Research has also demonstrated increased stuttering when a child is asking a question of others (Weiss and Zebrowski 1992). If a child avoids asking questions, the speaker can also be interpreted as uninterested in the interaction or in information about the conversational partner's interests, life, etc. Those who participate in academic discussions tend to be viewed positively, as strong students seeking new knowledge or seeking to further apply newly learned information. By contrast, those who avoid questions may be seen as over-confident, disinterested, or unmotivated.

Feelings about one's stuttering can result in responses which can be mistaken for true pragmatic issues. For example, this author once began working with a child whose stuttering was characterized by blocks and secondary behaviors at age four. The child's preschool teacher indicated that since beginning to stutter, the boy had become the class 'bully', telling peers what to do in an angry tone. Two things related to stuttering are of note in this instance. First, at times when a person who stutters feels out of control, they may respond by trying to control other aspects of their environment (Plexico et al. 2009). In the case of this child, once stuttering control strategies were learned, he returned to the cooperative behavior both his teacher and parents had observed before he was stuttering. Additionally, there are several 'phenomena' that tend to induce fluent speech in those who stutter. Some of these are speaking at the same time as others, singing, adopting an accent and (for some, as it is variable from person to person) speaking in an angry tone (Bloodstein and Bernstein Ratner 2008). It is also possible that this child was using his angry authoritative tone to increase speech fluency. Children have been known to move from one avoidance behavior to another (e.g. from singing to adopting an accent to whispering) until the underlying fear is addressed. These children do not want to engage in avoidance behaviors, but do not have a choice until they learn other, more effective strategies (such as openly stuttering and/or using stuttering strategies). The fact that the child's behavior changed when fluency was enhanced demonstrates that the child was likely using his 'bullying' to exert control or to use a voice that induced fluency.

By the same token, there are those who spend their childhood into adulthood avoiding communication and then receive fluency therapy as adults. The therapy provides the adult with strategies to control fluency, or simply the confidence to speak freely, regardless of stuttering. It is theorized that in times like this, some people with stuttering have more difficulty sharing the floor with others, as they have had so much to say for so long. In some cases, there may have been another disorder occurring concomitant to the stuttering that was masked by the avoidance of speaking, such as autism level 1. In other cases, there is simply a lack of understanding of sharing the floor due to lack of practice. In any case, sharing the floor and effective communication skills must be trained.

Case Example 18.1: Adult with Covert Stuttering

Max was a 35-year-old adult who was seeking stuttering therapy for the first time in his life upon his wife's recommendation. Max was being considered for a job promotion, and his supervisors commented that he needed to improve his communication skills. Max displayed no overt stuttering in his therapy sessions, and it soon became evident that he relied upon word avoidance and subtle 'tricks' to remain fluent. Max gave his clinician permission to contact his direct manager for his perception of areas Max needed to address in therapy. The manager informed the clinician that in his opinion, Max's problem was 'bigger than stuttering', as he heard very little stuttering at work. He went on to comment that he felt Max instigated problems with others, such as by addressing one person but looking at another during a work meeting. The manager indicated that superiors were unsure how to respond to this behavior. When the clinician brought this up, Max indicated that he does sometimes look at another person because the other person is someone he considers 'a more friendly face'. Max was avoiding direct eye contact with the person he was addressing because he was afraid of stuttering and the listener's subsequent reaction. In Max's assessment, by looking at the friendlier face, he was less likely to stutter and if he did, more likely to receive an acceptable nonverbal reaction. Max's perception of potential listener reactions to his stuttering had led to a complex set of behaviors which resulted in co-worker misperceptions of Max's true intentions.

18.6 Fluency, Cluttering and Pragmatics

18.6.1 Speech Fluency and Pragmatics: Cluttering

Cluttering without any concomitant disorders has been identified on rare occasions. Cluttering has been identified in people with autism (Scaler Scott 2011), learning disabilities (van Zaalen et al. 2011), Down syndrome (Van Borsel 2011), and stuttering (Ward 2006). Due to issues with the definition of cluttering, it has often been misdiagnosed as stuttering. Additionally, due to the fact that with increased self-monitoring many if not all cluttering symptoms tend to disappear, some adults with cluttering report having been sent away with no diagnosis whatsoever (Scaler Scott and St. Louis 2011).

Whether cluttering is or is not appropriately identified, it has the potential to have a negative impact upon communication skills. When reflecting upon their speech before diagnosis, adults with cluttering describe their listeners as making vague remarks about their needing to improve communication skills (Scaler Scott and St. Louis 2011). Although the advice and diagnosis were nonspecific, the message about needing to improve communication skills was clear. It is only in recent years that we are learning the negative impact cluttering can have upon social interaction. Some adults with cluttering have reported that they find others will not listen long enough for them to get to the punch line of a joke, or to the end of a story. People with cluttering have reported being accused of being deliberately evasive, leading to frustration on the part of the speaker (Scaler Scott and St. Louis 2011).

18.6.2 Cluttering Features and Pragmatic Difficulties

As cluttered speech often implies a lack of efficiency in communication, and mazing has been reported frequently in cluttering (see Bretherton-Furness and Ward 2012, for review), this may result in longer conversational turns and a perception of verbosity from the listener. There is at least one report of an adult with cluttering who noted that he had to learn specific rules about verbosity (Dewey 2007). One rule that he taught himself was to not speak more than a specified number of seconds per turn. While some with cluttering may need to be educated on turn-taking rules and sharing the floor, others may be well aware of these rules, but need assistance with strategies to organize their language so that they can get their points across efficiently and effectively.

Because those with cluttering have been found to have increased mazes in verbal narratives, it is important to consider how this difficulty may negatively impact social interaction. In a study comparing middle-school students with cluttering to controls on the effectiveness of communication when giving verbal directions and mediating communication breakdowns, Teigland (1996) found that those with cluttering showed increased mazing and use of nonspecific language, a lack of background information, and signs of taking less communication responsibility, such as by posing less 'mending' questions when something was not clear. Teigland (1996: 211) concluded that '… clutterers, to a certain extent, utilize indirect and verbose strategies of explanation. The result can be a linguistic breakdown due to the excessive grammatic burden'. Examples of such a burden on the listener can be found in those with cluttering who display multiple revisions during message formulation.

There is a lack of evidence regarding eye contact in those with cluttering. Clinically, difficulties with eye contact have been noted among people with cluttering. The source of this difficulty with eye contact seems to be variable rather than universal. For example, when a person with autism and cluttering exhibits difficulty with eye contact, there is a strong possibility that this is due to the sensory related features of autism. For those without sensory issues but with issues with pragmatics, awareness of the importance of engaging in eye contact with the listener may be decreased. For those without other diagnoses, there is evidence in the literature that gaze aversion among school-age children is more related to cognitive load than to social issues (Dougherty-Sneddon and Phelps 2005). This suggests that for those speakers who may have difficulty organizing verbal ideas, the speaker may not be engaging in eye contact directly due to putting attention on searching for words or ideas.

18.6.3 Cluttering Avoidance and Its Manifestations

There is the possibility of affective and cognitive components of cluttering resulting in decreased eye contact, just as they do in stuttering. Adults with cluttering have also reported avoidance of communication and/or social interaction due to past experiences with and fears about listener reactions to their speech (Scaler Scott and St. Louis 2011). Thus, just as in stuttering, the avoidance may have become an established pattern related to initial listener reactions to cluttering symptoms. Additionally, just as in stuttering, avoidance may be rooted in cognitive *mis*perceptions of the potential for negative reactions from others. For example, some with fluency disorders hold the perception that negative listener reactions will be the norm for them, even when they have not previously encountered these reactions. A person who clutters may be under the impression that all listeners may react negatively to their speech, and therefore resort to avoidance without testing such perceptions. Overall, just as in stuttering, the affective and cognitive components of cluttering may result in lack of engagement in social interaction.

Case Example 18.2: Adult with Cluttering
In working with a college student newly diagnosed with cluttering, the clinician asked her if she engaged in eye contact regularly with her communication partners. She noted that she had not thought about it, but that she would assess it over the next week and report back to the clinician next session. During her next session,

the student reported that she realized she does not engage in regular eye contact during conversations with her friends. She reported, "I realized that in the past, people didn't understand what I had to say. This led to me devaluing the importance of my contributions. So over time I started responding with shorter answers. I never looked for their [my peers'] feedback, I just gave short answers without looking them in the eye."

18.7 Atypical Disfluency and Pragmatics

Atypical disfluency has been identified in those with neurological differences including head trauma (Rosenfield et al. 1991), neurofibromatosis (Cosyns et al. 2010), ADHD (Scaler Scott et al. 2013b), and autism (see Scaler Scott et al. 2013a, for review). It has been reported in normally developing children (McAllister and Kingston 2005; Mowrer 1987), and spontaneous recovery in at least one preschooler (Mowrer 1987) and one school-age child (McAllister and Kingston 2005) has been reported in the literature. It is important to note that while normal development was reported in two school-age and one preschooler with atypical disfluency, in both cases no formal measures of pragmatic language skill were undertaken at the time of either study (see Scaler Scott et al. 2013a, for review). This was also true of a more recent study of WFDs in 12 children ranging in age from 2 to 10 years (MacMillan et al. 2014). Of these 12 children, two were diagnosed on the autism spectrum, one with generalized anxiety with some compulsive features, and one with ankyloglossia and a mild phonological delay. Five were reported to have other medical issues including tonsillitis, gastrointestinal issues, food allergies/intolerances, and/or sleep apnea. Four had 'nothing to report' in the area of medical and developmental history. It is important to note that pragmatic language disorders can be subtle and not diagnosed until as late as adolescence or adulthood. Therefore, one cannot completely rule out pragmatic language difficulties in these studies. Given that atypical disfluencies are often noted in populations who may have difficulty with pragmatic skill, there is at least a high probability that pragmatic language issues will be present in those with atypical disfluencies.

18.7.1 Atypical Disfluencies and Pragmatic Difficulties

It has been argued that if those with atypical disfluencies are not aware of or bothered by their disfluencies, there is no negative impact upon communication. It is important to take into consideration the potential impact of such disfluencies upon the listener. It would be unfair to suggest that a speaker should hide their disfluency for the ease of the listener. However, investigators are moving toward seeking to understand the function of atypical disfluencies. As possibilities are considered, it becomes more likely that these potential functions may be replaced by more appropriate behaviors that serve the same functions. Research has shown greater use of disfluent repetitions and silent pauses (considered to be speaker oriented) and less use of filled pauses and revisions (considered to be listener oriented) among those with High Functioning Autism (Lake et al. 2011). The question is whether the repetitions in atypical disfluencies are serving the speaker-oriented purpose of holding the floor. Whereas in stuttering or cluttering there is no motivation for maintaining the behavior, if there is a motivation for use of atypical disfluencies (such as holding the floor while formulating thoughts), the best response may be to teach an alternate response which is more efficient and effective in serving the same function as the disfluency (Scaler Scott and Sisskin 2007). Below are hypotheses for potential functions of atypical disfluencies and potential areas the clinician may address to provide an alternative response.

It has been the observation of this author that many who exhibit atypical disfluencies engage in less eye contact during a moment of disfluency than during fluent moments. This is true regardless of whether the baseline eye contact skills (perhaps due to other diagnoses) are already decreased or seem to be within normal limits. Further exploration of this area is needed. It is important to consider whether this lack of eye contact may reflect searching for a word or idea. If such were to be the case, then the underlying motivating factor for the atypical disfluency could be to hold the floor while retrieving words or ideas. Thus, targeting word finding and/or language organization may be a logical step toward improving the pragmatic skill of eye contact.

There is little documentation of turn-taking and verbosity in individuals with atypical disfluencies. A recent analysis of three cases of WFDs in children ranging in age from 7 to 13 years revealed excessive use of details, difficulties distinguishing details from the main idea in discourse, and frequent topic shifts (Sutkowski et al. 2015). It is difficult to determine whether such difficulties were related to the atypical disfluencies or to the concomitant diagnoses of Autism Level 1 in two of the three participants or ADHD in the other participant. All participants appeared to have no difficulty sharing turns in conversation, yet seemed to persist with their own topic of interest even when a topic shift was attempted by the clinician. Scores on formal testing showed gaps between average to above average language scores contrasted with below average working memory scores for language information. The authors theorized that given these findings, the speakers were using atypical disfluencies to buy time to compensate for language memory weaknesses while attempting to formulate their message.

If, in fact, those with atypical disfluencies have difficulty with working memory for language information, this can lead to topic abandonment, or alternatively, inflexibility in abandoning a topic or idea for fear of forgetting the main point. It can also lead to stops and starts and revisions, and difficulty following the speaker, as it does in cluttering. Thinking about the roots of conversational difficulties as related to working memory will change the focus of therapy techniques. Thus, a potential remedy to this motivating factor would be for the clinician to target language memory weaknesses. For those who exhibit atypical disfluencies and other diagnoses that may have a pragmatic component, a two-pronged approach based on teaching the rules of conversation and helping to organize and remember ideas during message formulation may be necessary to ensure success. Speakers with atypical disfluencies must be educated that they have important information to contribute, but that they must organize it in such a way that their listener can process, comprehend, and appreciate it.

Initial treatment studies have revealed elimination of atypical disfluencies through work on increased identification of disfluencies and self-monitoring (Sisskin and Wasilus 2014; Tetnowski et al. 2012; Van Borsel et al. 2005). Replacing atypical disfluencies with more functional conversational strategies such as natural pauses have been met with some success in reducing and/or eliminating the disfluencies (Scaler Scott et al. 2013b). The fact that there is spontaneous recovery in atypical disfluency (Mowrer 1987; McAllister and Kingston 2005) raises the question as to what caused the eventual elimination of disfluencies in these treatment studies. More needs to be known about the long-term outcome of these treatment studies, and whether the atypical disfluencies re-emerged over time. For now, however, the practicing clinician may want to look toward the functions atypical disfluencies may be serving to provide the most functional treatment possible to enhance social communication skills.

Case Example 18.3: School-Age Child with Atypical Disfluencies
Below is an excerpt from a student with WFDs. This student is attempting to create two sentences from a series of words and phrases in the Sentence Assembly subtest in the Clinical Evaluation of Language Fundamentals (Semel et al. 1995). This task provides a good illustration of both WFDs and mid-word insertions. It also shows the number of revisions he needs to finally formulate two clear sentence possibilities, even when having the words in front of him to manipulate.

First sentence: He finished-ished ho/ he play-ayed ho-ckey-ey/ before-ore/ his home-me/I mean/ he fin/before-ore he finished his-his homework/Um um/he play-yed hockey before he finished his homework/

Second sentence: Hmm-Hmm/he finished his homework before-h-ore he played hockey

18.8 Future of Fluency Disorders and Pragmatics

There are many promising avenues to be pursued in future research into pragmatic language skills in individuals with fluency disorders. The literature on the relationship between temperament and persistence versus recovery in childhood stuttering is gradually building. Findings are showing difficulties in inhibition (Ntourou et al. 2013; Choi et al. 2013), adaptability to change (Anderson et al. 2003), and ability to shift attention (Karrass et al. 2006) in those whose stuttering persists. Whether or not these traits are a cause or consequence of dealing with stuttering over years remains to be investigated. Regardless of the root cause of these difficulties, the implication of these findings is that those dealing with chronic stuttering are at increased risk for traits that could have negative impact upon positive social interaction. As further evidence is gathered, those working with individuals who stutter should consider this information, screen for pragmatic difficulties in those with fluency disorders, and treat individual differences that occur.

As mentioned, research is beginning to explore the potential underlying purpose served by atypical disfluency. Currently, clinicians are encouraged to develop hypotheses about underlying functions of atypical disfluencies and to treat what seems to be motivating the behavior, replacing it with an alternate behavior (Scaler Scott and Sisskin 2007). For example, if the speaker seems to be using multiple repetitions as a way to hold the floor while gaining processing/formulation time, the clinician can address this using silent pauses and 'think time' as an alternative. What is important to consider is the fact that because we do not yet know the underlying reason for the appearance of the atypical disfluencies, or the need for more processing or formulation time, currently our interventions as clinicians will result in modifications to behavior that address outward symptoms. As more data is gathered about whether these symptoms are a manifestation of issues with such areas as working memory and/or gaps in language skills, recommendations for how to manage pragmatic symptoms may change as well.

In cluttering, proposed theoretical underpinnings are being observed in experimental tasks and in fMRI findings. Alm (2011) has theorized that an 'executive hub' for speech production consists of the cognitive anterior cingulate cortex (cog ACC), the presupplementary motor area (pre SMA) and the SMA proper. Alm postulated that people with cluttering plus language and attention symptoms exhibit difficulty with regulation of the SMA and the ACC, whereas those with a small range of symptoms (i.e. difficulties with cluttered speech only) may only be affected by the SMA proper. The root of this dysregulation, Alm theorizes, is related to excess dopamine released in the basal ganglia. When dopamine is released, the executive hub fails to inhibit incorrect information while the speaker is assembling their message. The medial wall of the left frontal lobe, an area of the brain theorized by Alm to be implicated in the core features of cluttering, showed abnormal activation in a recent fMRI study of adults with cluttering (Ward et al. 2015). Thus, the differences in executive functioning among those who clutter which were once theoretical are now being confirmed in studies. These executive functioning differences may result in cluttering symptomatology which will have a negative impact upon social interaction, such as the impact of difficulties with working memory and/or response inhibition on conversation, as described below.

A pilot study of school-age children who clutter has shown dissociations in verbal versus nonverbal working memory scores (Kidron et al. 2012). Another pilot study has shown symptoms of response inhibition in adults with cluttering (Scaler Scott et al. 2015). Further study of the underlying nature of response inhibition and working memory in cluttering remains to be completed. It is important to realize that like in ADHD, difficulties in these areas may cause difficulties in everyday social functioning, even if there is no difficulty in understanding social rules. For example, if one has difficulty with working memory, one may find it difficult to maintain a topic of conversation and/or to complete a narrative without frequent interruption due to losing a train of thought. By the same token, if one has difficulty with response inhibition, unintended messages may slip out, at best causing the speaker to revise their thoughts multiple times and at worst causing offense to the listener. The potential for misinterpretation of social competency in those who clutter necessitates that we intervene to give these speakers as much advantage as possible in conversational interaction.

18.9 Summary

Some individuals with fluency disorders may have difficulty understanding social rules. Others may violate social rules due to reactions to their fluency disorder. Still others may violate these rules due to underlying linguistic and/or cognitive symptoms that result in inappropriate social responses. Individuals with fluency disorders have a history of being underestimated in school, in the workforce and in social situations. It is our role as clinicians to help ensure that our clients have the knowledge, skills, and resources necessary for effective social interaction. Only by providing this information and skill set can we help listeners to understand the positive attributes that our clients have to contribute to everyday social interaction.

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Part IV
Management of Pragmatic Disorders

Chapter 19
Pragmatic Assessment and Intervention in Children

Yvette D. Hyter

Abstract This chapter reviews assessments that examine pragmatic behaviors and skills in children, as well as intervention procedures that can be used to facilitate change in pragmatic abilities. Several formal and informal assessment tools exist but very few address more than one pragmatic component. A review of intervention procedures reveals that most of the procedures reported in the literature have the capacity to effect change in pragmatic behaviors. However, many of the intervention studies have been conducted with small numbers of participants, and have a low level of evidence or controls. The chapter concludes with suggested future research topics.

Keywords Communicative intention • Discourse management • Language assessment • Language intervention • Pragmatics • Presupposition • Social communication

19.1 Introduction

Pragmatics is frequently thought to be a key component of difficulties exhibited by children diagnosed with autism. However, it is well documented that disorders in pragmatics and social communication occur in a wide variety of populations including those with traumatic brain injury (Body et al. 1999), fragile X syndrome, Down's syndrome, and other cognitive impairments (Finestack and Abbedutto 2010; Roberts et al. 2007), specific language impairment (Botting and Conti-Ramsden 1999; Landa 2005) and neurodevelopmental disorders such as those caused by complex trauma and prenatal alcohol exposure (Coggins et al. 2003; Hyter 2003; Rogers-Adkinson and Hooper 2003; Streissguth and O'Malley 2000; Timler et al. 2005). Moreover, with the introduction of the definition of social (pragmatic) communication disorder into DSM-5 (American Psychiatric Association 2013), there has been

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increasing focus on pragmatics, its relationship with social communication, and on ways to effectively assess these skills and intervene with children who present with pragmatic language and/or social communication impairments. In order to meaningfully assess and treat pragmatic language skills in children, it is important to be clear about the nature of these skills. Some introductory remarks about the scope of pragmatics are thus warranted.

Huang (2015) explains that there are two divergent views of pragmatics, the Anglo-American and European or Continental schools of thought. The Anglo-American perspective has focused on pragmatics as a 'core component' of other linguistic systems (Huang 2015: 5). Its focus, then, is on social use of language systems (phonology, morphology, syntax, and semantics). The Continental view of pragmatics integrates cognitive, social and cultural approaches to language meaning. Both conceptualizations provide a more holistic view of pragmatics and social communication than either perspective alone (Hyter 2007; Hyter et al. 2015).

Pragmatics has generally been defined as the ability to use language or carry out communication goals effectively in social situations (Bates 1976). More recent definitions include a 'group of behaviors that are concerned with how language is used to convey meanings' (Adams 2002: 973); 'behavior that encompasses social, emotional, and communicative aspects of social language' (Adams et al. 2005: 568); and 'daily interactions among groups of people with varying worldviews, each influenced by a history of social practices' (Hyter 2007: 131). Pragmatics includes comprehension and production of communicative functions or intentions, organization and management of various forms of discourse, and sociolinguistic skills such as presupposition, making inferences, code and register shifting (Adams 2002; Bates 1976; Clark 2004; Cummings 2005, 2009, 2015; Landa 2005; Roth and Spekman 1984a).

Pragmatics is intimately connected to social communication (Coggins et al. 2003; Norbury 2014; Olswang et al. 2001). Social communication is comprised of interdependent relationships among pragmatics, social cognition (e.g. theory of mind, perspective taking, intention reading), executive functions (e.g. inhibition and mental flexibility), and affect regulation (the reciprocal component of executive functions). Working memory serves as the glue that holds all of these components together, as illustrated in Fig. 19.1 (Hyter 2012; Hyter and Sloane 2013).

Social (pragmatic) communication allows one to recognize and make sense of social situations and others' perspectives and motivations, which can help govern one's own behavior and language use accordingly. It also allows one to employ mental flexibility to adapt to diverse communicative contexts, carry out communication goals using effective linguistic skills for the given situation, and be mindful of social rules while processing other information (Adams 2005; Coggins et al. 2003; Hyter et al. 2001; Hyter 2003; Hyter 2012; Hyter and Sloane 2013; Olswang et al. 2001). All of these abilities could be influenced by one's affective state (Fujiki et al. 2002; Hyter and Sloane 2013). Pragmatics and social communication not only require comprehension and production of language skills but also of social cognitive, cognitive, and sociolinguistic skills, as outlined in Table 19.1.

Fig. 19.1 Hyter-Sloane model of social (pragmatic) communication (Hyter and Sloane 2013)

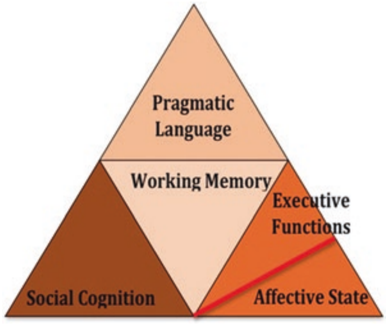

Table 19.1 Pragmatic and social communication components

Pragmatic and social communication components	Examples
Communication skills	Nonverbal communication skills including paralinguistic (prosody) and extralinguistic (kinesics or gestures and proxemics) skills
Language skills	Speech acts or communicative functions (comprised of joint attention and assertive and responsive acts)
	Discourse genre (conversational, narrative, expository) comprehension, and management skills (including reciprocity, repairs, turn taking, topic management, cohesion, coherence)
	Metapragmatic skills (including inferencing, presupposition)
	Syntax (how words are organized into sentences)
	Semantics (the meaning of words and word relationships)
Social cognition	Social and emotional knowledge
	Intersubjectivity; joint attention; joint reference
	Theory of mind
	Emotional regulation (affect regulation)
	Emotional and cognitive perspective taking
	Presupposition (inference, belief attribution)
Cognitive skills	Executive functions; working memory
Sociolinguistic skills	Linguistic perspective taking; code switching; register shifting; group membership; power relationships; knowledge of contextual requirements

19.2 Pragmatics and Contextual Considerations

The study of pragmatics and social communication is concerned with the connection between interlocutors and the contexts in which they engage (Cummings 2015; Hyter 2007; Levinson 1983; Perkins 2007; Rivers et al. 2012). Context is comprised of the interdependent and dynamic social structures and processes that give meaning to interactions (Hyter 2007: 131). One macro-level context to consider is globalization, the multidimensional interdependencies that occur across national borders often with unequal consequences across the globe (Steger 2003, 2010; Therborn 2009). One effect of this current stage of globalization is the forced displacement and voluntary movement of people from one part of the world to another, increasing opportunities for groups of people all over the world to live and work among others who hold worldviews, speak languages, and engage in cultural practices different from their own (Hyter 2014; United Nations News Centre 2013). Given this global circumstance, it is important for those interested in pragmatics to consider additional contextual factors such as personal (e.g. culture and gender) and environmental (e.g. social structures and public policies) influences on pragmatics, social communication, and language use (Block and Cameron 2002; Howe 2008; Trosborg 2010; World Health Organization 2002).

Assessments and those who administer them need to take into consideration cultural variations among groups of people (Carter et al. 2005; DeJarnette et al. 2015; Hyter 2007). There is a diversity of definitions of culture but for the purposes of this chapter, culture will be defined as the multigenerational and underlying assumptions, values, and beliefs held by groups of people, which drive daily practices (Martin and Nakayama 2012; Ting-Toomey 2012). Recognizing cultural differences in pragmatics is necessary in order to avoid approaching pragmatics through an ethnocentric lens (Kramsch 2008; Trosborg 2010; Wierzbicka 2003), and developing or administering assessments that are not ecologically valid (Carter et al. 2005; DeJarnette et al. 2015). Culture influences pragmatics and subsequently the assessment measures and intervention practices used to examine and support these behaviors (Hyter 2007; DeJarnette et al. 2015; Wierzbicka 2003).

Pragmatic taxonomies have often presented types of speech acts, for example, as universal. However, there are as many different speech acts as there are cultural contexts (Kecskes 2015; Mey 2001). Culture affects speech acts and communication styles used when people are engaged in their everyday lives (Carbaugh 2016: 566). More specifically, the use and interpretation of a speech act, the macrostructure and content of a narrative, as well as a presupposition made during a communicative interchange may be interpreted through different cultural frameworks. Some speech acts serve culturally specific roles (Green 2002; Rivers et al. 2012; Wyatt 1995). Speakers of African American English (AAE), for example, can subtly express disdain while making a disparaging comment directly to their communication partner through such verbal acts as 'readin'' or 'throwing shade'[1], and through nonverbal acts such as a 'neck roll' or 'suck teeth' (DeJarnette et al. 2015; Goodwin and Alim 2010; Green 2002; Smitherman 2000).

Pragmatics must also consider meaning in the context of social structures (Giroux 2010; Hyter 2014; Stockman 2007). Social structures are institutionalized norms embedded in the ways society is organized politically, economically, and socially

[1] *Readin'* and *throwing shade* are different terms that refer to the same type of speech event. Morgan (2002) defines readin'

as exposing someone's interactive deception. It is used to 'denigrate another to his or her face in an unsubtle and unambiguous manner' (252) and it is 'legitimate only when it is accomplished in the presence of others.' (263)

(Agger 2006; Farmer et al. 2006; Hyter 2014: 108). A social structure is the power that is enacted through language use. Power is unequal when communication occurs between people in asymmetrical relationships, such as between male and female faculty members, or a service provider and a parent (Lippi-Green 2012; Wiley 2005). Referring to Clark and Wilkes-Gibbs' (1986) collaborative model of communication, Lippi-Green (2012) suggests that those who are engaged in communication with others and who are in a position of power can choose whether or not to reject or accept their responsibility during the communicative act, while those who are engaged from a position of less power are encumbered with the burden of ensuring the success of the communicative act.

Assessments of pragmatic language must consider that actors are influenced by culture and by context. Cultural differences influence every component of pragmatics from paralinguistic and kinesic aspects to verbal language use. There are cultural differences in the ways that communicative interactions are enacted and interpreted, such as differences in when to talk, to whom one can talk, and how indirect or direct one should be. Hyter (2007) and DeJarnette et al. (2015) appeal for the use of emic assessment processes (inductive/intracultural) instead of, or in addition to, etic processes (deductive/intercultural) when analyzing pragmatics and social communication (Lett 1990). (Emic and etic are concepts coined by Kenneth L. Pike, cited in Headland 2004.) Engaging in assessment processes across contexts is best for getting a sense of the child's true pragmatic abilities.

Assessments should also include a range of procedures for gathering background information from family members or other parties involved with the child in order to get a holistic view of the child's pragmatic strengths and challenges. Such procedures could include ethnographic interviews and observations in naturalistic environments. Ethnographic interviewing is a procedure that helps the examiners ask open-ended questions in a way that elicits the examinee's and/or his or her family members' perspective about communication strengths and challenges (Westby et al. 2003). Observations of the child in natural settings engaged in daily activities is a process that allows the maximum opportunity to observe the child's pragmatic strengths and challenges across multiple contexts (Hyter 2007). Assessment outcomes can provide a foundation for planning intervention, and some will be useful for comparing children to their peers. What follows is a discussion of specific pragmatic assessments that have been addressed in the speech-language pathology literature over the last 30 years.

19.3 Pragmatic Assessment in Children

Because it is comprised of a myriad of complex processes, one of the challenges of assessing pragmatics is the sheer enormity of the concept. As a result of this challenge there are rarely any assessments that address the totality of pragmatics. Another challenge to assessment is that pragmatic and social communication skills are contextually embedded. The best options for assessing pragmatics occur in natural contexts where these skills can be directly observed in real time. Direct observation of pragmatic behaviors allows for more in-depth and broader views of a child's strengths and challenges, and permits the assessment outcome to lead more directly to intervention goals (Cordier et al. 2014: 1589). This is not to suggest that discrete point[2] standardized norm-referenced measures of pragmatics do not exist. They do, but they are few in number.

The next section will highlight some of the more highly used informal and formal pragmatic assessments for children. As used here, 'informal' refers to valid assessments that measure pragmatic skills, and result in information that can easily become the basis of intervention. (A valid assessment is one that measures what it purports to measure.) These assessments include some of the parent and teacher checklists or reports that exist, and analog activities such as role-playing situations that simulate natural environments. Informal measures may or may not have strong psychometric properties, but may be clinically useful. Formal assessments refer to standardized, norm-referenced instruments that are used to compare a child's pragmatic abilities to those of his or her peers. Additionally, this section will include a description of pragmatic components that are now included in some of the norm-referenced measures traditionally focused on language structure and meaning, such as the Pragmatic Profile of the *Clinical Evaluation of Language Fundamentals* – 5 (Wiig et al. 2013). Procedures for analyzing conversational, narrative, and expository discourse as well as analog and theory of mind tasks will also be examined. The section ends with a description of a new assessment battery for which the research version is currently being tested on populations of diverse children.

19.3.1 Checklists and Observation Profiles

Checklists and observation profiles are typically user-friendly instruments that examine multiple aspects of pragmatics. These instruments are listed in Table 19.2. They include a variety of taxonomies regarding the skills that comprise pragmatics, which are determined by the theoretical framework from which the instrument was developed. These instruments often provide information about whether a child's pragmatic behavior is present or absent. They are also used to determine how often a behavior occurs (e.g. Bedrosian 1985; Damico 1985; Dewart and Summers 1995; Girolametto 1997; Hyter et al. 2005; Hyter and Applegate 2012; Prutting and Kirchner 1987; Rice et al. 1990; Roth and Spekman 1984b). One of the primary benefits of checklists and observation profiles is that the results can be used to develop intervention goals and guide intervention processes.

Roth and Spekman (1984a, b) indicate that three primary areas should be examined: communicative intentions (speech acts); presupposition (the speaker's ability to shape and organize the message in relation to the communicative needs of the

[2] Discrete point assessment refers to those measures which are designed to examine complex skills in individual, decontextualized parts (Francis and Reyhner 2002).

Table 19.2 Checklists and observation profiles and areas of pragmatics assessed

Observations and checklists	Areas of pragmatics assessed	Age range
Pragmatic Protocol (Prutting and Kirchner 1987)	Speech acts	5 years and older
Discourse Skills Checklist (Bedrosian 1985)	Conversational discourse	School-age children and adults with cognitive impairments
Systematic Observation of Communicative Interaction (Damico 1985)	Conversational discourse	6 years through adulthood
Pragmatics Profile of Everyday Communication Skills in Children (Dewart and Summers 1988, 1995)	Speech acts	Preschool to 10 years
	Conversational discourse	
Social Interactive Coding System (Rice et al. 1990)	Speech acts	Preschool
Parent report rating scale (Girolametto 1997)	Conversational discourse	12–36 months
Targeted Observation of Pragmatics in Children's Conversation (Adams et al. 2011)	Conversational discourse	School age
Pragmatics Observational Measure (Cordier et al. 2014)	Speech acts (expression and comprehension of verbal and nonverbal acts)	5–11 years
	Social emotional attunement	
	Executive functions	
Communication and Symbolic Behavior Scales (Wetherby and Prizant 1993)	Speech acts	8–24 months, but 18–30 months for those with developmental delay
	Reciprocity	
	Social affective signaling	
	Symbolic behavior	
Children's Communication Checklist (Bishop 1998) and Children's Communication Checklist – 2 (Bishop 2006)	Speech	4–16 years
	Language content and form Discourse	
	Scripted language	
	Context	
	Nonverbal communication	
	Social relations	
	Interests	
Pragmatic Language Skills Inventory (Gilliam and Miller 2006)	Conversational discourse	5–12 years
	Presupposition	
	Narrative skills	
	Expository skills	
Language Use Inventory (O'Neill 2007)	Communication with gestures	Younger than 4 years
	Communication with words	
	Use of longer sentences	

listener); and the social organization of discourse such as conversational, narrative or expository discourse (Landa 2005; Roth and Spekman 1984a, b). Roth and Spekman (1984b) stressed the importance of a natural context for making pragmatic observations. They state that 'atypical' or unique contexts will less likely result in behaviors that can be generalized to other contexts, and 'contrived' or orchestrated contexts may over-represent what the child is able to typically perform (1984b: 12).

One of the most widely used checklists is one developed by Prutting in 1982 (cited in Prutting and Kirchner 1987), and Prutting and Kirchner (1987). Their *Pragmatic Protocol* was designed to be completed by speech-language pathologists on children 5 years and older into adulthood. It consists of 30 communicative acts including verbal speech acts, conversational skills such as topic management and turn taking, paralinguistic abilities such as intelligibility and vocal intensity, and nonverbal aspects of communicative intentions such as proximity and facial expressions. These communicative acts are judged as being appropriate or inappropriate or no opportunity to be observed. This protocol is reported to be reliable with mean reliability reported to be 94.4 % agreement among raters for judgments of appropriate behaviours and 92.3 % for judgments of inappropriate behaviours (Prutting and Kirchner 1987: 109). One of the disadvantages of this protocol is that the results are primarily dichotomous, rather than revealing a range of behaviors (Cordier et al. 2014: 1589). Another problem is that what is judged to be appropriate or inappropriate is not influenced by culture (Hyter 2007).

The *Discourse Skills Checklist* (Bedrosian 1985) was designed to examine 'topic and conversational control' (231) of school-age children and adults with cognitive impairments, while engaged in at least two different communicative contexts, such as when interacting with a peer, a teacher or the speech-language pathologist/therapist. The checklist includes five primary areas of discourse, each of which is divided into more specific skills. The five discourse areas are topic initiations (e.g. frequency and subject matter), topic maintenance (e.g. responds to questions, acknowledges topic), use of eye contact (e.g. uses eye contact to designate a listener in a group), turn taking (e.g. is easily interrupted, interrupts others), and politeness (e.g. able to make indirect requests). This checklist also includes nonverbal parameters of pragmatics such as proxemics (e.g. stands too close to people when talking) and kinesics (e.g. points to initiate a topic).

The *Systematic Observation of Communicative Interaction* (SOCI; Damico 1985; Damico et al. 1999) includes a time-sampling technique (10-second intervals for 12 min) to determine the success of the communicator's conversational skills in natural settings. The assessment is suitable for children aged 6 years through to adulthood. Damico and colleagues designed this instrument to utilize a 'problematic analysis strategy' (Damico et al. 1999: 78), meaning that the coded behaviors have already been identified as indicating 'communicative difficulty' (79). This instrument focuses on four primary areas: communicative intentions (e.g. responding to questions, making requests), problematic verbal behaviors (e.g. failure to provide significant information), problematic nonverbal behaviors (e.g. inappropriate proxemics), and conversational postulates based on Grice's (1975) conversational maxims. Reliability coefficients for the SOCI range from .99 to .63, but the majority of indices had a reliability of .90 or higher (Damico et al. 1999: 84). A common concern about observation instruments is their tendency to include variables that require subjective judgments on the part of the examiners, reducing reliability. Damico and colleagues state that 'each of the variables used in SOCI were chosen because they could be explicitly defined and had proven psychological reality' (Damico et al. 1999: 86).

Dewart and Summers (1988, 1995) created the *Pragmatics Profile of Early Communication Skills* and later the *Pragmatics Profile of Everyday Communication Skills in Children.* These instruments were designed as a structured interview with caregivers to 'explore' the communication skills of preschool and school-age children (up to the age of 10 years) in the context of everyday life. This interview protocol has four sections focused on communicative functions (speech acts), responses to communication (questions about whether the child understands direct and/or indirect requests, for example), interaction (how the child participates in conversation, whether he or she is verbal or not), and conversation and contextual variation (how the child's communication may vary based on the communicative context). Dewart and Summers (1995) suggest using triangulation as a form of validity. Triangulation is a method typically used with qualitative data and is a means of collecting data from at least three sources (e.g. interview, observation, medical documents) and comparing these data against each other (Merriam and Tisdell 2015). To obtain reliability between interviewees' responses, they suggest 'asking a similar question again at a later time' (Dewart and Summers 1995: 15).

The *Social Interactive Coding System* (SICS; Rice et al. 1990) was developed to provide a description of speech acts used as a function of the context in which the child was engaged. It was 'designed to measure situational variables that may influence social interactions' (2), but only focuses on initiations and responses produced by the child. Rice et al. designed the SICS to be used with a time-sampling procedure and to collect data on the context of the child's play (e.g. dramatic play), who the child was speaking to or communicating with (e.g. peer or teacher), interactive status (e.g. initiations, responses or no response), script code (e.g. the specific activity in which the child was engaged), play level (i.e. solitary, adjacent or social interactive), and language use (i.e. English or other). These authors found that coding the SICS, using percent of agreement between observers, was 89 % on number of interactions coded, and an overall reliability of 95 % among coded interactions (Rice et al. 1990: 6). Although the SICS is a reliable tool, it does not provide an opportunity to record the child's individual utterances, specific behaviors, or over how much time each interaction occurs (Rice et al. 1990).

Girolametto (1997) developed a parent report rating scale for young children aged 12–36 months with language impairment. This rating scale has 25 items and yields a mean score for conversational skills in two domains, assertiveness and responsiveness. Similar to the SICS (Rice et al. 1990), this scale focuses only on one dimension of communication, initiations and responses. This rating scale was built on the foundation of four different conversational profiles introduced by Fey (1986). These profiles are the active conversationalist (high levels of assertiveness and responsiveness), the passive conversationalist (responsive but not assertive), the inactive communicator (minimally assertive and responsive), and the verbal non-communicator (assertive but not responsive). Girolametto (1997) reports scale reliability, test-retest reliability, content validity and concurrent validity.

Targeted Observation of Pragmatics in Children's Conversation (TOPICC; Adams et al. 2011) was developed specifically for an intervention project conducted by the authors. This tool is designed to be used with school-age children and focuses on seven conversational categories: reciprocity; taking account of the listener's knowledge; turn-taking; verbosity; topic management; discourse style; and response problems (Adams et al. 2011: 9). Reliability has yet to be addressed (Norbury 2014).

The *Pragmatics Observational Measure* (POM; Cordier et al. 2014) is designed to assess school-aged children between 5 and 11 years during free play with peers. This 27-item measure includes several components in order to capture a range of pragmatic behaviors. These components are '(1) Introduction and responsiveness (introducing communication and being responsive to social interactions with peers); (2) Non-verbal communication (interpreting and using non-verbal communication); (3) Social-emotional attunement (understanding and using emotional reactions and intentions of peers); (4) Executive function (using higher-level thinking to promote interaction with peers); and (5) Negotiation (using appropriate negotiation techniques when interacting with peers)' (1590). This measure shows good internal consistency, construct validity, acceptable inter- and intra-rater reliability, and strong correlations between the POM and Prutting and Kirchner's (1987) Pragmatic Protocol.

Some checklists and questionnaires are norm-referenced. One of the earliest of these measures developed to examine pragmatics in children is the *Communication and Symbolic Behavior Scales* (CSBS; Wetherby and Prizant 1993). This measure was normed on 282 typically developing children who were 8–24 months old, as well as on children with developmental disabilities from 18 to 30 months old (Wetherby and Prizant 1993). It directly assesses a child's skills through the use of standardized procedures which were created to mimic 'natural adult-child interactions'. These serve to elicit a range of 'communicative and symbolic behaviors' (Wetherby et al. 1998: 84) across different communicative contexts. There are 22 items divided into seven scales: communicative functions; communicative gestures; vocalizations (use of vocalizations in the absence of gestures); verbalizations (number of different words and word combinations); reciprocity (communication in response to another's communicative initiatives); social/affective signaling (gaze shifts); and symbolic behavior (different play schemes in symbolic play). One of the primary concerns about the CSBS is the amount of time it takes to administer (i.e. 50–75 min) and to score (i.e. 60–75 min).

Wetherby and Prizant (2001) have also developed a shorter profile called the *Communication and Symbolic Behavior Scales – Developmental Profile* (CSBS-DP). This is a screening instrument which is completed by caregivers of children aged 6–24 months. The CSBS-DP has three components. The first part is a 24-question checklist that was normed on 2000 children from diverse ethnic backgrounds. The checklist includes questions about the child's emotion and eye gaze (e.g. does your child smile or laugh while looking at you?), communication (e.g. does your child do things just to get you to laugh?), gestures (e.g. does your child point to objects?), sounds (e.g. does your child use sounds or words to get attention or help?), words (e.g. how many different words does your child use meaningfully that you recognize?), understanding (e.g. when you call your child's name, does he or she respond by looking or turning toward you?), and object use (e.g. about how many blocks does your child stack?). The second part of the CSBS-DP is a follow-up parent questionnaire. The third part is a behavioral sample that the speech-language pathologist/therapist records while the child interacts with the caregiver.

The *Children's Communication Checklist* (CCC; Bishop 1998) and the *Children's Communication Checklist-2* (CCC-2; Bishop 2006) are probably the most widely used pragmatic assessments for school-age children. It is norm-referenced and has been standardized on 950 children. It is designed to be completed by parents of children between 4 and 16 years of age, but can also be used as a guided interview. This checklist is comprised of 70 items and two primary domains. The domain of language includes five components: articulation; phonology; language structure; vocabulary; and discourse. The other domain, pragmatics, includes initiation, scripted language, context, and nonverbal communication, as well as social relations, and interests. These last two scales focus on behaviors that will typically differentiate children with ASD. This measure allows information to be gathered on challenges as well as strengths exhibited by the child. It is scored on a four-point scale of 0 (less than once per week or never), 1 (at least once per week but not every day), 2 (once or twice per day), or 3 (several times or more than twice per day). Scoring for the CCC-2 yields scaled scores, percentile ranks, confidence intervals, as well as composite and index scores. The General Communication Composite may reveal a general communication problem, while the Social Interaction Deviance Composite differentiates children with ASD from those with SLI.

The *Pragmatic Language Skills Inventory* (PLSI; Gilliam and Miller 2006) is a norm-referenced observational measure which is completed by a parent or teacher who knows the child well and has observed the child in natural contexts. It is a quantitative measure that can be used to diagnose deficits in pragmatic language. The PLSI has three scales: personal interaction (e.g. initiating conversations, asking for help, nonverbal communication); social interaction (e.g. knowing when to talk and when to listen, understanding classroom rules, turn taking in conversations, and predicting the consequences of one's actions); and classroom interaction (e.g. using figurative language, topic maintenance, written narrative skills, and explaining tasks). Each of these scales contains 15 items. The PLSI was standardized on 1175 children between the ages of 5 and 12 years who were representative of the US population based on gender, race, ethnicity, and disability (Wilkinson 2010). It provides standard scores and percentile ranks for the three subscales, and a pragmatic language index which can be used to determine if pragmatic language impairment exists. The authors report that strong concurrent validity was established with the Test of Pragmatic Language (TOPL; Phelps-Terasaki and Phelps-Gunn 2007).

The *Language Use Inventory* (LUI; O'Neill 2007) is a norm-referenced parent questionnaire which is designed to assess the pragmatic language competence of children younger than 4 years of age. The goal of the LUI is to examine the child's communicative behaviors in everyday interactions. The LUI relies on parent report, which has been shown to be ecologically valid. The three major parts of the LUI are (1) how the child communicates with gestures, (2) how the child communicates with words, and (3) the child's longer sentences. Each of these three major parts of the instrument includes several subscales. Research on the LUI shows it to have internal reliability and discriminant validity (O'Neill 2007). Also, it has been standardized on a sample of 3500 Canadian children stratified by income, ethnicity, parental education and exposure to languages other than English (O'Neill 2009). The LUI can be used as a screening tool to detect concerns about delay in pragmatics or language use in young children.

19.3.2 Discourse Analysis Procedures

Several discourse analysis procedures are used to assess the macro and microstructures of different types of discourse, such as conversations, narratives, and expository texts. Many of the checklists examined in Sect. 19.3.1 can be used to assess aspects of conversational discourse. Accordingly, this section will focus on procedures that are used to analyze narrative and expository texts.

Macrostructure includes elements that make up the overall organization of narrative (e.g. overall structure, episodic complexity) or expository discourse (e.g. text grammars/rules). In Stein and Glenn's (1979) narrative story grammar schema, macrostructure elements would include character, setting, initiating event, internal response, plan, attempts, consequences, and a resolution. For expository discourse, macrostructure elements result in information organized to provide such texts as descriptions, sequence/procedural, cause/effect or comparison/contrast statements (Heilmann et al. 2010; Nelson 2010; Westby 2005). By contrast, microstructure refers to the productivity (amount of information in words or T-units[3], for example) or sentence-level complexity in the discourse (Nippold et al. 2005). It is important to note that both narrative and expository texts are forms of discourse but have quite different macro and microstructures from each other (Nippold et al. 2005; Westby 2005).

A narrative is the telling or retelling of events that are interconnected by time (i.e. they are told sequentially) (Labov 1972; Labov and Waletsky 1967; Ukrainetz 2006) or by associated themes (Champion 2000; Michaels 1981). They include protagonists attempting to solve a problem, are structured with a beginning, middle and ending, and include the behaviors of the protagonists (i.e. landscape of action) as well as their internal states (i.e. landscape of consciousness) (Bruner 1986). Expository texts 'convey information' (Nippold and Scott 2009: 1), are linguistically

[3] A T-unit stands for 'minimal terminable unit', and was defined by Hunt (1970) as an independent clause and any of the dependent clauses attached or embedded in it. This measure is used by speech-language pathologists as a measure of syntactic maturity (Scott 2013).

complex, and contain abstract vocabulary (Scott and Balthazar 2010; Westby et al. 2010). Examining both narrative and expository discourse comprehension and production can reveal a great deal about language abilities (Boudreau 2008). Narratives have been shown to be important for social success (Westby 2005), and the ability to comprehend and produce both narrative and expository discourses is essential for academic success (Griffin et al. 2004; Landa 2005; Ward-Lonergan 2010).

Examining narrative production and comprehension can reveal a great deal about one's language abilities (Boudreau 2008; Landa 2005). Difficulty with narratives can negatively impact a child's development across multiple domains (McCabe and Rollins 1994; Petersen 2011; Westby 2005). Narratives are useful for assessing aspects of pragmatics such as inference, presupposition, cohesion, coherence and pragmatic supports such as social cognition and working memory. Due to the wide range of uses of narratives, assessments of these speech events have become standard practice among speech-language pathologists (Botting 2002; Petersen et al. 2008). As with the other components of pragmatics, narrative assessments can be informal or conducted with formal, standardized, norm-referenced, individually-administered instruments. They are typically elicited by having the child tell a story using a wordless picture book (e.g. Curenton and Justice 2004; Gorman et al. 2011; Heilmann et al. 2010; Hoffman 2009; McCabe et al. 2008) or tell a personal narrative (e.g. Westerveld et al. 2004). Several narrative assessment procedures and protocols exist, but the list is far too long to be included in the space of a book chapter. What follows below and in Table 19.3 is a summary of some of the more widely reported narrative assessment procedures.

One of the few standardized measures for examining narrative is *The Renfrew Bus Story* (also called *The Bus Story*) developed by researchers in Britain (Cowley and Glasgow 1997). This measure is designed for children from 3;6 to 6;11 years. The child looks at several pictures in sequence as the clinician follows the script and reads the story to him or her. The child then retells the story while the story is being audio recorded. Audio recordings are then transcribed and scored for 'information (number of details in the retelling that match the story); sentence length (mean number of words for the five longest sentences); complexity (number of sentences containing subordinate or relative clauses); and independence (amount of examiner prompting)' (Petersen et al. 2008: 117). This measure was normed on 418 children but can be time consuming to score. Researchers in the US found that *The Bus Story* was useful for predicting language outcome for children older than three years but had the tendency to result in false positives – erroneously indicating the existence of a language disorder (Petersen et al. 2008).

The *Strong Narrative Assessment Procedure* (SNAP; Strong 1998) is a criterion-referenced measure that is used to examine narrative discourse skills using a story retell process. Comparative data is available for children aged 7–10 years, and the assessment can be used to evaluate children aged 6–13 years. The SNAP contains four audiotaped narratives corresponding to four wordless picture books by Mercer Mayer: *Frog, Where are You?*; *Frog Goes to Dinner*; *A Boy, a Dog and a Frog*; and *One Frog Too Many*. The book *Frog Goes to Dinner* is administered first as a practice story and, therefore, is not scored. The examiner then elicits a narrative using

Table 19.3 Some narrative assessment measures

Name of assessment and bibliographic reference	Primary areas assessed	Methods used[a]
Renfrew Bus Story (Cowley and Glasgow 1997)	Microstructure	Series of pictures
Strong Narrative Assessment Procedure (Strong 1998)	Macrostructure	Wordless picture books
Test of Narrative Language (Gillam and Pearson 2004)	Comprehension	Script story
	Macrostructure	Sequenced pictures
	Microstructure	Wordless picture book
Narrative Assessment Protocol (Pence et al. 2007)	Microstructure	Wordless picture book
Narrative Language Measures (Petersen and Spencer 2010)	Comprehension	Retelling a narrative read by the examiner; Generation of a personal narrative using conversational elicitation procedure (McCabe and Rollins 1994)
	Microstructure	
	Macrostructure	
Narrative Scoring Scheme (Heilmann et al. 2010)	Macrostructure	Wordless picture book
Index of Narrative Microstructure (Justice et al. 2006)	Microstructure	Single picture elicited; Fictional self-generated narrative

[a]Generation by means of a wordless picture book, single picture, or series of pictures

any of the remaining stories (Volkmar 2013). The child listens to one of the recordings while following along with the corresponding wordless picture book. To create a naive listening situation, the child will listen to the recording through headphones or the clinician will leave the room when the recording is played (Petersen et al. 2008). The child will then retell the narrative without looking at the book and respond to questions about the story. The child's recorded narrative is analyzed for 26 narrative macro- and microstructure elements comprised of length of narrative, syntax, cohesion, and story grammar elements. The frequency and percentage of narrative features is then calculated (Petersen et al. 2008).

The *Test of Narrative Language* (TNL; Gillam and Pearson 2004) assesses narrative comprehension and production, specifically measuring the child's ability to retell the sequential order of events, as well as tell a cohesive and coherent text. Specific narrative tasks include retelling a story (restaurant script) without visual cues, and constructing a narrative given a sequence of pictures, and a single picture while being audiotaped. Following the narrative output, the audiotapes are listened to by the examiner and scored for story content, overall story structural organization (macrostructure) and microstructure. The examiner scores the test as they listen to the transcripts; therefore, written transcripts of the story are not required. The TNL was standardized on 1059 children between 5;0 and 11;11 years of age who were stratified on several social indicators (gender, race, ethnicity, geographic region, etc.). It reports high validity and reliability.

The *Narrative Assessment Protocol* (NAP; Pence et al. 2007) is designed to be used by professionals (teachers, speech-language pathologists) to assess the expressive language of children using a narrative task. During this assessment, narratives are elicited using a wordless picture book, and can be scored in real time (as the child renders the narrative) or from an audiotape. NAP focuses on microstructure and provides information about complex sentences, phrase structure, use of modifiers, nouns, verbs, as well as number of different words and the mean length of T-units. This measure shows sensitivity (number of true positives, and therefore avoiding false positives) and specificity (number of true negatives avoiding false negatives) of .80, inter-rater reliability as an average of .93 and modest concurrent validity with the CELF-Preschool 2 (Semel et al. 2004).

The *Narrative Language Measures* (NLM; Petersen and Spencer 2010) is a series of tests designed to examine the micro and macrostructure of narratives produced by preschool and school-age children. It can be used for screening and for guiding intervention. This assessment has three subtests, the Test of Narrative Retell, the Test of Story Comprehension, and the Test of Personal Generation. The authors developed 40 short stories that include experiences familiar to young children. These stories are used to elicit narratives and are written to be read in a standardized manner by examiners. Inter-rater reliability was reported to be .96 for the Test of Narrative Recall, .94 for the Test of Personal Generation, and .91 for the Test of Story Comprehension.

Heilmann et al. (2010) developed the *Narrative Scoring Scheme* (NSS), a procedure to document the skills necessary for producing a ‘coherent and interesting story’ (156). The authors report that the NSS allows the examination of many different aspects of narrative in one analysis process by using a scoring system as well as examiner judgment. This metric includes seven components of narrative as extracted from the extant literature. These components are introduction of setting and characters, character development exhibited by mentioning main and supporting characters, mental state verbs, referencing (i.e. referential cohesion), conflict resolution, cohesion (i.e. lexical and conjunctive cohesion), and conclusion.

The *Index of Narrative Microstructure* (INMIS; Justice et al. 2006) is a clinical tool designed to evaluate narrative microstructure, typically measured in terms of productivity. It focuses on the amount of information provided by the narrator and measures such things as numbers of T-units, total number of words, and number of different words (Hughes et al. 1997; Justice et al. 2006; Makinen et al. 2014; Muñoz et al. 2003). The INMIS is an important tool in that it works out ‘clinical dilemmas’, such as determining which of the abundant narrative microstructure elements to use when evaluating the quality of a narrative, as well as the quantity of elements present in the narrative (Justice et al. 2006: 179). The INMIS can be used in collaboration with a narrative elicitation procedure that is already available as a published narrative test. It can also be used to analyze a specific set of microstructure elements that can easily be calculated by hand. It contains normative data based on 250 children between 5 and 12 years of age or kindergarten through sixth grade levels. It can be used as a screener, a diagnostic tool, as well as a measure for tracking narrative changes over time.

Other informal narrative analysis procedures that are widely used to examine narrative macrostructure include High Point Analysis (Labov 1972; Labov and Waletsky 1967; Peterson and McCabe 1983), Applebee's (1978) narrative stages, Stein and Glenn's (1979) Story Grammar Analysis, and Gee's (1991) Poetic Analysis. High Point Analysis is a method for examining the macrostructure of narrative that builds until it reaches a 'high point' or climax, which is the reason for the telling of the story. At this point the action is suspended and the complicating action presented in the narrative is evaluated and then resolved (Champion 1998). Applebee (1978) identified six levels of narrative development that increase in complexity, from heaps as the earliest narrative structure that emerges around 2 years of age, to true narratives that emerge around 6 or 7 years. Stein and Glenn (1979) identified story grammars, or the underlying structure of a narrative, that includes goal-directed behaviors of the involved protagonists. According to Stein and Glenn, a narrative is comprised of a setting and at least one or more episodes.

Gee's (1985, 1991) analysis is used to reveal the underlying structure of a thematically rendered narrative, based on prosody and tempo of the narrative rendering. This is useful for analyzing the narratives of children who are speakers of African American English, and who may generate narratives using thematically linked events rather than topic-centered narrative structure. One additional way of examining narrative is the use of Bruner's (1986) landscapes as a way of determining how the narrator links the character's actions with their subjective states. Bruner states that there are at least two content landscapes occurring in narratives, the landscape of action that describes the activities of the characters in the narrative, and the landscape of consciousness that expresses human subjectivity or the thoughts, feelings, perceptions, and beliefs of the characters in the narrative.

Expository discourse is used in various contexts and the ability to produce and comprehend expository text is required to be successful in academic settings, when interacting with peers, and in employment situations (Nippold et al. 2008). Engaging in expository discourse requires complex language skills, and sometimes specialized knowledge (Nippold et al. 2008). It has been demonstrated in the literature that expository text results in more complex syntactic skills and more T-units, than other forms of discourse, particularly conversational and narrative discourse (Nippold et al. 2005).

Expository discourse has been elicited in a variety of ways, but the procedure predominantly reported in the literature is for the child to explain how to play a favorite game or sport (FGS task) (Nippold et al. 2005; Nippold et al. 2008; Westerveld and Moran 2011). The FGS task requires the child to identify any game or sport and explain it to the examiner. In the development of a database of expository language samples, Heilmann and Malone (2014) adapted the FGS task and added additional steps that would more closely align the task with current expectations of curricular transparency. For example, they added to the FGS task, a time for the child to plan his or her discourse, and a written outline of key parts of expository text (2014: 279). Heilmann and Malone found that there were minimal topic effects for the FGS task; that is, whether the child explains a team sport or individual sport or a game, the significant differences between the topics were minimal. They found that there were significant differences for number of different words, total number of words, and total number of C-units[4]. Although these measures showed significant differences based on topic, they suggest that they 'only accounted for 2 % to 4 % of the variance in the measures', and that 'these difference have minimal impact on the interpretation of results' in the clinical use of FGS (2014: 285).

19.3.3 Analog and Theory of Mind Tasks

Analog tasks include such activities as role-playing situations, shadowing while providing reminders or coaching, and modeling. These real life-like tasks can be used to elicit specific social communication and pragmatic behaviors. When observing interactions in natural contexts an examiner cannot predict or control what behaviors are produced. In this way, analog tasks are useful during assessment (Coggins et al. 2007; Kaczmarek 2002) and intervention (Brinton et al. 1998a, b; Hyter 2003; Hyter et al. 2001; Olswang et al. 2001). Brinton and colleagues developed an analog task which was designed to be used to examine a child's ability to collaborate and negotiate with peers (Brinton et al. 1998a, b). In one task children are instructed to build a cardboard periscope together. This task was reported to be similar to the activities children would be required to do within a classroom context. In another task the participating children had to negotiate purchasing a snack. Brinton and colleagues reported that these tasks were successful at eliciting collaborative behaviors and negotiating strategies by the participating school-age children with disabilities. Hyter et al. (2001) used role play to facilitate the ability of children with emotional/behavioral disorders and pragmatic deficits to describe objects, provide step-by-step directions about a particular activity, state opinions about inappropriate behavior, and negotiate a desired outcome of a situation. Results of this study revealed that the role-play intervention brought about increases in the children's ability to describe objects with sufficient detail and provide directions, as well as increased their number of speaking turns.

A social cognitive skill known as theory of mind (ToM) supports pragmatic skills (Hyter and Sloane 2013; Westby and Robinson 2014). ToM is the ability to attribute mental states (thoughts, beliefs, knowledge) to others as well as to oneself. Impairments of ToM are most often described as characteristic of autism (Baron-Cohen 1995; Hutchins et al. 2012; Perner and Lang 2000). However, ToM difficulties can also be found in many other conditions, including deafness and hard of hearing (Stanzione and Schick 2014). ToM is typically assessed using belief attribution tasks such as the Sally-Anne Test (Baron-Cohen et al. 1985). Both Westby and Robinson (2014) and Hutchins et al. (2012) have identified shortcomings with typical ToM assessment tasks. First, typical ToM assessments treat ToM as if it is a 'unitary construct' rather than multiple constructs (Westby and Robinson 2014:

[4] C-units are main clauses and any subordinate clauses attached to it, but they can also refer to incomplete sentences (Nippold 2014).

363). Recent neuroimaging studies have shown that there are diverse types of ToM (see Westby and Robinson (2014) for a complete review of the types of ToM). Second, because ToM has been typically viewed as a unitary construct, the assessments have been scored dichotomously, on a pass/fail basis, which does not allow the assessments to adequately examine ToM (Hutchins et al. 2012).

Although there are several reported tasks to assess ToM (Wellman and Liu 2004; Pons et al. 2004; O'Hare et al. 2009), as of the end of 2015, there is only one standardized measure of ToM, the *Theory of Mind Inventory* (ToMI; Hutchins et al. 2008; Hutchins et al. 2012; Lerner et al. 2011). The ToMI is comprised of 48 statements that are responded to using a Likert-type scale ranging from *definitely not* to *definitely*. Statements include those such as 'My child understands that people can be wrong about what other people want' or 'If I put my keys on the table, left the room, and my child moved the keys from the table to a drawer, my child would understand that when I returned, I would first look for my keys where I left them.' (Hutchins et al. 2012: 333). The questions on this instrument directed to parents require parents to impute mental states to their children. Nevertheless, Hutchins and colleagues analyzed data from parents in a local and national study and reported strong test-retest reliability, internal consistency, and criterion validity using the Peabody Picture Vocabulary Test-4 (Dunn and Dunn 2007).

19.3.4 Individually Administered, Standardized, Norm-Referenced Assessments

Pragmatics and social communication are contextually situated and culturally bound, making them difficult to assess adequately through discrete point testing measures such as individually administered, norm-referenced tests (Adams 2002; Hyter 2007; Norbury 2014). These discrete point assessments focus on knowledge of language use or pragmatic behaviors, and are primarily offered as decontextualized test items. There are few measures of pragmatic language that fall into this category of instruments. These assessments usually do not include the perceptions of others such as a parent or a teacher on the social pragmatic communication behaviors of the child (Girolametto 1997), and do not mirror the abilities of clients in everyday, real-life interactions (Togher 2001).

The *Test of Pragmatic Language-2* (TOPL-2; Phelps-Terasaki and Phelps-Gunn 2007) is the most widely used measure, which is designed to be individually administered by speech-language pathologists or related professionals. It is a standardized, norm-referenced instrument which examines pragmatic skills in children between the ages of 6 and 18 years by focusing on seven components: physical context; audience; topic; purpose; gestures; abstractions; and pragmatic evaluation (Hoffman et al. 2013: 200). This assessment can establish if a child is able to make judgments about decontextualized situations from another's perspective. However, it is not able to determine whether the child can engage in making these judgments in real time (Vicker 2003).

The *Comprehensive Assessment of Spoken Language* (CASL; Carrow-Woolfolk 1999) is a battery of individually administered tests in four different categories (lexical/semantic; syntactic; supralinguistic; and pragmatic) for persons from 3 to 21 years of age. Two of the four assessment categories are geared toward assessing pragmatics and social communication or components that support these areas of development. The supralinguistic test can be used to assess the examinees' ability to make sense of non-literal interpretations of spoken messages within a particular context, which requires the ability to make inferences and to use world knowledge. The pragmatic test focuses on determining if the examinee knows what it is appropriate to say in different situations, and how to modify what is said to fit a particular context.

These tests are administered in a manner similar to the way the TOPL-2 is administered in that the clinician reads a stimulus item and the examinee is required to respond to that item out of context. The CASL was standardized on 2750 individuals between the ages of 3 and 21 years. Of these 2750 participants, 1700 served as the basis for normative scores. The CASL provides standard scores, percentiles, composite scores, and indexes. Carrow-Woolfolk (1999) reports high internal consistency and test-retest reliability. Concurrent reliability for composite scores has been found with the third edition of the *Test of Language Development – Primary* (TOLD-P; Newcomer and Hammill 1997), which is another individually administered and decontextualized language assessment (Hoffman et al. 2011).

In addition to stand-alone assessments and checklists, several individually administered assessments are presented in Table 19.4. These instruments include a component that can be used to provide information about a child's pragmatics and social communication. Such measures include the *Test of Language Competence – Expanded* (Wiig and Secord 1989), *Comprehensive Assessment of Spoken Language* (Carrow-Woolfolk 1999), *Diagnostic Evaluation of Language Variation* (Seymour et al. 2005), *Preschool Language Scales* (Zimmerman et al. 2011), *Clinical Evaluation of Language Fundamentals-5* (Wiig et al. 2013), *Bilingual English-Spanish Assessment* (Peña et al. 2014), and the *Test of Integrated Language and Literacy Skills* (Nelson et al. 2016).

19.3.5 Promising Assessment Battery of Pragmatics and Social Communication

For a number of years, the author has been working with colleagues to develop a multi-tiered battery to assess the pragmatic language and social communication of young children. Known as the *Assessment of Pragmatic Language: Preschool* (Hyter et al. 2005) and the *Assessment of Pragmatic Language and Social Communication* (APLSC; Hyter and Applegate 2012), the premise on which this assessment battery was constructed is that social cognition and other cognitive skills (e.g. working memory, executive functions and affect regulation) work together with pragmatic skills. The assessment, therefore, includes these domains.

Table 19.4 Assessment measures with subtests that assess pragmatics

Assessment measure	Areas of pragmatics assessed	Age range
Test of Language Competence-Expanded (Wiig and Secord 1989)	Subtests examine making inferences and the child's ability to recreate speech acts	5–9 and 10–18 years
Comprehensive Assessment of Spoken Language (Carrow-Woolfolk 1999)	Subtests require the child to use his or her pragmatic judgment by explaining what to do or say in a particular communicative context	3–21 years
Diagnostic Evaluation of Language Variation (Seymour et al. 2005)	Subtest requires taking others' perspectives, telling a narrative, and explaining a character's actions based on the character's mental state represented in a picture	4–9 years
Preschool Language Scales – 5 (Zimmerman et al. 2011)	Items assess the child's ability to infer communicative intentions and to attribute false belief to others	Birth to 7;11 years
Clinical Evaluation of Language Fundamentals – 5 (Wiig et al. 2013)	Pragmatics Profile Checklist is provided for the examiner to complete with input from caregivers and other related professionals associated with the child. Pragmatics Activity Checklist is used to rate verbal and non-verbal behaviors in relationship to social interaction	5–21;11 years
Bilingual English-Spanish Assessment (Peña et al. 2014)	A pre-assessment activity used to establish rapport with the examinee is used to elicit assertive and responsive communicative acts, using both English and Spanish	4–6;11 years
Test of Integrated Language and Literacy Skills (Nelson et al. 2016)	Subtest assesses examinees' ability to understand social situations and construct a response to a situation by explaining what another person might say in the circumstances shown in a picture	6–18 years

This battery is used with children who are from 3 to 7 years of age. There are two checklists. One checklist is completed by caregivers and another is completed by professionals such as teachers or social workers who are familiar with the child. The domains examined on these checklists include communication effectiveness, communicative functions (speech acts), conversational discourse management, perspective taking, executive functions, and social engagement. These checklists are designed to serve as a universal screening instrument within a Response to Intervention Model (RtI)[5]. In addition to the two checklists, this battery includes a classroom observation form (COF). This is designed to be used by speech-language pathologists/therapists while observing a child engage with peers or others in his or her most natural environment such as a preschool classroom or home. The COF has

[5] RtI is a tiered process used in the United States to prevent academic problems in children, and to provide support when academic problems arise. It involves increasing intensity of services and has the goal of improving academic outcomes for children, including those with communication and/or learning disabilities (Fletcher and Vaughn 2009).

simulated activities that are designed to examine the child's sense-making (Lund and Duchan 1988) – the ability to talk about what is happening, ability to manage narrative discourse, and employ executive functions in social situations. The last part of the battery is a self-report checklist that can be completed by children older than 7 years. The APLSC is promising in that it will provide screening measures that provide input from caregivers/parents, teachers and other people (e.g. human services worker) involved with the child, as well as input from the child, a classroom observation process for speech-language pathologists and the use of analog tasks.

19.4 Pragmatic Intervention

It is important for speech-language pathologists/therapists to have access to effective interventions for children who present with pragmatic language impairments. Over the last 10–12 years, there has been a focus in speech-language pathology on evidenced-based practice. This is a process for critical analysis and employment of three types of evidence – research evidence, clinical evidence (data), and the perspective of the informed client (Dollaghan 2004, 2007). With regard to intervention processes aimed at improving pragmatics, the evidence remains thin, although it continues to grow (Gerber et al. 2012). In this section, five articles are reviewed that discuss intervention programs and procedures for pragmatics.

Adams (2003) used a synthesis model to design an intervention for children with pragmatic language impairments. This model focuses on the 'social, cognitive, and linguistic' dimensions of pragmatics (82). The assumption underlying the social dimension of pragmatics is that children learn in the context of interpersonal relationships. The assumption of the cognitive dimension is that children with pragmatic language impairments have difficulty with social cognition. The linguistic dimension assumes that 'there is a level of linguistic competence at which the rules of pragmatics are represented' (83). Six males aged 6–9 years, who were already enrolled in speech-language services, participated in Adams' study. Two assessments were administered prior to therapy and were re-administered after therapy. They were the Formulating Sentences and Sentence Recall subtests of the *Clinical Evaluation of Language Fundamentals–Revised* (Semel et al. 1987) and the Narrative and Inferential Comprehension subtest of the *Assessment of Comprehension and Expression* (Adams et al. 2001).

The six research participants received eight weeks of intervention, three times per week. It is not clear from the administration schedule what the specific intervention procedures were, but the methods included teaching listening rules (e.g. listen for meaning and do not interrupt) and conversational rules (e.g. stay on topic and focus on the main points) to the children. Role play with puppets was used to help the participants identify when a conversational rule had been broken (e.g. when someone interrupted or switched topics). The intervention also included social stories and comic strip conversations[6] that incorporated events from real-life experiences to help the students contextualize the conversation and interaction rules they were learning. Adams (2003) reported that conversational skills improved among study participants in that they did not dominate the conversation as much; they were more reciprocal conversational partners. All participants showed an increase between pre-test and post-test subtest scores on formal assessments administered. Adams' study revealed two groups of participants, those with language impairment that resulted in pragmatic difficulties and those with social cognitive impairments and unaffected language skills. Children with impairments in social cognition were less responsive (showed less improvement) to the intervention.

Cooper et al. (2000) developed a program to address social skills in children with the goal of helping them engage in cooperative work and conflict resolution. Study participants were children at kindergarten. The intervention occurred in their classrooms over a three-month period and included explicit instruction of social skills, implementation of a prepackaged violence prevention program, and cooperative learning exercises. For social skills, children were encouraged to listen to others, share with others, complete jobs and talk appropriately. The cooperative learning and conflict resolution behaviors were specifically taught through modeling and guided practice. Cooper and colleagues reported that the intervention was effective in each of the participating classrooms.

Heneker (2005) provided intervention to 11 students between the ages of 5 and 11 years, the majority of whom exhibited communication difficulties. Intervention was provided in four key areas: vocabulary comprehension and use (e.g. word classes; multiple meanings), general language (e.g. grammatical morphemes), 'social skills' (e.g. listening skills, turn taking, emotion recognition and expression), and speech sound production. Heneker reported that all students, who participated in this intervention, progressed and increased their confidence in communication, although improvements in social skills were based on the perceptions of the school staff.

Hyter et al. (2001) provided classroom-based intervention to school-age children aged 8;6 to 12;11 years with emotional/behavioral disorders who exhibited pragmatic language difficulties. The intervention occurred over an 8-week period, twice per week for 30 min. It focused on describing objects, taking into consideration the level of information a communication partner had and/or needed in order to understand what object was being described. It also focused on stating personal opinions about inappropriate behavior, and negotiating with peers for a mutually satisfying outcome. Prior to intervention, study participants were administered the *Test of Pragmatic Language* (TOPL; Phelps-Terasaki and Phelps-Gunn 1992), the *Test of Language Development–Intermediate* (TOLD-I; Newcomer and Hammill 1988)

[6] A social story describes social cues that occur in any given social situation, such as gaining entry into play groups or taking turns. The social story breaks down the social skill into step-by-step instructions, and is used to support individuals in learning how to internalize and use social skills in real time (Gray 2010). Comic strip conversations are conversations that use drawings to support persons engaged in a conversation (Gray 1994).

and the *Behavior Evaluation Scale-2* (McCarney 1994). The intervention methods included direct instruction, scripts, modeling and role-play. Hyter et al. (2001) reported that at the end of the intervention period, participants increased abilities in adequately describing objects and providing rationales during negotiations. Also, post-intervention scores for the TOPL and TOLD-I were significantly higher than pre-intervention scores.

Ivey et al. (2004) conducted a study of the use of social stories by three male children with a diagnosis of pervasive developmental disorder-not otherwise specified. The children were aged from 5 to 7 years. The goal of the intervention was to create social stories for new activities. It addressed five behaviors: remaining on task; making a comment; reading a sign; understanding and ability to use vocabulary. The findings of this study suggested that all of the participants showed improvement in skills addressed by the social stories used in the intervention. There was decreased ability in the targeted skills when the social stories were discontinued, and an increase in targeted skills when the social stories were implemented again. Ivey et al. (2004: 172) suggest that their data shows the 'functional relationship' between the use of social stories and the participants' ability to take part in new situations occurring in a familiar context.

Additionally, three systematic reviews of treatment of pragmatics have been completed since 2010 (Gerber et al. 2012; Law et al. 2011; Petersen 2011). Gerber et al. (2012) conducted a systematic review of intervention studies published between 1975 and 2008 that focused on at least one of eleven clinical questions raised by Gerber and her colleagues. They identified eight studies that met their criteria based on the 'study protocol, blinding, random allocation, treatment fidelity, significance, practical significance, and intention to treat' (237). Of these studies the majority received a quality score of low to moderate. The interventions were focused on self-monitoring, repair strategies, increasing topic initiation and maintenance abilities, eliminating irrelevant comments, appropriate use of prosody, identification of emotions, and improving social understanding (Gerber et al. 2012: 240). Therapy procedures included modeling behaviors, role play, practice, metapragmatic discussions, and caregiver training (240). Gerber et al. (2012) found that there was an effect of intervention of discourse on language used during social interactions.

Law et al. (2011: 7) conducted a systematic review of communication interventions designed to improve communication and behavioral outcomes for school-aged children with 'speech, language and communication needs and social, emotional and behavioral difficulties'. The interventions were primarily social/pragmatic interventions. Law and his colleagues identified 19 articles published between 1985 and 2004 that satisfied the following inclusion criteria: children must have communication and behavioral difficulties; the study must focus on communication and behavioral outcomes; intervention must be behavioral in nature rather than pharmaceutical; children should be 5–11 years of age and have English as a first language; and the study must report empirical data. The authors of this review divided the interventions into didactic interventions that used behavioral modification techniques, and hybrid interventions that used a range of techniques and took context variability into account. Of the 19 studies identified by Law, eight used hybrid interventions (Cooper et al. 2000; Heneker 2005; Hyter et al. 2001; Ivey et al. 2004; Law and Sivyer 2002; Pasiali 2004; Smith et al. 2004; and Stringer 2006). Law et al. (2011) found that the majority (89 %) of the studies reviewed were of 'low' quality based on methodology, research design, and topical relevance.

Petersen (2011) conducted a systematic review of narrative-based language intervention with children who have language impairment. He reviewed nine articles published since 1980 that reported a narrative intervention procedure with children between 3 and 21 years of age with language or learning disabilities (Davies et al. 2004; Gillam et al. 1995; Hayward and Schneider 2000; Klecan-Aker et al. 1997; Peña et al. 2006; Petersen et al. 2008; Petersen et al. 2010; Swanson et al. 2005; Tyler and Sandoval 1994). All of the studies were judged to have low-to-moderate quality based on a number of criteria. Petersen found that there was a range of narrative procedures used to focus on macrostructure and microstructure development. These included narrative retelling, teacher and peer modeling, role play, think aloud activities, use of songs and pictures, and close procedures. Petersen (2011) reported that including multiple story retellings in narrative intervention, and focusing on narrative macrostructure may have the potential to improve narrative macrostructure and microstructure. He does caution, however, that most of the reviewed studies had small sample sizes and were considered to be low quality studies.

Westby and Robinson (2014) described different types of ToM and what intervention should or could look like if addressing aspects of ToM. They stated that the intervention processes they suggest are based on 'empirical support or on what is known about typical development and patterns of impairment' (369). Westby and Robinson provided extensive descriptions of developmental stages of ToM and what an intervention program for those different stages could comprise. For example, intervention may include joint action routines for children between 0 and 18 months of age, pretend play for preschool-age children, and first-order belief development for children 4–5 years of age using children's literature and movies.

19.5 Summary

It is imperative for speech-language pathologists and other communication professionals to have access to evidenced-based and effective pragmatic assessments and interventions. In this chapter, several pragmatic assessments have been examined. There are very few, if any, pragmatic assessments that address multiple components of pragmatics, but there are many informal assessments and a growing number of standardized norm-referenced assessments. Several systematic reviews of the extant literature have revealed an increasing number of interventions designed to address pragmatic skills. Many of these interventions have low levels of evidence and minimal controls, although several have been found to demonstrate some improvements to the study participants' skills. Below is a list of tasks that scholars in speech-language pathology and communication sciences should have on a 'to do' research list for the next few years.

1. There is a need for more culturally and linguistically responsive pragmatic assessment and intervention measures. Pragmatics is highly influenced by culture. Yet, most of the studies on pragmatic assessment and intervention have included monolingual English speakers of European American descent (Petersen 2011). Studies that have focused on pragmatic language of other groups of people (e.g. African American children) have focused heavily on one aspect of pragmatics (e.g. narrative production) at the exclusion of other pragmatic components (Hyter et al. 2015).
2. The field is missing pragmatic assessment measures that are designed to examine more comprehensive aspects of pragmatics rather than focusing on one or two components. Future development of assessment measures that permit a more holistic picture of a child's pragmatic skills is essential.
3. We need assessment measures that are designed to incorporate information from a range of perspectives and contexts, such as information that can be collected from family members, educators involved with the child, as well as the professional communication specialist. A combination of data collection processes, e.g. observation tools completed by professionals as well as parent and/or teacher report forms, will yield the most holistic perspective of the child's pragmatic abilities (Landa 2005).
4. Many of the current studies of pragmatic assessment and intervention have small numbers of participants. Existing research should be replicated with larger numbers of participants, which will facilitate the generalizability of the assessment results and intervention outcomes.
5. Intervention studies are needed that address a wider range of pragmatic components. Providing intervention procedures in the form of manuals would also be helpful for clinicians.

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Chapter 20
Pragmatic Assessment and Intervention in Adults

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Abstract This chapter describes current clinical practice in assessment and intervention in adults with pragmatic deficit associated with acquired brain damage. The chapter focuses on the management of communication disorders in people with left or right hemisphere damage following a stroke, traumatic brain injury or dementia. Other progressive conditions such as Parkinson's disease and multiple sclerosis are also mentioned. Various techniques and instruments that are used in clinical settings are discussed in relation to current views on the nature of cognitive-communication disorders, pragmatics and functional communication. Finally, the chapter offers a brief description of research-based intervention methods used to address pragmatic aspects of communication and examines treatment outcomes in specific populations.

Keywords Aphasia • Cognition • Communication • Dementia • Pragmatic assessment • Pragmatic disorder • Pragmatic intervention • Right hemisphere damage • Social interaction • Traumatic brain injury

20.1 Introduction

This chapter outlines current clinical practice in the management of adults with dementia, traumatic brain injury (TBI), right-hemisphere damage (RHD) and left-hemisphere damage. These conditions adversely affect pragmatic aspects of communication. The chapter first describes a framework for the assessment and treatment of these disorders within speech-language pathology and other factors that affect the clinical management of communication disorders. It then presents a number of techniques and instruments that are used in clinical settings or are recommended in clinical guidelines for assessing pragmatic aspects of communication disorders in adults with acquired brain damage. This is followed by a brief review

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of current intervention methods for people suffering from TBI, RHD, dementia and aphasia following a stroke and for which outcomes have been explored. Although it is acknowledged that other features of cognition, such as memory, attention and executive function, as well as motor deficits all interact and affect pragmatic ability, the assessment and treatment of those features will not be dealt with here.

The descriptions of acquired communication disorders, such as aphasia, are generally based on results obtained with the instruments that are used to explore and diagnose the conditions. This may affect the perception and the clinical management of different communication disorders. It is noteworthy that it is not possible to detect pragmatic deficits associated with communication disorders using standard aphasia test batteries such as the *Western Aphasia Battery* (Kertesz 1982) and the *Boston Diagnostic Aphasia Examination* (Goodglass and Kaplan 1983). It is unsurprising, therefore, that there has long been confusion about how to conceptualize pragmatic deficits. This is reflected in the terminology that is used to describe these deficits as well as in their clinical management. Body and Perkins (2006) have examined this confusion, and note that terms such as 'cognitive-linguistic disorder', 'cognitive-pragmatic disorder', 'high-level language disorder' and 'pragmatic language disorder' are all used to describe similar neurogenic communication disorders. The term 'cognitive-communication disorder' was adopted by the American Speech-Language-Hearing Association (ASHA) and the College of Audiologists and Speech-Language Pathologists of Ontario (CASLPO) in the early 2000s to distinguish between primary *language* impairment, such as aphasia following a stroke, and communication disorders related to primary *cognitive* impairment, as in TBI (Togher et al. 2014). The term 'cognitive-communication disorder' is now widely used to describe communication disorders in dementia, RHD and TBI.

However, there is still confusion in the terminology used to describe more subtle pragmatic deficits that arise after left-hemisphere damage and in progressive neurogenic communication disorders, such as occur in multiple sclerosis and Parkinson's disease. Further, it has been stressed that pragmatics, in the sense of one's communicative competence and knowledge about how to use language in social interaction, tends to be unaffected in cases of aphasia following left-hemisphere brain damage (Holland 1991). Nevertheless, anomia in aphasia, and other conditions, inevitably affects language use at the discourse level, for example, in turn taking or in the degree of clarity of phrases. The term 'discourse' may be used to refer to several different phenomena. In this context, it may be used to refer to language as a *product*, in the form of anything beyond a sentence, or to the *processes* of language use, which may be used for interaction or to produce a monologue. However, it has been argued that discourse is always shaped by context and is, therefore, a pragmatic phenomenon regardless of whether or not pragmatics is considered a component of discourse or discourse a component of pragmatics (Müller et al. 2008; Perkins 2007). These issues have previously been discussed from a theoretical linguistic perspective (see Cummings 2007, 2014). This chapter focuses on pragmatic assessment and intervention in current clinical management in speech-language pathology.

20.2 Assessment and Intervention in Communication Disorders

20.2.1 A Framework for Assessment and Intervention

The *International Classification of Functioning, Disability and Health* (ICF; WHO 2001) provides a model for describing various approaches to the assessment and treatment of communication disorders. According to the ICF model, an individual's functioning may be described in two distinct but closely related areas. The first area consists of two components: (a) *body structures* and *body functions*, which describe the level of impairment; and (b) how these functions affect everyday *activity* and *participation* in social life. The second area consists of the contextual – *personal* and *environmental* – factors that affect function and disability. A word-retrieval test may provide information about the degree and quality of impairment due to brain damage. An assessment of the communicative ability of, for example, a person with TBI may yield information about the limitations they face in everyday activities. Analysis of their ability in conversational interaction with a conversation partner may yield specific information both about the barriers they face in conversations and about the influence of environmental factors, such as the conversation partner's ability to support the communication. Questionnaires or an interview may be used to find out what the person feels about their participation in life. Intervention may then be tailored to the impairment and directed towards, for instance, word retrieval. Or treatment may be focused upon activity and environmental factors and be designed to develop functional communicative strategies that may be used by both the person with TBI and their conversation partner.

In aphasia, the pragmatic problems of communication are usually described as secondary to impaired core language functions, which may be explored with diagnostic aphasia batteries. In TBI, RHD and dementia the interaction between language and other cognitive functions is understood to be crucial for functional communication. Although pragmatic deficits may result from the impairment of core cognitive functions, they may only become apparent when language is used in a communicative act. The consequent limitation cannot then be detected using instruments that measure only core functions, such as language functions or other aspects of cognition. Problems may only become evident in more complex tasks that demand interaction between different cognitive functions, such as memory and executive function, and when the appropriate response depends on the context. This is also true in cases of more subtle language deficits following brain damage in the left hemisphere, when a standard diagnostic aphasia battery is insufficiently sensitive to detect deficits. Thus, pragmatic deficits may be associated with left-hemisphere damage, either as a primary consequence of brain damage or as secondary to the impaired core language function in aphasia.

20.2.2 Evidence-Based Practice and Guidelines in Clinical Management

Several instruments and methods are available for the clinical management of communication disorders. A speech-language pathologist's (SLP) choice of methods of assessment and treatment will be based not only on their own experience and knowledge about the particular communication disorder, but also upon advice from colleagues, ideas gleaned from conferences and workshops and also national statements like clinical guidelines (Frith et al. 2014). SLPs are certified healthcare providers and, as such, they are obliged to use evidence-based practice. Evidence-based practice/medicine (EBP or EBM) has been defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients (Sackett et al. 1996). EBP means applying clinical assessment methods and interventions based on an integration of clinical expertise with the best available evidence from systematic research, although the available evidence may vary in strength depending on the source. The American Speech-Language-Hearing Association (2016) provides information about EBP and an example of a hierarchy of levels of evidence. The best available evidence for a specific intervention within speech-language pathology is usually in the form of results from small quasi-randomized or non-randomized studies, which are generally graded quite low. Experimental and controlled single subject designs are also common in speech-language and other behavioural research but are still usually not mentioned in established evidence-grading systems.

Evidence-based national guidelines for the management of communication disorders, or best practice guidelines for specific conditions such as stroke and dementia, have been published in countries such as Australia (Australian Aphasia Rehabilitation Pathway 2014), Canada (College of Audiologists and Speech-Language Pathologists of Ontario 2012; Heart and Stroke Foundation 2013), the United States of America (American Speech-Language-Hearing Association 2015), and the United Kingdom (Royal College of Speech and Language Therapists 2005). An updated version of the latter is available online for members of RCSLT only. The guidelines are often developed through collaboration between researchers, clinicians and sometimes also patients. However, while the management of impairment in aphasia is often well described, there is great variation in the degree to which pragmatics is discussed in national clinical guidelines. One reason for this is that research on communication disorders has mainly been focused on impairments in core functions in language and the available systematic research on language use in activities, affecting pragmatics, is still limited. Nevertheless, best practice and clinical guidelines in Australia, Canada, the UK and the USA nowadays recommend assessment and treatment of functional and pragmatic aspects of communication. The recommendations about treatment also include different forms of conversation training and training of conversation partners.

20.3 Assessment of Pragmatics in Cognitive-Communication Disorders

Language use is a complex form of behaviour and the diagnosis of deficits requires expertise as well as reliable tools and techniques. Pragmatic aspects of communication are usually best described as qualitative phenomena and whether or not certain behaviours are atypical depends upon context. However, in the clinical management of communication disorders perceived phenomena must be translated into quantitative data in order to assess the level of deficit and effects of intervention.

In the assessment of communication ability or behaviour the selected instrument must be valid and reliable and it must provide information that guides the interpretation of the results obtained. A valid assessment is one which measures what it is intended to measure, while a reliable assessment is one which yields consistent results during repeated measurement of a phenomenon regardless of the operator. A test method may be standardized and thus include a description of how to administer and grade the tasks. Standardized instruments often also provide normative data which makes it possible to compare the obtained results with results from a group of comparable non-impaired people. Other assessment methods, especially those used in the assessment of pragmatic abilities, are non-standardised. Normative data is then not available and variations in results may be large but still represent normal achievement for a particular individual in a specific context. The interpretation of test results should also allow for variations in linguistic and cultural background (Centeno and Ansaldo 2013) regardless of whether or not norm-referenced instruments or non-standardized assessment methods are used.

So, what types of instruments are used in the assessment of pragmatic and cognitive-communication disorders? A review of clinical guidelines and surveys of the instruments reportedly used by SLPs reveals a discrepancy between the recommendations provided in guidelines and the choices generally made by clinicians. The results of an online survey showed that although SLPs tend to report that they examine functional communication (78.8 %), less than half (44.3 %) of the participating SLPs in the UK, the US, Canada, Australia and New Zealand state that they routinely assess discourse in patients with TBI (Frith et al. 2014). Routines set by senior colleagues and time constraints are often decisive for the choices made about methods of assessment and treatment.

Although it takes time for new methods and approaches to find their way into clinical practice, several instruments and methods are available and in use to explore pragmatic ability. A selection of the instruments and methods used in SLP clinics is presented below.

20.3.1 High-Level Language and Comprehensive Test Batteries

When an instrument is described as exploring high-level language, it usually includes tasks that depend on pragmatic aspects of communication and that tax cognitive functions such as executive function and memory. Mild or subtle language problems that may be missed by standard diagnostic aphasia batteries may be detected with high-level language tasks (Crosson 1996). These tasks involve the comprehension of metaphors and other non-literal forms of language, as well as complex or pragmatic inference tasks. Tasks that require meta-linguistic reflection on sentence structure and semantic-lexical relationships as well as divergent naming (the production of a variety of different kinds of responses instead of a single correct response) also involve interaction between the language system and cognitive factors (e.g. cognitive flexibility). There are numerous comprehensive test batteries available to detect cognitive-communication disorders in different populations. Some examples of these batteries are shown in Table 20.1.

One of the tests shown in Table 20.1 is the *Test of Language Comprehension* (TLC; Wiig and Secord 1989). The TLC measures meta-linguistic higher-level language functions in five sub-tests. Normative data are available but there are questions about the reliability and validity of these sub-tests. Although many high-level language test batteries have been developed to assess cognitive-communication disorders in TBI, the TLC has been used to detect cognitive-communication problems in people with multiple sclerosis (MS), and a Swedish adaptation of the TLC has been used in both MS and Parkinson's disease (Lethlean and Murdoch 1997; Laakso et al. 2000; Berg et al. 2003).

The *Mount Wilga High Level Language Screening Test* (MWHLL; Christie et al. 1986) aims to sample linguistic skills over a broad range and also to examine the influence of cognition and behavioural characteristics on communication. In a survey of 174 SLPs in Australia and New Zealand (Vogel et al. 2010), as many as 78.8 % reported using the MWHLL. However, in a survey by Frith et al. (2014) of SLPs in the UK, the USA and Canada, 35.2 % reported using the MWHLL. Since there is little empirical research or normative data provided with the MWHLL, the SLPs' choice is probably influenced by the fact that the assessment is freely available online. About just as many (35.3 %) of the respondents in the Frith et al. (2014) survey reported using the *Measure of Cognitive-Linguistic Ability* (MCLA; Ellmo et al. 1995). This assessment is designed to provide a systematic evaluation of language in relation to cognitive ability and does provide normative data.

The *Arizona Battery for Communication Disorders of Dementia* (ABCD; Bayles and Tomoeda 1993) is one of several norm-referenced batteries that are widely used in assessing cognitive-linguistic ability in suspected dementia. The ABCD is designed for differential diagnosis as well as for monitoring change over time. It explores not only linguistic ability but also other cognitive functions such as memory and visual-spatial processing.

Table 20.1 High-level language tasks and comprehensive test batteries

Instrument	Purpose of the test	Included measures or subtests
Test of Language Comprehension – Expanded Edition (TLC; Wiig and Secord 1989)	Evaluates use of semantic, syntactic and pragmatic language strategies	Sub-tests: Ambiguous sentences; Listening comprehension (making inferences); Oral expression (recreating sentences); Figurative language; Remembering word-pairs
Mount Wilga High Level Language Screening Test (MWHLL; Christie et al. 1986)	Assesses linguistic skills and examines the influence of cognition and behavioural characteristics	Sub-tests: Naming skills; Verbal explanation; Planning; Auditory memory; Auditory comprehension; Reading comprehension; Written expression; Numeracy
Measure of Cognitive-Linguistic Abilities (MCLA; Ellmo et al. 1995)	The MCLA assesses linguistic abilities in relation to cognitive deficits	Measures comprehension; discourse; pragmatics; functional reading; story recall; verbal abstract reasoning; narrative discourse; visual confrontation naming; written narrative skills; and oral mechanism function
RIC Evaluation of Communication Problems in Right Hemisphere Dysfunction (RICE; Halper et al. 1996)	Assesses visual cognition and pragmatic skills in relation to RHD	Measures visual scanning/tracking; writing; non-literal language interpretation; behavioural observation profile; pragmatic communication skills rating
Right Hemisphere Language Battery (RHLB; Bryan 1994)	Provides a quantitative and qualitative assessment of the language and communication impairments in subjects with RHD	Sub-tests: lexical semantic comprehension; spoken metaphor appreciation; written metaphor appreciation; verbal humour appreciation; comprehension of inference; production of emphatic stress; and a discourse analysis
Arizona Battery for Communication Disorders of Dementia (ABCD; Bayles and Tomoeda 1993)	A diagnostic battery used to assess language and cognitive status in suspected dementia	Seventeen sub-tests assess: mental status; immediate and delayed recall of stories; auditory comprehension; repetition; word learning; reading; naming; drawing; and figure copying
Discourse Comprehension Test (DCT; Brookshire and Nicholas 1997)	Assessment of reading and auditory comprehension and retention of stated and implied meaning on discourse level	Includes ten stories with questions that require yes-no responses
The Awareness of Social Inference Test-Revised (TASIT-R; McDonald et al. 2003, 2011)	Explores social perception by using videotaped vignettes and standardized response probes	Sub-tests: (1) The Emotion Evaluation Test assesses the ability to interpret emotional displays; (2) Social Inference-Minimal assesses the ability to understand the meaning of both sincere and sarcastic exchanges; (3) Social Inference-Enriched assesses the ability to use additional contextual cues in assigning conversational meaning

There are several comprehensive test batteries that are specifically designed for assessment in RHD. These tests assess both pragmatic ability and specific cognitive abilities (see Tompkins et al. 2013). The *Right Hemisphere Language Battery* (RHLB; Bryan 1994) explores language and communication impairments in subjects with right hemisphere dysfunctions. The instrument is standardised but the non-brain-damaged sample used in the standardization is limited to 30 individuals. *The RIC Evaluation of Communication Problems in Right Hemisphere Dysfunction* (RICE; Halper et al. 1996) is designed to detect several of the cognitive deficits associated with RHD as well as pragmatic problems. Inter-rater reliability is reported to be acceptable in trained raters. However, Tompkins et al. (2013) have questioned its validity since as many as 22–34 % of the non-brain-damaged population in control groups were rated as having impaired function on tests of metaphorical language and narrative discourse. (See issues relating to monologic discourse in language tasks in Sect. 20.3.4).

Many of the existing test instruments are designed for a specific population but may be used with other populations too. There are also exceptions, for example, the *Assessment Battery for Communication* (ABaCO; Sacco et al. 2008) is described as useful for the assessment of pragmatic abilities in patients with brain injuries or other neuropsychological disturbances. It explores both comprehension and production using videotaped vignettes and role play. Good construct validity, high inter-rater agreement and good internal consistency as well as normative data have been reported by the authors (Angeleri et al. 2012; Sacco et al. 2008). The ABaCO was developed in Italy and only parts of it are currently available in English.

There are also test instruments that focus only on the comprehension of pragmatically more complex language. The *Discourse Comprehension Test* (DCT; Brookshire and Nicholas 1997) is used to assess brain-damaged adults' comprehension and retention. It includes ten stories that consist of both stated and implied main ideas and they are controlled for length, grammatical complexity, listening difficulty and information content. Comprehension is checked with yes/no questions. However, the validity of the test – how well it reflects comprehension in everyday life – has been questioned (Spreen and Risser 2003).

Impaired inference ability in tests and in social interaction in cases of RHD and TBI has been related to theory of mind (ToM) deficits. In TBI, ToM has also been conceptualized as social perception, an aspect of social cognition (McDonald and Flanagan 2004). *The Awareness of Social Inference Test-Revised* (TASIT-R; McDonald et al. 2003, 2011) uses audio-visual vignettes to assess perception of emotion, ToM judgments and comprehension of direct and indirect speech. It is one of only a few instruments in the field of social cognition and communication that is standardized. It provides normative data as well as measures of inter-rater reliability and has an established validity.

Results obtained with high-level language tasks must be interpreted with caution (Tompkins et al. 2013). Although cognitive-communication disorders may be detected with this type of task, one must remain aware of the effects of the meta-linguistic nature of the tasks. When a person is asked to reflect on language in an assessment task, the demands are very different from those of everyday communication.

Furthermore, the ability to reflect upon and talk about such things as semantic-lexical relationships or the meaning of a metaphor also depends on factors such as the education, profession and reading habits of the person prior to the onset of the communication disorder.

The number of standardized, norm-referenced tests suitable for assessing cognitive- communicative disorders is limited and existing neuropsychological standardized tests do not usually provide an accurate picture of an individual's functioning in everyday life (Coelho et al. 2005). This remains a problem regardless of what type of test instrument is used. The test situation necessarily differs from those of everyday communication and is usually free of the distractions that characterize normal life. Furthermore, the tasks are usually presented in a structured way, which reduces demands on attention, memory and executive function. Also, a person may use effective compensatory strategies in everyday life that they are not allowed to use in the test situation. Coelho et al. (2005) also note that in a formal test situation the person with a communication disorder is usually not required to either initiate or limit their own actions as they would be required to do in ordinary life. Furthermore, individual motivation may support performance in real-life settings in a way that it does not in a clinical setting.

It is impossible to carry out language tasks, particularly in real-life settings, without using cognitive powers such as attention, memory and executive functions. It has been argued that the core problem for people with cognitive-communication disorders is the timing required to adapt one's plans to a specific context in which various kinds of 'noise' exist (Body and Perkins 2006; Perkins 2007). Identifying the elements of interaction between language and other cognitive powers that may give rise to observable deficits may require non-standardized, experimental testing of different hypotheses (Coelho et al. 2005; Body and Perkins 2006). Accordingly, linguistic and other cognitive factors may be tested systematically in various combinations to assess the effects of their interaction. When the findings from this kind of assessment are then compared with those from observations of the performance of everyday tasks, a good basis for the planning of interventions may be achieved.

20.3.2 Functional Communication Assessment

Functional communication has been defined as 'the ability to receive or to convey a message, regardless of the mode, to communicate effectively and independently in a given [natural] environment' (American Speech-Language-Hearing Association 1990: 2). On the basis of this definition, an instrument like the *Amsterdam-Nijmegen Everyday Language Test* (ANELT; Blomert et al. 1994) is disqualified as a functional communication assessment as according to the manual only oral-verbal contributions are scored in ANELT. Many instruments for assessing functional communication have been criticized for their lack of reliability or validity, while others have been criticized for being too time consuming or for failing to provide information that is useful for clinical management (Prins and Bastiannse 2004).

Table 20.2 Instruments for the assessment of functional communication

Instrument	Purpose of the test	Included measures or subtests
The Functional Communication Profile (FCP; Taylor-Sarno 1965)	Assesses functional communication of patients in a rehabilitation setting	Rates 45 communication behaviours, which are divided into five areas: movement; speaking; understanding; reading; and other
Communicative Abilities in Daily Living-2 (CADL-2; Holland et al. 1998)	Assesses pragmatic and functional aspects of communication	Explores 10 communicative activities in 50 items in seven categories: reading, writing and using numbers; sequential relationships; social interactions; divergent communication (responding to misleading information or proverbs); non-verbal communication; contextual communication; humour/metaphor/absurdity
American Speech-Language-Hearing Association – Functional Assessment of Communication Skills for Adults (ASHA-FACS; Frattali et al. 1995)	Explores independence and quality of basic functional communicative skills	Assesses 43 items in four domains: social communication; communication of basic needs; reading, writing and numeracy; and daily planning
The Communicative Effectiveness Index (CETI; Lomas et al. 1989)	Explores ability to interact with other people	A scale describes 16 everyday situations

The fact that new ways of measuring functional communication are continuously being developed also indicates that it is difficult to construct an instrument that suits all settings and views of what functional communication is. Table 20.2 provides an overview of some instruments that are used to assess functional communication in aphasia and cognitive-communication disorders.

The *Functional Communication Profile* (FCP; Taylor-Sarno 1965) was the first attempt at creating a standardized instrument for measuring the functionality of language use in everyday life. The FCP explores the ability to use language in 45 everyday activities, such as ‘Indicating yes and no’ and ‘Reading newspaper headlines’. The level of ability is rated on a scale running from ‘normal’ to ‘absent’. The reported inter-rater reliability is reasonably high (Spreen and Risser 2003). Although there are now many other instruments available, as many as 27 % of SLPs in Australia and New Zealand reported in a survey that they use the FCP in acute settings (Vogel et al. 2010).

The *American Speech-Language-Hearing Association – Functional Assessment of Communication Skills for Adults* (ASHA-FACS; Frattali et al. 1995) measures the degree of independence as well as effectiveness and quality of language use in specific everyday activities. The clinician rates a client’s ability to perform tasks on a seven-point scale. Each domain is also rated for quality of performance on a five-point scale. The ASHA-FACS is standardized and has been developed for use in both aphasia and in cognitive-communication disorders in relation to TBI. The focus is on independence in communication and the degree of support provided by the conversation partner is, therefore, considered when carrying out the assessment. Although the instrument was developed for assessing the outcome of intervention, its focus on independence may reduce its usefulness for assessing intervention designed to train conversation partners.

The *Communicative Abilities in Daily Living-2* (CADL-2; Holland et al. 1998) is sometimes described as a functional test and sometimes as a test of pragmatic ability for people with aphasia. The CADL-2 explores several communicative faculties, including social interaction, non-verbal communication, and contextual communication in a total of 50 items. The clinician presents various questions and tasks and the response is recorded as ‘correct’, ‘adequate’ or ‘wrong’. The manual reports data of mixed reliability and validity and normative data from the original CADL are not included in the CADL-2. The CADL-2 has been translated into several languages.

In the *Communicative Effectiveness Index* (CETI; Lomas et al. 1989) a relative or carer of the person with communication disorder reports on how they perceive the patient’s communicative function using a visual-analogue rating scale. CETI presents 16 descriptions of everyday communication activities such as ‘Giving yes and no responses appropriately’ and ‘Describing or discussing something in depth’. In each of the items the respondent reports to what extent the patient is able to perform the activity as compared with their ability before the onset of their disorder. The ratings on the visual-analogue scale are then converted to a ten-point scale. The CETI is easy to use and provides an opportunity to discuss the client’s communication skills with relatives. However, it does not provide much information for the planning of interventions.

20.3.3 Communication Checklists and Rating Scales

Communication checklists and rating scales are potentially useful tools for assessing communicative behaviours. Table 20.3 provides an overview of a number of checklists and rating scales.

Adequate inter-rater reliability can be achieved, but it has been shown that external factors may affect ratings and assessors require several hours of training on most scales to reach acceptable reliability (Coelho et al. 2005; Eriksson et al. 2014). Furthermore, the degree of validity is often not described and data on normal performance are usually not available either, so results obtained with this kind of instrument must be used with caution (Turkstra et al. 2005). However, the lack of useful norm references may be a consequence of the nature of the phenomena measured. Pragmatic behaviour in conversation is highly dependent on participant roles and other contextual factors (Ahlsén 1995; Togher et al. 1999).

The *Pragmatic Protocol* (Prutting and Kirchner 1987) is a rating scale that was initially developed for children but is also used with adults. The construction and content of the scale are based on pragmatic theories and it has been in use for a long time. It consists of a descriptive taxonomy of 30 items related to different behavioural

Table 20.3 Checklists and rating scales

Instrument	Purpose of the test	Included measures or subtests
Pragmatic Protocol (PP; Prutting and Kirchner 1987)	Protocol provides a general observational profile of a person with communication disorder	Thirty questions in three main areas are included: verbal aspects; paralinguistic aspects (e.g. intelligibility and vocal quality); and non-verbal aspects of communicative behaviour
La Trobe Communication Questionnaire (LCQ; Douglas et al. 2000)	Questionnaire explores perceived pragmatic ability in conversational interaction	Thirty questions in six domains: Quantity; Quality; Relevance; Manner; Cognitive constructs; Rate
Measure of Skill in Supported Conversation (MSC; Kagan et al. 2004)	Rating scales provide a measure of ability to support conversational interaction with a person with aphasia	Two sub-scales: (A) Acknowledges competence; (B) Reveals competence (supports understanding and expression and verifies interpretations)
Measure of Participation in Conversation (MPC; Kagan et al. 2004)	Rating scales provide a measure of ability to participate in conversational interaction	Two sub-scales: (A) Interaction (verbal and non-verbal); (B) Transaction (verbal and non-verbal)

aspects of conversational interaction. The assessment is based on a 15-min spontaneous and unstructured conversation with a conversation partner. Each of the items included are rated as ‘appropriate’, ‘inappropriate’, or noted as ‘no opportunity to observe’. Prutting and Kirchner (1987) showed acceptable levels of inter-rater reliability with this method. The *Pragmatic Protocol* has since been followed by the development of numerous other scales with a pragmatic theoretical base. These include the *Profile of Communicative Appropriateness* (Penn 1988), the *Edinburgh Functional Communication Profile* and its revised version (Skinner et al. 1984; Wirz et al. 1990). However, few of these scales are routinely used in clinical practice today.

The *La Trobe Communication Questionnaire* (LCQ; Douglas et al. 2000) was developed for assessment of communication in people with traumatic brain injury. It provides normative data from non-brain-damaged young adults as well as measures of test-retest reliability and validity (Douglas et al. 2007a, b; Struchen et al. 2008). The LCQ comprises a self-report version of the questionnaire for the person with TBI to complete, and a corresponding version to be completed by a significant other, who knew the person before the onset of their disorder. As with Damico’s (1985) *Clinical Discourse Analysis* (CDA), the LCQ is based on the four Gricean conversational maxims (Quantity, Quality, Relevance, and Manner) that give effect to the Co-operative Principle (Grice 1975). Twenty of the 30 questions in the LCQ evaluate the problem behaviours outlined in CDA. The remaining questions are included to detect rate and cognitive-communicative constructs that are often affected in TBI. For each question the respondent estimates on a four-grade scale how often certain behaviours occur in everyday conversations. The respondents’ perception of whether there has been a change of the behaviour since the onset of the disorder is also reported on a three-grade scale.

The *Pragmatic Protocol* (and similar pragmatic rating scales) and also the *LCQ* provide a measurement of a person's pragmatic conversational ability. However, research has highlighted the collaborative nature of conversational interaction, especially in cases of communication disorders, and this has influenced the development of assessment methods. The *Measure of Participation in Conversation* (MPC; Kagan et al. 2004) and the *Measure of Skill in Supported Conversation* (MSC; Kagan et al. 2004) are two observational measurement systems that take the form of rating scales (Kagan et al. 2001). The MPC and MSC were developed on the assumption that functional communication results from interaction between individuals. One of the motivations for developing these scales was the need to measure treatment outcome in conversation partner training. The scales have been developed and assessed for people with aphasia and TBI (Kagan et al. 2004; Togher et al. 2010).

The MPC and MSC are used to assess both the communicative competence of the person with the disorder (the MPC) and the conversation partner's ability to support communication (the MSC). Using both scales together may provide a more comprehensive view of the quality of conversational interaction. The fact that the quality of social interaction and the degree of successful exchange or support are assessed on separate sub-scales underscores the importance of the relationship between the participants over and above the communication of information *per se*. The instruments provide holistic quantitative measurements of different qualitative aspects of communication. The scales have been reported by the authors to have good reliability and validity (Kagan et al. 2004).

20.3.4 Discourse and Conversation Analysis

Diagnostic aphasia batteries usually include a section for assessment of language ability on a discourse level. This may consist of retelling a story or a procedural language task that is presented with guidelines for quantitative ratings. However, exploring pragmatic aspects of discourse usually requires more detailed analysis as well as analysis of several different types and contexts of discourse.

Discourse analysis tasks may be monologic or conversational. Monologic tasks, such as story retelling, story generation, procedural discourse tasks and picture description, are commonly used in relation to communication disorders. The discourse may be assessed in terms of cohesion at the sentence level, or coherence at the discourse level (see Coelho et al. 2005 for a brief review). The amount of information and accuracy and quality of content may also be measured. However, measurements of conversational discourse may be more reliable than measurements made during monologic discourse tasks. Although impairments have been consistently reported in analyses of factors such as productivity and efficiency of verbal output, or content accuracy and coherence from monologic discourse, the validity of these results may be limited. This is because the use of language is affected by context, and monologic discourse tasks create artificial situations (Armstrong et al. 2011;

Beeke et al. 2003, 2008). Results such as omissions or inappropriate comments should thus be interpreted cautiously. The need for repeated sampling as well as the use of several different assessment methods has been emphasized. Personal narratives, in which the recounting of past events holds meaning for the narrator and offers new information to the assessor, provide a more valid discourse sample (Streit Olness et al. 2012).

Pragmatic aspects of conversational interaction have been thoroughly described (D'hondt et al. 2009). Since conversational interaction is the most common form of language use, exploring the ability to interact in conversation is essential in the assessment of communication disorders. Rating scales which are used to assess participation in and support of conversations yield valuable information. However, it is not possible to distinguish the contribution of the person with the communication disorder from that of the person they are interacting with. Conversation analysis (CA) is a qualitative method that has been applied to the study of both typical and atypical interaction (Sidnell 2010). It has helped to show that people with aphasia often use strategies together with their conversation partners to manage communication effectively (see Goodwin 2003 for several examples).

CA has its roots in ethnomethodology and was developed within sociology in the 1960s (Atkinson and Heritage 1984). The content and outcomes of interaction are seen as the result of collaboration between the participants and CA enables the observer to study the way in which the participants co-produce and understand the actions as meaningful. When performing CA, it is important that data consist of natural conversational interaction rather than interaction in a pre-ordained, structured task. Conversational interaction is seen as orderly and sequential, and each action is therefore to be interpreted in relation to the previous one. This practice affects how participants design their contributions and it also functions as a resource for the participants' interpretation of the discourse. In traditional CA, contributions are interpreted according to what can be observed in the context and described in the data. In its applied form, CA also acknowledges the impact of factors that are not visible in the transcripts of the interaction (Wilkinson 2014).

To date, applied CA has been used mainly in the assessment of aphasia but also to describe conversational interaction in cases of Huntington's disease (Saldert and Hartelius 2011), Parkinson's disease (Griffiths et al. 2012, 2015; Saldert et al. 2014), in motor neuron diseases (Bloch and Wilkinson 2009, 2011; Bloch et al. 2015), and in dementia (Perkins et al. 1998; Samuelsson and Hydén 2011). It has also been proposed that the method would be suitable for revealing pragmatic deficits in cases of RHD (Saldert 2006; Barnes and Armstrong 2010). CA also provides the basis for the planning of interaction-focused intervention (see Sect. 20.4.1.2).

In CA research, careful transcription of videoed conversational interaction forms the basis of the analysis. In clinical work, the results from the analysis are used for the planning and implementation of intervention, and simplified versions of transcripts may be used in training (Saldert et al. 2012). However, for many SLPs who work in clinical practice, it is not possible to spend time conducting transcriptions. Also, it has been shown that transcriptions are not necessary for an assessment of discourse or for the planning of therapy (Armstrong et al. 2007; Eriksson et al. 2016; Saldert et al. 2015).

The benefits of CA have been recognized by many clinicians and two assessment instruments that are based on its methodology have been developed. These are the *Conversation Analysis Profile for People with Cognitive Impairment* (CAPPCI; Perkins et al. 1997), which was developed for the assessment of cognitive impairments in dementia, and the *Conversation Analysis Profile for People with Aphasia* (CAPPA; Whitworth et al. 1997). These instruments consist of a structured interview which is conducted with a key conversation partner to the person with communication disorder. The CAPPA also offers a corresponding interview format that may be used for people with aphasia. The interview format is supplemented with a method for the analysis of a sample of the participants' conversation. In CAPPCI, the participants' perception of various aspects of the conversational interaction is explored using 26 questions that are divided into four main areas: (1) Linguistic abilities; (2) Repair; (3) Initiation and turn taking; and (4) Topic management.

Another part of the interview involves an assessment of how the person's communication style has changed since they developed their communication disorder. In the analysis of the video-recording the SLP focuses on the same areas as in the interview. It is then possible to compare the SLP's analysis with the perceptions reported in the interview. The results from CAPPCI/CAPPA provide the SLP with a picture of the limitations and resources in the specific couple's interaction and also provide information about their understanding of the problems. This is valuable for the planning of intervention. An adapted version of the CAPPCI interview, transformed into a questionnaire for significant others, has been shown to be useful for identifying how spouses perceive the effects of RHD or atypical Parkinsonism on the conversational interaction of their partner (Saldert 2006; Hartelius et al. 2011).

Case Illustration 20.1: Pragmatic Deficits in Relation to Right-Hemisphere Damage

Nils is a man in his sixties who used to work as a foreman in a large industrial company. He was an active member of various associations and reading used to be one of his greatest hobbies. About four and a half years before taking part in a study exploring communication in relation to RHD, he suffered a stroke in the right Sylvian fissure (see Saldert 2006).

Cognitive tests showed impaired verbal working memory and problems with sustained attention. A discourse comprehension test revealed impaired comprehension when tasks required inferential ability (Nils scored 8/18 on questions about content in short stories). In a questionnaire based on *Conversation Analysis Profile for People with Cognitive Impairment* (CAPPCI; Perkins et al. 1997), Nils' wife reported that his ability to interact in conversation had changed after the stroke. She noted comprehension problems, a tendency to lose the thread when he was speaking, problems with word retrieval, difficulties managing topics, reference failure and impaired ability to self-repair. An analysis of the conversational interaction between Nils and an SLP also revealed that he had difficulty finding words and he did not seem to be able to self-repair by means of, for example, circumlocution (see Extract 20.1).

Extract 20.1

Word-finding difficulties and collaborative repair

Nils and his SLP have been talking about the lack of access to physical training for people who have suffered a stroke. Nils has tried a new rehabilitation clinic and wants to say that they offered the same type of training as the previous clinic he visited, but cannot find the right words and the SLP misunderstands. Nils initiates repair, but is not able to use circumlocution or to explain what he means. Instead, the two of them manage the repair co-operatively. (Length of pauses in seconds is displayed within parentheses in the extract.)

1	Nils	but uh (1.0) and that was all right they were uh (2.5) naturally
2		it is not different than there than it is at the rehab centre
3	SLP	no it is they can't manage they
4	Nils	no (1.0) but it is the same uh uh sort of uh
5	SLP	yes yes the same
6	Nils	the same (1.0)
7	SLP	type of training and such?
8	Nils	yes
9	SLP	yes as they have
10	Nils	it's the same (1.0) roughly

20.4 Intervention for Pragmatics in Cognitive-Communication Disorders

This section presents various methods of intervention that address pragmatic issues in communication disorders. It offers a brief review of selected methods for which outcomes have been assessed in studies or that have been recommended in clinical guidelines.[1] The methods are presented according to the neurological populations that they have been used to treat. However, there is currently only limited knowledge about the effects of intervention focused on pragmatics. Until more studies are available, experts recommend including treatments designed for other neurological populations in the planning of intervention for those suffering from similar problems (Blake et al. 2013; MacDonald and Wiseman-Hakes 2010; Mahendra and Hopper 2013).

[1] Although various forms of un-powered and powered alternative augmentative communication (AAC) devices have been shown to facilitate conversational interaction in cases of communication disorders, the only AAC intervention discussed here is that of training the conversation partner to be supportive in communication.

20.4.1 Intervention in Aphasia After Left-Hemisphere Damage

20.4.1.1 Targeting Discourse in People with Aphasia

Although discourse-level production and comprehension are always affected to some degree in aphasia, there are surprisingly few, well-evaluated treatment programmes that focus on pragmatic aspects of production and comprehension in people suffering from this condition. Treatments at the discourse level in aphasia are often carried out as structured discourse tasks. One example is what has been called ‘language games’ (Davis and Wilcox 1985; Pulvermüller and Roth 1991), in which participants communicate with each other and an SLP or volunteer by performing different types of speech acts. The tasks may involve requesting objects or using picture cards, such as in ‘Go fish’, in small groups. This type of task also focuses on the suitability of phrases for the context and provides an opportunity to practice the use of formulaic expressions such as ‘Here you are’, ‘You’re welcome’, ‘I’m sorry’, ‘Too bad’ and ‘Pardon me?’, all of which are useful in everyday conversation (Stahl and Van Lancker Sidtis 2015). However, as Simmons-Mackie et al. (2014) point out, language games involve a formalized kind of interaction that differs from natural conversation. It does not, for example, permit spontaneous elaborations or shifts of topic.

One method that is based on language games is *Promoting Aphasics’ Communicative Effectiveness* (PACE; Davis and Wilcox 1985). This involves the training of several pragmatic elements that are important in conversation, e.g. taking turns, choice and variation in use of modality for communication and feedback. In PACE, the therapist and the patient participate on equal terms, each trying to get a certain message across to the other. The information to be conveyed is obtained from picture prompts and it is supposed to be ‘new’ to both participants. Both participants are also free to use any means or modality to get their message across. Unfortunately, despite promising outcomes in some studies, evidence of positive effects from PACE is still inadequate (Davis 2005).

Another type of structured task that uses language games is *Intensive Language-Action Therapy* (ILAT), including constraint-induced language therapy (CILT) (Difrancesco et al. 2012; Pulvermüller and Roth 1991). It has now been clarified that the permitted mode of production should not be restricted to oral-verbal utterances and that accompanying non-verbal expressions are desirable (Difrancesco et al. 2012). ILAT also includes planning tasks that focus on the expression of actions. Modest effects from intensive training with ILAT/CILT have been noted in systematic reviews, but whether these effects result from the treatment itself or from the intensity of activities is unclear (Cherney et al. 2010; Brady et al. 2012).

In *context-based treatment*, participants practice performing individualized everyday communication tasks such as calling a taxi or a friend on the phone, or using a communication book in a conversation (Hinckley et al. 2001; Hinckley and Carr 2005). Role play, the generation of functional strategies and context-specific cues are used in the training. According to the authors, assessments of this method suggest that it may be suitable when intensive treatment is not possible but more research is needed to establish its effectiveness.

Conversation therapy refers to treatments that target the individual with aphasia and/or the conversation partner (see Simmons-Mackie et al. 2014 for a review). Conversation therapy is designed, for example, to increase the number of initiations and turn taking, improve topic management and repair, and increase the use of multimodal communication in conversation. Research into conversation treatments for people with aphasia usually describes group settings. One of the few exceptions is a study by Savage et al. (2014), who describe a method for training the person with aphasia by using multimodal conversational strategies such as writing cues, drawing and gesturing as well as speech in conversations with the SLP.

Group therapy treatments may draw on positive group dynamics and the natural social setting to obtain good intervention outcomes (Elman and Bernstein-Ellis 1999; Bernstein-Ellis and Elman 2007; Rautakoski 2011). A group setting may be used both with individuals with aphasia and with their conversation partners (see, for example, McVicker et al. 2009). When the participants are people with aphasia, at least one facilitator, for example an SLP, is present and the participants are selected for each group according to the type and severity of aphasia. The treatment usually involves discussions of activities and events in the participants' lives. Language games may also be included and the participants are encouraged to use multimodal communication.

Treatment programmes that focus on developing the use of gestures in people with aphasia have also been reviewed (Rose et al. 2013). Studies show that some individuals with aphasia can learn to use symbolic gestures. However, Rose and colleagues conclude that practising the use of gestures in combination with oral output gives better results. More research is needed to establish the effects of gesture treatments on communication.

20.4.1.2 Training Communication Partners

There is evidence that conversation partners of people with aphasia can improve their ability to support communication by participating in communication partner training (CPT) and that the effects of this training can be maintained over time (Simmons-Mackie et al. 2010). This evidence also indicates that CPT may be effective in improving communicative activities and/or participation in life activities both for people with aphasia and their conversation partners. In CPT, the treatment may involve teaching generic communicative techniques that are believed to support communication in aphasia. Alternatively, it may be more interaction-focused and aim to affect particular behaviour patterns found in the interaction between a person with a communication disorder and their conversation partner.

Supported Conversation for Adults with Aphasia (SCA™; Kagan 1998; Kagan et al. 2001) is now an established training programme that is based on teaching and practising generic techniques. Conversation partners are taught about aphasia and then provided with a set of resources, based on multimodal communication, that enable them to act supportively. The goal is to increase the conversation partners' ability to help the person with aphasia to express themselves, and to adapt their own way of communicating so as to make it easier for that person to understand. A further goal of SCA™ is to enhance the conversation partners' awareness of social factors in conversational interaction. It also involves training participants to note non-verbal cues and to make the interaction as equal and adult as possible despite the communication disorder. Controlled group studies have found positive outcomes of interventions using the SCA approach (Kagan et al. 2001; Legg et al. 2005).

Conversational interaction is a complex phenomenon that is continuously being shaped by the goals and personalities of participants and by various contextual factors. Teaching, for example, healthcare professionals and social workers about communication disorders and generic support techniques will enable them to adapt to the resources and needs of the different people they meet. In an interaction-focused approach (Wilkinson 2010; Wilkinson et al. 2011), treatment is designed to target the interactional patterns of two particular people who regularly communicate with one another. Intervention is based on an analysis of video-recorded natural conversations between the person with the communication disorder and their conversation partner, often in the home environment. Clinicians with experience of interaction-focused conversation therapy are usually able to identify limiting and facilitating behaviour just from watching video-recorded interactions and careful transcription are not necessary for assessment (Armstrong et al. 2007; Eriksson et al. 2016; Saldert et al. 2015). However, less experienced clinicians often find that transcription of at least parts of the interaction may help support their analysis and treatment planning.

One advantage of this method is that it makes use of the needs and resources of both participants in the design of intervention. Typically, patterns of turn taking, sequences, repair and topic management are examined. This type of analysis makes it possible to take into account how identities and social roles are expressed in conversation. A common objective is to reduce the tendency of the conversation partner to assume a pedagogic role and to try to help the person with aphasia practice speaking, thus creating inequality in the relationship (see Case Illustration 20.2). This type of pedagogic sequence is pragmatically adequate in a context involving a teacher and a student, but not in conversational interaction between spouses.

Case Illustration 20.2: Training Naming in Everyday Conversations
Chris is a woman in her forties who has mild-moderate aphasia after a left-hemisphere stroke. She frequently has difficulty finding words but is often able to explain what she means by using gestures and by sky writing single words, letters and numbers. Her husband David wants to help her practise her naming ability during their everyday conversations.

Extract 20.2

Spouse in pedagogic sequence

Chris has told David about an advertisement for a training machine which she is interested in buying and David wants know how much it costs. Chris cannot find the right words but writes down the numbers on the table with her finger. David then urges Chris to try to express the number orally. In lines 12–22 she does try, but in lines 16 and 18 she indicates that she does not want to and in line 23 she changes the topic.

1	David	*how much is it?*
2	Chris	*one costs like this* (Chris writes 1995 on the table)
3	David	*nineteen ninety five*
4	Chris	*that's right*
5	David	*m*
6	Chris	*nine...*
7	David	*one thousand*
8	Chris	*yes*
9	David	*say it*
10	Chris	*yes*
11	David	*one...*
12	Chris	*one thousand*
13	David	*ni...*
14	Chris	*ninety*
15	David	*nine hundred*
16	Chris	*I know it in my head so I...*
17	David	*yes say it I want you to say it*
18	Chris	*like this* (Chris writes 1995 on the table again)
19	David	*yes one thousand*
20	Chris	*yes*
21	David	*nine hundred nine.. ty...fi...*
22	Chris	*hundred ninety five ok it costs... I have seen a*
23		*better machine, it cost a little bit more*

Chris knows that David just wants to help. But it is annoying for her and this was one of the targeted behaviours in the CPT that David participated in (see Saldert et al. 2015).

The CPT part of the programme *Supporting Partners of People with Aphasia in Relationships and Conversation* (SPPARC; Lock et al. 2001) is based on the theory of experiential learning (Kolb 1984) and on Conversation Analysis (Sidnell 2010). The core goals of SPPARC are to advance knowledge of communication in general, raise the participants' awareness of their own communication patterns and facilitate their interaction. The programme uses supervised analyses of video-recorded samples of conversation both from the participants' own interactions and role playing and from those of other people. The SPPARC resource pack (Lock et al. 2001) includes an example of an eight-session intervention with video examples and suggestions for handouts. Intervention with SPPARC may be adapted for both particular pairs and for group settings. Although CPT is not suitable for all conversation partners, positive results have been reported from treatment with SPPARC, or adapted versions, though mainly from case studies (Wilkinson 2010; Wilkinson et al. 2011; Beckley et al. 2013; Beeke et al. 2014; Saldert et al. 2013, 2015).

There is now also an online resource known as *Better Conversations with Aphasia* (BCA) that is based on interaction-focused therapy and the SPPARC approach to CPT (Beeke et al. 2013). BCA is an interactive learning resource that includes audio and visual materials for SLPs who want to learn how to conduct interaction-focused conversation therapy. It offers a complete therapy programme and advice from experienced clinicians about how to carry it out. There are also BCA sites for people with aphasia and their families which provide information about conversation therapy and the stories and experiences of people who have used BCA.

Other treatments that target specific pairs are *Conversational Coaching* (Hopper et al. 2002) and the *APPUTE method* (Nykänen et al. 2013). This approach focuses on both partners in order to improve their ability to communicate information to one another by increasing their range of modalities (writing, drawing, gesturing as well as speech). The training usually involves practice in conveying information in structured tasks.

20.4.2 Intervention in Right-Hemisphere Damage

Research on the effects of interventions for cognitive-communication disorders in relation to RHD is scarce. Myers (1999), Tompkins (1995) and Tompkins and Scott (2013) have proposed several forms of intervention but note that most of these have yet to be empirically tested. In a review of evidence-based treatment for RHD, Blake et al. (2013) found that the available evidence rests on a limited number of studies with few participants and they conclude that much more research is needed. However, they present several intervention studies that have explored the effects of training people with RHD in prosody and discourse comprehension.

Studies of two types of treatment programme for the improvement of prosody in patients with RHD have shown promising results (Rosenbek et al. 2006; Jones et al. 2009). The motor-imitative programme uses imitation to train prosody and the cognitive-linguistic programme supports prosody production by using a verbal label, description of vocal characteristics appropriate for a particular emotion and pictures of faces expressing that emotion. These programmes use a step-wise hierarchy of cues that require the patient to become increasingly independent in their production of prosody. Both programmes resulted in immediate as well as sustained improvement.

There is a comprehensive theoretical framework explaining at least some of the problems of impaired comprehension in RHD based on a hypothesis of coarse coding deficit (Beeman 1998) and/or suppression deficit (Tompkins et al. 2000, 2013). *Contextual Constraint Treatment* (CCT) is based on this framework. Treatment uses contextual cues to help the person determine the appropriate meaning of words and sentences and is believed to strengthen the neural pathways that support coarse coding (Tompkins et al. 2011, 2012; Blake et al. 2015). Using contextual cues is believed to activate semantic networks and prompt recognition of a word's distantly related features, which may be important for understanding an intended meaning. Short sentences are used to put a particular word in context, which makes it possible to avoid erroneous activations. A controlled study of four participants exposed to this method resulted in more accurate and faster responses in three of them (Blake et al. 2015). These three participants were also able to generalize their improved performance to better comprehension of narrative discourse. Although Tompkins et al. (2012) found promising effects from CCT in terms of participants being able to better interpret the meanings of non-literal language, such as idioms and metaphors, this was not found in Blake et al.'s (2015) study.

The coarse semantic coding hypothesis also forms the theoretical basis of work on the comprehension of ambiguity in metaphors. Lundgren et al. (2011) explored a treatment programme in which five participants with RHD worked with semantic network analysis of concepts included in metaphors. For example, the participants were asked to write down what they associated with the concepts of *family* and *cradle* and to identify the relations between the concepts when used in the metaphor 'a family is a cradle'. The ability of all five participants to give oral interpretations of the metaphors improved significantly and these improvements persisted in three of the four participants who were able to participate in a three-month follow up.

20.4.3 Intervention in Traumatic Brain Injury

In a review and recently published clinical guidelines, Togher et al. (2010, 2014) present evidence-based recommendations for the management of cognitive-communication disorders in people with traumatic brain injury. Two randomized controlled trials have been conducted on the effects of training in social communication skills among people with TBI (Dahlberg et al. 2007; McDonald et al. 2008). The participants were given weekly homework tasks, such as practicing topic maintenance with a family member. This resulted in improved interaction and, since the training was performed at home, improvements seemed to be generalized to interaction with other people as well. The advantage of a person with communication disorder training with their conversation partner is highlighted by Togher et al. (2014). Several randomized controlled trials have explored the benefits of training conversation partners in communication, whether they are paid carers, police officers or the partner of the person with TBI (Behn et al. 2012; Togher et al. 2004; Togher et al. 2013).

It has been proposed that communication interventions for people with TBI should always be considered in clinical practice (Cicerone et al. 2011). This helps motivate participants by giving them individual goals and positive outcomes have been shown to be more likely when interventions involve activities in real-life contexts that include important communication partners in the training. Other useful factors seem to be feedback self-monitoring from video recordings (MacDonald and Wiseman-Hakes 2010). Interventions for communication deficits have usually been conducted in groups but positive outcomes have been reported when individual training is combined with group sessions (Togher et al. 2014).

A treatment programme that includes several of these elements is the *Communication-specific Coping Intervention* (CommCope-I; Douglas et al. 2015). The CommCope-I is designed to improve coping strategies when communication breaks down and the treatment reflects the principal concept of self-coaching developed for people with TBI (Ylvisaker 2006). The programme is personalized by first exploring the particular problems and resources of the individual participant and then developing relevant coping strategies. These strategies are then practiced in scenarios with an increasing degree of difficulty, starting with practicing with the SLP and leading towards self-management in everyday life. The outcome of each session is evaluated with video recordings that are assessed together with feedback from the SLP and self-ratings as well as the ratings of family and carers. To date, the method has only been assessed in single-subject designs but the results are promising with improvement persisting at three-month follow up (Douglas et al. 2015).

Interventions for pragmatic communication deficits following TBI have thus far focused on communicative interaction. Studies of other neurological populations need to be consulted for the results of training for comprehension, although Gabbatore et al. (2015) have recently explored the effects of a new treatment programme that includes training of comprehension. The authors claim that the *Cognitive Pragmatic Treatment Programme* is designed to treat both comprehension and production in people with cognitive-communication disorders. The intervention includes watching video recordings and discussing the interactional content in group sessions and role playing everyday life situations. The role play makes it possible to practice communicative strategies and get feedback in a protected environment. The outcome has so far only been assessed in a study with 15 participants and no control group (Gabbatore et al. 2015). However, the authors report improved comprehension and use of both linguistic and paralinguistic elements of communication as well as increased social appropriateness.

20.4.4 Intervention in Dementia and Other Progressive Neurological Conditions

Until recently, intervention that targets communication disorders in people with dementia has not been considered meaningful and SLPs seldom work with this group (Hopper et al. 2007). Although the evidence is sparse, it has nevertheless now been shown that people with dementia can learn new strategies in their communication. Moreover, pragmatic aspects of conversational interaction may be improved, with increased topic maintenance, decreased repetitiveness and fewer ambiguous statements, by using such aids as personal memory books (Egan et al. 2010). However, the most positive results are found with CPT (Eggenberger et al. 2013; Zientz et al. 2007). It has been concluded that CPT not only improves the quality of life and wellbeing of people with dementia but also increases positive interactions. CPT programmes usually involve teaching about dementia and providing techniques to facilitate communication.

Several treatments have been shown to increase carers' knowledge about communication in relation to dementia and it is assumed that this leads to better communication with dementia sufferers. For example, the results of the communication programme FOCUSED (Ripich et al. 1995) have been assessed among the informal carers of people with Alzheimer's disease (Ripich et al. 1998, 1999). The training was delivered over a total of eight hours in a group setting. It included discussions about dementia and communication, examples shown in video-recorded vignettes and role playing for practicing specific strategies. Another programme, the DVD-based training programme entitled RECAPS and MESSAGE, has shown promising results among nursing home staff (Broughton et al. 2011) and informal carers in community settings (Liddle et al. 2012). This programme is designed to provide caregivers with strategies to support both memory and communication and it includes video examples and written advice about communication strategies.

In other types of progressive cognitive-communication disorders in conditions such as multiple sclerosis, Parkinson's disease and Huntington's disease, treatment usually targets motor speech and/or voice production. Early attempts to use CPT for the partners of people with Parkinson's disease have so far yielded mixed results. In a pilot study assessing the adaptation of SPPARC (Lock et al. 2001; see Sect. 20.4.1.2) to Parkinson's disease, a small improvement was noted in one of the three participating spouses' ability to support communication after only three training sessions (Forsgren et al. 2013). In a study of CPT for assistant nurses in nursing homes, one of the pairs included an elderly man with Parkinson's disease (Eriksson et al. 2016). An interaction-focused approach was used, i.e. the training was tailored to the behaviour of the particular pair. Video recordings were made of their interaction in daily routines and discussed with the assistant nurse on eight occasions to enhance awareness of her own patterns of communication. The assistant nurse was able to improve her timing in taking turns with the resident during the training.

20.5 Summary

Within speech-language pathology the term 'cognitive-communication disorder' is now more or less widely used to describe pragmatic problems in individuals with traumatic brain injury, right-hemisphere damage and dementia. But there is still confusion in the terminology that is used to describe more subtle pragmatic deficits in left-hemisphere damage and in progressive neurogenic communication disorders that arise in conditions such as multiple sclerosis and Parkinson's disease. This terminological confusion may affect the clinical management of these populations.

Most national clinical guidelines recommend assessment and intervention that focuses on discourse and pragmatic aspects of communication in cognitive-communication disorders as well as in aphasia. The assessment of functional communication in everyday activities is well established, and comprehensive test batteries that explore pragmatic aspects of language are common. However, there are few reliable and valid methods available for the analysis of discourse. Several factors, such as available clinical resources and level of knowledge, may affect the choice of assessment methods. Further, standardized test batteries may lack validity and fail to provide useful information for the planning of intervention. Pragmatic aspects of communication are complex and context-dependent interaction between language systems and other aspects of cognition demands sensitive and flexible assessment methods.

Guidelines and clinical practice statements usually advocate prioritizing a social model and life participation approach to intervention. However, there is still a discrepancy between what is recommended in the guidelines and what is reported from clinicians in general. Establishment of new approaches to clinical management takes time and there is a need for more well-designed research to assess the effects of treatment. In the meantime, there is some evidence of positive outcomes from interventions that focus on the pragmatic abilities of people with cognitive-communication disorders or aphasia and their communication partners.

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Part V
Recent Developments in Pragmatic Disorders

Chapter 21
Neural Aspects of Pragmatic Disorders

Brigitte Stemmer

Abstract Pragmatic abnormalities or impairments have been described in a large range of developmental disorders and psychiatric and neurological diseases and conditions. Despite a rich literature, no clear picture has emerged concerning the neural underpinnings of the various aspects of pragmatic behavior. Reasons are manifold and include methodological issues, no conclusive picture of the processes involved in pragmatic behavior and vague concepts of the processes. It is argued that pragmatic behavior is a dynamic concept that emerges through the complex interaction of cognitive and non-cognitive processes. Consequently, the recruitment of neural substrates and neural networks depends on the processes implicated and may change from situation to situation. Atypical pragmatic behavior is the result of malfunctions at various levels of organization and occurs when the neural substrates and networks contributing to the fulfillment of such processes do not operate as required. An argument is made to include small- and large-scale brain networks into research on normal and abnormal pragmatic behavior.

Keywords Autism spectrum disorder • Brain • Frontal lobe damage • Inference • Large-scale brain network • Neurodegenerative disorder • Neuropragmatics • Pragmatic disorder • Reasoning • Right hemisphere damage • Schizophrenia • Specific language impairment • Theory of mind

21.1 Introduction

Knowledge about the conventions of society, interlocutors' role in society, shared and non-shared knowledge, and characteristics of individuals such as gender, family status, age, emotional state, and facial expressions are examples of variables that influence how we interpret utterances. We must be able to pick up these cues from the environment and from interlocutors, and interpret them appropriately. Any

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circumstances that prevent us from gathering and processing this information adequately can lead to inappropriate or atypical pragmatic behavior. It is thus not surprising that pragmatic abnormalities can be observed in conditions as diverse as, for example, insufficient mastery of a foreign language, intellectual disability or autism spectrum disorder.

Pragmatic impairment may occur without any obvious underlying pathology, or it can occur as a secondary symptom accompanying a disease or condition. It is thus possible for illnesses or conditions to share similar pragmatic 'symptoms', although the mechanisms that produce these symptoms may differ. Pragmatic abnormalities have been described in a large range of illnesses and conditions such as autism spectrum disorder, attention deficit hyperactivity disorder (ADHD), traumatic brain injury (TBI), degenerative brain disease, right hemisphere damage (RHD), schizophrenia, and so on. Frequently, the observed pragmatic abnormalities are not specific to just one disease or condition as can be seen in Table 21.1. (Note that this table is not exhaustive and not all aspects of pragmatics have been investigated in all illnesses and brain disorders.) There is also the possibility that a specific pattern of pragmatic abnormality is characteristic of a specific brain disorder, disease, or condition. So far, however, research has not provided compelling evidence for such specific associations. One reason could simply be that such specificity does not exist. Another reason might be that we do not have sufficient data to make such a claim as it would entail investigation into the same pragmatic behavior across different patient populations and conditions.

(For more complete descriptions the reader is referred to summaries by Bibby and McDonald (2005); Bora et al. (2016); Cummings (2009, 2015, 2016); Henry et al. (2014); Le Bouc et al. (2012); Martín-Rodríguez and León-Carrión (2010); Muller et al. (2010); Stemmer (2008a); Stemmer and Joanette (1998); Tager-Flusberg (2007) and Weed (2011).)

Considering that pragmatic disorders have been observed in a wide range of patient populations, one question is why such disparate illnesses or conditions as, for example, degenerative brain disease, autism spectrum disorder, frontal brain damage, and schizophrenia can produce overlapping pragmatic impairments. It is conceivable that despite the different pathophysiology of the various brain disorders or diseases, the disease or condition leads to some mechanism or outcome that affect in similar ways the processes underlying pragmatic behavior. In this context, it would be useful to know the processes that underlie pragmatic phenomena and how they are represented and processed in the healthy brain.

Pragmatics is typically viewed as the study of language meaning in context. One aspect of pragmatics concerns how interlocutors assign or negotiate meaning in their communicative exchange. In this context, it has been suggested that communicative intention is a core feature of pragmatic phenomena (Bara et al. 2016). The processes underlying communicative intention are undeniably important pragmatic components. There are, however, other processes that also contribute to pragmatic behavior and which must be considered. They include linguistic and other cognitive processes (e.g. attention, memory, executive functions) and non-cognitive processes (e.g. emotions). Linguistic pragmatics relies on verbalization and a certain degree of

Table 21.1 Pragmatic difficulties in a range of patient populations

Patient population	Described pragmatic difficulties
Children and adults with intellectual disability, including fragile X syndrome, Down's syndrome, and Williams syndrome	General measures of pragmatic language skills
	Referential communication
	Deviant, repetitive language
	Theory of mind tasks
Children with pragmatic language impairment	General measures of pragmatic language skills
	Implicature questions
	Inferential communication
Children with specific language impairment	General measures of pragmatic language skills
	Inappropriate responses in conversation
	Social and non-social reasoning and use of inferences
Autism spectrum disorder	General measures of pragmatic language skills
	Referential expressions
	Integration of context
	Topic drifts
	Theory of mind tasks
	Social and non-social reasoning and inference
	Figurative language
Attention deficit hyperactivity disorder	Theory of mind tasks (controversial)
	Reasoning and drawing inferences
Traumatic brain injury in adolescents	Figurative language
	Discourse (negotiating, hinting, describing)
	Non-social reasoning and use of inferences
Traumatic brain injury in children	Pragmatic inferences
	Non-literal and figurative language
	Production of narratives
	Social and non-social reasoning and use of inferences
Neurodegenerative disease (Parkinson's disease, Huntington's disease)	Non-literal and figurative language, comprehension of ambiguities
	Comprehension of complex discourse
	Drawing inferences
	Theory of mind tasks

(continued)

Table 21.1 (continued)

Patient population	Described pragmatic difficulties
Neurodegenerative disease (Alzheimer's disease, fronto-temporal dementia)	Comprehension of non-literal and figurative language
	Discourse features; information content
	Script comprehension
	Referential communication
	Topic management
	Theory of mind tasks
	Social and non-social reasoning and use of Inferences
Right hemisphere damage	Conversation
	Comprehenison of sarcasm, idioms, metaphors
	Communicative intentions
	Prosody
	Politeness
	Theory of mind (controversial)
	Social and non-social reasoning and use of inferences
	Topic maintenance
	Discourse features
Traumatic brain injury in adults	Topic maintenance
	Metapragmatic knowledge
	Figurative language
	Discourse features, cohesion, coherence in narratives
	Theory of mind tasks (controversial)
	Non-social reasoning and use of inferences
Schizophrenia	Conversational implicatures
	Figurative language
	Narrative production
	Theory of mind tasks
	Social and non-social reasoning and use of inferences
	Discourse features; topic maintenance

linguistic competence is thus necessary to produce and comprehend utterances appropriately. An aphasic patient who has problems at the word and sentence level may have problems producing pragmatically appropriate utterances such as unconventional requests, metaphors, or jokes, or comprehending such utterances, depending on the severity and type of the disorder. Other cognitive abilities such as attention, memory or monitoring and control processes are equally important. A patient suffering from memory problems may act pragmatically inappropriately because he or she is not able to remember contextual information or cannot integrate pieces of information. Further, the ability to reason and draw inferences are processes that also have a large impact on pragmatic performance. A patient with intact linguistic abilities may be unable to infer the moral of a story, interpret metaphoric language, or infer the intentions of an interlocutor.

Pragmatic competence is thus not an isolated entity but relies on intact linguistic, communicative, social and cognitive competence. Considering the large number of variables implicated, it seems unlikely that a specific neural substrate can be identified from which pragmatic behavior emerges. It is more reasonable to assume that pragmatic behavior emerges from the interaction of various processes and, by consequence, from the neural structures and mechanisms that support these processes. The pragmatic behavior we observe in healthy and pathological populations is influenced by information from the world around us (external factors), what happens in our body or organism (internal factors) and the way external and internal factors interact. Our brain tries to make sense of the input it receives and the knowledge it possesses by performing a series of actions that are directed towards some outcome or result. Such processes entail, for example, the activation of cognitive systems (attention, memory, language) and non-cognitive systems (arousal, emotions), the integration of available information, upgrading and the creation of new information, and controlling the actions through inhibition and activation mechanisms. The manner in which these actions operate in the brain is referred to as processing. The question we wish to pursue concerns the neural substrates and mechanisms underlying the processes implicated in pragmatic behavior, and whether or how damage to these processes in various disease processes or conditions can ultimately be reflected in atypical or impaired pragmatic behavior. As most research investigating neural substrates of processes associated with pragmatic behavior has focused on the processes related to mentalizing or mindreading as well as on reasoning and inferencing processes, especially in the context of discourse and non-literal and figurative language, the following discussion will focus on these aspects.

21.2 Communication and Theory of Mind in Pragmatic Disorders

Communication with other people is a complex process. It involves sharing common grounds such as knowledge and contexts. It entails building, integrating and modifying mental models based on our own knowledge, experience, and mental capacities, and based on what we perceive of our interlocutor's knowledge, experience and mental capacities. All this must be achieved in reference to the world around us (Stemmer 1999a, 1999b). One aspect of communication is the ability to represent and attribute mental states, thoughts and emotions to one's own mind and to the minds of others. This has been referred to as mentalizing or mindreading, that is, the person is said to have a theory of mind (ToM) (Baron-Cohen 1995).

Research has indicated that a well-developed ToM is largely language independent, and that ToM and language may but do not necessarily share neural substrates (Saxe 2009). Reasoning and control abilities, sharing attention, following eye-gaze, recognizing emotion, and distinguishing between self and other have been considered essential parts of the mentalizing process (Abu-Akel and Shamay-Tsoory 2011; Saxe 2009). Some type of ToM impairment has been described in most individuals with pragmatic disorders (see Table 21.1). This is not surprising if one considers that ToM abilities contribute to our social competence which, in turn, is necessary for successful pragmatic behavior. In this sense, ToM is an important aspect of communication, albeit not the only one (see Cummings (2015) for discussion). Considering that ToM plays an important role in utterance interpretation and the fact that ToM impairments have been identified in a large range of pragmatic disorders, a reasonable assumption is that the neuroanatomical or neurochemical bases underlying ToM are, at least partially, also shared by these disorders.

Numerous studies of ToM using different technologies and tasks have converged on a set of brain regions that are implicated in ToM tasks and are considered to be core regions of ToM: the right and left temporo-parietal junction, medial parietal cortex (including posterior cingulate and precuneus), and medial prefrontal cortex. The exact role of these regions during mentalizing is, however, still a matter of discussion. Some researchers have suggested that the attribution of mental states is supported by the right temporo-parietal junction while the medial prefrontal cortex is involved in the consideration of the other person (Saxe 2009). Others have proposed that the core regions are part of an intention processing network in which the precuneus and right temporo-parietal junction are recruited by private intentions, the left temporo-parietal junction by prospective social intentions, and the medial prefrontal cortex by communicative intentions (Bara et al. 2016).

Still another approach has been taken by Abu-Akel and Shamay-Tsoory (2011). These authors have outlined a neurobiological model underlying ToM that distinguishes three levels of analyses of ToM functionality: the individual's ability to *represent* cognitive and affective mental states, the ability to *attribute* mental states to self or other, and the manner in which mental states are *executed or applied*. While each of these levels is associated with distinct neuroanatomical networks and/or neurochemicals, there are overlaps and interactions within this architecture. The model posits that the temporo-parietal junction in posterior regions of the brain has a special role in the representation of mental states while ventral and dorsal attentional systems (including the right temporo-parietal junction, the inferior frontal gyrus, the intraparietal sulcus, the superior parietal lobe and the dorsal frontal cortex, near the frontal eye field) are important for the ability to distinguish between self and other mental states. Lateral structures of the prefrontal cortex are involved in the ability to control the application of represented mental states. This is supported by the dopamine system whose function within the ToM network is to regulate the representation of cognitive and affective mental states through its influence on frontal-striatal circuits. Another function is to monitor the maintenance and updating of these mental representations by maintaining a fine balance between cognitive stability and cognitive flexibility (Abu-Akel and Shamay-Tsoory 2011).

If we accept that there is an identifiable neural network that supports aspects of ToM, then it follows that there is a likelihood that ToM abilities will be affected should the core neural network that is supposed to underlie ToM abilities be in any way compromised. By consequence, pragmatic behavior that relies on ToM abilities should also be affected. Brain disease, brain damage or any other condition that presents with ToM problems would thus be united by the fact that they affect in some way processes that are necessary for successful ToM performance. Illnesses or specific brain damage that have been associated with ToM difficulties include autism spectrum disorder, neurodegenerative disease, traumatic brain injury, right hemisphere damage and mental illnesses such as schizophrenia (see Table 21.1). Amongst these illnesses, ToM difficulties have been most consistently associated with autism spectrum disorder. This will be discussed in the next section.

21.2.1 ToM in Autism Spectrum Disorder

Autism spectrum disorder (ASD) is considered to be a disorder of neural development. ASD is an umbrella term for a range of neurodevelopmental disorders that are characterized by abnormal social behavior and communication, atypical expressive and receptive language competence, and circumscribed interests and restricted, repetitive behavioral patterns (American Psychiatric Association 2013; Kwok et al. 2015; Tager-Flusberg 2007). ASD encompasses autistic disorder, Asperger's disorder, and pervasive developmental disorder. While repetitive behaviors and communication problems are also present in other developmental disorders (e.g. anxiety disorders and expressive language disorders), anomalies of social perception are considered to be unique to ASD (McPartland et al. 2011). Although there is considerable heterogeneity in the expression and severity of symptoms in ASD, abnormal social and communicative behavior is one of the core features of the condition. ASD is associated with impairments in social reasoning and drawing inferences, in using context for utterance interpretation, and in cognitive and affective mental states (see Cummings (2009, 2015) for a summary). It is thus not surprising that there is a large literature on pragmatic disorders in ASD.

Numerous structural and functional brain abnormalities have been described in children with ASD (Harris 2015) (see Table 21.2). They include larger overall brain volumes and differences in brain growth trajectory. An excess of neurons in the prefrontal cortex has been shown in autopsies of the brain of young children. Although over-production of neurons is a normal feature of brain development, typical development involves a process called pruning where excessive neurons and synapses are eliminated. This process is necessary for normal neural circuit functioning. In children with ASD, however, the process of pruning seems to be faulty, possibly leading to the abnormalities in functioning and connectivity described later in life (Courchesne et al. 2011). In addition, atypical connectivity patterns have been described in frontal and temporal brain regions and the amygdala at rest as well as during task processing (such as face perception, attribution of mental states,

Table 21.2 Brain abnormalities in disorders associated with pragmatic abnormalities

	Main structural, functional or neurochemistry abnormalities in the brain*	**Core cognitive/neuropsychological impairments****
DEVELOPMENTAL DISORDERS		
Down's syndrome	Trisomy of chromosome 21. Decreased brain volume and brachycephaly especially in cerebellum and hippocampus; impaired neurodevelopment and synaptic plasticity.	Impaired intellectual abilities including language, learning and memory
Fragile X syndrome	Mutations in the fragile X mental retardation 1 gene (FMR1); lack of fragile mental retardation protein (FMRP); downregulation in GABA system.	Impaired intellectual abilities including language, learning and memory; hyperactivity, anxiety. In Fragile X-Associated Tremor and Ataxia Syndrome (FXTAS) impaired impulse control and executive functions.
Williams syndrome	Deletion of genes on chromosome 7q11.23. Abnormalities include decreased white matter volume compared to grey matter volume; greater posterior regional brain volume compared to frontal regional volume. It is unclear whether these abnormalities are specific to Williams syndrome.	Decreased IQ. Increased social drive. Impaired visual-spatial abilities; impaired expressive language. Insensitivity to negative emotional signals. Attentional bias towards faces.
Specific language impairment including pragmatic language impairment as a subtype	Notable absence of gross brain abnormalities; abnormal cortical and subcortical morphology in selected regions of the brain and of white matter connections	Heterogeneity of symptoms; most common profile: slow acquisition of lexis, morphology, syntax; slow speed of processing, poor phonological and verbal working memory, poor auditory processing, poor sequential procedural learning and memory

(continued)

Table 21.2 (continued)

	Main structural, functional or neurochemistry abnormalities in the brain*	**Core cognitive/neuropsychological impairments****
Autism spectrum disorder	Accelerated brain growth during childhood; decreased cortical thickness in left temporal and parietal lobes; abnormal synaptic pruning; atypical connectivity patterns.	Theory of mind tasks; abnormalities in face perception; abnormal social behavior
Attention deficit hyperactivity disorder	Very heterogeneous findings. Difficult to reconcile. Amongst them abnormalities in: frontoparietal networks; default network; visual and sensorimotor cortex; subcortical structures, cerebrellum.	Attention, executive functions
Traumatic brain injury in adolescents and children	Very heterogeneous group. Lesion can occur anywhere in the brain and can be focal or diffuse.	Very heterogeneous, can affect all cognitive and non-cognitive systems.
ADULT DISORDERS		
Parkinson's disease	Degeneration of dopaminergic neurons in the substantia nigra. Lewy body pathology spreading in olfactory bulb, intestine, lower brain stem nuclei, midbrain, thalamic and cortical areas.	In about one-third of patients problems with simultaneous processing, cognitive switching tasks, executive functions.
Huntington's disease	Autosomal dominant hereditary disorder. Cell and volume loss in striatum (caudate and putamen).	Broad range of cognitive functions affected (including executive function, memory) and psychiatric issues.

(continued)

Table 21.2 (continued)

	Main structural, functional or neurochemistry abnormalities in the brain*	**Core cognitive/neuropsychological impairments****
Alzheimer's disease	Accumulations of intracellular and extracellular protein aggregates (phosphorylated tau; neurofibrillary tangles; Aβ peptid forming neuritic senile plaques). Lesions in temporal lobe (hippocampus) with disease progression spreading to other brain regions	Learning, working memory (later in disease process any cognitive and non-cognitive impairment can occur depending on damaged substrates and networks)
Fronto-temporal lobe dementia (FTD)	Subtypes are progressive non-fluent aphasia, semantic dementia and frontal variant of FTD. Etiology unknown, although protein pathologies and a genetic component have been discussed. Progressive atrophy of circumscribed regions in frontal and temporal cortex. Later progression and more distributed damage.	Depending on subtype of FTD, loss of meaning attribution (semantic dementia); changes in personality, attention and executive functions with decline in social behavior (frontal variant of FTD); agrammatism, phonemic paraphasia, anomia (progressive non-fluent aphasia)
Right hemisphere damage	Very heterogeneous group. Lesion can occur anywhere in the right hemisphere affecting frontal, temporal, parietal, occipital regions. Cause for damage can be stroke but also other injury (e.g. TBI) or disease processes (e.g. fronto-temporal dementia)	Functional impairment depends on neural networks that are affected.

(continued)

Table 21.2 (continued)

	Main structural, functional or neurochemistry abnormalities in the brain*	**Core cognitive/neuropsychological impairments****
Frontal lobe damage	Heterogeneous group. Lesion occurs in right or left frontal areas due to stroke, trauma or other disease processes (including fronto-temporal dementia)	Impaired attention, complex non-literal and metaphoric language, executive functions, memory, affect
Aphasia	Most frequently caused by an ischemic or hemorrhagic stroke. Aphasia can also be caused by trauma, brain disease, tumor and so on. Middle cerebral artery frequently affected but lesion site can be very heterogeneous and can include cortical and subcortical regions.	Depending on the subtype, impairment of language production, language comprehension, working memory
Traumatic brain injury	Very heterogeneous group. Lesion can occur anywhere in the brain and can be focal or diffuse.	Very heterogeneous, can affect all cognitive and non-cognitive systems.
Schizophrenia	Reductions in whole-brain volume, whole-brain gray matter, frontal gray and white matter, parietal and temporal lobe white matter; large differences in lateral ventricular volume; alterations in glial cells; atypical activation of anterior cingulate and dorsolateral prefrontal cortex in response to selective attention and working memory tasks; dysregulated neurotransmitter systems (dopamine, glutamate, γ-Aminobutyric acid (GABA); global and local connectivity deficits	Impaired selective attention and working memory, discourse

*Note that the table is not exhaustive; only frequently described structural and functional findings are listed. The reader should also be aware of the heterogeneity that may exist from one patient to the other. It is thus possible that there are patients who do not show any of the findings listed here.
**The functional impairments described may be the defining characteristic of the disorder, or the disorder is frequently accompanied by the functional impairment. It may, however, also be that the functional impairment is not present in all patients with the disorder.

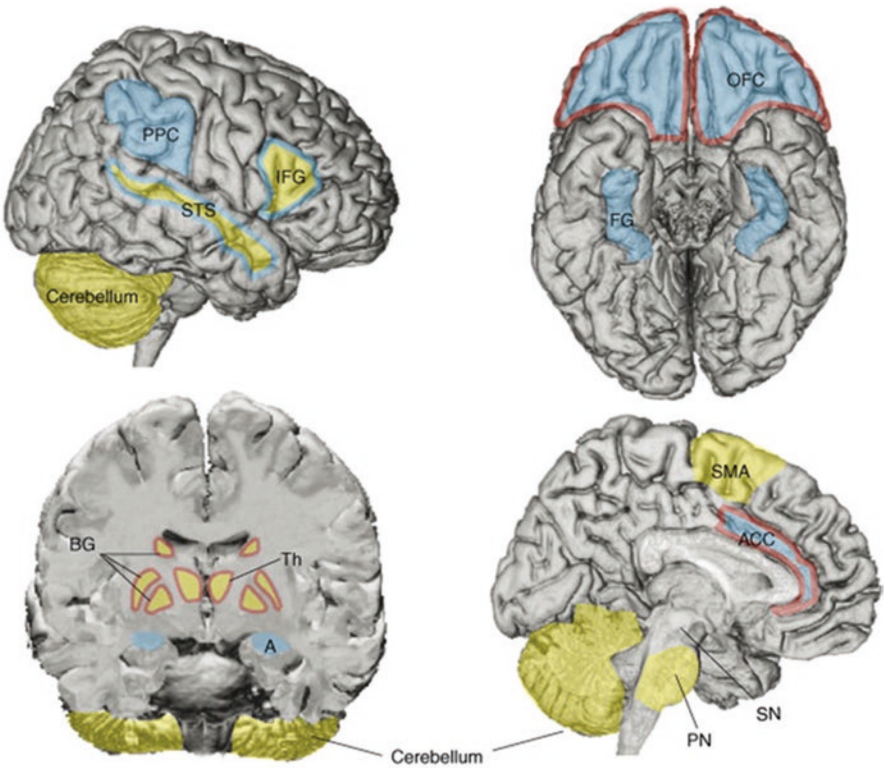
language processing, executive function tasks, response inhibition). This has led some researchers to hypothesize that these abnormalities are associated with behavioral problems such as inhibitory control and face recognition (Waldie and Saunders 2014). Critical voices have, however, pointed out that the connectivity findings are inconsistent across studies including underconnectivity, overconnectivity or no connectivity problem (McPartland et al. 2011). While evidence is accumulating that individuals with ASD show atypical connectivity patterns during a lifespan, the functional relevance still needs to be clarified (Harris 2015; Uddin 2015).

Another explanatory attempt comes from social information processing theories (Adolphs 2003, 2009). Neuroimaging studies have indicated anatomical and functional differences in the so-called social areas of the brain in ASD. These abnormalities have been correlated with social and pragmatic difficulties such as problems in remembering and identifying people, the inability to perceive social cues and emotional prosody and misunderstanding nonverbal communicative cues such as gestures and facial expressions (McPartland et al. 2011, 2016). Fig. 21.1 shows a summary of the brain regions that have been suggested to be involved in ASD and their association with core impairments in ASD.

These brain regions are linked with social behavior in animal studies and in lesion studies in human patients, or are identified in functional imaging studies. They include regions of the frontal lobe, the superior temporal cortex, the parietal cortex, and the amygdala. Expressive language function is linked to Broca's area in the inferior frontal gyrus and portions of the supplementary motor cortex. Wernicke's area is essential for receptive language function and the superior temporal sulcus plays a role in both language and social attention. Repetitive or stereotyped behaviors of autism may involve the orbitofrontal cortex and caudate nucleus (Amaral et al. 2008).

Considering the close relationship of ToM and ASD, one would expect impairment of the ToM neural network in ASD. However, neuroimaging studies that have directly compared individuals with ASD to neurotypical individuals when performing ToM tasks have produced controversial results. While some studies report no differences in ToM-relevant brain regions in ASD compared to neurotypical individuals, others report differences or mixed results (summarized by Dufour et al. 2013). There are numerous reasons for these discrepancies including small sample size, large individual variability, heterogeneity in the ToM tasks used and subsets of ASD investigated as well as methodological differences. Another reason might be that the theoretical assumptions or the approach taken may not have been optimal for uncovering differences (see Sect. 21.4).

While the research findings discussed previously remain controversial, research addressing a specific aspect of social cognition, face processing, has produced surprisingly stable findings. The ability to process faces is an important aspect of



Social impairment	Communication deficits	Repetitive behaviors
OFC – Orbitofrontal cortex	IFG- Inferior frontal gyrus (Broca's area)	OFC – Orbitofrontal cortex
ACC – Anterior cingulate cortex	STS – Superior temporal sulcus	ACC – Anterior cingulate cortex
FG – Fusiform gyrus	SMA – Supplementary motor area	BG – Basal ganglia
STS – Superior temporal sulcus	BG – Basal ganglia	Th – Thalamus
A – Amygdala mirror neuron regions	SN – Substantia nigra	
IFG – Inferior frontal gyrus	Th – Thalamus	
PPC – Posterior parietal cortex	PN – Pontine nuclei cerebellum	

Fig. 21.1 Major brain regions that may be relevant to the core features of autism spectrum disorder (Figure and legend taken from Harris (2015) with permission)

communication in that faces provide clues about the other person's emotional and mental state. Our ability to focus on faces and process information from faces has consistently been linked to the fusiform face area in the brain. The amygdala (an almond-like structure residing deep inside the brain) is implicated if faces express emotions, and especially fear. Children with ASD show slowed processing of faces and fail to attend to core features of the face like the eyes. In addition, they have problems with face discrimination and face recognition. At the brain level, this has been associated with reduced activity in the fusiform gyrus or fusiform face area when responding to faces. Impaired connectivity between the fusiform gyrus and the amygdala as well as reduced amygdala activity has also been reported (for a summary see Waldie and Saunders 2014; McPartland et al. 2011; Hernandez et al. 2015).

21.2.2 ToM in Individuals with Other Brain Disorders

ToM abnormalities have also been described in brain disease and brain damage other than ASD such as in neurodegenerative disorders, traumatic brain damage (TBI), right hemisphere damage (RHD), and schizophrenia (see Table 21.1). While in ASD abnormal social behavior and communication, including ToM, is one of the defining characteristics, in other patient populations, the issue is more equivocal as these characteristics do not always accompany the disorder, particularly TBI, RHD and dementia patients. In addition, these pathologies are often accompanied by malfunction of one or more cognitive systems like attention, memory and executive functions. A recurring question has been whether pragmatic difficulties, including ToM abilities, are secondary consequences of these malfunctions or whether they constitute an entity or module by themselves. The issue is further complicated by the fact that the affected neural substrates in these pathologies can vary considerably not only between groups (e.g. diffuse brain malfunction in dementia versus circumscribed lesions in right hemisphere stroke patients) but also within groups (e.g. lateral frontal versus medial frontal or parietal damage in RHD or TBI) (for a summary see Table 21.2). It is thus not surprising that while some studies report ToM impairments, others do not, and as to the neural underpinnings, the findings are inconclusive. Just as with ASD, reasons for the discrepancies are numerous: severity of the brain damage or illness, heterogeneity of the patients investigated and the tasks used, unclear influence of co-existing cognitive and non-cognitive impairments.

The summary is based on Cortese and Castellanos (2015); Evans and Brown (2016); Gasser et al. (2015); Harris (2015); Jackowski et al. (2009); Järvinen et al. (2013); Konopaske and Coyle (2015); Menon (2011); Parsons and Raymond (2015); Reilly et al. (2010); Ruparelia and Mobley (2015); and Savonenko et al. (2015).

The previous discussion has shown that there is currently little conclusive evidence concerning shared neural substrates in patients with brain damage or brain disease who present with ToM problems. Reasons for the inconclusive findings have been mentioned above. Another explanation could lie in the construct of ToM itself. Until now we have treated ToM as if it were a well-defined concept. There is, however, no clear understanding of the processes that actually make up ToM abilities, or whether ToM is modular, an entity by itself without identifiable subprocesses. Although the brain regions recruited by ToM tasks (bilateral temporo-parietal junction, right anterior superior temporal sulcus, medial precuneus, medial prefrontal cortex) have been remarkably reliable, these regions have also been activated by other processes, for example those requiring attention, inferential or integration abilities. The situation is even more confusing when one looks at clinical studies where ToM is sometimes used for describing specific impairments and, at the same time, is used as a cognitive trait that explains the disorder. Most researchers would probably agree that ToM abilities require reasoning and inferential abilities and that a minimum of intact attentional, memory, executive, and (in the case of verbal ToM tasks) language functions are necessary. It is, however, not clear to what degree those functions have to be intact for ToM to function properly. ToM has been used as a multidimensional, ill-defined concept and various (and not always similar) dimensions of ToM have been tested across studies and in heterogeneous patient populations. The current concept of ToM is vague including the processes that make up ToM. These and other problems with ToM have been raised more than a decade ago (see Leudar et al. (2004) for a special issue dedicated to criticism of ToM) and have recently been raised again (Schaafsma et al. 2015).

Some of the conceptual issues discussed in relation to ToM also pertain to pragmatics. Most research has focused on describing the nature of pragmatic impairments in specific patient populations and has borrowed concepts from cognitive science to explain the identified impairments or abnormalities (see Cummings (2009) for a detailed discussion). It is currently not clear what the basic processes are that support pragmatic behavior (see Cummings (2015) for a discussion). Neural aspects of pragmatics have largely been studied using three approaches: (a) associating damaged brain regions of patients with the pragmatic phenomena under investigation (for example, speech acts and figurative language); (b) investigating which brain areas are implicated when 'pragmatic' stimuli are experimentally presented; or (c) associating the cognitive processes assumed to be involved in tasks that tackle pragmatic behavior to neural substrates. Regardless of the approach taken, as long as there are no testable theoretical models of 'how pragmatics works' – that is, the processes and mechanisms involved in pragmatic behavior – the discussion of neural substrates and neural mechanisms supporting pragmatic behavior will remain hypothetical.

To sum up this section, one way to tackle the neural underpinnings of pragmatic behavior is by looking at the processes implicated in pragmatic behavior and their underlying neural mechanisms. Neural substrates and mechanisms are recruited depending on the processes that are required for appropriate pragmatic behavior to emerge. If these processes and their underlying neural substrates and mechanisms are disturbed or impaired by illness or any other condition, atypical or inappropriate pragmatic behavior may occur. Although there is currently no theory or model of the processes or mechanisms that underlie pragmatic behavior, processes relevant for successful ToM performance, including inferencing processes, seem to share properties that are also relevant for pragmatic performance. It was thus suggested that the neural mechanisms underlying ToM processes may also be relevant for pragmatic behavior. However, not all research findings support this hypothesis. Although the ability to represent and attribute mental states, thoughts and emotions to one's own mind and to the minds of others is one of the primary symptoms of

ASD, the core neural network underlying ToM is not always impaired in ASD. Methodological difficulties and the elusive concept of ToM may explain the discrepant findings. In other patient populations the picture is complicated by the fact that there is still controversy around the question whether ToM is actually impaired in these populations. In those cases where ToM problems have been identified, no clear pattern has been discerned. Generally, there is a lack of systematic investigation of the neural underpinnings of ToM impairment.

21.3 Reasoning and Inferential Skills

While reasoning within a social context is an important aspect of pragmatic performance, reasoning and inferential skill outside the social domain are equally important. Regardless of whether it is in a social or non-social context, reasoning is a mental activity that enables us to generate new knowledge, which allows us in turn to predict, explain and navigate the world around us. There are different modes of reasoning that may all be viewed as some form of deductive reasoning (see Bibel and Kreitz (2015) for a summary). The use of inferences is an important part of reasoning, and in cognitive science and psychology theories of human inferencing have been developed that try to explain various forms of reasoning (see Johnson-Laird (2010) for a summary). In the context of text comprehension, the use of inferences (or inferencing) is viewed as a set of computational processes that depend on the cognitive skills and the specific knowledge of the comprehender (Keenan 2015). Understanding non-literal language (e.g. requests) or figurative language (e.g. metaphors, idioms) relies heavily on our ability to reason and draw inferences.

The question of whether social and non-social reasoning are different entities or simply one entity with a different focus is still a matter of debate. Brain regions that have been identified as being particularly involved in social reasoning such as the prefrontal cortex and the temporo-parietal junction have also been activated by tasks that involve non-social reasoning (Baetens et al. 2015). In other words, brain regions that have been described as core areas involved in ToM abilities are not exclusively dedicated to social reasoning and mentalizing but are also active in non-social reasoning tasks. This is, in fact, not such an unusual observation, considering that many brain regions that have previously been thought to be dedicated to a particular function (such as Broca's area for aspects of language) are now known to also fulfill other functions.

Just as with social reasoning, non-social reasoning and inferencing processes are an integral part of pragmatics. Different patient populations with pragmatic disorders have been shown to have problems with non-social reasoning and making inferences (see Table 21.1). Similar to the ToM construct, research findings are sometimes difficult to reconcile as studies have often confused the descriptive and explanatory level, and used reasoning and inferencing as skills to describe an impairment or as processes to explain the cause of the impairment. Early research with right hemisphere damaged patients using behavioral methods had suggested that these patients' problems with aspects of discourse and with (complex) nonliteral and figurative language comprehension were grounded in their difficulties with drawing inferences. Inferencing abilities were thus viewed as the domain of the right hemisphere (see Stemmer (2008a, 2008b) for summaries).

Subsequent research showed, however, that other patient populations (aphasia, dementia, schizophrenia, and some developmental disorders) presented similar problems. Numerous studies with patients suffering from frontal lobe disease or damage (e.g. RHD, left hemisphere damage, fronto-temporal dementia, TBI) then pointed to the frontal lobes as a region with special importance for pragmatic functions including reasoning abilities. This is not surprising considering that the frontal lobes are implicated in self-awareness and consciousness, social and personality development, attention, memory and executive functions. Research has also shown that the frontal lobe system is functionally fractionated and entertains rich connections with other parts of the brain (Stuss and Knight 2002). Impairment of different frontal lobe systems and/or the connections to or from these systems may thus affect pragmatic performance in different ways. It is, however, difficult to know whether there are any patterns of pragmatic impairment as most studies have not considered the functional fractionation of the frontal lobe in a systematic way, nor have they systematically investigated the different facets of pragmatic behavior in different patient populations. In addition, atypical pragmatic behavior has also been found in patients with brain damage outside the frontal lobes which would support the view that pragmatic behavior emerges through the interaction of different brain systems (see Stemmer (2015) for a summary).

With the advancement of neuroimaging techniques the hope has been that these technologies would clarify the contribution that each hemisphere and specific regions within the hemispheres make to the interpretation of discourse and nonliteral and figurative language. However, studies have produced controversial results that do not always coincide with findings from behavioral studies. So far, the picture that has emerged points to a number of variables that seem to determine the degree to which the left and/or right hemisphere contributes to nonliteral and figurative language processing. In addition to intrinsic patient characteristics (attention, memory, language abilities and emotional state), these variables include the context, the complexity of and familiarity with the stimulus material and the task design.

Further, there is some evidence that the language network recruited at the word and language level (low-level language) is also recruited in high-level language processing. This makes sense if one accepts the view that high-level language processing relies on the interaction of different neural networks and brain regions that contribute to the emergence of high-level language phenomena, including attentional, memory, language and emotional networks. Based on meta-analyses concrete suggestions have been made concerning some brain regions that seem to be particularly active in high-level language processing (Ferstl et al. 2008; Ferstl 2010) (see Stemmer (2015) for a summary). These include the anterior regions of the temporal lobe possibly reflecting semantic and episodic memory integration processes and regions in the parietal lobe conjointly with anterior temporal lobe activation possibly associated with integrating text information. The activation of the dorsomedial region of the prefrontal cortex has been interpreted as reflecting recruitment of conscious strategic processes. These findings, however, should be regarded with caution as the studies included in the meta-analyses were heterogeneous. Moreover, many studies which pointed to different findings had to be excluded as they did not meet the criteria for inclusion in the meta-analyses.

Despite the numerous behavioral and neuroimaging studies that have investigated nonliteral, figurative language and discourse processing in the healthy human brain, there is currently no consensus on the underlying neural substrates. On the one hand, this is disappointing considering the effort that has been made to shed light on these issues. On the other hand, considering the many variables that determine the processes implicated in the interpretation of nonliteral, figurative language or discourse, it is not so surprising after all. In fact, one may pose the question whether the search for specific or dedicated brain regions and networks is not a fruitless endeavor, particularly if one takes the view that the neural networks and mechanisms implicated in human thought processes are dynamic systems that emerge and interact on demand, that is, systems which may converge at different salient hubs only to be then distributed according to demand (Stemmer 2016).

What does this mean for the investigation of the neural substrates contributing to appropriate or inappropriate pragmatic behavior? Considering that we currently do not have a good template of higher-level language processing in the healthy human brain, questions concerning the workings of neural systems underlying the processes implicated in pragmatic behavior in the pathological brain must remain hypothetical and general. What has become apparent is that an approach that focuses on specific brain regions, without considering neural networks and the dynamics of these networks between and within brain areas, is very limited. We know today that regions in the brain that are associated with aspects of lower-level language processing entertain a rich network of connections and it is to be expected that higher-level language processing adds to the richness of these networks. Fig. 21.2 illustrates the rich connections that link language regions in the left hemisphere known to be involved in low-level language processing. This model needs to be developed in order to include high-level language processing and thus provide testable hypotheses.

The superior longitudinal fasciculus I (orange) links the cortical areas of the superior parietal lobule with the caudal dorsolateral and dorsomedial frontal cortex. The superior longitudinal fasciculus II (purple) links the caudal part of the inferior parietal lobule (angular gyrus) with the ventrolateral frontal cortex, primarily area 45. The superior longitudinal fasciculus III (green) links the rostral part of the inferior parietal lobule (supramarginal gyrus) with the rostroventral part of area 6 and area 44. An additional fascicle (scarlet red) runs from occipito-temporal motion areas to the intraparietal sulcus and lateral frontal cortex. The fibers of the arcuate fasciculus (dark blue, yellow, and red) link posterior temporal cortex with lateral frontal cortex. The middle longitudinal fasciculus is depicted in light blue. The temporo-frontal extreme capsule fasciculus (blue/violet) links the superolateral temporal lobe with the ventrolateral frontal area 45A. Modified after Petrides (2014) with permission.

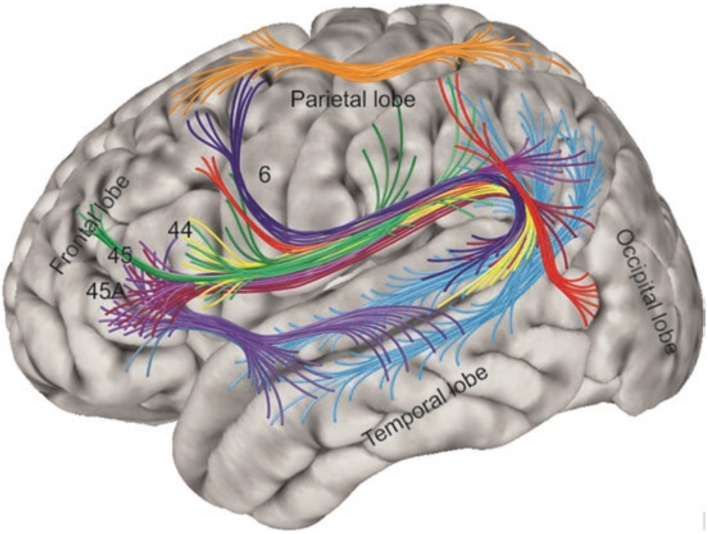


Fig. 21.2 Illustration of the various pathways that link areas of the peri-Sylvian region in the human brain

21.4 Pragmatic Disorders From a Large-Scale Brain Network View

Let us step back and ask a more global question: How does the human brain create a human mind? More concretely, how does the brain give rise to mental phenomena such as attention, memory, language, emotions or, as this is our focus, to typical and atypical pragmatic behavior? Based on the assumption that certain parts of the brain play unique roles in mental function, the classical approach to the study of this question was to relate cognitive or behavioral deficits to lesions in specific parts in the brain. When neuroimaging techniques became popular, functional brain imaging focused on associating activation in specific brain regions with the performance of particular cognitive tasks as has been discussed in previous sections. With technical advances in neuroimaging, however, instead of focusing on small parts of the brain we are now able to look at how the entire brain reacts as people perform different mental operations. We have learned that many regions cooperate during cognitive processes and that one region frequently performs several different functions (including, for example, Broca's region). Current neuroscience theories have moved away from a focus on discrete brain areas towards distributed models of brain function (see Bassett and Gazzaniga (2011) for a more detailed discussion). In this view, cognition emerges from the complex interaction of widespread brain areas (see Menon (2011), Bressler and Menon (2010) and Sporns (2010) for an overview of large-scale brain networks). Fig. 21.3 provides an example of how such large-scale brain networks are envisioned to work in comparison to the classical model.

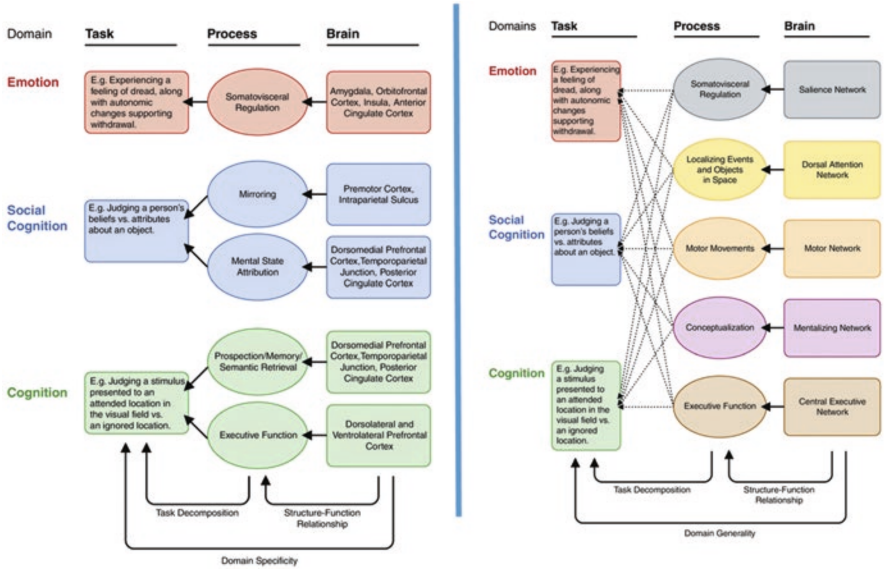


Fig. 21.3 Classical domain-specific neural modules (left) compared to large-scale domain general brain networks (right) (Figure from Barrett and Satpute (2013) with permission)

The model in Fig. 21.3 assumes that there are five brain networks each of which supports processes that contribute to aspects of task performance. In the classical domain-specific approach there is a strong brain structure to brain function relationship, with specific brain regions mapping onto specific processes within a domain. Each domain-specific task may implicate different processes that are supported by brain networks specific to the domain. From a classical view, pragmatic behavior would thus emerge through the operation of specific brain regions that support the processes that contribute to pragmatic behavior. Taking a large-scale brain network perspective, a range of pragmatic behaviors would emerge through the operation of brain networks that support specific processes which can contribute to any of the tasks in the various domains. The distinction between affective, cognitive and social neuroscience is thus an artificial one as the functional properties of the brain emerge from neural integration across time and space (Barrett and Satpute 2013) (see Bassett and Gazzaniga (2011) for an interesting discussion of the concept of emergence). Within such a network the possibilities for something going wrong and not working optimally are numerous as are the possibilities for compensation of malfunctioning components. The neural networks that ultimately produce pragmatic behavior are thus dynamic representations that form ad hoc depending on the demands at a given time.

In addition to the large-scale networks, another network that has gained prominence is the default-mode network (DMN) (Buckner et al. 2008; Spreng and Andrews-Hanna 2015). This network is active in individuals when no particular task has to be performed and has been associated with self-generated thought. An interesting observation is that the ToM network and the DMN largely overlap, indicating a role of the DMN in internal aspects of social cognition. In fact, it has been suggested that the DMN functions more broadly than the ToM network and also involves conceptual processing, memory and prediction (Spreng and Andrews-Hanna 2015). The cognitive components associated with the DMN comprise left and right dorsal medial and medial temporal subsystems with core regions in bilateral frontal and parietal regions. The dorsomedial subsystem has been associated with social conceptual knowledge and meta-cognitive reflection on such knowledge. The medial temporal lobe subsystem may be involved in the tracking and updating of person knowledge and the core regions represent information relevant to the self. As the DMN entertains widespread connectivity with mnemonic, limbic and semantic structures, it has further been suggested that it has a role in integrating external or internal information with one's current social context, affective experience, and prior knowledge (Spreng and Andrews-Hanna 2015).

The application of large-scale brain networks and DMN to brain pathophysiology is relatively recent and it remains to be seen whether it will help overcome the limitations of current approaches. The benefits of applying brain network analyses to brain pathology has been discussed by Menon (2011) and Kennedy and Adolphs (2012). Psychiatric and neurological diseases and disorders usually present with distributed and multifocal structural and/or biochemical brain abnormalities, and focusing only on specific brain regions while ignoring the interactive nature of the brain is extremely limiting. Applying brain network analyses might shed light on the way processes could be affected by the malfunction of large-scale interactions in the brain. In brain network models, damage can occur when one or several brain regions (nodes) and/or the connections (edges) that link them are lesioned. Dysfunctional networks can send atypical or erroneous signals to the entire network or sub-networks across the brain and affect a spectrum of cognitive and non-cognitive functions. Dysconnectivity patterns at a global and local brain level have been described in several psychiatric and neurological pathologies, including ASD, schizophrenia, depression, and Alzheimer's dementia, and suggestions have been made about how these abnormalities might lead to cognitive and non-cognitive dysfunction (Kennedy and Adolphs 2012; Menon 2011). Much of the current research is investigating the interaction of processes underlying cognition in large-scale networks and it remains to be seen whether testable models will develop. In this context, one may speculate whether pragmatic behavior emerges through the interaction of such local, global and DMN networks.

21.5 Summary

Pragmatic abnormalities or impairments have been described in a large range of developmental disorders and psychiatric and neurological diseases and conditions. Despite the heterogeneity of these disorders and conditions, most of them show overlapping pragmatic abnormalities and nearly all have been reported to have difficulties with some type of reasoning and the use of inferences. In a social context, problems with reasoning have most often been attributed to faulty mindreading or mentalizing abilities, commonly referred to as ToM. For some disorders such as ASD difficulties with ToM have been considered to be a core problem while in other disorders ToM difficulties have frequently been viewed as the consequence of or secondary to other cognitive or non-cognitive problems.

The prevalence of ToM difficulties in patients with brain diseases or disorders has led to numerous studies in social neuroscience investigating the neural underpinnings of ToM. Core regions in the frontal, parietal and temporo-parietal areas of the brain have been identified and specifically associated with ToM. Some authors have fractionated ToM functionality into the representation, attribution and execution of mental states, and associated distinct neuroanatomical networks and neurochemicals with each level of analysis. Most studies have used a one-dimensional approach to study ToM and, against expectation, patients who have shown problems with ToM have not always presented with lesions or atypical brain activation patterns in brain regions that are part of the core ToM network. This has been attributed to methodological challenges faced by studying heterogeneous patient populations as well as to conceptual issues surrounding ToM.

Social reasoning and inferencing processes as required by ToM tasks have been viewed as important but are not the only processes contributing to pragmatic behavior. Non-social reasoning and inferencing skills have been viewed as equally important and, in this context, the neural underpinnings of non-literal and figurative language, as well as discourse, have been discussed. Behavioral and neuroimaging studies have produced controversial results concerning the contribution that the right hemisphere and specific brain regions make to these specific aspects of pragmatics. While difficulties controlling the numerous variables that influence the processes involved in these aspects of pragmatics may be one reason for this unsatisfactory situation, another reason may be that the approach taken so far is not able to adequately capture the dynamics of the neural systems involved. A position was then taken that views pragmatic behavior as a dynamic rather than a static concept. On this view, pragmatics emerges through the complex interaction of different processes that recruit brain networks at local (small-brain networks, hubs) and global (large-scale networks) levels to satisfy the demand of the task or thoughts the individual engages in at a given time. Such a view seems compatible with the suggestions made by Cummings (2015) who has argued that 'utterance interpretation has a rational, intentional, holistic character'. Atypical pragmatic behavior would thus be the result of malfunctions at various levels of organization and combinations thereof, such as at a local or global network level, at the level of interaction between the networks, and/or as a consequence of the influence a malfunctioning network has on other networks.

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Chapter 22
Cognitive Aspects of Pragmatic Disorders

Louise Cummings

Abstract The study of the cognitive substrates of pragmatic disorders is a relatively recent development in clinical pragmatics. This development has been ushered in by calls from researchers and clinicians on two fronts. First, it has been urged that the field of pragmatics should undergo a cognitive turn, such that a cognitive examination of pragmatic concepts is afforded equal significance to societal, philosophical and linguistic approaches to the discipline. Second, clinicians have increasingly acknowledged that it is not possible to assess and treat clients with pragmatic disorders in isolation from cognitive concerns. The chapter begins with an examination of the various cognitive processes that play a role in a standard communicative exchange. From this examination the two main components of any cognitive treatment of pragmatic disorders – executive functions and theory of mind – are established. The findings of clinical studies of clients with pragmatic disorders are discussed. These studies suggest an association between cognitive processes such as theory of mind on the one hand and a range of pragmatic impairments on the other hand. Conversational data from clients with pragmatic disorders are used to illustrate these cognitive-based pragmatic impairments. Finally, three theoretical frameworks with the potential to explain the cognitive basis of pragmatic disorders are examined.

Keywords Cognitive-communication disorder • Cognitive pragmatics • Executive function • Mental state attribution • Modular pragmatics • Relevance theory • Theory of mind • Utterance interpretation

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22.1 Introduction

This chapter takes the following claim as its starting point: no account of pragmatic disorders is possible in the absence of cognitive processes. Indeed, it will be argued that cognitive factors are so inextricably linked to pragmatic disorders that we cannot explain these disorders or effectively assess and treat them without appeal to these factors. To the reader, this claim may not appear to be particularly novel when so many communication disorders have already yielded to cognitive examination. After all, cognitive accounts of the linguistic deficits in communication disorders such as specific language impairment and developmental phonological disorder are by now well established (Cummings 2008, 2013a; Rvachew 2014; Ellis Weismer 2014). But in the relatively short history of the clinical study of pragmatic disorders, a cognitive approach is still sufficiently recent to qualify as a novel development. There are three reasons why a cognitive approach has been a latecomer to the study of pragmatic disorders. First, although the mainstream study of pragmatics has received the attention of cognitive theorists for some time (e.g. Sperber and Wilson's ([1986] 1995) relevance theory), a cognitive approach has been slow to be applied to the study of pragmatic disorders and is still an underrepresented area of clinical investigation (Cummings 2007a, b). This is due in large part to the disciplinary background of pragmatists. Theoretical pragmatists often lack knowledge of communication disorders in general and pragmatic disorders in particular. Accordingly, they are reluctant to apply their cognitive ideas to the study of pragmatic disorders and, equally importantly, to integrate insights from these disorders into the development of pragmatic theories.

Second, pragmatics has witnessed rapid expansion and specialization within its various sub-disciplines. There are now well-established lines of enquiry in areas such as historical pragmatics, societal pragmatics, and intercultural pragmatics, to name just three sub-disciplines. Notwithstanding this specialization, pragmatics has remained largely wedded to its philosophical roots. These roots have been a source of much conceptual depth in the discipline. However, they have also limited the extent to which pragmatics has been able to orient itself towards the cognitive issues that are needed to understand pragmatic disorders. Body et al. (1999) make this same point when they remark of pragmatic theories that 'their rationale and area of focus have been the concerns of their parent disciplines – principally philosophy, sociology, and linguistics – with the result that the relationship between pragmatics and areas such as cognition and neurology, both crucial in understanding communication pathologies, have been relatively little explored' (89). Third, cognitive theorists have viewed aspects of cognition such as visual perception and language decoding as more amenable to cognitive investigation than processes like utterance interpretation and belief fixation. The reasons for this difference of treatment are complex and relate ultimately to the distinct characters of these processes – visual perception is a bounded or encapsulated cognitive process in a way that utterance interpretation is not. However, the upshot is that while cognitive accounts of the former domains have been seriously pursued by investigators, similar accounts of utterance interpretation are not nearly so numerous. Once again, the result is a distancing of pragmatics in general and pragmatic disorders in particular from the cognitive domain.

In this chapter, a cognitive approach to the study of pragmatic disorders will be developed along the following lines. In Sect. 22.2, a standard communicative exchange is examined. This exchange is unremarkable in that it is typical of the many similar exchanges that unfold between communicators on a daily basis. Yet, its mundaneness belies a level of cognitive complexity which is astounding as much as anything for its lack of proper examination by pragmatists. A complex array of mind-reading skills and other cognitive processes are seen to permeate the exchange. In Sect. 22.3, these cognitive skills are examined, first on their own terms and then in relation to aspects of impaired pragmatics in children and adults with pragmatic disorders. This small clinical literature is still at a formative stage. However, it is nonetheless revealing of the type of relationship that may exist between pragmatic phenomena on the one hand and a range of cognitive skills on the other hand. In Sect. 22.4, linguistic data from children and adults with pragmatic disorders is examined. In some cases, this data takes the form of conversational exchanges in which individuals with pragmatic disorders are participants. In other cases, the responses of subjects to experimental stimuli are presented and analysed. In all cases, pragmatic disorders can be seen to be related to specific cognitive deficits. In Sect. 22.5, three theoretical models which have the potential to explain the cognitive basis of pragmatic disorders are briefly examined. These models are relevance theory, cognitive pragmatics theory and modular pragmatics theory. Finally, the contents of the chapter are summarized in Sect. 22.6.

22.2 A Standard Communicative Exchange

That cognitive processes are integral to utterance interpretation is something of a platitude. However, the true import of this statement can really only be recognized when we set about a detailed examination of the role of these processes in a standard communicative exchange. Consider the exchange below between Pete and his wife Fran:

Pete: Should we ask Sally over to have a drink with us this weekend?
Fran: She told me her father was still unsteady on his feet after the operation.
Pete: Okay, I'll leave it until next month.

This exchange is typical of the communicative encounters that each of us experiences on a daily basis. Pete is checking with his wife Fran if he should invite Sally for a drink at the weekend. Fran implicates that this is probably not a good idea as Sally's father has still not fully recovered from an operation and, presumably, needs Sally's assistance. Pete indicates that he has recovered this particular implicature of Fran's utterance by saying that he will leave inviting Sally until next month. On most post-Gricean pragmatic accounts, this exchange reveals the importance of the recognition of intentions in communication. In effect, Pete can only truly be said to have understood Fran's utterance when he has recognized the particular communicative intention which motivated it. The recognition of communicative intentions is a cognitive process through and through. But it is not the only, or even the most important, cognitive process that is at work in the above exchange. Before Pete even begins to decode Fran's utterance, he must undertake a number of perceptual processes. These processes include *auditory perception* not just of the linguistic stimuli in Fran's utterance but also of the barking family dog in the background against which Pete is straining to hear what Fran says. Pete must also use his skills of *visual perception* to register the expression of doubt on Fran's face. Before Fran even utters a word, this expression is conveying to Pete that his proposal to invite Sally over for a drink will not be endorsed by her. Of course, Pete's perceptual processes will be completely overwhelmed if he does not have some means of controlling the auditory and visual stimuli to which he attends. Pete's capacity for *selective attention* is what allows him to attend to the auditory stimuli that constitute Fran's utterance, while simultaneously disregarding the dog that is barking in the background.

Aside from perception and attention, Pete must employ more than one form of *memory* in his interpretation of Fran's utterance. He must draw upon semantic memory to understand the meaning of the words 'father', 'unsteady' and 'operation' in Fran's utterance. The meanings of these words are held in short-term memory as Pete undertakes the linguistic decoding of Fran's utterance. Pete's store of world knowledge in long-term memory will enable him to recall that Sally's father had a hip operation and to appreciate that a person's mobility is likely to be compromised, at least initially, following such a procedure. For her part, Fran will also draw on these different types of memory to make sense of this exchange with Pete. Pete's mention of Sally in his first utterance may trigger an autobiographical memory for Fran of a visit that she and Sally made to Rome last year. Fran must also activate her semantic memory to understand that 'a drink' usually means an alcoholic beverage and that 'the weekend' refers to the period of time between the end of work on Friday and the start of work on Monday. Fran's utterance suggests the activation of world knowledge in her long-term memory. Specifically, she knows that a hip operation is major surgery that can result in complications (e.g. infection) and can involve a long period of recuperation and rehabilitation. She also knows that Sally's father has only recently undergone this procedure and that his rehabilitation is unlikely to be complete in consequence. Fran might even go as far as recalling the hip operation that her mother had some ten years earlier and some of the difficulties her mother experienced in the recovery period. In short, a vast range of memory resources are activated during this exchange between Pete and Fran, with each type of memory contributing to the eventual success of the encounter.

Perception, attention and memory are clearly integral to the communicative moves between Fran and Pete in the above exchange. But they are not the only cognitive skills that are exercised by these participants in this exchange. For Pete and Fran must also undertake a series of complex *mental state attributions* in order to construct their own utterances and interpret each other's utterances. These mental states include cognitive states such as knowledge, belief and ignorance and affective states such as happiness, disgust and fear. Pete's use of the pronouns 'us' and 'we' in the first turn in this exchange only makes sense to the extent that Fran will be able to establish the intended referents of these terms. For this to happen, Pete must be able to attribute certain *knowledge* states both to his own mind and to Fran's mind. Specifically, he must know that Fran knows the intended referent of these terms. Pete must also know that he can employ the deictic expression 'this weekend' and that Fran will be able to supply the intended temporal referent of this term. Once again, this is only possible to the extent that Pete is able to attribute a certain *belief* state to Fran, namely, the belief that 'this weekend' refers to the upcoming weekend and not to some distant period of time. Pete's utterance also only makes sense on the assumption that he can attribute a certain state of *ignorance* to Fran. For Pete must believe that Fran is ignorant of his plans to invite Sally for a drink in order to even raise this proposal in the first place. For her part, Fran is also attributing a range of cognitive states to Pete in this exchange. For example, she must believe that Pete already *knows* that Sally's father has had an operation. Why else would Fran include this knowledge as a presupposition of her utterance? Fran must also believe that Pete is *ignorant* of the recovery that is being made by Sally's father in order for Fran to report this information in the exchange.

Mental state attribution does not end here, however. For alongside the attribution of cognitive states, Pete and Fran must also attribute a range of affective states to each other's minds. Let us imagine a scenario in which Sally is an unpleasant house guest. She swears regularly in the company of others, often gets into arguments and she never thanks her hosts for their hospitality. Under these circumstances, we may expect Pete to attribute certain affective states to Fran, including *fear*, *disgust* and possibly even *anger* about Sally, before he even gets to the point of suggesting to Fran that they invite her over for a drink. Unless Pete's aim in the exchange is to upset Fran, we may expect him to attribute quite a different set of affective states to her (happiness, enthusiasm, etc.) prior to the point where he produces his first utterance. For her part, Fran is also attributing affective states to Pete throughout this exchange. For example, she may register Pete's *surprise* at hearing the news that Sally's father is still unsteady on his feet after his hip operation. Pete's raised eyebrows may alone suffice for Fran to attribute this particular affective state to him. An affective state of surprise may quickly change to one of *disappointment* when Pete accepts in his final utterance that an invitation to Sally to join them for a drink will have to be postponed for some time to come. Fran may use prosodic features of Pete's utterance such as intonation and stress as the grounds for the attribution of this affective state to him. Alternatively, Fran may detect some *delight* on Pete's part if his final utterance in this exchange is accompanied by a smile. Using her background knowledge that Pete likes to do home improvements at the weekend, this smile may be all Fran needs to establish that Pete is quite *pleased* to be relieved of this particular social engagement.

This section has revealed that a complex array of cognitive skills lies at the very heart of utterance interpretation. Most pragmatic accounts of utterance interpretation fail to acknowledge the full contribution of these skills. How often do we hear that utterance interpretation involves the recognition of communicative intentions?

In reality, these intentions merely mark the end point of a process of mental state attribution that weaves endlessly through a range of cognitive and affective mental states. How often are we told that hearers draw on background knowledge in memory to interpret the utterances of speakers? In reality, no hearer would ever get to the point of needing to retrieve knowledge from memory if he could not first selectively attend to certain stimuli in his environment. What the discussion in this section has demonstrated is that the cognitive processes which pragmatists acknowledge in their accounts of utterance interpretation are a mere subset of the cognitive skills that speakers and hearers actually use in their communicative exchanges with each other. And even the treatment of these skills in this section has not been exhaustive. For example, we have not addressed how the exchange between Pete and Fran would be affected if either of these participants were unable to initiate, plan and organize their utterances. In the rest of this chapter, we subject these cognitive skills to a detailed examination of the type not typically encountered in pragmatic accounts of utterance interpretation. The aim is to demonstrate that cognitive skills are so inextricably linked with the various phenomena that we take to constitute pragmatic interpretation that there is no sense in which we can proceed to talk about notions like implicature and presupposition in the absence of these skills. It is only when this aim is achieved that the study of pragmatic disorders can be said to have taken a 'cognitive turn'.

22.3 Theory of Mind and Executive Function

In Sect. 22.2, cognitive skills that are central to utterance interpretation, but which are seldom explicitly acknowledged by pragmatists, were progressively laid bare during the examination of a standard communicative exchange. These skills are subsumed under two main cognitive functions known as theory of mind (ToM) and executive function. In this section, ToM and executive function are examined in detail. This examination begins with a discussion of the types of cognitive skills that researchers identify as being integral to ToM and executive function. It will be seen, for example, that while ToM is a unitary concept based on meta-representation, executive function subsumes quite distinct cognitive skills which nevertheless act in concert with each other to produce goal-directed behaviour. The examination of these cognitive skills on their own terms then gives way to a discussion of how these skills are disrupted in children and adults with a range of clinical disorders. In some cases, normal ToM and executive function skills may not be acquired during the developmental period. This occurs in children with autism spectrum disorder, for example, who lag well behind their normally developing peers in the acquisition of ToM. In other cases, ToM and executive function skills may become disrupted in adulthood as a result of disease, illness or injury. This occurs in adults who sustain a traumatic brain injury, and who may have impaired executive function skills in consequence. The findings of clinical studies are reported. These studies demonstrate a link between ToM and executive function on the one hand and pragmatic language skills on the other hand. Although these studies are small in number, it will be argued that their results are strongly suggestive of a role for both ToM and executive function as cognitive substrates of pragmatic disorders.

22.3.1 Theory of Mind

Theory of mind describes the ability to attribute mental states both to one's own mind and to the minds of others. It is by means of the attribution of these states that we can explain and predict the behaviour of others. The mental states which are so attributed include cognitive mental states (e.g. knowledge and belief) and affective mental states (e.g. happiness and anger). Because the attribution of these states involves the ability to read other minds, ToM is also referred to as mind-reading by investigators. The term 'theory of mind' has its origins in the work of two primatologists called Premack and Woodruff.[1] However, it has been in the study of human minds rather than primates that the concept has wielded most influence. Although the meta-representational skills which are integral to ToM can be variously assessed (e.g. detection of *faux pas*, mind-in-the-eyes tests), the standard test of ToM takes the form of a false belief test. In one of the most widely used false belief tests, two dolls, called Sally and Anne, are used by an investigator to act out the following scenario. Children observe a scenario in which one doll (Sally) switches the location of an object that is subsequently requested by the other doll (Anne). Importantly, Anne is unaware that this switch has been made and believes that the object is still in the original location where she placed it. The child who appreciates that Anne now has a false belief about the location of the object, a false belief that leads her to search for the object in its original location, is said to have passed the test. This child is aware that other agents (represented here by the doll Anne) can have beliefs that differ from his or her own. A child who fails to appreciate that Anne's mental states need not be the same as his or her own will respond that Anne will search for the object in its new location for the simple reason that this is where the child knows the object to be.

A considerable amount is now known about the development and decline of ToM during the human lifespan. For example, we know that normally developing children begin to pass false belief tests between 4 and 5 years of age (Krachun et al. 2010). However, younger children can also pass these tests under certain conditions. Wellman and Lagattuta (2000: 25) identify these conditions as downplaying the salience of the real state of affairs or making salient the prior mental state of the

[1] Premack and Woodruff used the term 'theory of mind' in a 1978 paper entitled 'Does the chimpanzee have a "theory of mind"?'. In that paper, ToM was defined as follows: 'In saying that an individual has a theory of mind, we mean that the individual imputes mental states to himself and others […] A system of inferences of this kind is properly viewed as a theory, first because such states are not directly observable, and second, because the system can be used to make predictions, specifically about the behaviour of other organisms' (1978: 515).

actor in the scenario (both encourage the child to consider the actor's false belief), the active engagement of the child in the deception of the target person, phrasing the false belief question in certain ways, and overlearning the main features of the false belief narrative. There are also notable ToM achievements in older children and adolescents (Dumontheil et al. 2010). Children of 10 and 11 years of age can pass first- and second-order ToM problems, perform slightly above chance on third-order ToM problems and perform at chance on fourth-order ToM problems (Liddle and Nettle 2006). Bosco et al. (2014) found that the maturation of ToM continues during pre-adolescence and adolescence, with girls outperforming boys on all ToM components examined in the study. ToM skills have also been found to decline in more advanced years. For example, Maylor et al. (2002) found that performance on ToM stories in an old age group (mean age = 81 years) was significantly worse than that of two other age groups (mean ages = 19 and 67 years) across all conditions in the study. Cavallini et al. (2013) report a specific impairment in inferring mental states which starts from 60 years of age and which is independent of changes in executive functions such as working memory.

There is also an extensive empirical literature on the presence of ToM deficits in several clinical populations with marked pragmatic impairments. These populations include children and adults with autism spectrum disorder (ASD), intellectual disability, and traumatic brain injury (TBI) and adults with right-hemisphere language disorder, dementia and schizophrenia. In an early study of ToM in autism, Baron-Cohen et al. (1985) found that while 85 % of normal children and 86 % of children with Down's syndrome passed the belief question in a false belief test, 80 % of children with autism failed this same question. Subjects with ASD have also been found to have diminished awareness of their own and others' intentions (Williams and Happé 2010), to display impaired visual perspective-taking (i.e. knowledge that different people may see the same thing differently at the same time) (Hamilton et al. 2009), and to have impaired understanding of the perception-knowledge relationship (Lind and Bowler 2010). Additionally, there are difficulties in inferring complex emotions and mental states from faces and voices (Golan et al. 2006; Kleinman et al. 2001; Rutherford et al. 2002), and in social contexts and from non-verbal social cues (David et al. 2010; Golan et al. 2008). ToM deficits have been reported in subjects with intellectual disability in the presence of a range of syndromes. These syndromes include Williams syndrome, fragile X syndrome, Down's syndrome and foetal alcohol spectrum disorders (Abbeduto et al. 2001; Cornish et al. 2005; Grant et al. 2007; Rasmussen et al. 2009; Santos and Deruelle 2009; Sullivan and Tager-Flusberg 1999; Yirmiya et al. 1996). ToM performance does not appear to be related to receptive vocabulary or grammatical ability at least in Williams syndrome (Van Herwegen et al. 2013). ToM impairments have been found to remain in fragile X syndrome even after controlling for lower non-verbal IQ (Lewis et al. 2006).

Children and adults who sustain a TBI can experience significant ToM deficits. These deficits often persist for years after the injury that caused them, and can have a negative impact on the employability and social reintegration of adults (see Cummings (2011, 2014a, 2015a, 2016b) for discussion). McLellan and McKinlay

(2013) found deficits in affective ToM in adult subjects who had sustained a TBI as a child. All subjects were a minimum of five years post-injury at the time of study. Henry et al. (2006) reported that the recognition of basic emotions and capacity for mental state attribution in adult subjects with TBI are both significantly reduced relative to controls. ToM impairments in adults with TBI have been found to remain stable between the time of injury and at 1-year follow-up (Milders et al. 2006). Not all studies have found evidence of ToM impairments in subjects with TBI. Muller et al. (2010) reported that subjects with severe TBI perform as well as control subjects on first-order false belief tasks. Although studies have revealed ToM and mentalising deficits in clients with right-hemisphere damage (RHD) (Griffin et al. 2006; Happé et al. 1999; Weed et al. 2010), a review of this area by Weed (2008) judged that evidence of a specific ToM deficit in RHD is still inconclusive. In a recent study, Yeh and Tsai (2014) found that patients with right stroke had poorer performance than patients with left stroke on the cognitive component of non-verbal theory of mind.

Dementias have implications for a large range of cognitive skills. ToM is no exception, with both cognitive and affective aspects of ToM known to be disrupted in a number of different dementias. ToM deficits have been identified in patients with frontal and behavioural variant frontotemporal dementia (Fernandez-Duque et al. 2009; Gregory et al. 2002; Lough et al. 2006; Torralva et al. 2009), and in adults with Alzheimer's disease (Castelli et al. 2011; Fernandez-Duque et al. 2009; Gregory et al. 2002). Irish et al. (2014) reported that subjects with semantic dementia exhibit marked ToM deficits relative to control subjects. These deficits, which correlated significantly with atrophy in right anterior temporal lobe structures, were not exclusively attributable to the semantic processing impairments of these subjects. Finally, clients with adult-onset schizophrenia are known to have significant ToM deficits. Schizophrenic clients perform poorly on first- and second-order ToM tasks (Bozikas et al. 2011). Negative symptoms in schizophrenia have been found to be associated with ToM difficulties, while positive symptoms (e.g. delusions) are linked to overmentalizing (Lincoln et al. 2011; Montag et al. 2011). ToM performance in patients with first-episode schizophrenia and in patients with remitted schizophrenia has been shown to be related to executive functions (Fernandez-Gonzalo et al. 2014; Mehta et al. 2014).

Amongst this rich literature on ToM in a range of clinical disorders are a small but growing number of studies that have examined the relationship between ToM and pragmatic language skills (Cummings 2016c). Several such studies have addressed conditions that have their onset in the developmental period. Second-order ToM reasoning has been found to be significantly associated with the ability of subjects with Asperger's syndrome to interpret non-literal utterances (ironic jokes) (Martin and McDonald 2004). In a study of 57 children with autism, Hale and Tager-Flusberg (2005) reported that ToM contributed unique variance in the use of topic-related contingent utterances beyond the significant contribution made by language skills. Losh et al. (2012) examined ToM and pragmatic language in children with idiopathic autism and children with fragile X syndrome with and without autism. ToM was related to pragmatic language ability in all three clinical groups.

John et al. (2009) examined the referential communication skills of 57 children with Williams syndrome aged 6–12 years. These children were required to verbalize to a speaker when a message was inadequate, and also to communicate effectively the way in which it was inadequate. ToM contributed significantly to the prediction of variance in overall verbalization of message inadequacy. In a study of 24 children with congenital visual impairment, Pijnacker et al. (2012) reported that the ability to understand the motivations behind the use of non-literal language such as irony is associated with ToM skills.

Similar correlations between pragmatic language skills and ToM have been reported in adult-onset conditions. Monetta et al. (2009) found a significant correlation between the ability of non-demented patients with Parkinson's disease to interpret an utterance as a lie or an ironic remark and performance on second-order belief questions. Cuerva et al. (2001) reported a significant association between performance on a test of second-order false belief and pragmatic deficits in the interpretation of conversational implications and indirect requests in 34 patients with probable Alzheimer's disease. Brüne and Bodenstein (2005) found that approximately 39 % of the variance of proverb comprehension in schizophrenic patients was predicted by their ToM performance. Mo et al. (2008) reported that metaphor comprehension was significantly correlated with second-order false belief understanding in 29 schizophrenic patients who were in remission at the time of study. In a study of schizophrenic patients with formal thought disorder, Langdon et al. (2002) reported that poor ToM performance was associated with impaired understanding of irony in these patients. Mazza et al. (2008) examined ToM and pragmatic language skills in 38 patients with schizophrenia. These patients performed significantly worse than healthy controls on ToM tasks and a pragmatics task examining appreciation of Gricean maxims, even after controlling for IQ and executive function scores. Moreover, a significant correlation was found between the number of errors on the Gricean maxim task and ToM performance in these patients.

These studies are strongly suggestive of a role for ToM in the cognitive substrates of pragmatic disorders. However, at this early stage in the empirical investigation of the relationship between ToM and pragmatics, it is necessary to exercise caution when drawing conclusions from these studies. Studies which reveal a correlation between ToM deficits and pragmatic impairments in children and adults should not be taken to indicate that ToM deficits *cause* pragmatic impairments. It is possible that a third variable like IQ or executive functions is making an independent contribution to both ToM deficits and pragmatic impairments. It is also possible that any causal relationship, if such a relationship does exist, is in the opposite direction to the one which we have assumed to be the case in this section, i.e. pragmatic impairments *cause* ToM deficits. There is some empirical support for this latter relationship. Muller et al. (2010) found that patients with TBI performed significantly worse than controls on a task examining the interpretation of direct and indirect speech acts and on a faux pas test (a test of ToM). The interpretation of indirect speech acts was shown to be significantly correlated with performance on the faux pas-related questions of the faux pas test as well as performance on second-order false belief stories. Muller et al. suggested that impairment in these patients' language skills, specifically pragmatic abilities, may at least partially explain their problems with ToM. Clearly, future research into the cognitive substrates of pragmatic disorders must go beyond the demonstration of correlations between ToM and pragmatics in clinical subjects to establish the exact nature of this important relationship.

22.3.2 Executive Functions

No examination of the cognitive substrates of pragmatic disorders can afford to overlook the burgeoning literature on executive functions. This set of cognitive processes is less easily defined than theory of mind. This is on account of the fact that executive functions subsume a large range of cognitive processes that play a role in the planning, regulation and execution of goal-directed behaviour. Definitions of executive functions typically take the form of a list of examples, as Elliott (2003) acknowledges:

> The term 'executive function' is used as an umbrella for various complex cognitive processes and sub-processes. Most attempts to define executive function resort to a list of examples (such as task-switching, planning, or that other useful umbrella term 'working memory'), which reflects the fact that executive function is by no means a unitary concept. (49)

The attempt to define executive functions by listing examples is particularly well exemplified by Carlson et al. (2004) who state that '[t]he executive functions serve to monitor and control thought and action and include skills such as self-regulation, inhibitory control, planning, attentional flexibility, error correction and detection, resistance to interference, and working memory' (299). An exhaustive treatment of executive functions is not possible in the present context (see chapter 3 in Cummings (2014a) for such a treatment). Accordingly, this section examines three foundational components of executive function: inhibition, working memory and shifting. In what follows, each of these executive functions is defined. The development of these functions in normally developing children is briefly considered. Finally, the impairment of these executive functions in children and adults with a range of pragmatic disorders is also addressed.

Inhibition, working memory and shifting are separable, but correlated executive functions in adults (Miyake et al. 2000). However, there is evidence that executive function is a unitary, domain-general process at 3 years of age, when executive function skills are emerging (Wiebe et al. 2011). Executive function appears to retain this unitary character at least until children reach adolescence. Xu et al. (2013) examined developmental changes in updating working memory, inhibition and shifting in 457 children aged 7–15 years. A single-factor (unitary) executive function (EF) model best explained the EF performance of children aged 7–9 years and 10–12 years. However, a three-factor model that included updating working memory, inhibition and shifting best accounted for EF performance of children aged

13–15 years. Xu et al. claim that this finding indicates that developmental dissociations in these three executive functions do not emerge until children transition into adolescence.

Inhibition or inhibitory control is the ability to suppress competing, dominant, automatic or prepotent responses. A commonly used measure of the ability to inhibit a habitual response is the Stroop Test (Stroop 1935). In this test, a subject is presented with colour words (e.g. 'blue', 'red') in different coloured inks. The subject must name the colour of the ink rather than say the word. The word often intrudes – it is the habitual response – and it is this response which the subject must inhibit. Young, normally developing children typically fail inhibitory control tasks. However, under certain conditions (e.g. the presence of a delay between stimulus and response), children of 4 years of age have been found to succeed on these tasks (Diamond et al. 2002). Urben et al. (2011) reported an improvement in the ability of children to inhibit a prepotent response between 5 and 10 years of age. Ikeda et al. (2014) used a Stroop-like big-small task to examine inhibitory control in children aged 3–12 years. This task required subjects to say 'big' when viewing a big circle (same condition) and 'big' when viewing a small circle (opposite condition). The opposite condition required children to inhibit a prepotent response. Stroop-like interference decreased markedly in these children, with the difference between conditions in error rates significant for 3–4 year olds and 5–6 year olds but not for older children.

Working memory, or rather the updating and monitoring of working memory representations, is a key executive function. This function 'requires monitoring and coding incoming information for relevance to the task at hand and then appropriately revising the items held in working memory by replacing old, no longer relevant information with newer, more relevant information' (Miyake et al. 2000: 57). A range of tasks can be used to investigate the updating of working memory. One such task is a time-monitoring task in which subjects have to indicate the passing of time every five minutes while watching a movie. Forman et al. (2011) reported that adolescents aged 12–16 years displayed reduced clock checking and increased timing error than they had done four years earlier at 8–12 years of age. Adolescents with greater relative gains in the development of working memory achieved better calibration than subjects with less developed working memory functions. Mäntylä et al. (2007) found that children needed more clock checks in order to obtain the same level of response accuracy as adults, a finding which was related to the children's difficulties in temporary maintenance and updating of working memory contents. Whitely and Colozzo (2013) found that the capacity to update working memory in typically developing children with a mean age of 7 years was related to the ability to make accurate reference to story characters during a narrative production task.

Shifting – also known as attention switching or task switching – involves shifting back and forth between mental sets, multiple tasks or operations (Miyake et al. 2000: 55). A range of tasks may be used to examine shifting. One of the most popular is the Wisconsin Card Sorting Test (WCST). This assessment requires subjects to sort cards according to different principles such as form, colour or number. As the task progresses, the subject is required to change his approach as he encounters unannounced shifts in the sorting principle (from colour to number, for example). In a study of developmental norms on the WCST, Chelune and Baer (1986) found that by the time children are 10 years old, their performance on this test is indistinguishable from that of adults. Huizinga and van der Molen (2007) used the WCST to examine developmental change in set-switching and set-maintenance in children and adults. These investigators found adult levels of performance on set-switching in 11-year-olds and set-maintenance in 15-year-olds. Crone et al. (2006) examined children's ability to use feedback cues to switch between different sorting rules in a rule change task. The number of perseverative errors was less in 16- to 18-year-olds than in 8- to 10-year-olds. Children aged 12–14 years performed at an intermediate level on this task. For further discussion of the development of all three foundational components of executive function – inhibition, working memory and shifting – the reader is referred to Best and Miller (2010).

Significant executive function deficits have been found in children and adults with a range of disorders in which there are marked pragmatic impairments. Among disorders with onset in the developmental period, studies have reported such deficits in autism spectrum disorder (ASD), specific language impairment (SLI), intellectual disability and attention deficit hyperactivity disorder (ADHD). Van den Bergh et al. (2014) reported problems with inhibition, planning and cognitive flexibility in 118 children and adults with ASD aged 6–18 years. Clinically significant problems with cognitive flexibility were found in 51 % of these subjects. Inhibition problems were mostly found in the youngest children aged 6–8 years. Vugs et al. (2014) found problems with inhibition, shifting, emotional control and planning/organization in a study of 58 children with SLI aged 4 and 5 years. Additionally, these children performed significantly worse than typically developing children on cognitive and behavioural measures of working memory. In a study of 25 children with Down syndrome, Daunhauer et al. (2014) found significant deficits in working memory and planning across teacher and parent reports of these children's behaviour. Parents (but not teachers) further reported difficulties in inhibitory control in these children relative to a group of typically developing children. Schoemaker et al. (2014) assessed inhibition and working memory performance three times in 18 months in a preschool sample of 200 children with ADHD and disruptive behaviour disorders (DBDs). Over time, poorer inhibition performance was associated with ADHD and DBDs, while poorer working memory performance was associated with ADHD.

Executive function deficits are also found in several adult-onset disorders in which there are significant pragmatic impairments. These disorders include traumatic brain injury (TBI), right-hemisphere damage (RHD), schizophrenia and the dementias. Executive dysfunction is a common sequela of TBI. Rochat et al. (2013) reported poorer prepotent response inhibition and resistance to proactive interference (the ability to resist intrusion into memory of previously relevant information) in 28 patients with moderate to severe TBI. A significant positive correlation existed between urgency (the tendency to act rashly when distressed) and prepotent response inhibition. Executive function deficits are typically among the cognitive problems experienced by adults with RHD. Pulsipher et al. (2013) reported impairments in the attention, spatial and executive function domains of a comprehensive cognitive battery in 33 patients following unilateral right stroke. Executive functions are impaired in adults with schizophrenia, often in accordance with certain symptoms. In a study of the neurocognitive profile of 58 patients with schizophrenia, Tan and Rossell (2014) found that patients with thought disorder performed more poorly than those without thought disorder in the domain of inhibition. Executive function deficits are a common feature of the dementias. Godefroy et al. (2014) reported dysexecutive syndrome in 87.5 % of a sample of 102 patients with Alzheimer's disease. This syndrome was characterized by prominent impairments of planning, inhibition flexibility and generation in the cognitive domain. For further discussion of executive functions in these clinical populations, the reader is referred to section 3.4 in Cummings (2014a).

The relationship between executive function deficits and pragmatic impairments has been addressed by a small number of clinical studies. The findings of these studies lend some support for a specific role for executive functions in a range of pragmatic language impairments. Bishop and Norbury (2005) reported a significant relationship between generativity (as measured on two fluency tasks) and autistic-like communicative abnormalities in children with pragmatic language impairment. In a study of patients with Tourette's syndrome, Eddy et al. (2010) found a significant relationship between errors on the Pragmatic Story Comprehension Task (a test of the understanding of sarcasm and metaphor) and the time taken to respond to items during the inhibitory condition of the Black and White Stroop Test (one of two inhibitory measures used in the study). In a study of 43 adults who sustained a severe TBI, Douglas (2010) found pragmatic difficulties involving violations of the Gricean maxims of quantity, relation and manner on the La Trobe Communication Questionnaire (LCQ; Douglas et al. 2000). Executive function measures predicted 37 % of the variability in LCQ scores. Channon and Watts (2003) found less discrimination between direct, literal interpretations and correct, indirect interpretations of brief vignettes in a group of subjects with closed head injury (CHI) than in a control group. In subjects with CHI, pragmatic performance was found to be associated with an executive measure of inhibition.

As with theory of mind, the relationship between executive functions and pragmatic language skills in children and adults with a range of clinical disorders is likely to be complex and not straightforwardly causal in nature. This claim is supported by two observations. First, several studies have failed to find a link between executive functions and pragmatic language impairments. These studies include Donno et al. (2010) in persistently disruptive primary school children, McDonald (2000) in patients with RHD, and Dardier et al. (2011) in subjects with frontal lesions following TBI. If executive function deficits were directly causing pragmatic impairments, the findings of these studies would be difficult to explain. Second, the relationship between executive function deficits and pragmatic impairments may be mediated by ToM. There is clear evidence of a relationship between executive functions and ToM in several clinical studies, with some of these studies also examining aspects of pragmatics. For example, attention and planning have been found to be predictors of first-order ToM in patients with remitted schizophrenia

(Mehta et al. 2014). In a study of French children with cerebral palsy, Caillies et al. (2012) found that second-order ToM performances were correlated with working memory scores, while Stroop scores (inhibitory control) were related to the understanding of ironic remarks. It may be that ToM is the proximal cause of pragmatic impairments in children and adults, with executive functions operating as a distal cause. Clearly, further empirical investigations are required in order to clarify the exact nature of the relationship between executive functions and pragmatic disorders.

22.4 Pragmatic Disorders Illustrated

The research findings which were examined in Sect. 22.3 really only come to life when we consider the impact of pragmatic disorders on an individual's communication skills. The reader can only properly appreciate that impact when a child or adult is seen to struggle with the pragmatic demands of a conversation or other form of discourse as a result of these disorders. In this section, pragmatic disorders are illustrated through a series of short verbal exchanges involving clinicians or investigators on the one hand and children and adults with a range of pragmatic impairments on the other hand. Some of these exchanges are taken from spontaneous conversations, while others are from structured tasks of the type used to elicit responses in an experimental study. In the interests of balanced coverage, two of these exchanges involve conditions which have their onset in the developmental period. The conditions in question are autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD). Two further exchanges involve conditions which have their onset in adulthood. These adult-onset conditions are schizophrenia and AIDS dementia complex. In examining these exchanges, the aim will be to identify the pragmatic impairments that are experienced by children and adults and to relate these impairments to specific ToM and executive function deficits. The stage will then be set to consider possible theoretical models of the cognitive substrates of pragmatic disorders in Sect. 22.5.

22.4.1 ASD and ADHD

Deficits in cognitive and affective ToM are a source of considerable pragmatic impairments in ASD. These impairments are particularly evident when children and adults with ASD need to engage in ToM reasoning in order to respond to pragmatically demanding questions. Such questions can only be effectively addressed by attributing cognitive and affective mental states to the minds of speakers or other agents in a scenario. By way of illustration, consider the following data from a study by Loukusa et al. (2007a). These investigators examined the responses of children with Asperger syndrome or high-functioning autism to a series of pragmatically demanding questions. The children in this study, who were aged 7–9 years and 10–12 years, were frequently seen to misinterpret the researcher's questions. In each case, misunderstandings appeared to reflect a failure on the part of these children to establish the particular mental state that might have prompted a person to speak or act in a certain way. For example, in the following extract, a researcher is showing a 7-year-old boy with Asperger's syndrome a picture of a boy sitting on the branch of a tree. A wolf is sitting underneath the boy at the bottom of the tree. The wolf is growling at the boy. A man with a gun is walking nearby. The researcher reads the following verbal scenario aloud and then asks a question:

'The boy sits up in the tree and a wolf is at the bottom of the tree. How does the boy feel?'

The boy responds: Fun because he climbs up the tree. I always have fun when I climb up a tree.

The boy's response in this case is clearly not pragmatically appropriate. Not only does the boy fail to identify the correct affective state of the child in the picture – it is likely to be one of fear rather than 'fun' or enjoyment – but the subject's own mental perspective inappropriately dominates his response. Both failings can be explained by the significant ToM deficits that are found in children and adults with ASD. In the presence of these deficits, the boy is unable to set his own mental perspective apart from that of the child in the picture and makes an inappropriate response to the researcher's question in consequence.

ToM deficits also explain the failure of a 9-year-old boy with Asperger's syndrome to respond appropriately to the researcher's question in another scenario examined by Loukusa et al. (2007a). In this scenario, the researcher shows the boy a picture of a mother and a girl. The girl has a dress on and she is running. There are muddy puddles on the road. The girl has just stepped in the puddle and the picture shows the mud splashing. The researcher reads the following verbal scenario aloud and then asks a question:

'The girl with her best clothes on is running on the dirty road. The mother shouts to the girl: "Remember that you have your best clothes on!" What does the mother mean?'

The boy responds: You have your best clothes on.

Clearly, the mother's communicative intention in producing this utterance is to warn the girl to protect her clothes. However, the boy has done little more than repeat the mother's utterance in his response. The boy's failure to establish the communicative intention that motivates the mother's utterance is related to his deficits in cognitive ToM. The boy is unable to establish the cognitive mental state – a communicative intention – that lies behind the mother's use of a certain speech act (a warning) in this case. In the absence of this mental state, a mental state that is critical to the understanding of this scenario, the boy with Asperger's syndrome has little option but to repeat the mother's utterance.

The pragmatic impairments of children and adults with ADHD demand a very different type of cognitive explanation. For these individuals, executive function deficits make a significant contribution to impaired conversational performance. This contribution can be direct or indirect in nature, with executive function deficits in memory, inhibitory control and shifting related to symptoms of inattention, hyperactivity and impulsivity in ADHD (Bueno et al. 2014; Kamradt et al. 2014). (The reader is referred to Cummings (2012a, 2014b) for further discussion of ADHD.) The poor conversational skills of children with ADHD are exemplified by the following exchange between an adult and an 8-year-old boy who has a diagnosis of ADHD (Tannock 2005: 45). The exchange occurs 20 min after the start of a psychoeducational assessment:

Child: "What are we gonna do next? Huh? What's in there? What's that?"

(interferes by grabbing test materials)

Adult: "You'll see in a sec"

(adult reaches into case for next set of test materials)
a few minutes later, child interrupts testing -

Child: "Where's the um…the things…um…where's the um…bugs?"

(climbs on seat to peer into case)

Adult: "Pardon? What bugs? There are no bugs here. Now, tell me what – "

child interrupts again -

Child: (loud unmodulated voice) " – The bugs. You said I'll see the bugs. I don't wanna do this. I wanna see the bugs…the…um…secs…the insecs!"

In this short exchange, the child interrupts the adult's conversational turn on two occasions and creates two further, non-verbal interruptions (he grabs test materials and climbs onto the seat). His verbal contributions consist largely of questions which are delivered in quick succession and do not wait for responses from the adult. Even when presented with a direct command ('Now, tell me what…'), it is clear the child disregards the adult's instruction and continues to pursue a topic (the bugs) which the adult has indicated has no relevance to the exchange (the adult explicitly states 'There are no bugs here'). These conversational anomalies are consistent with executive function deficits. The child appears unable to inhibit his utterance about the bugs even after the adult has attempted to suppress this inappropriate response. The child also appears unable to shift his attention between assessment tasks. In the adult's second conversational turn, a clear transition to the next assessment activity is indicated. However, this transition is effectively ignored by the child who continues to press the point about the bugs. These problems occur alongside the child's use of mental state language ('I don't *wanna* do this'; 'I'll *see* the bugs'), suggesting that his ToM skills are intact for the most part.

22.4.2 Schizophrenia and AIDS Dementia Complex

As was discussed in Sect. 22.3.1, adults with schizophrenia can exhibit significant deficits in cognitive and affective ToM. These deficits appear to explain some of the pragmatic impairments that these clients experience (Cummings 2012b, 2014c). Colle et al. (2013) examined linguistic and extra-linguistic pragmatic functioning in 17 adults with schizophrenia. A range of pragmatic phenomena, including the comprehension and production of irony, were examined through the use of videotaped scenarios. In one such scenario, a subject with schizophrenia is shown a boy and a girl who are eating a disgusting soup. The boy smacks his lips with a gesture meaning "It's very good!". The subject is asked the following question:

Test question and response:
What did the boy mean by that? *He meant to say that she cooked a delicious soup.*

In another videotaped scenario, a subject is shown two people called Robert and Paola. It is Robert's birthday, and Paola gives him a gift saying "Happy birthday!" Robert unwraps the gift and discovers an awful tie. With an annoyed expression he says "Thanks, really, I needed one of those". The subject is asked the following questions:

Test questions and responses:
What did Robert say? *He liked the tie.*
In your opinion, did Robert like the tie? *Kind of.*
Why? *He made a perplexed expression.*

These scenarios are used to test subjects' understanding of non-verbal and verbal irony, respectively. In neither case, however, does the subject produce a response which indicates that he has understood the ironic intent of the actors in the scenarios. The failure to detect this intent is consistent with the ToM deficits of adults with schizophrenia. Alongside the deficit in cognitive ToM – a communicative intention is a *cognitive* mental state – there is evidence in the second scenario of additional difficulties in affective ToM. The adult with schizophrenia in this scenario has attributed an incorrect affective mental state to Robert – he is *annoyed* rather than *perplexed*, as this subject indicates. These combined ToM deficits can go some way towards explaining the difficulties with irony comprehension that were reported in Sect. 22.3.1.

Clients with AIDS dementia complex often have pragmatic language deficits which are not detected on standardised language tests. McCabe et al. (2008) reported the case of a 36-year-old man called Warren who had only mild language impairments as measured on standardised tests. However, Warren's pragmatic language skills were severely impaired particularly during conversation. McCabe et al. concluded that Warren's symptoms were consistent with an acquired cognitive communication disorder due to impaired executive functioning. Warren underwent a battery of psycholinguistic and observational measures on three occasions during a 13-month period. A semi-structured interview was conducted on the first of these occasions by a researcher who was a speech-language pathologist. This interview was essentially conversational in nature. It addressed Warren's AIDS as well as life in general. In the following conversational extract, Warren (W) is talking to this researcher (R):

R: So you'd be 34 then?
W: I've been 34 for the last 3 years
R: ah, OK so you're actually?
W: Oh what happened was I added a year and a year at my birthday, didn't celebrate it so therefore I forgot about it. In September as a halfway between two ages I start saying what the next one is
R: Uh huh?
W: So I've added there as well and the years come along and I didn't remember doing either of the first two so I did it again when I was 32
R: Oh dear
W: Someone pointed out that I was 34 last year and 33 last year and I went "no, I'm not I'm 34", I'm gonna get me a calculator and a new set of batteries that were still in the package so that guaranteed the calculator was working properly 'cause it kept telling me I was 33 and I could'a swore it was lying to me.
R: What year were you born in?
W: '64
R: '64
W: The odd thing was, was I was filling out doctors' forms and hospital forms and all sort of things, putting down the date of birth as xxth of xxxx of '64 and my age was 34 but a diversional therapist in a nursing home was the only person who actually noticed that there was something wrong with this picture. I thought "well, it's fairly obvious I'm in it" so there's your problem.

Warren's conversational difficulties are most pronounced at the level of planning and organizing his message. His response to the researcher is circuitous and weaves through irrelevant and contradictory information. From as soon as Warren begins to speak, he appears to lose his goal in speaking. In fact, that goal – to convey his age to the researcher – is never fully realized as the researcher is left to work out Warren's age from his year of birth. Warren is also unable to detect that the researcher is not following his response, with interventions such as 'Uh huh?' quite simply ignored as he continues his rambling explanation. There is no evidence of Warren being able to use this feedback from the researcher to reformulate his message. Warren also appears incapable of regulating the length of his response. Alongside these difficulties in planning, organizing and regulating his response, Warren makes use of mental state language (e.g. 'I *thought*'). Some of this language relates to memory (e.g. 'I didn't *remember*'; 'I *forgot* about it'), suggesting that memory may also be part of Warren's problems with executive functioning. In this case, the presence of mental state language is not necessarily an indication that Warren's ToM skills are intact. After all, Warren is particularly poor at detecting his listener's lack of understanding in the exchange.

22.5 Theoretical Models

This section addresses three theoretical frameworks which have the potential to contribute to an explanation of the cognitive basis of pragmatic disorders. The three frameworks in question are relevance theory, cognitive pragmatics theory and modular pragmatics theory. Within modular pragmatics theory, I include a number of accounts which take a modular approach either to pragmatic phenomena *per se* or to the meta-representational (ToM) skills that are purported to play a role in utterance interpretation. The aim in this section will be to outline the main tenets of these frameworks, and to consider how each has been applied to the study of pragmatic disorders. An extended, critical discussion of these frameworks has been conducted elsewhere and will not be pursued in the present context.[2]

Relevance theory is a cognitive psychological account of the rational processes that underpin human cognition and communication. According to Sperber and Wilson ([1986] 1995), humans seek to maximize the relevance of their mental representations to the world. To this end, one's own rational behaviour and the rational behaviour of others is constrained by a principle of relevance. It is a mutual commitment to relevance that allows hearers to draw implicatures from speakers' utterances and speakers to contribute only those utterances that have maximal relevance to a conversational exchange. Sperber and Wilson's principle of relevance operates on a cost-benefit basis, with hearers continuing to process a factual assumption for its contextual implications until such times as the cost of cognitive processing exceeds the number of implications which are derived from this processing. The explicit nature of the relevance-theoretic framework – utterance interpretation is effectively explained in terms of deductive operations performed on assumptions – has allowed researchers to make specific predictions about utterance interpretation both in language intact subjects and in children and adults with pragmatic disorders. In this way, relevance theory has informed investigations of the use of reference by children with specific language impairment (Schelletter and Leinonen 2003), the use of context during pragmatic language comprehension in children with Asperger syndrome and high-functioning autism (Loukusa et al. 2007b) and the use of bridging inferences by adults with right-hemisphere damage (Dipper et al. 1997). Some of these studies have employed ToM alongside relevance theory in an explanation of pragmatic disorders (Happé 1993).

In cognitive pragmatics theory, Bara (2010) follows Sperber and Wilson in casting the mental processes of communication in terms of an inferential mechanism. However, he explicitly rejects relevance theory's reliance on deductive rules,[3] and he doubts that a single principle of relevance can explain all communicative

[2] For such a discussion, the reader is referred to Cummings (2005, 2009, 2012c, 2013b, 2014a, 2015b, c, 2016a) for relevance theory, to Cummings (2014a) for cognitive pragmatics theory, to Cummings (2009, 2014a2015c) for modular pragmatics theory and to Cummings (2009, 2013c, 2014a, 2015b, 2016a) for modular ToM.

[3] 'Human beings reason not by applying innate logical rules, but by constructing and manipulating mental models that subjectively represent states of affairs in the world' (Bara 2010: 22).

phenomena. At the conceptual heart of cognitive pragmatics theory is the notion of a behaviour game. Bara intends this concept to hark back to the Wittgensteinian concept of a language game. A behaviour game is a structure which allows the interpersonal actions of actors to be coordinated, and enables actors to select the intended meaning of an utterance from the many different meanings that an utterance could, in theory, convey. Regardless of the type of utterance produced by the speaker, the hearer's first task in interpreting an utterance is always identifying the behaviour game to which it refers. It is the complexity of the inferential chain which connects a speaker's expression act to the opening of a behaviour game which determines the ease or difficulty with which hearers interpret utterances. Certain speech acts are more complex than other speech acts because they require a larger number of inferences to link them to a game. *Inferential complexity* is thus a key criterion in Bara's categorization of speech acts such as irony and deceit. Bara contends that the *type of mental representation* also plays a role in predicting the ease with which actors comprehend speech acts. Cognitive pragmatics theory has received much support from studies of pragmatics in normally developing children (Bara et al. 2000; Bucciarelli et al. 2003; Bosco et al. 2006). The theory has also been used to examine aspects of pragmatics in children with autism (Bara et al. 2001), and in adults with left- and right-hemisphere damage (Cutica et al. 2006), Alzheimer's disease (Bara et al. 2000) and TBI (Angeleri et al. 2008; Bara et al. 1997).

Several theoretical frameworks appeal to cognitive modules to represent the pragmatic knowledge and cognitive skills (e.g. theory of mind) which are integral to utterance interpretation. An example of the former approach is Kasher's modular pragmatics theory (Kasher 1984, 1991a, b, 1994). Central to Kasher's theory is the proposal that pragmatic knowledge consists of two separate parts: (1) modular, pragmatic knowledge which is purely linguistic; and (2) central, pragmatic knowledge which is not purely linguistic (Kasher 1991a: 389). Kasher treats it as an open question whether all modular pragmatic knowledge is embodied in a single module, or in several modules. As well as examining possible candidates for this modular pragmatic knowledge, Kasher (1991a: 391) delineates other aspects of pragmatic knowledge 'which seem to be related to the general center of cognition'. As one might expect, these are rational intentional processes of the type that allow a hearer to calculate the implicatures of a speaker's utterances (central pragmatics). Additionally, there are a number of interfaces which allow the integration of information from different modules, which can then serve as input to the central system (interface pragmatics). This pragmatic knowledge is the basis upon which we identify referents of indexical expressions such as 'she' and 'there'. In such cases, the output of a language module must be integrated with the output of a perception module, with the central system achieving an integrated understanding of the referent based on information from both sources.[4] Modular pragmatics theory has been

[4] Another important component of Kasher's modular pragmatics theory is its attempt to localise each type of pragmatic knowledge in the brain. A proposal for the localization of pragmatic knowledge that is consistent with clinical findings is one in which modular pragmatics is located in the brain's left hemisphere, while parts of central pragmatics are in the right hemisphere. Kasher and

shown to explain aspects of intact and impaired pragmatics in adults with chronic schizophrenia (Meilijson et al. 2004) and in subjects with left- and right-hemisphere damage (Kasher et al. 1999; Soroker et al. 2005).[5]

Other theoretical approaches contend that ToM skills can be represented by a cognitive module. To the extent that these skills are involved in utterance interpretation, some type of ToM module may also be presumed to play a role in pragmatic understanding. Segal (1996) pursues a modular account of ToM (what he calls the psychology faculty, the 'seat' of the psychological abilities that allow us to explain and predict our own and other people's actions on the basis of concepts such as belief and desire). To the extent that modular status is claimed for this faculty, it must be demarcated from other cognitive domains. According to Segal (1996), demarcation is a function of certain restrictions on the flow of information between the psychology faculty (or psychology module) and other cognitive domains: 'I suggest that if a set of appropriately related psychological states exhibits either informational encapsulation [some of the information in the subject's mind outside a given module may be unavailable to it] or limited accessibility [some of the information within a module may be unavailable to consciousness], then they constitute an intentional module' (143). For Segal, the psychology faculty exhibits not only domain specificity and informational encapsulation but a number of other modular features. These features are revealed when Segal asks if the psychology module is also a module à la Fodor: 'At present it seems to fit the criteria reasonably well, but not entirely. It does appear to be domain specific, informationally encapsulated, to fire obligatorily, to be reasonably fast and to have a characteristic ontogeny' (149). (Jerry Fodor is the original proponent of the modularity thesis.) For further discussion of the thesis of mental modularity and its application to ToM, the reader is referred to Carruthers and Chamberlain (2000).

22.6 Summary

This chapter has examined the cognitive substrates of pragmatic disorders in children and adults. The discussion began with a standard communicative exchange which was used to illustrate the various cognitive processes that play a role in communication. These processes were broadly classified as theory of mind (ToM) skills

his co-workers have made a significant contribution to the development of the sub-discipline of neuropragmatics. For discussion of this area of work, the reader is referred to Cummings (2010).

[5] Relevance theory has more recently subscribed to the view that a cognitive module is the basis of pragmatic interpretation. According to Wilson (2005), pragmatics is a type of mind-reading which is performed by a domain-specific inferential module. And while pragmatic interpretation is not merely the application of general mind-reading abilities to the communicative domain, it is nonetheless a dedicated module which trades on certain regularities within this domain: 'Verbal communication presents special challenges, and exhibits certain regularities, not found in other domains, and these may have led to the development of a dedicated comprehension module with its own special-purpose principles and mechanisms' (1131).

and executive functions. Empirical findings relating to the normal development of these skills and their disruption in children and adults with pragmatic disorders were examined. In a small, but growing number of clinical studies, investigators have examined the relationship between ToM and executive functions on the one hand and pragmatic language skills on the other hand. The results of these studies were discussed, with caution urged about their significance. Specifically, it was argued that it is not possible to draw conclusions about the causal role of ToM and executive functions in pragmatic disorders based on findings of correlations between these variables. Several pragmatic disorders which appeared to be related to cognitive factors were illustrated. Finally, three theoretical models with the potential to contribute to a cognitive explanation of pragmatic disorders were considered.

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Chapter 23
Psychosocial Aspects of Pragmatic Disorders

Pamela Snow and Jacinta Douglas

Abstract This chapter considers the everyday psychological and social costs attached to having pragmatic language difficulties. We briefly review key terminology concerning pragmatic language functions, before summarizing features of pragmatic language difficulties that occur in both the developmental period (e.g. associated with language impairment, autism spectrum disorder, hearing impairment, traumatic brain injury, intellectual disability) and in adulthood (e.g. in fronto-temporal dementia, aphasia, and Alzheimer's disease). We present a schematic model as a means of conceptualizing the elements of pragmatic language competence and its inverse, pragmatic language difficulties, within the broader psychosocial context. We argue that psychological factors such as coping style and self-efficacy for communication need to be considered alongside social factors (such as cultural mores and everyday communication contexts) if the true impact of pragmatic language difficulties is to be both documented and adequately addressed when interventions for affected individuals are designed, implemented, and evaluated.

Keywords Community integration • Employment • Friendship • Pragmatics • Psychosocial functioning • Restorative justice • School exclusion • Social relationship • Youth justice

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23.1 Introduction

This text has examined the complex, nuanced 'dance' that humans engage in with each other when they use language to communicate. As one of our evolutionary triumphs, language competence is fundamental to what it means to be human. So when this skill is compromised in some way, even only by relatively small degrees, a high price is exacted for the affected individual, and quality of life can be adversely affected in a range of way across the lifespan.

Language is the tool that is employed to negotiate the business of everyday life, be it in intimate partner relationships, educational and vocational settings, commercial exchanges, or a range of other incidental, highly variable, sometimes 'one-off' interchanges with other people. Some of these exchanges are highly predicable and follow a pre-determined, socially prescribed script, such as when we are walking towards a work colleague in a long corridor. We see our colleague in the distance, but she is too far away for one-to-one communication to occur. We both comply with the over-learned routine of averting eye gaze for a moment, then, when just close enough, looking up and uttering a scripted social greeting, such as "Hi", "How's things?" Such exchanges occur frequently in everyday life, but can be capricious if the interactants make even a small mis-step with respect to timing, such as when Person A says "Hi there" and Person B, anticipating "How's things?", reflexively answers "Good thanks". In this instance, a small, but benign tear has occurred in the social fabric. This tear might cause momentary embarrassment, awkwardness, or even amusement, but because the interactants probably have an implicit understanding of how it occurred, the tear is minor and easily repaired or overlooked.

As a matter of evolutionary necessity, humans are fundamentally relational creatures. We need to function in groups in order to survive and to ensure continuation of our species. Connections with others help us to construct shared meaning and a sense of purpose and belonging, both of which have significant positive effects on mental health. Conversely, most people experience adverse psychological consequences when they are cut off from contact with others, or when the quality of their key relationships suffers as a consequence of misunderstandings, conflict, or 'stonewalling'. Indeed, such assumptions form the basis of a major model of counselling known as Interpersonal Psychotherapy (Weissman et al. 2000). Some relationships that we form as humans are deep and long-lasting, while others are superficial and may be quite transient. This means that different interactions have different degrees of tolerance with respect to the impact of pragmatic language impairments.

In this chapter, we will examine some of the more serious and pervasive psychosocial consequences of pragmatic language impairments, for specific groups of speakers, at different points in the lifespan. In so doing, we will consider important constructs such as social cognition, theory of mind (ToM), and empathy/emotional attunement. We begin by establishing some common understandings with respect to terminology such as 'pragmatics', 'pragmatic competence', 'language impairment' and 'psychosocial functioning'.

23.2 Definitions and Terminology

We will use the term 'pragmatics' throughout to refer to the wide range of codified but subtle ways in which language has evolved in a given culture. Many pragmatic functions have powerful underlying roles in maintaining the social status quo (e.g. the use of linguistic devices to acknowledge power differentials between speakers) and in ensuring that neither party to an exchange is caused to lose face as a consequence of an interaction (or if this does occur, that it is intentional rather than as a result of an inadvertent violation of an important, but unstated social rule).

The notion of 'pragmatic competence' is difficult to define and assess. An individual's likely success as a competent user of language cannot always be ascertained from his or her performance on formal, standardised language measures. Such measures provide valuable data about so-called 'structural' aspects of language, such as expressive and receptive vocabulary and syntax. They may even offer some understanding of an individual's comprehension of non-literal language, such as idiom and metaphor. However, they provide all of this information in ways that are stripped of vital contextual cues (and ambiguities) and scaffolding that exist to varying degrees in everyday communication. For this reason, standardised language measures may lack ecological validity, i.e. sensitivity to real-world problems (Dunn et al. 1995; Turkstra et al. 2005). Alternatively, pragmatic assessments may be highly ecologically valid, but they are subject to a range of reliability challenges. These issues are addressed in Chaps. 19 and 20 (this volume), and so will not be discussed in detail here.

In a developmental sense, it might be said that pragmatic competence corresponds with what parents and other adults view as 'manners'. Consider, for example, the extent to which adults need to set parameters and provide feedback to children on communication variables such as speaking volume (shouting is acceptable when playing outside, but not inside at meal-time and not in spaces such as places of worship), vocabulary use (some words may cause confusion or offence to some listeners, e.g. grandparents, but be acceptable when communicating with others, e.g. peers), and conversation topics (some of which are 'off-limits' in some contexts, but acceptable in others), to name but a few variables. In many cases, children simply need to break an unknown or invisible rule in order to realize its existence and receive on-the-spot feedback from parents (and later from teachers), acting as 'pragmatic coaches'. Pragmatic competence, then, emerges incrementally on the back of cognitive skills such as perspective-taking, theory of mind, social cognition, and skills in other linguistic domains, and needs to be continually refined across the lifespan. When present, it is the backbone of interpersonal success. When even only mildly compromised, however, speakers can experience a wide range of psychosocial costs, including misunderstanding, rejection, ridicule, and marginalisation. In many cases, these costs also accrue for communication partners.

The term 'language impairment' is deceptively difficult to define. On the face of it, one could argue that it should simply, and universally, refer to scores on standardised measures that fall a pre-determined distance (e.g. 1.5 standard deviations) from a population-based norm established around fixed variables such as chronological age. In reality, however, it is a contested term and one that shares nosological space with related, but different terms, such as 'specific language impairment', 'language deficit', 'language disorder', 'language difficulty', 'language-learning impairment', and 'language delay'. These terms all have theoretical, empirical and, some would say, political histories. Although their use can be justified in specific instances, in practice there is a lack of rigour and demarcation around them.

These terms also neglect to take account of the considerable influence of socio-economic status on language functioning, and so fail to illuminate ways that clinicians and researchers should disentangle disorder from difference. The notion of 'difference' in turn arouses sociolinguistic debate as to questions of pathologizing communication behaviours that deviate from a so-called 'norm'. While this debate is beyond the scope of this chapter, it does have bearing on questions of when pragmatic behaviours should be judged as 'disordered' versus being a manifestation of sociolinguistic norms for a subgroup. These terminology issues are no less significant for pragmatic language than they are for the more formal aspects of language, such as vocabulary, syntax, morphology, and phonology. For the purposes of this chapter, 'language disorder' will be used to encompass children and adolescents whose language skills are not operating at expected levels on the basis of cultural norms. 'Language impairment' will be used to refer to adults who have an acquired difficulty using and/or understanding language.

In this chapter, the term 'psychosocial functioning' will refer both to the psychological costs of impaired pragmatic function (e.g. anxiety, depression, low self-esteem, poor self-efficacy for communication) and to the social impacts (e.g. peer rejection, social isolation, and difficultly fulfilling important life roles, such as those of friend or employee). These psychosocial impacts, though pervasive, may not always be obviously traceable in the minds of parents, teachers, and clinicians to pragmatic language difficulties. However, they cast a long shadow with respect to everyday quality of life, both for affected individuals and for their families.

For convenience, we will consider disorders of childhood, adolescence, adulthood and older age separately. However, it must be remembered that pragmatic competence is a lifespan issue and evolves over time as a function of early attachment and attunement experiences, social, educational and vocational attainment, adversities such as acquired neurological insults, and cultural context. Further, it must be remembered that the disorders to be considered in this chapter are not nearly as categorical and distinct as researchers might like to believe. As clinicians are only too aware, conditions such as language disorder, autism spectrum disorders, attention deficit hyperactivity disorder, and intellectual disability are in fact dimensional, with often overlapping and indistinct boundaries. So whilst we will consider the literature on such disorders as if they are orthogonal, in reality, we must remember that they are not. Comorbidity is the norm in clinical populations.

In Sect. 23.3, we will briefly review key disorders of childhood and adolescence, and their pragmatic language profiles. This will be followed in Sect. 23.4 by an examination of likely psychosocial consequences of pragmatic difficulties across key social contexts: home and family, and education and training (academic and

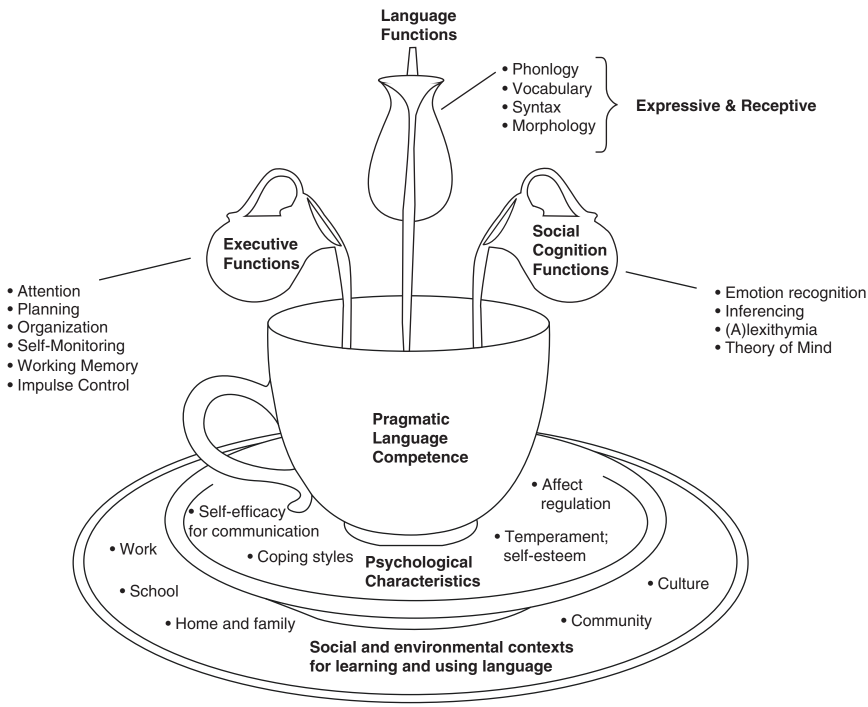

Fig. 23.1 'A cup of competence': pragmatic language competence and the psychosocial company it keeps

social aspects). Consideration will also be given to subgroups which are at high-risk for pragmatic language impairments and psychosocial difficulties, most notably young people in state care and the youth justice system, who frequently experience suspensions and expulsions from school as a consequence of difficulties obliging the many social contracts that define those settings. In Sect. 23.5, we will consider acquired disorders in adulthood, and the ways in which these impact on psychosocial functioning in the social contexts listed above, with the addition of implications for employment and community engagement.

Figure 23.1 depicts a schematic representation of the various functions that constitute pragmatic language competence: executive functions; language functions; and social cognition functions. These functions are positioned in the broader context of individual psychological characteristics as well as social-environmental factors. This diagram will be used in the chapter as a model for thinking about the relationship between pragmatic language skills and psychosocial functioning. Given the range and complexity of the inputs depicted in Fig. 23.1, it is not surprising that pragmatic skills (a) emerge gradually over the developmental period, (b) require considerable scaffolding and shaping within the communication environment, and (c) are highly vulnerable in the case of neurodevelopmental and environmental threats.

The fact that pragmatic competence is subject to a wide range of influences perhaps explains in part its relative fragility in the context of otherwise spared language functions in some conditions.

23.3 Pragmatic Disorders in Childhood

In everyday community settings such as kindergartens and schools, children present with a range of linguistic, cognitive, social, emotional and behavioural strengths and difficulties. Researchers seek to study samples of children identified on the basis of a particular disorder and its diagnostic criteria, e.g. as per the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association 2013). In so doing, they aim to exclude children with comorbid conditions. Parents and teachers, however, must deal with the uneven and often idiosyncratic profile of strengths and difficulties observed in their children and students. So while we will consider these disorders separately for the purpose of briefly reviewing their key pragmatic features, it must be remembered that their occurrence in isolation is probably more the exception than the rule.

23.3.1 Specific Language Impairment

Any discussion of specific language impairment (SLI) needs to be firmly predicated on an understanding of the limitations of the term, both conceptually and for purposes of clinical differentiation between children. A recent special edition of the *International Journal of Language and Communication Disorders* entitled 'The SLI Debate' covers the complexities and tensions for researchers and clinicians regarding appropriate terminology to classify and describe young people whose language skills are not within what is considered 'normal range' for their age, based on standardised measures (Ebbels 2014). Although there is growing agreement concerning the limitations of the term 'specific language impairment', particularly regarding constraints imposed by the meaning of the modifier 'specific', there is no consensus yet as to a suitable replacement. Since the 1980s researchers have sought to reserve this term for children whose language difficulties are not accounted for by low IQ or other known neurodevelopmental disorders. However, it has been less warmly adopted by clinicians, who must deal with the everyday reality of common comorbidities with language impairment, e.g. attentional difficulties, social-emotional, and behavioural disturbances. Bishop (2014) has suggested that the term 'language-learning impairment' be employed, as this encompasses both social and academic aspects of language difficulties, in the developmental period and beyond. Interested readers are referred to Bishop (2014) and Reilly et al. (2014) for further discussion.

One of the key methodological issues surrounding the study of children with language impairments is the fact that many studies are cross-sectional. This means that while important correlations can be identified (e.g. between language functioning and behaviour), it is not possible to determine patterns of causality. To address this, a small number of longitudinal studies of both typically developing and language disordered children have been conducted in recent years, and these are helping to shed light on the different developmental trajectories experienced by children with language disorders (e.g. Lindsay and Dockrell 2012; Rice et al. 2008; St Clair et al. 2011). However, language skills (structural and pragmatic), behavioural self-regulation, and psychological coping skills all 'unfold' across the developmental period, and are influenced by both protective and risk factors in the child's environment. It is not realistic, therefore, to expect that simple linear relationships will be established, even as a function of rigorous longitudinal studies.

Longitudinal evidence does indicate, however, that children and adolescents with language disorders (even in the absence of pragmatic difficulties), are prone to longer-term psychosocial difficulties, such as compromised behavioural self-regulation, social difficulties, and/or reduced academic achievement (see Cohen 2001; Beitchman and Brownlie 2014 for review). Language difficulties may be unrecognised by others who may misinterpret them as rudeness or disinterest. The impact of the deficits themselves, as well as the reactions they induce in others, can result in considerable stress, anxiety, and depression. This may contribute to avoidance of experiences that specifically tax verbal skills, e.g. public speaking. The presence of pragmatic difficulties in addition to problems with core skills such as vocabulary, morphosyntax and narrative skills situates communication breakdown in the interpersonal space and is taxing for both speaker and interactant.

23.3.2 Autism Spectrum Disorder

The pragmatic language skills of children and adolescents with autism spectrum disorder (ASD) are among the signature features of the disorder. As the word 'spectrum' suggests, however, the pragmatic skills of such young people are highly variable, ranging from severe difficulties establishing and negotiating meaningful social connections with others, to subtle deficits in which communication nuances are mis-cued, and some form of confusion and/or disquiet may be created in the mind of the communication partner. Key pragmatic language difficulties that have been identified in ASD speakers of all ages include turn-taking-difficulties, problems providing relevant information to listeners, poor conversational repair, and problems with cohesion and clarity of reference (see Klusek et al. 2014). Some pragmatic problems experienced by speakers on the autism spectrum may be related to impaired ToM and associated difficulties complying with Gricean maxims (Grice 1975) with respect to the listener's information needs. Hale and Tager-Flusberg (2005) have noted, however, that although ToM is an attractive theoretical framework in which to study the social cognition and pragmatic language profiles of young people with autism spectrum disorders, it is not an all-encompassing explanatory mechanism.

23.3.3 Acquired Brain Injury

The cognitive-communicative impact of acquired brain injury (ABI) in the developmental period is highly variable, depending on the severity and mechanism of injury, and the developmental stage at which it is sustained, relative to the acquisition and consolidation of pragmatic language skills (Ponsford 2013). In some cases, pragmatic difficulties become more apparent over time, as the young person fails to refine his or her verbal repertoire in accordance with developmental expectations and norms. In general, children who sustain mild-to-moderate brain injuries perform relatively well on most structural and discourse language measures, though verbal fluency and confrontation naming may be compromised (see Hay and Moran 2005; Sullivan and Riccio 2010 for review). As injury severity increases, however, so do the manifestations of discourse-level difficulties, e.g. in narrative and expository genres, both of which are critical to social and academic success in the developmental years. Because of their links with working memory and related executive functions, these discourse-level difficulties are also likely to manifest in conversation, where the young person may have difficulties with inferencing, following the 'gist' of a topic, yielding turns, and overall compliance with Gricean maxims.

23.3.4 Intellectual Disability

Intellectual disability is an umbrella term that covers a range of both syndromal and non-syndromal conditions. Genetic disorders are the most common causes of intellectual disability (e.g. Down syndrome and fragile X syndrome) and comorbidities with other neurodevelopmental disorders, such as autism and ADHD are common (Australian Institute of Health and Welfare 2008). Sensori-neural and/or conductive hearing loss also occurs in some two thirds of children with Down syndrome (Martin et al. 2009), with obvious additional implications for the development of core language, discourse, and social skills. Generally speaking, children with Down syndrome display a similar range of pragmatic competencies (e.g. making comments, giving answers, and issuing protests) as typically developing peers of comparable developmental levels, but fall behind on some discourse skills such as making requests and initiating new topics (see Martin et al. 2009 for review). Not all evidence concerning the discourse skills of young people with intellectual disability reveals deficits, however. For example, Finestack et al. (2012) reported that adolescents with Down syndrome and/or Fragile X syndrome out-performed typically developing peers on a number of narrative macrostructure measures. Although counter to some previous findings in this area, this reminds us that areas of strength as well as difficulty need to be identified in all speakers.

Irrespective of language functioning, all forms of intellectual disability are associated with elevated risk for low- and high-prevalence mental health conditions, in particular anxiety and depression (White et al. 2005). It is not possible to determine the contribution made by pragmatic language disorders to such conditions. However, experiences of social isolation and exclusion which may arise on account of pragmatic language disorders are likely to be common underlying features. Unfortunately, it is common for mental health problems to be under-diagnosed in people with intellectual disability and/or to be mis-attributed as 'syndromal' and hence under-treated (Hurley 2006). Verbal difficulties contribute significantly to symptom delineation during history taking, and so are central to adequate description and management of depression and anxiety. It is also possible that psychosocial functioning could be improved for some individuals via suitably adapted standard biopsychosocial interventions for mental health conditions.

23.3.5 Hearing Impairment

Children and adolescents with hearing impairment are disadvantaged not only by difficulties perceiving phonological and linguistic components of spoken language, but also more significantly, by difficulties establishing the nuances of inflection and prosody, articulatory elision, jokes, word-plays such as double entendres and puns, and the use of discourse devices such as irony, sarcasm, and figurative language (Schorr et al. 2008). Language is central to the acquisition of ToM (sometimes referred to as 'mentalizing') which, not surprisingly, develops later in children with hearing impairment than in their hearing peers (Peterson 2004). In turn, ToM contributes to social cognition skills and the ability to disambiguate competing social messages so that communication breakdown does not occur and neither party loses face. In spite of technological advances in assistive technology in recent years (most notably the advent of cochlear implants), young people with hearing impairments acquire age-appropriate pragmatic skills later than their peers (Most et al. 2010) and there may be a ceiling on the extent to which these skills develop over time. Difficulties using mentalizing vocabulary (Huttenen and Ryder 2010) are likely to interfere with the formation and maintenance of friendships, as this skill is central to empathy and perception of emotional attunement on the part of others (Frith and Frith 2003).

23.3.6 Attention Deficit/Hyperactivity Disorder

In their review of studies concerning pragmatic language functioning in children diagnosed with attention deficit/hyperactivity disorder (ADHD), Green et al. (2014) observed that many behavioural features of ADHD as described in the DSM '…. can be viewed as pragmatic language deficits' (p. 16) These features include the child not listening when spoken to directly, often talking excessively, often having difficulties awaiting a turn, and often interrupting or intruding on others (see also Camarata and Gibson 1999). Green et al.'s review included both questionnaire studies and observational and experimental studies, and identified that comorbidities were common in children diagnosed with ADHD, particularly SLI and ASD. Common pragmatic difficulties identified in the review included inappropriate initiation, poor turn-taking, reduced linguistic coherence at sentence and discourse levels, and problems inhibiting contextually inappropriate verbalisations (including speaking in situations where silence was expected).

23.4 Pragmatic Language Difficulties and Childhood Life Success

23.4.1 The Modern School Environment

An important factor that needs to be considered for school-aged children with pragmatic language difficulties is the inherent cognitive and social complexity of the modern classroom. Since the final quarter of the twentieth century, there has been a marked shift in most Western education jurisdictions away from formal, didactic, so-called 'teacher-centred' classrooms, to less formally structured and highly relational learning spaces. In these spaces children may be seated facing each other in small groups at tables, and may be required to work cooperatively in order to solve a problem, create an artistic output of some form, or manufacture a structure (Cornelius-White and Harbaugh 2010). Such 'learner-centred' spaces require children to construct the learning objective and then work cooperatively towards achieving it.

As such, modern classroom environments are highly unpredictable and contain small social ecosystems within them. Each small learning group can receive direct input (often in the form of guided questions) from the teacher. Such classrooms are noisier than traditional teacher-centred settings, and in spite of ideological preferences to offer 'inclusive' education to children with special needs (e.g. Broderick et al. 2005) may, in fact, be more cognitively demanding for such children, and hence hinder, rather than promote their learning. It is significant in this context that in their survey of classroom behaviours that teachers find problematic, Wheldall and Merrett (1988) identified that talking out of turn and disrupting other children were the most commonly cited behaviours. Such behaviours may, of course, reflect developmental constraints on concentration and self-regulation, but may also be manifestations of (possibly undiagnosed) developmental disorders that are associated with pragmatic difficulties.

The modern school also places demands on children that go well beyond academic success. Many schools place a premium on constructs such as citizenship and personal accountability, and so emphasise policies and practices designed to cultivate a sense of belonging for all children, as well as reducing the likelihood of bullying and social marginalization. In so doing, however, they place considerable demands on children's interpersonal skills in general, and their pragmatic language skills in particular. School represents a complex mix of unstructured and highly rule-governed activities. In some cases, rules are explicit and logical and in others they are implicit and conveyed via signalled social approval and/or removal of approval and connection to the peer group. This can be confusing enough for typically developing children, but must be quite overwhelming and opaque to children with pragmatic language difficulties.

23.4.2 Restorative Practice

In recent years, in Western education jurisdictions, there has been a strong shift away from punitive and adversarial ways of dealing with young people's wrongdoings, towards strategies that are aimed at repair and restoration of social relationships, via a conversational process known as restorative conferencing (or sometimes more broadly referred to as restorative practice). Restorative practices include the use of 'circle time' in early years' classrooms, as well as the convening of restorative conferences when a young person violates the rights of another in some way. Circle time is often used as a way of sharing and resolving conflict experiences that children have found upsetting or confusing during the day. The following description is taken from an anti-bullying website aimed at resourcing classroom teachers to make good use of circle time:

> Circle time has an important role to play in the prevention of bullying. It can help young people develop skills such as listening and empathising; it can promote respect for others and self-esteem; it is a forum within which the nature and effects of bullying can be considered; and it can be used to develop an anti-bullying code to which all members of the school community have contributed.
>
> It can also be used to react to a particular problem. For example, if a particular group of youngsters is involved in bullying behaviour this could be openly discussed in the circle. Another example might be if a pupil is being socially excluded because of a perceived difference. A circle time discussion could be initiated which focused on an individual's right to be different. This could be done in such a way that it did not draw attention to the excluded individual but promoted reflection about the underlying causes of the isolation (Anti-Bullying Network 2016).

As may be seen, there is a significant emphasis here on receptive and expressive language skills, social cognition, perspective taking, empathizing, and achieving mutual respect. Children with pragmatic language difficulties may find meeting even the basic requirements of such an activity (e.g. only one person talking at a time) challenging, and so violate the expected code in the context of an activity that highlights the virtues of strong interpersonal skills. Recent evidence also points to the difficulties that children with language disorders may experience in dissembling (concealing) emotions for the purpose of preventing disappointment or hurt on the part of another person (Brinton et al. 2015). Such difficulties are likely to impair participation in activities such as circle time, threaten friendships, and be misinterpreted by adults as callousness.

In the context of restorative conferencing about a particular incident, it is typical for the following questions to be asked of the children involved:

- What happened?
- What were you thinking at the time?
- What have you thought about since?
- What is the impact on other people?
- What do you think needs to be done to make this right?

Significant language, social, and metacognitive skills are required in order to respond to these questions. Answering the question 'What happened?' requires narrative language abilities in order to provide a coherent account that links events both temporally and causally. Competent narrators also need to be able to take the perspective of the listener in order to take account of listener prior knowledge and the level of background information they may require in order to make sense of the story in question (Paul and Norbury 2011). Restorative practices also require the identification of affective states in others together with the ability to respond to these in socially, culturally, and developmentally appropriate ways. Further, they tax cognitive processes that enable perspective taking and an acknowledgement that others' beliefs about an event might be different from one's own. Again, children with pragmatic language difficulties may be specifically lacking in such skills, and so may be disadvantaged with respect to their ability to fully engage. There are, however, potential benefits of circle time and restorative practices for children with special needs, in the sense that these conversations are structured and facilitated by an adult, who can take steps to repair misunderstandings and foster communication success. Further information about the use of restorative practices with special needs populations can be found in the recent text by Burnett and Thorsborne (2015).

23.4.3 The School-to-Prison Pipeline and Exclusions and Suspensions

Unfortunately, some children and adolescents display such significant difficulties with behavioural self-regulation, often entailing a verbal component, such as abusive or otherwise disrespectful language, that they experience penalties in the school setting. Initially, such penalties may comprise brief periods of time-out, in or outside the classroom. For some young people, however, there is an escalation to suspensions and/or exclusions from school. This had led some authors to refer to a 'school-to-prison pipeline' (Christle et al. 2005). Children on this trajectory are socially and academically marginalized, spending proportionally more time with other disaffected peers, and experiencing reduced exposure to prosocial role models. Thus, suspensions and exclusions are likely to do more long-term harm than good, particularly when they are coupled with social disadvantage (Hemphill et al. 2014). A significant proportion of young people who are excluded go on to find themselves in contact with police and the courts, via violations which may range from offences against good order (e.g. graffiti damage to public or private property), status offences (acts which are deemed criminal by virtue of the young person's status as a minor, e.g. being out unsupervised late at night), property offences and, most seriously, acts of interpersonal violence (which include threats to harm as well as actual harm). It should be remembered too, that longterm social marginalization is also a form of "prison" albeit not behind high walls and physical bars.

A high proportion – on some estimates around 40 % (Stewart et al. 2002) – of young people who come into contact with youth justice services do so after or alongside contact with child protection agencies. Such contact reflects adverse childhood experiences such as various forms of neglect and/or abuse. Many of the factors that lead to child protection contact reflect inter-generational risk and disadvantage, and simultaneously work against the development of receptive and expressive oral language competence, prosocial interpersonal skills, the development of empathy, and pragmatic competence. Such factors include maternal depression, coercive and erratic parenting, and disturbed attachment (see Cohen 2001; Snow 2009). A recent review has identified child maltreatment as a significant threat to the development of language skills (Lum et al. 2015). However, it must be noted that maltreatment is not always evident to teachers and other adults in the child's world, so phenomena such as poor auditory processing may be mis-labelled as inattention or lack of cooperation.

Over the last 20 years, there has been a closer focus on the oral language skills of young people in the youth justice system, with researchers in the UK (e.g. Bryan 2004; Bryan et al. 2007), the USA (Sanger et al. 2001), and Australia (Snow and Powell 2008, 2011; Snow et al. 2016) examining both structural and pragmatic aspects of oral language competence in this high-risk population. In addition to identifying significant deficits pertaining to expressive and receptive 'core' language skills (vocabulary in particular) and narrative abilities, some researchers have shown that pragmatic skills such as inferencing and disambiguation are also compromised in young offenders (Snow and Powell 2008, 2011). It is important to note, too, that a relationship has been established between poor language skills and histories of interpersonal violence (Snow and Powell 2011). This finding suggests that a subgroup of young offenders experiences particular difficulty in the interpersonal space, and reverts to physical responses over verbal problem solving and other approaches that may de-escalate rather than exacerbate tensions between interactants.

This is consistent with evidence that young offenders, when faced with ambiguous social cues, will tend to favour a hostile over a neutral attribution (Tarolla et al. 2002). Unfortunately, however, there is a dearth of evidence examining such attributions in relation to pragmatic language abilities. From a forensic interviewing perspective, evidence on the narrative language skills of young offenders also points to particular difficulties in including story grammar content that it is relevant to the listener's needs (Snow and Powell 2008). A tendency to omit critical aspects of the story, such as the plan, direct consequences, and resolution may mean that Gricean maxims are violated with respect to quantity, quality, and relation. As Snow and Powell (2008) have observed, this can have particularly negative implications for the transmission of information in high-stakes interactions, such as police interviews.

In addition to marked difficulties with structural and pragmatic aspects of language, young offenders have also recently been shown to display high rates of *alexithymia* (Snow et al. 2016). This refers to difficulties assigning verbal labels to one's own affective states. While alexithymia is a strong *comorbidity* with language impairment in young offenders, it does not appear to be its *correlate*. Rather, it is strongly associated with the presence of depressed mood and anxiety, indicating that such young people may experience both language and emotion-based difficulties engaging in verbally-mediated therapeutic interventions such as counselling.

Young people with neurodisabilities are over-represented in youth justice statistics (Hughes et al. 2012). However, in studies in which oral language difficulties have been specifically considered (e.g. via screening interview as per Snow and Powell, 2011), young people with neurodisabilities appear to be under-represented. This probably reflects reluctance on the part of young people with neurodisabilities (whether diagnosed or not) to take part in studies that have a focus on oral language skills. Importantly, it means that the already high prevalence estimates of language difficulties in these populations are almost certainly *under*-estimates. Epidemiological samples are needed in order to gauge the extent of this under-estimation.

Important psychosocial implications of generally impoverished core language skills in youth offenders, and pragmatic language difficulties in particular, include difficulties engaging with diversionary options that may be offered by the courts (e.g. restorative conferencing) and also reduced ability to engage with therapeutic services such as psychological counselling. Snow and Sanger (2011) provide a detailed outline of the likely ways in which young offenders (and possibly their victims) may be disadvantaged in the context of a restorative conference. This requires careful research attention so that policies and practices can be tailored with core and pragmatic language skills in mind. Further research is needed, too, in order to determine the role of language skills in fostering engagement in psychological therapies such as Cognitive Behaviour Therapy (CBT). CBT requires the client to engage in a highly verbal exchange, in which he or she is invited to talk about the process of *thinking about their thinking.* This taps both metacognitive and metalinguistic abilities, as well as the ability understand metaphor, and practice different ways of responding in the simulated context of a counselling session. Research is required in order to determine the extent to which psychological therapies require modifications to make them more accessible and hence more beneficial to vulnerable young people with pragmatic language difficulties, whether in the youth justice system or not.

23.5 Pragmatic Disorders Acquired in Adulthood

In this section, we consider pragmatic language impairments in the context of three types of neurological disorders acquired in adulthood: (1) those that result in unilateral focal brain damage as exemplified by stroke; (2) those that result in diffuse brain damage as exemplified by traumatic brain injury (TBI); and (3) those that result in degenerative damage to the brain as exemplified by Alzheimer's disease (AD) and primary progressive aphasia (PPA). Each of these acquired neurological disorders affects a large proportion of the adult population. They all bring with them psychological challenges most frequently associated with the presence of depression and/or anxiety. These challenges can both be exacerbated by and exacerbate the negative impact of impaired pragmatic competence in social environments. Following a brief overview of each of the disorders including associated psychological sequelae, the relation between pragmatic competence in these acquired neurological disorders is considered across three social domains: (1) relationships: friendships and intimate partnerships, (2) employment, and (3) community integration.

23.5.1 Stroke

Worldwide epidemiological data indicate that 15 million people suffer a stroke each year. Approximately one-third of these people will die and one-third will be left with permanent disability (Mackay and Mensah 2004). It is estimated that 21–38 % of stroke patients have aphasia. However, there are no data available concerning the incidence and prevalence of pragmatic language impairment in stroke survivors.

Depression is a significant psychological problem in the stroke population, with approximately one-third of survivors suffering from depression at some time following the event (Hackett et al. 2005). Longitudinal research shows that while some cases resolve over time, 15–20 % of individuals identified as depressed at follow-up assessments are new cases (Ayerbe et al. 2011). Further, more than half (55 %) of those identified as depressed at one assessment remain depressed on follow-up. The presence of depression in stroke survivors has a negative impact on functional recovery (Goodwin and Devanand 2008) and is associated with greater social isolation (Baseman et al. 2010) and poorer health-related quality of life in the short and longer term (Donnellan et al. 2010). Commonly identified risk factors for post-stroke depression include female sex, previous history of depression, functional limitations and cognitive impairment (Hackett and Anderson 2005) including language impairment (Ouimet et al. 2001). Although data exploring relationships between language impairment and post-stroke depression are relatively limited, evidence suggests that the presence of language impairment increases the risk of depression and has an adverse effect on functional and social outcomes as well as overall quality of life (Davidson and Zhang 2008).

Following a stroke, communication disorders have a complex origin and in the case of pragmatics should not be over-simplified as relatively spared pragmatic function in survivors with left hemisphere damage and pragmatic problems in those with right hemisphere damage. As described in Chaps. 9 and 10 (this volume), pragmatic difficulties are clearly associated with both left and right hemisphere damage.

23.5.2 Traumatic Brain Injury

Traumatic brain injury (TBI) refers to brain injury acquired through a traumatic event such as a traffic accident, assault, or fall resulting in an altered state of consciousness and diffuse damage to the brain (National Institute of Neurological Disorders and Stroke 2011). It is the most common cause of disability in young people, with an annual incidence in most Western communities of 150–250 individuals per 100,000 population (Roozenbeek et al. 2013). The complex neurobehavioural effects of TBI result in a range of cognitive, communication, personality, behavioural, psychological and social consequences which disrupt the quality of life of survivors and their families over many years (Roozenbeek et al. 2013). TBI typically affects young people (mostly men) at the beginning of their working lives. Those who sustain moderate and severe injuries face the challenge of long-lasting deficits necessitating intensive rehabilitation efforts and ongoing support to facilitate community reintegration. Between 30 and 70 % of TBI survivors develop depression (Roozenbeek et al. 2013) and more than half experience ongoing difficulties with social integration (Dikmen et al. 2003).

Impaired communication is a well-established consequence of TBI. As many as 70 % of those with TBI report difficulties with communication, including motor speech impairment (Wang et al. 2005), word-finding problems (Bittner and Crowe 2006; Olver et al. 1996), comprehension difficulties (Olver et al. 1996), and impaired pragmatic ability (Channon and Watts 2003; McDonald 1993; Snow et al. 1997, 1998; Turkstra et al. 1995). Although longitudinal studies providing detailed communication outcome data are rare, our research demonstrated that pragmatic deficits after TBI persist at least in the medium term and result in substantial ongoing demands on rehabilitation resources (Snow et al. 1998).

23.5.3 Degenerative Brain Damage

The category of degenerative brain disorders includes a large number of neurological conditions that are identified according to distinct clinical signs and symptoms or specific pathology. Frontotemporal degeneration (FTD), particularly semantic variant primary progressive aphasia, has been selected to exemplify conditions in which pragmatic language impairment has been investigated. FTD is a disease process that results in progressive damage to the temporal and/or frontal lobes of the brain. The characteristic sign of FTD is a gradual, progressive decline in behaviour and/or language with memory usually relatively preserved. As the disease progresses, it becomes increasingly difficult for people to plan or organize activities, behave appropriately in social or work settings, interact with others, and care for themselves, resulting in increasing dependency on caregivers. Clinical subtypes include behavioural variant FTD (bvFTD), primary progressive aphasia (PPA), and the movement disorders progressive supranuclear palsy and corticobasal degeneration.

PPA is a dementia syndrome characterised by an insidious, progressive loss of language skills with relative preservation of other cognitive and behavioural skills for at least the first few years (Gorno-Tempini et al. 2011). The prevalence of PPA is estimated to be around 15–22 cases per 100,000 population in the 45–64 year age range (Knopman and Roberts 2011). PPA has a profound effect on a person's ability to communicate and function in social situations. Based on specific features, PPA can be classified into one of three variants: nonfluent, logopenic, or semantic. Semantic variant PPA (svPPA) results in progressive deterioration in semantic knowledge and memory of facts and word meaning (Nickels and Croot 2014). A relatively early feature of svPPA is profound pragmatic disturbance, commonly observed during conversation (Harciarek et al. 2014). Individuals with svPPA present as excessively talkative with disinhibited output characterized by stereotypic perseverations and not stopping to listen. Eventually, severe pragmatic impairment, together with frequent questioning of the meaning of words, significantly contributes to social and communication handicap.

23.6 Acquired Pragmatic Language Impairment and Social Functioning

Ability to interact appropriately in everyday interpersonal situations is fundamental to successful social integration. Impaired pragmatic competence correlates significantly and substantially with indices of social function across several outcome domains for adults with acquired neurological disorders. In particular, evidence supports the negative impact of pragmatic impairments on the development and maintenance of relationships such as friendships and intimate partnerships, the achievement of success in the work environment, and community integration more generally. As shown in Fig. 23.1, pragmatic language competence sits in a complex, multifactorial space characterised by interacting associations with cognitive and psychological functions and social and environmental parameters. This complexity is evident in much of the research seeking to unravel the nature and magnitude of interactions between pragmatic language competence and social outcomes in adults with acquired neurological disorders.

23.6.1 Relationships

Relationships have long been acknowledged to be powerful moderators of stress and wellbeing (Cohen and Wills 1985; Douglas 2013; Jetten et al. 2012). Socially isolated people tend to be less healthy, both psychologically and physically (Cohen and Janicki-Deverts 2009; Umberson and Montez 2010; Umberson et al. 2006). For example, more socially-integrated people have more resistance to disease (Cohen et al. 1997), including stroke (Rutledge et al. 2008), and show less cognitive decline, including dementia (Fratiglioni et al. 2004). In fact, the evidence linking social relationships as a risk factor to health, mortality and morbidity, is as strong as evidence linking smoking, obesity, blood pressure and physical activity to health (Umberson et al. 2006).

Lack of social relationships and poor quality of existing relationships are both common and enduring experiences for many people who acquire neurological disorders during adulthood (Barry and Douglas 2000; Clare et al. 2012; Lefebvre et al. 2008; Pound et al. 1998). Increasing evidence also shows that disorders likely to be associated with negative outcomes in the domain of relationships are those that involve changes in communication ability (Douglas 2015; Hilari et al. 2010). This association has been powerfully illustrated in qualitative research exploring the experiences of those living with the consequences of TBI. Take, for example, Katherine who was 31 years old when she participated in research exploring the association between depression and social support (Douglas and Spellacy 2000). Six years had elapsed since Katherine's injury and she clearly captured the challenge that relationships entailed for her:

> Find it very hard to make friends – not game enough. People will look at me and think I'm different. I feel that, Yes, I'm different even this far on. I need to feel that I'm loved. (Douglas and Spellacy 2000: 82).

She also concisely described the importance of the social communication consequences of TBI:

> …the relating and talking to people, that's the hardest (Douglas and Spellacy 2000: 82)

Like many others with acquired pragmatic language impairment, Katherine was acutely aware that interpersonal social interactions were both challenging and stressful, and played a substantial role in relationship formation and maintenance.

23.6.2 Friendships

Although friendship is difficult to define, some common features have been identified in the literature. Willmott (1987) investigated friendship networks and concluded that a friend is someone you can trust, someone whose company you enjoy, and someone with whom you can discuss things freely. Friendship is not one-sided but is characterised by mutual help and support. Friends usually have similar attitudes, beliefs and interests (Nussbaum 1994) and also share similar values concerning communication (Burleson et al. 1992). Of particular note, Burleson et al. (1992) found that 'comforting', or being able to make others feel better when they were upset, was a communication skill that pairs of friends commonly rated as important to maintaining their friendships. Thus, changes in a person's communication behaviours, particularly those that convey mutuality and interpersonal sensitivity are likely to have a negative impact on the balance of existing friendships. Further, if a person's communication behaviours no longer reflect socially appropriate behaviour, it is likely to be difficult for that person to develop new friendships.

Both the loss of friendship and the negative impact of changed pragmatic competence on friendship have been highlighted by several studies involving people with TBI. Participants in Douglas and Spellacy's (2000) study identified problems with loss of friendship as well as a desire to make new friends:

> I'm a loner; friends who were there at the time have just gone. I'm still at home; .... to be accepted by other people, to have friends. I go out by myself on Saturdays just to tell people at work I've been out (Douglas and Spellacy 2000: 82).

People with TBI also identified stress around social interaction as one of nine sources of stress in Karlovits and McColl's (1999) qualitative study. A reason identified for this stress was that TBI survivors felt they no longer had ownership over what came out of their mouths. One participant commented:

> At times I tend to monopolize the conversation. I'm trying to keep an eye on that. I'd be roughly corrected in the past and I realize it doesn't win too many friends (Karlovits and McColl 1999: 852).

Further, direct evidence of the link between acquired pragmatic impairments and difficulties maintaining and developing friendships after TBI can be found in the work of Paterson and Stewart (2002) and Shorland and Douglas (2010). Analysing focus group data from 11 participants, Paterson and Stewart identified themes relating to how participants viewed their interactions and relationships. Participants linked lost friendships with their altered communication, particularly an inability to communicate with tact: 'You just say straight away what you want, there is no tactfulness involved' (Paterson and Stewart 2002: 16). This study painted a negative picture for the formation of new friendships due to the accompanied strain on day-to-day interactions. The authors described how the participants' communicative ability did not support their desire to achieve acceptance from others. For example, one participant commented on the contradiction created by his physical appearance and his communication: 'When you go somewhere, aye, they look at you, 'oh he's alright.' And as soon as you speak, it all flips over one side' (Paterson and Stewart 2002: 16).

Shorland and Douglas (2010) highlighted similar difficulties in their study of the friendship experiences of two young adults, Rachel and Dave, following severe TBI. Three key themes were apparent following analysis of in-depth interview data: evolution of friendships following TBI; perceptions of communication; and opening up to others. The theme that captured the participants' current perception of their ability to communicate, contained clear examples of their personal experiences of impaired pragmatic competence. The following quotes are from Shorland and Douglas (2010: 574). Rachel commented on difficulties with turn-taking cues, leading to her tendency to interrupt. She also remarked on problems with discourse structure and difficulties modifying prosody to convey emotional tone:

> Sometimes I have trouble if someone's speaking and I'm not quite sure when they've finished, like if they have a pause for a moment and then I want to go and say something but they actually haven't finished saying something so I butt in.
>
> Sometimes I start with saying something then I go back to the beginning of what I should be actually saying to make, make more sense in my mind but I'm sort of speaking that out loud; I suppose I try and correct it [disjointed discourse] as best as possible. But yeah it happens sort of as I'm, as I'm speaking because my brain doesn't sort of do it beforehand like un-brain injured people's brains.
>
> She [friend] could tell by what I was saying that I was sincere, but not by the tone of my voice.

Both Rachel and Dave highlighted difficulties with maintaining or contributing to conversations:

> I had trouble with continuing a conversation. You say 'hi how are you' and then where do you go from there? (Rachel).
>
> I'm OK when it's one on one, although sometimes I sort of run out of things to say and then, then sort of the other person doesn't, bring anything new into the conversation, you sort of get stuck (Dave).

Dave also described difficulties with initiating conversations and the impact of reduced speed of processing on his interactions:

> Approaching someone, initiating, is a little like strange, or unfamiliar to me and bringing conversations to a close I don't always know how to, how to end a conversation or how to leave a conversation in a, in a correct manner . . . if I have to get away quickly or something, I, I'll just say 'I've got to go' sort of and leave without saying, without even thinking to say 'I've had a great time' or 'we, we should do this again.'
>
> I know I've got slow thought patterns, difficulty in word finding sometimes ….. being able to comprehend things or assess things quickly in the heat of the moment [is difficult].

While Rachel and Dave perceived their own pragmatic language impairments, they were not always aware of how these impacted upon their ability to maintain and form friendships. For example, Rachel had recently been involved in a speech pathology session, which was attended by two of her friends who had known her since before her accident. In this session, her friends discussed changes to Rachel's communication that impacted on the quality of their relationships. Rachel remarked:

> I think it's the same but [my friends] were telling me things that they noticed that my communication is different … When they were telling me these problems, it made me feel a bit disheartened, a bit miserable.

Rachel reported that to some degree, her friends excused this kind of communicative behaviour because they had knowledge of her premorbid personality and the nature of her brain injury. Later in her interview, however, she articulated an understanding that the outcome might be different if the person with whom she was interacting was unfamiliar with her story:

> So the way I speak to people and communicate with them I suppose would affect the friendships that I have and am trying to make.

Dave described the impact of his communication difficulties on relationships by reference to his lack of confidence: ‘Confidence is a big issue, when it, when it goes to walking up and talking to someone’. This is consistent with reports that people with TBI take a passive role in conversation (Bogart et al. 2012). Dave described himself in this manner but also noted that his passive communication style was to some degree specific to a communication partner. Finally, both Rachel’s and Dave’s experiences supported the importance of addressing the communication difficulties of this population using context-specific approaches that include social activities with friends and peers.

23.6.3 Intimate Relationships

Acquired communication impairments impact on relationships in general, and most significantly, on intimate spousal/partner relationships. Sustaining emotional intimacy in healthy partner relationships relies on dialogue, transparency, vulnerability, and reciprocity (Perlman 2008). Indeed, relational problems in couples have been conceptualised as a function of individual deficiencies in communication skills, resulting in dyadic distress and dissatisfaction (Rogge and Bradbury 1999). Two-way conversations are the currency for sustaining intimacy in healthy partner relationships. As Duck (1988) proposed, we can conceptualise communication as the grout that maintains the structure of the relationship, and should thus expect that changes in communication will threaten the spousal bond. Evidence to support this contention can be found in the literature pertaining to psychosocial outcome for couples following stroke (Bakas et al. 2006; Grawburg et al. 2013), TBI (Bracy and Douglas 2005; Gill et al. 2011; Godwin et al. 2014; O’Flaherty and Douglas 1997) and diagnosis of dementia (Eloniemi-Sulkava et al. 2002; Pozzebon et al. 2016).

Aphasia brings several challenges for those in coupled relationships, and spouses of individuals with aphasia have long been reported to feel a loss of partnership within the marriage (Kinsella and Duffy 1979). Adjustment problems for couples also tend to increase with time (Kinsella and Duffy 1979; White et al. 2003). Caregiving partners of aphasic stroke survivors are also more likely to have depression and all aspects of their health are affected: functions, activities and participation (Grawburg et al. 2013). In a rare study directly investigating the impact of right hemisphere communication disorders on intimate relationships, Blonder et al. (2012) found significant associations between marital satisfaction and facial affect processing and prosody discrimination.

Reduced sexual activity is particularly common in the stroke population and is likely to be related to changed body image, lowered self-esteem and reduced communication within the partner dyad. As Lemieux et al. (2001) commented, individuals with aphasia are likely to experience added difficulties due to reduced ability to initiate sexual activities or engage in intimate sexual conversation with their partner.

Individuals with TBI frequently struggle within intimate relationships as a result of communication challenges, information processing difficulties, and frequent emotional and sexual intimacy issues (Godwin et al. 2014). Similarly, their partners also experience communication difficulties as barriers to intimacy. Gill et al. (2011) interviewed 18 couples at a mean length of 4.78 years post TBI. Most of their participants cited good communication as critical to maintaining their intimate relationship and negotiating the changes they encountered as a result of the injury. Partners noted that communication seemed to take place on a different level after TBI, with conversations lacking intellectual and emotional depth: 'I think an intimate moment is when you pour your heart out. And we can't do that anymore' (Gill et al. 2011: 62). Some also reported that their injured partner tended to avoid discussing issues that affected the relationship. Bracy and Douglas (2005) noted topic avoidance in their study of couples following TBI. However, avoidance tended to be used as a coping strategy by partners to steer clear of topics that may trigger negative, difficult or aggressive interactions.

Using a model of interpersonal communication, O'Flaherty and Douglas (1997) explored the subjective experience of living with the consequences of TBI. All the married participants in the study described fundamental changes to the dynamics of the dyadic relationship. Most participants reported a substantial decline in social and leisure activities, with married dyads reporting a progressive tendency for the uninjured spouse to socialise alone. Increased tension in situations in which wider family and/or friends come together was cited as one of the reasons for this. Further, the injured partner's unpredictable and inappropriate communication was seen as the source of this tension for spouses, while injured partners reported feeling unable to 'keep up' in fast-moving and busy social situations, and therefore consciously chose to avoid them:

> ...as I said I just don't go [to social activities at his wife's workplace] because I'm more of a hindrance or make it harder for her to enjoy herself (O'Flaherty and Douglas 1997: 900).

Spouses also identified insensitive or violent outbursts, and difficulties with implicature and social banter as particularly challenging in their relationships:

> ...it's still very hard when someone's screaming and shouting at you (O'Flaherty and Douglas 1997: 901).

> ...you know, if there's a trick in it. And she just won't get it. Won't get it; Some of the problem with friends... part of the friendship was always banter. Banter that you used to... and you [directed at injured partner] can't keep up with that now ...You know jokes and asides (O'Flaherty and Douglas 1997: 903).

In the context of dementia, spousal caregiver burden is generally viewed as a multicomponent construct which is influenced by the behavioural characteristics displayed by the person with dementia, the caregiver's emotional-psychological state, and the social context of their given situation (de Vugt and Verhey 2012). The literature also suggests that spouses may experience distress and anxiety long before their partner is diagnosed with dementia. First inklings of problems are usually associated with some acknowledgement by the spouse of behavioural changes in their partner, particularly changes that have a negative impact on the relationship (de Vugt et al. 2003; Garand et al. 2007). Disturbed communication has been described by spousal caregivers as the greatest challenge, and has been associated with increased negative perceptions of relationship quality (Blieszner and Roberto 2009; Braun et al. 2009; Clare et al. 2012; de Vugt et al. 2003; Garand et al. 2007).

Pozzebon et al. (2016) recently synthesized findings of published qualitative research concerned with the spousal experience of living with a partner diagnosed with either Alzheimer's disease or FTD. Their review included 16 published studies and collectively represented the views of more than 200 spouses. 'Loss of Partner' emerged as the central theme of the overall spousal experience. Categories evident within this theme covered spouses' perceptions of negative change in the dyadic interaction and quality of their relationship, feeling that their partner had become a different person, experiencing reduced reciprocity and connectedness, loss of talking to each other and changes in sexual intimacy. Diminished spousal satisfaction in their relationship appeared to be largely associated with changes in the quality, quantity and reciprocity of the couple's interactions. Statements made by spouses in the source studies were used to illustrate this association:

> He doesn't say goodbye. And doesn't kiss anybody or hug anyone any more. Even with friends and family. If someone dies or is ill, he has no feelings. It's terrible. You want to tear your hair out (Partner with bvFTD; Massimo et al. 2013: 4).

> Well, you can discuss but you have to lead the conversation because she very seldom carries on a conversation unless you start it, and then it's more or less question and …. She just doesn't respond (Partner with AD; Boylstein and Hayes 2012: 598).

Decline in communication skills was described by spouses both in prodromal phases of disease progression and later after the dementia diagnosis had been made. Observed changes in partners' communication included difficulties understanding instructions, problems with interpretation of jokes and humour, difficulties following conversations, reduced concentration, repetitive questions or comments, word-finding difficulties, reduced initiation and maintenance of meaningful discussions, and reduced sensitivity to conversation partners (Boylstein and Hayes 2012; Frank et al. 2006; Gillies 2012). Many spouses stated that changes in dyadic interaction patterns with their partners contributed directly to them feeling increasingly disconnected from their partner. Indeed, from the spousal perspective, dementia could be seen to be primarily manifested in behaviour and more specifically in talk (Schrauf and Iris 2014).

Clearly, across the acquired neurological conditions we have considered here, intimate relationships are vulnerable to pragmatic impairments that result in even subtle changes in interpersonal communication. Further, these changes can progressively erode the fabric of a couple's relationship and pose a direct threat to the cohesion and dynamics of that relationship. Consequently, it is important that we focus therapeutic attention on pragmatic competence, particularly in the context of friendships and intimate partnerships.

23.6.4 Employment

Return to competitive employment presents a major challenge to adults who sustain brain damage during their working years. Given that strong communication and interpersonal skills are typically considered essential attributes in most contemporary workplaces, it is logical to expect that those with acquired pragmatic impairment will struggle in the employment arena. A substantial body of work supports the association between return to work (RTW) and cognitive impairment (Rassovsky et al. 2006; Sherer et al. 2008), particularly executive and memory function and self-awareness of cognitive function (Ownsworth et al. 2006; Struchen et al. 2008). Evidence to support pragmatic competence as a crucial factor in this social domain is growing. Much of this evidence sits within the TBI literature due to its socio-demographic features, communication profile, and poor RTW characteristics.

Sale et al. (1991) tracked the reasons for job separations in a supported employment program for adults with TBI. The most frequently indicated primary factor in layoff involved interpersonal communication problems. Specific social communication problems cited as causing difficulties in the workplace included social cue misinterpretation and inappropriate comments. More recently, Hofgren et al. (2010) investigated facilitators to employment 12 months following brain injury in 48 people with stroke and 24 with TBI. The affect subscale was the only one of six subscales on a neuropsychological screening instrument to yield a significant difference between those who returned to work and those who did not. This subscale captures pragmatic competence through items measuring ability to express affect with vocal tone, ability to interpret facial expression, and ability to comprehend and express humour.

Struchen et al. (2008) studied the potentially confounding interaction between social communication and executive function skills in the context of concurrently measured occupational functioning. Data from 121 participants with TBI were analysed using multiple regression. Executive functioning performance accounted for a unique 13.3 % of the variance in occupational functioning. Social communication performance accounted for an additional unique 5.6 % of the variance following adjustment for age, education, and performance on executive functioning measures. These results support the proposition that interpersonal communication skills contribute to vocational outcome in their own right, distinct from the contribution made by executive function skills. Further, although executive control processes influence social communication competence, they do not explain social communication problems (Channon and Watts 2003; Douglas 2010; Snow et al. 1997).

Based on the premise that adherence to Grice's maxims (Grice 1975) is important for interactions in the workplace, Douglas et al. (2016) hypothesised that frequency of behaviours representing Quantity, Quality, Relation and Manner violations would differentiate those who return to and maintain employment (EMP) from those who do not (UNEMP) following TBI. Variables that have been shown to have an impact on employment outcome (age, gender, education, pre-injury employment, occupation, pre-injury psychiatric and substance abuse history, severity of injury, and time post-injury) were controlled through group matching. The La Trobe Communication Questionnaire (LCQ; Douglas et al. 2000, 2007) was used to enable systematic exploration of specific domains of deficit. The potential role of self-awareness of communication function was also explored, by measuring communication from two perspectives: (1) the person with TBI (self-report), and (2) a close family member (relatives' report).

As hypothesized, difficulties with social communication differentiated the two groups and significant differences between the groups emerged both from the perspectives of the injured adults themselves and from the perspectives of their close relatives. In addition, the pattern of results within the two employment groups differed significantly, with the pattern in the UNEMP group being consistent with impaired self-awareness and the pattern in the EMP group being consistent with intact self-awareness. Behaviours associated with violations of Relation (poor topic management, situational inappropriateness), Manner (delay before responding, turn-taking difficulty, slow rate, difficulty modifying speech style), Quantity (non-specific vocabulary) and Quality (giving information that is not correct) were identified by relatives of the adults with TBI in the UNEMP group as creating frequent problems. Clearly, such difficulties can create problems during work-based interactions and present significant obstacles to employment for adults with TBI. Further, such behavioural violations require systematic treatment which is tailored individually within specific work contexts to support RTW.

23.6.5 Community Integration

Given the preceding discussion, it is logical that research results would support the link between social communication and community integration. As has been observed by several authors, people who display poor pragmatic language competence have difficulty engaging in social situations, leading to uncomfortable interactions with others. Such interactions contribute to rejection by others and poor community integration, which can in turn contribute to negative self-concept, depressed mood, loneliness, and withdrawal from efforts to engage in community activities. In turn, withdrawal from community activities further reduces opportunities for social encounters contributing to further social isolation.

While studies that have directly investigated the association between social communication and community integration in people with acquired brain damage report variable findings with respect to the magnitude of the association, they generally yield modest to strong statistically significant correlations. Snow et al. (1998)

reported that clinician-rated discourse errors correlated significantly with ($r = -0.36$, $p = .04$) and accounted for 13 % of the variance in social integration scores as measured by the Craig Handicap Assessment and Reporting Technique (CHART; Whiteneck et al. 1992) in a group of 26 adults with severe TBI followed up 2 years after injury. Galski et al. (1998) reported similar findings between clinician-rated discourse parameters and the CHART (r ranging from 0.06 to 0.41) in a group of 30 participants with moderate to severe injuries. More recently, Dahlberg et al. (2006) showed that self-rated but not close other-rated social communication ability was significantly associated with social integration in a group of 60 participants with moderate to severe brain injury sustained 1–21 years previously. Correlation coefficients between self-rated social communication abilities and both the CHART and the Communication Integration Questionnaire (CIQ; Willer et al. 1994) ranged from 0.28 to 0.43. Social communication abilities accounted for up to 18.5 % of variance in social integration scores.

Knox and Douglas (2009) investigated the association between the ability to interpret facial expression and social integration and found a significant and moderately large correlation ($r = 0.65$, $p = .008$), accounting for 42.3 % of the variance between the two variables. Importantly, analysis showed that the strength of the association remained after controlling for the effect of cognitive function. Finally, Struchen et al. (2011) evaluated the contribution of social communication skills (LCQ self-report) to social integration outcomes (CIQ) using hierarchical multiple regression on data from 184 adults with TBI at least 6 months after discharge from acute care. After accounting for demographic and injury-related characteristics, social communication and affective/behavioural variables accounted for a statistically significant amount of variance in social integration functioning measured by the CIQ. Social communication measures accounted for 11.3 % of the overall explained variance in social integration and the LCQ total score made a statistically significant and unique contribution to the prediction of social integration scores as measured by the CIQ (Willer et al. 1994).

These findings provide sound evidence for the importance of social communication in shaping community integration. The words of those grappling with the everyday experience of community engagement powerfully capture the complexity and daunting nature of the activity:

> You've got to be trying to think about two things, that you're actually doing the actual communication stuff, but then at the same time remember the stuff you're saying (Douglas 2015: 206).

> … I get so anxious … there's so much happening, I never knew (Douglas 2015: 207).

These two quotes together reflect much of what we have depicted in Fig. 23.1. The first quote emphasises the multifactorial nature of pragmatic language competence. The second draws our attention to the unpredictability, stress and anxiety that surrounds everyday communicative interactions for those with acquired pragmatic language impairments.

23.7 Summary

Pragmatic language difficulties are significant because they are located in the interpersonal space and disrupt one of the most basic purposes of human communication: the ability to form, manage, and maintain relationships with other human beings. Such relationships are essential for mental health across the lifespan, as they are the basis of a sense of connection and belonging within dyadic and group contexts. In recent years, there has been a pleasing shift to consideration of the lived experience of language disorder/impairment (with or without pragmatic difficulties), and this has resulted in some improved awareness of the psychological difficulties and social barriers encountered by affected individuals. Much further research is needed, however, in order for this emerging knowledge to be translated into meaningful interventions that result in improved quality of life, both for affected individuals and for their communication partners.

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