Contributions To Phenomenology 77

Thomas M. Seebohm

History as a Science and the System of the Sciences

Phenomenological Investigations

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Preface

A modern Socrates walking around in the marketplace of opinion that is offered in the modern media will soon discover that very few dare to raise objections against arguments starting with "science has shown that ...." What "science" says is considered to be the final decider in the court of reason that determines the answers for all questions that can be raised both in the region of theoretical knowledge and in the region of technological solutions for practical problems. Such arguments presuppose, of course, that it is known what a science is or ought to be. And the Socratic question in this situation is, of course, "Tell me, dear friend, what science is." The experts for answers to this question in the last century, i.e., the epistemologists, offered two answers. Further Socratic questioning reveals that diametrically opposed conclusions can be derived from the two answers.

The first answer is the answer of analytic philosophy, the modern version of nineteenth century positivism. The answer is that sciences are real sciences only if they are able to apply the methods of experimental research based on immediate intersensory observations,[1] and in addition they are real sciences only to the degree in which they are also to apply mathematics. Only real sciences in this sense are able to discover the laws of nature and to determine how things *really* are. The natural sciences are sciences of the real world, i.e., of nature. The so-called human sciences are sciences only to the degree to which they are able first to apply methods of natural sciences and then, in a second step, to give reductive explanations for their discoveries with the support of results from the natural sciences. This is the final conclusion of the first answer.

The second answer distinguishes between the methods of the natural sciences and those of the human sciences. Human sciences apply the methods of understanding (*Verstehen*), i.e., of the interpretation of the manifestations, the life expressions, in the cultural world. Natural sciences are sciences that apply the methods of explanation and as nomothetic sciences they are interested in the discovery of causal

[1]Note that in these investigations the term "intersensory" always refers to observation that is not merely sensory but intersubjective.

laws determining the events in the natural world of what really is the case. There are, hence, *prima facie* in general no serious differences in the judgments about the methodology of the natural sciences between the defenders of the first and the second answer. A second glance reveals, however, that the thesis of the defenders of the second answer implies that the world of the human sciences, the cultural world, has priority over the world of the natural sciences. This needs some further explication.

The main objection that can be raised in defense of the second against the first answer is that explanations in the human sciences have to presuppose what has to be explained. What has to be explained are manifestations of cultural activities, i.e., actions, interactions, speeches, but then also written speeches, texts, art works, etc. Such manifestations are more than objects that can be given in intersensory observations. They must be understood, i.e., they need interpretations. Explanations in the human or cultural sciences presuppose, hence, interpretations. There is no way to defend the objective validity of such explanations without a possible justification of the objective validity of the presupposed interpretations with the aid of methods that can serve as warrants for the objective validity of these interpretations.

The conclusion that can be derived from the principles of this argument for the second answer says that the history of the natural sciences shows that the natural sciences themselves are also manifestations of specific activities in specific phases of cultural history. The natural sciences can, hence, ultimately be reduced to the problem of understanding interpretations of nature in the human sciences. This conclusion is diametrically opposed to the conclusion that is derivable from the first answer.

However, this argument also reveals the weak spot in the second answer. There is, on the one hand, philology as *the* historical human science that can be recognized as a "pure" science of interpretation. There are, on the other hand, historical human sciences that *presuppose* interpretations of texts, monuments, and artifacts, but their main interest ultimately lies in reconstructions of "what really happened" and explanations of "why has it happened," i.e., an interest in "historical" facts and causal explanations of these facts. It is, hence, possible to maintain a strict distinction between a scientific methodology of explanation and a scientific methodology of interpretation, but it is not possible to use this distinction between different methodologies as a justification for a strict separation between the natural and the human sciences.

A reader of the second volume of Husserl's *Logical Investigations*, with the subtitle *Investigations Pertaining to the Phenomenology and Theory of Knowledge*, as well as the *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Book I*, is left with the impression that phenomenological investigations will be able to give a consistent and final answer to the question of what a science really is and to offer an outline of a system of different types of theoretical disciplines that can be recognized as sciences. Looking then into *Ideas II* and the later works of Husserl, the reader is left, however, with the somewhat disappointing impression that Husserl obviously shares the above-mentioned second answer, emphasizing a transcendental and even metaphysical priority of the world

of the cultural or spiritual sciences over the world of the natural sciences. It is also disappointing to discover that, though Husserl offers a general theory of knowledge and a philosophy of science, he says almost nothing about a phenomenological epistemology of the sciences and a system of the sciences, i.e., what is missing are critical descriptive analyses of the *methodologies* of the sciences.

Phenomenology is not a doctrine or a closed philosophical system. It is, according to Husserl, a research program. Having the above-mentioned incompatibilities, shortcomings, and doubts in mind, it is, hence, the aim of the following investigations to develop a consistent system of a phenomenological epistemology. The expectation that such investigations should begin with the natural sciences is reasonable. It is reasonable because seen from the viewpoint of the history of the sciences, it is obvious that the development of the modern empirical sciences begins with the emergence of the natural sciences and that the claim that the so-called human sciences are indeed sciences was only raised later, first for the historical human sciences and then for psychology and the social human sciences. The summary of the conclusion at the end of the following investigation will follow this order. But the *methodology* of *research* in *history as a science*—not history as a collection of narratives—and in the *historical human sciences* has been a blind spot in phenomenological epistemological reflections. Therefore, the investigation (Part I, Sect. 4.5; Part II, Chap. 5) will begin with the epistemological problems of the historical human sciences, proceed from there to the *prima facie* diametrically opposed problems of the natural sciences, and deal with psychology and the social human sciences at the end.

This outline of the system of the sciences, and the additional thesis that *history as a science* is the mediator in the alleged opposition of the natural and the human sciences, is incompatible with both of the considered above answers to the question "what is a science." It is, however, in agreement both with our lived experience in a lifeworld with sciences and with the foundations of a lifeworld with sciences in the structure of practical interactions with the natural environment in pre-scientific lifeworlds (Part I, Sect. 3.5; Part II, Chap. 6; Part IV, Chap. 9).

Thomas M. Seebohm

Acknowledgements

Given the circumstances, the research work preparing the investigations of this book would not have been possible without the continuing supply of recent publications and information about editions of the phenomenological traditions in the United States (especially the tradition of the New School, Dorion Cairns, Felix Kaufmann, Aron Gurwitsch, and Alfred Schutz, provided by Lester Embree) and the "Center for Advanced Research in Phenomenology, Inc." Embree read also drafts of chapters of the book and gave valuable advice for the technical terminology and the general structure of the whole.[1] I highly appreciate and am thankful for Dr. Elizabeth Behnke's work as copyeditor of the book, including her advice for polishing the style and editorial problems in the bibliography. I am also very thankful for the support in finding solutions for technical problems and the formatting of the text of my technical advisor Michael Rang. I appreciate and I am thankful for the decision of the editorial board and the editors of the Contributions to Phenomenology series and to the publisher, Springer, for accepting and publishing the book.

[1]Before he became ill, my friend sent me a printout of the whole of his book. I marked a number of typographical errors and suggested divisions of some long paragraphs and sent it back. When I was sadly honored with the request to see the work though the press, this marked-up copy was sent back to me and showed not only that most of the suggested divisions and corrections were accepted but also that some errors I had overlooked had been caught by the author. After making these corrections, all that the text lacked were abstracts for the chapters. Here I soon gave up composing them myself and instead have formed the abstracts out of the section headings within the chapters. I am grateful to my assistant, Elliot Shaw for his help. Lester Embree, July 2014.

Obituary

Thomas M. Seebohm

Thomas Mulvany Seebohm died at home in Bonn surrounded by his wife and three sons on August 25. He was born on July 7, 1934 in Gleiwitz.

Due in part to the times in Germany after the war, after graduating in classical gymnasium in 1952, he learned cabinetmaking, becoming a journeyman in 1954. He then studied Philosophy, Slavic Languages, Slavonic Literature, and Sociology at the Universities of Bonn, Saarbrűcken, and Mainz, receiving his doctorate in Philosophy *summa cum laude* in 1960 with *Die Bedingungen der Möglichkeit der Transzendentalphilosophie* (Bonn 1962). From 1960 to 1965 he studied medieval Russian philosophy and culture further, eventually publishing *Ratio und Charisma. Ansatz zur Ausbildung eines philosophisches und wissenschaftlichen Weltverständnisses im Moskauer Russland* (Bonn 1977).

Seebohm began teaching as an Assistant at Mainz in 1965, and was a Visiting Professor at the Pennsylvania State University in 1970–1972 and at Trier in 1973. He was then a Full Professor at Penn State 1973–1984, with additional visiting professorships at the New School for Social Research in 1980 and at Heidelberg in 1981. He was a Director of the Center for Advanced Research in Phenomenology, Inc. since the 1970s. And finally he returned to Mainz as the successor of Gerhard Funke in 1984 and retired in 1999.

Further books are *Zur Kritik der hermeneutischen Vernunft* (Bonn 1972), *Philosophie der Logik. Handbuch Philosophie* (Freiburg 1984), *Elementare formalsierte Logik* (Freiburg 1991), *Hermeneutics: Method and Methodology* (Dordrecht 2004), and, finally, a comprehensive phenomenological epistemology, *History as a Science and the System of the Sciences* (Dordrecht, in press).

There is a Festschrift, *Phenomenology on Kant, German Idealism, Hermeneutics, and Logic* (ed. O.K. Wiegand et al., Dordrecht: 2000), with an Introduction by Joseph Kockelmans on the accomplishments until then that fit that title and that made Thomas cry when he read it. Kocklemans's summary is that, "above all Seebohm considered himself a creative phenomenologist who as a critically reflecting

philosopher would look at all major issues with which he became confronted from a transcendental point of view" (p. 3). From helping with the last book, I can add that Thomas also found a final affinity with the New School tendency in American phenomenology, i.e., Dorion Cairns, Aron Gurwitsch, and Alfred Schutz.

Lester Embree

Contents

List of Abbreviations

Dilthey GS	Wilhelm Dilthey. *Gesammelte Schriften.* Bd. I–XII. Stuttgart: Teubner; Bd. XIII–XX. Göttingen: Vandenhoeck und Ruprecht, 1914–1990.
Dilthey SW	Wilhelm Dilthey. *Selected Works,* ed. R. Makkreel et al., 6 vols. Princeton: Princeton University Press, 1985ff.
EP	*Encyclopedia of phenomenology,* ed. L. Embree et al. Dordrecht: Kluwer, 1997.
Husserl CW	*Collected Works.* The Hague/Dordrecht: Martinus Nijhoff/Kluwer/ Springer, 1980ff.
Husserl Hua	*Husserliana: Edmund Husserl, Gesammelte Werke.* Den Haag/ Dordrecht: Martinus Nijhoff/Kluwer/Springer, 1950ff.
Kant KGS	Immanuel Kant. *Kants gesammelte Schriften,* ed. Königlich Preußischen Akademie der Wissenschaften. Berlin: Walter de Gruyter, 1902ff.
Peirce CP	*Collected Papers of Charles Sanders Peirce,* ed. C. Hartshorne et al. Cambridge, MA: Harvard University Press, 1931–1935.
Schutz CP	*Collected Papers*. The Hague/Dordrecht: Martinus Nijhoff/Kluwer/ Springer, 1962ff.

Chapter 1
Introduction

The goals of this investigations will be discussed in detail with the necessary references to the literature in the last chapter of part I. What follows in this introduction are preparatory remarks about guiding viewpoints for the phenomenological analyses of the method and the subject matter of the following investigations.

1.1 What is Epistemology and What is a Phenomenological Epistemology?

The first task of an epistemology is to determine the requirements of the systems of intentional cognitive acts that can be recognized as sciences. All theoretical and practical activities that are guided by a systematic doctrine of methods are disciplines. Two requirements have to be satisfied by a discipline for it to be recognized as a science. The first requirement is that the discipline is a purely theoretical activity and all interests in practical *applications* of the results of scientific investigations are in brackets. The second requirement is that the discipline is guided by a methodology. A methodology is a doctrine of methods that warrants objective validity, i.e., a validity that is an intersubjective validity in principle of the results of scientific research. The first task of a methodology is to determine the region of the type of objects and states of affairs that can count as legitimate objects of the science, and in terms of a phenomenological ontology, this means that it has to determine the categorial structure of the ontological region of the science. The second task is to determine the logical structure and the ontological implications of the methods that can serve as warrants for the objective validity of the judgments of a science about the objects and states of affairs in the ontological region of the science. These two tasks are correlates.

A *caveat* has to be added: There are indeed respectable academic disciplines, e.g., jurisprudence and engineering, that presuppose one or more scientific disciplines,

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but their main concerns are methods for the professional application of the results of research in the presupposed sciences. Moreover there are academic theoretical disciplines such as literary criticism or rhetoric that do require respectable scholarship and scholarly skills guided by doctrines of methods yet are unable to satisfy the requirements of a scientific methodology.

The tasks of epistemological reflections on a science are to analyze the different logical and ontological requirements of the different methodologies of the different sciences; to justify its claim to offer theories that are intersubjectively valid in principle for all researchers who are willing to apply the methodology; and to determine the scope and the limits of this claim. Two abstract epistemological distinctions between two basic principles determining different types of sciences must be sufficient for the purposes of an introduction. A first epistemological distinction that is of basic significance for the following investigations is the methodological distinction between the empirical and the formal sciences. The methodology that is able to confirm or disconfirm assumptions in the formal sciences is the methodology of formal proofs and decision procedures. The methodologies in the empirical or positive sciences are weaker. They presuppose an empirical basis in intersensory observation that are able, within certain limits, to test the hypothetical assumptions in different types of empirical sciences. Assumptions that are not disconfirmed in certain contexts of empirical intersensory observation are confirmed for this context of observations but such confirmation is always open for revisions in further tests in the future. It is essential to note that this general description is not only able to cover the testing of hypotheses in experimental research in the natural sciences, but also covers, e.g., the methodology of disconfirming or confirming hypothetical interpretations of texts with the aid of applications of the first canon of philological hermeneutics.

Epistemological reflections appear after the emergence of the sciences in modern philosophy as an appendix to a general theory of theoretical knowledge. A general theory of knowledge appears in the context of phenomenological investigations as the intentional analysis of the relation between intentional objects or *cogitata* and intentional acts or *cogitationes.* A general theory of cognition in this sense includes philosophical knowledge and religious experiences, but also the knowledge that is implied in the actions and interactions of everyday practical life. In the philosophical tradition reflections on the general theory of cognition have been guided by assumed universal principles about the nature of truth and being, e.g., in the tradition of modern metaphysics since Descartes, in Kantian transcendental philosophy, and in David Hume's and John Stuart Mill's empiricisms, or the assumption that logic itself is transcendental in modern analytic philosophy, etc. The assumption of such principles has always implied that an epistemology also has the character of a normative discipline. It says what scientists ought to do. The universal principles differ, but all of these theories of knowledge and implied epistemologies presuppose in addition more or less precise descriptions of the activities of the human mind in general and of the methodologies guiding the different types of sciences. The descriptive aspects in general theories of knowledge and epistemologies in the

development of traditional philosophy after the emergence of the sciences can be of interest for and used in investigations of a phenomenological epistemology.

According to the subtitle of Husserl's *Logical Investigations*, phenomenology is, as already mentioned above, a general theory of knowledge. A general theory of knowledge covers the entire realm of intentional acts and their correlates, the intentional objects, and their foundations in passive syntheses. Setting aside the phenomenology of knowing aesthetic and ethical objects, the main focus of interest in the *Logical Investigations* is theoretical knowledge. A phenomenology of knowledge in this narrower sense is the backdrop of a phenomenological epistemology. This backdrop is present and presupposed in a phenomenological epistemology as the pure descriptive explication of the general structures of conscious life. None of the hypothetical metaphysical presuppositions of traditional philosophical theories of knowledge are admitted. The presupposed structures that are pre-given for a phenomenological epistemology are as follows:

(1) the *ego cogito cogitatum*, i.e., the correlation of intentional acts and their intentional subject and objects;
(2) the analysis of the constitution of the givenness of ideal objects, i.e., the morphological essences and the exact essences given in material *eidetic* intuition and the formal essences of formal apophantics and formal ontology given in formal *categorial* intuition (Sects. 2.3 and 2.4);
(3) the structure of the subjective inner temporality and inner spatiality of the givenness of the hyletic field and the intentional acts reacting in the last instance to affections triggered by contrast phenomena in the hyletic field (this level is of significance not only for the phenomenology of association and habits, including passive syntheses, but also for the analysis for appräsentations in which Others and in general the correlation of a developed individual subjectivity and intersubjective community are given in lived experience);
(4) the essential distinctions between static phenomenological analyses and genetic and generative phenomenological analyses;
(5) the phenomenological analysis of the lifeworld as the foundation of intersubjective experience given in the double aspects of the individual experience of the lifeworld and the phenomenology of the social world. The descriptions of both perspectives are descriptions of eidetic structures and presuppose eidetic intuition.

It is a tacit presupposition of general theories of knowledge in modern philosophy from the beginning in the sixteenth to the twentieth century, i.e., from Descartes and Locke via Kant to modern positivism and analytic philosophy, that the empirical basis for observations in the empirical sciences is given in the sense experience of individual objects. It is sometimes mentioned that observations are "verifiable" only as intersensory observations without reflecting upon the implications of this requirement. It is, on the contrary, an explicit general principle of a phenomenological theory of knowledge and, therefore, also of a phenomenological epistemology that the objective validity of knowledge is only possible as intersubjective validity and

that sensory observation can, therefore, serve as objectively valid observations only as intersensory, i.e., intersubjective sensory, observation. It is not the Cartesian *ego cogito* in splendid isolation that is the correlate of scientific evidence; instead only a community of researchers in a science can be understood as the *inter*subjective correlate of objectively valid knowledge and understanding.

1.2 Extensions and Modifications

Seen from the viewpoint of a phenomenological epistemology, the basic shortcoming of Husserl's analyses is that he was not very interested in methodological problems. There is a certain disinterest in the methodology, i.e., the mathematical operations or techniques, of mathematicians and of formalized logic in the analyses of formal ontology as a *mathesis universalis* and especially in the phenomenology of mathematics. Nothing is said about the difference between classical mathematics and modern mathematics, including non-Euclidean geometries and higher algebra with transcendent, imaginary, and complex numbers (part I, Sect. 2.2; part III, Sect. 8.3). Except for the reflections on the application of mathematics in the natural sciences as empirical sciences, not very much is said about the methodological significance of this application for the natural sciences and the differences in the application of mathematics in physics and chemistry as hard sciences, in the life sciences as soft natural sciences, and in the human sciences, e.g., in economics, but not only in economics (part IV, Sect. 10.6). Nothing is said about the difference between classical and post-classical physics or about the difference between the type of mathematics that has been applied in classical physics and the mathematics in post-classical physics (part III, Sects. 8.3 and 8.4).

Almost nothing is said about the significance of the methodology of experimental research in the natural sciences. Husserl emphasized the affinity between his transcendental phenomenology and Dilthey's universal human science (*universale Geisteswissenschaft*) in his later writings (part I, esp. Sects. 4.3 and 4.5). The historical world is seen as the world of the spirit, and the human sciences, understood as sciences of the spirit, are understood as the best preparation for the transition to the phenomenological attitude. However, nothing is said about Dilthey's reflections on the methodology of the historical human sciences. Nothing is said about philology and the central problem for Dilthey and the methodologists of the nineteenth century, namely, the methodology of the interpretation of texts and archaeological interpretation, in short, the philological-historical method.

To fill these gaps is a necessary presupposition for a phenomenological epistemology. Required are significant extensions together with some modifications of the analyses that can be found in Husserl's writings.

(1) Formal apophantics, i.e., logical grammar, and formal ontology are, as Husserl himself emphasized, of basic significance for the phenomenological method

itself, last but not least for the method of eidetic intuition and with it for the theory of material ontological regions. Required is

(1.a) an extension of the theory of the whole and the parts. These extensions are presuppositions for the analysis of the methodology of the human sciences, and they are in addition of significance for the material ontological region of the life sciences (part I, Sect. 2.2): moreover,

(1.b) precisions are required in the formal ontology of units, collections, and numbers, i.e., the region of mathematical ideal objects. The precisions are necessary for the analysis of the application of mathematical formalisms in the hard sciences, especially in physics (part I, Sect. 2.2; part III, Sect. 8.3). But in addition,

(1.c) there are problems in Husserl's final characterization of the system of formal ontological categories (on "category" and related terms see part I, Sect. 2.2). The main problem for an epistemology of the empirical sciences is whether the relation of the theory of whole and the parts, on the one hand, and the theory of units and manifolds, the mathematical categories, on the other hand, are simply two disciplines of the *mathesis universalis* on the same level, or whether the second is on a level of higher universality of formalizing abstraction than the first.

(2) Further extensions and modifications are necessary for the phenomenological analysis of the foundations of the sciences in the lifeworld.

(2.a) The analysis of the ontological region of the empirical human sciences requires the analysis of the categories of the phenomenology of the social world and phenomenological psychology, the phenomenological descriptive analysis of individual experience *of* the social world, including its natural environment. Husserl's main interest was phenomenological psychology, but the phenomenology of the social world provided by Schutz can be considered as a consistent extension of Husserl's analyses of the basic structures of the lifeworld. Only minor modifications that have the character of precisions will be necessary (part I, Sects. 4.4 and 4.5; part IV, esp. Sect. 10.5).

(2.b) Missing but necessary for a phenomenological epistemology of the human sciences is a typology of different types of understanding. Understanding is used in Husserl (but also, e.g., in Schutz, Heidegger, and elsewhere) as the highest universal category that covers all cogitative types and their intentional objects and, by the same token, is the basic category of the human sciences. Essential for a phenomenological epistemology are the distinctions between first-order elementary and higher understanding and second-order elementary and higher understanding (part I, Sect. 3.2). Elementary understanding will be characterized as the understanding at work in the interactions of practical life and higher understanding as the contemplative theoretical understanding of the

lifeworld, of the human condition in religion, art, philosophy, and last but not least, the sciences. First-order understanding is the understanding of intentional objects given in passive and active cognitive syntheses, and secondary understanding is the understanding of the first-order understanding of Others. As sciences of interpretation the human sciences are restricted to second-order understanding. The natural sciences are a specific type of higher understanding, but they also have foundations in elementary understanding.

(2.c) Causality, matter, and form are already basic categories of pre-scientific ontology. Explications of these categories in terms of the methodologies of the different empirical sciences are also of basic significance for epistemological reflections on the sciences. It is, hence, necessary for a phenomenological epistemology to analyze the constitution of these categorial structures on the level of solipsistic primordial experience; in the context of elementary understanding as foundations for the cognitive attitude of the sciences; in the context of pre-scientific ontological reflections in higher understanding; and finally in the contexts of the explication of these categories not only in the empirical natural sciences but also in the empirical human sciences. Viewpoints guiding such analyses can be found in Husserl's writings, but in this case a phenomenological epistemology also presupposes in this case precisions and extensions (part I, Sect. 3.5, part II, Chap. 6, part III, Sects. 8.1 and 8.4; part IV, Sects. 9.2, 10.1 and 10.3). Together with the extensions (2.b), the extensions (2.c) are of basic significance because they indicate that a radical opposition of the natural sciences as sciences of causal explanations and the human sciences as sciences of understanding does not hold water.

(3) It was a philosophical, even a metaphysical, principle of many scientists, and in the philosophical theories of knowledge, that science, first of all physics, will be able to offer theories that tell us how the things in themselves really are. It has also been a widely accepted thesis since the eighteenth century that the methods of physics cannot be applied in all empirical sciences, first of all in the life sciences, but that it will be possible to reduce the explanations of all phenomena belonging to the life sciences, and even of the human sciences, to the principles that can be derived from the hard sciences.

(3.a) The determination of the region of objects that belong to the empirical basis of an empirical science in the all-inclusive region of the lifeworld has the character of an abstraction. Husserl's account of the type of *reductive* abstraction that is constitutive for the cognitive attitude of the empirical natural sciences in general can be used as a starting point, but needs significant extensions and modifications. The *Crisis of European Sciences and Transcedental Phenomenology* and earlier writings mention *prima facie* only one abstractive reduction for the natural sciences in general. Considered more closely, however, two abstractions can be distinguished. The first reduction abstracts from the purposes and values

of everyday practical life, and in general from all contents that are given in lived experience and reflections on lived experience. The second abstractive reduction abstracts from all secondary qualities of observable objects that are given in the residuum of the first abstraction, reducing them to primary qualities. The first abstraction determines the ontological region of the natural sciences in general, including the life sciences. The second abstraction determines, within this broader region, the empirical basis and the methodology of the hard sciences, physics and chemistry insofar as it can be reduced to physics. Only ontological categories that are explicable in terms of mathematics can be admitted in the residuum of the second abstraction (part III, Sects. 8.1, 8.2 and 9.1).

(3.b) According to Husserl's later writings and especially the *Crisis,* the region of the objects of the natural sciences is the residuum of a reductive abstraction. It is as such a region that is separated from and opposed to the region of the concrete lifeworld as a whole, and the lifeworld as a whole is understood as the ontological region of the human sciences. Presupposing this interpretation, it will be difficult, quite apart from further complications, to distinguish between the historical or spiritual world of the human sciences and pure phenomenology.

Closer epistemological reflections on the methods and possible methodologies of the human sciences indicate, however, that there is a general but not necessarily immediately reductive abstraction that determines the region of the empirical basis of the human sciences in general as a region within the concrete lifeworld. There are in addition other abstractions that are able to determine the scope and the limits for methodologically guided philological interpretations of fixed life expressions, i.e., a hermeneutics, understood as a methodology for the interpretation of fixed life expressions (Sects. 4.5, 5.3 and 5.4). In the following investigations abstractions that determine in their residuum the region of objects that can be objects of a methodology of a science will be called methodological abstractions.

The main intention of the following investigation is, hence, to give a phenomenological answer to the general question "what are the empirical sciences" and to offer some guidelines for further investigations in the different branches of a phenomenological epistemology. Such further investigations are invited and necessary to provide not only extensions but also corrections of what has been said in this investigation in the future. Phenomenology and therefore also a phenomenological epistemology is not a closed system. It is an open research program.

A final remark about references to Husserl and in general to the literature in the following investigation must be added. References to the literature indicate critical systematic *applications* and not methodologically guided *interpretations*. Thus in talking, e.g., about "ideal types," there will be references to the writings of Alfred Schutz. What then follows is not an interpretation of the meaning of the term in Schutz, but an explication of the meaning of the term in the context of the analyses of the system of the empirical sciences in the following investigations.

Part I
Phenomenological Preliminaries

Chapter 2
The Formal Methodological Presuppositions of a Phenomenological Epistemology

2.1 Phenomenology: From Descriptive Psychology to Descriptive Epistemology

The ability to observe and to give reliable *descriptions* of observations is a necessary presupposition for research in the natural sciences. The task of descriptions is to secure that other researchers in the field are able to recognise the species of immediately given objects they want to explicate or to explain. The descriptions of observations, including observations of experimental situations, ought to be free from all prejudices, including previously accepted taxonomic systems and explanations and, in general, logical deductions. Well-known examples for such phenomenological descriptions are the verbal and pictorial descriptions of species of animals and plants in the life sciences. The technical term for the discipline responsible for such descriptions of scientific observations in the second half of the nineteenth century was "phenomenology." Phenomenology was the art of descriptions of observations, i.e., of the appearances of states of affairs for intersubjectively accessible sensory experience. Though causal explanations and pre-given taxonomic systems are in brackets for such descriptions, the latter should emphasize what might be of methodological significance in experimental situations or for the construction of taxonomic systems. Phenomenology in this sense is not a science, but an indispensable foundation of the natural and cultural or human sciences. It was understood as a refinement of nineteenth century empiricism, first of all the empiricism of John Stuart Mill, and it is compatible with the positivistic naturalism of the nineteenth century.[1]

Psychology as an empirical natural science came into existence in the second half of the nineteenth century and from the very beginning it implied naturalistic

[1]The leading naturalist at the time of Carl Stumpf in Germany was Ernst Haeckel.

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T.M. Seebohm, *History as a Science and the System of the Sciences*,
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psychologism.[2] The thesis that philosophical epistemology can be reduced to psychology triggered the controversy between psychologists and the defenders of traditional philosophical epistemologies, first of all the Neo-Kantians. If psychology is recognized as one empirical science among others, then it is also necessary to apply phenomenology in the sense mentioned above in the descriptions of psychic phenomena. According to Carl Stumpf, such descriptions must prepare and accompany the development of psychological theories and the test of such theories with the aid of experimental psychology.[3] In this new context phenomenology is more than a description of objects given in direct intention. Applied to psychology it is the discipline of the *reflective description* of phenomena. Phenomenological descriptions in all other natural science refer to observations of objects given in the direct intention of the outer senses. Reflections on data of the inner sense have no place in the observations of physics, chemistry, and biology. The descriptions of psychology, however, also refer to objects given in the oblique intention of the inner sense. The struggle between empiricists and rationalists in modern philosophy was first of all a struggle about what is given in the self-givenness of subjectivity in the inner sense. The problems connected with the difference between observations in direct and oblique intention were the first weak spot in the arguments of the naturalistic psychologists of the nineteenth century.

The application of phenomenology to psychology caused two additional problems, the problem of the epistemological status of the human sciences and that of the epistemological status of formal logic and mathematics. Both are, in the last instance, aspects of the general problem of psychologism. The phenomena of psychology are objects given oblique intention, i.e., they are given in *reflection*. Psychic acts and their contents appear in reflective descriptions as an inseparable unity. Seen from this viewpoint psychology is the foundation of the subjective as well as the objective aspect of epistemology in general and of the epistemological problems of *all* sciences. The question was whether or not the epistemology of the human sciences can be reduced to the epistemology of the natural sciences. According to Carl Stumpf and others, psychology is a science only if it is able to apply the methods of causal explanation and of the experimental checks of hypothetically assumed theories about causal connections. Phenomenology is only a preparatory discipline for this purpose, and only in this sense is it the foundation of psychology as a science. According to Wilhelm Dilthey, however, descriptive psychology is a human science, and in addition the foundation of the human sciences (*Geisteswissenschaften*).[4]

The thesis that ideal objects (and with them, the truths of formal and formalized logic and mathematics) have to be understood and explained as psychic phenomena is an immediate implication of radical psychologism. The countersensical and

[2] Naturalistic psychology was already predominant in Germany one generation before Carl Stumpf, e.g., in the research of Hermann von Helmholtz.

[3] Spiegelberg 1960, vol. I, esp. 59f.

[4] See below, Chap. 4, Sect. 4.2.

paradoxical consequences of the attempt to reduce a-temporal and necessary truth to empirical evidence is the second weak spot of naturalistic psychologism.[5] According to Carl Stumpf, the founder of experimental psychology and teacher of Husserl, the phenomena of phenomenology in the old sense are the correlates of psychical functions. But as objects of psychology these psychic functions are also phenomena. Stumpf's psychological functions can be understood as analogues of Franz Brentano's intentional acts. Whether Brentano is a psychologist is a disputed question. It is, however, obvious that Stumpf explicitly rejected psychologism.[6] The correlates of his psychic functions, the phenomena, are not parts but *counter*parts of psychic functions, or, as Husserl following Brentano later said, the correlates of intentional acts.[7]

Stumpf distinguished between primary phenomena, the contents of immediate sensuous experience, and secondary phenomena, the images of memory: but also between phenomenology and eidology. The phenomena of objective descriptions of observations are counterparts of immediate sensual experiences. Seen from the viewpoint of naturalistic empiricism, it is acceptable to maintain that the contents of such descriptions cannot be reduced to psychic phenomena. They represent mind-independent objective reality. It is also acceptable that the contents of secondary phenomena, the images of memory, refer to real objects. The objects of eidology are, however, constructs formed by the mind, e.g., the distinction between dependent parts or attributes and independent substrates, or the structural laws between sensual materials like color and extension, and the structural laws of states of affairs.[8] All of this foreshadows the exposition of the system of the formal ontological and logico-grammatical categories in Husserl's *LI* and his theory of eidetic intuition in general and not only of formal but also of material essences.[9]

Stumpf's position is ambiguous. He rejected the thesis that the objects of eidology can be discovered with the aid of empirical induction. He asserted that the discovery of the constructs presupposes free variation in imagination and that this free variation is able to distinguish between necessary, possible, and impossible structures of the constructs. Finally, he rejected the thesis that such possibilities and

[5] Husserl's arguments against a psychologism that has its foundations in empirical psychology in ch. 3–8 of the first volume of the *Logical Investigations I* (henceforth *LI*) are, seen with a grain of salt, similar to the arguments of the Neo-Kantians and have been praised by the Neo-Kantian Paul Natorp.

[6] Stumpf rejected psychologism in this sense, but he also rejected the dominating epistemology of the Neo-Kantians without indicating what kind of epistemology ought to replace it. See Spiegelberg 1960 vol. I, 56; on Brentano and intentionality see 39ff.

[7] Spiegelberg 1960, vol. I. esp. 58ff.

[8] Spiegelberg 1960 vol. I, 63f.

[9] *Essentia* is the Latin counterpart of the Greek *eidos* in the philosophical terminology of Classical Antiquity and the Middle Ages. For the sake of simplicity this investigation prefers Latin terms, e.g., *reductio*/reduction for *epochē*.

impossibilities can be explained as abilities and inabilities of the human mind. The justification both for the rejections and for the assumption of an eidology is his conception of descriptive psychology.

The second problem is that his descriptive phenomenology refers to empirical observation. Descriptions of empirical observation are, taken by themselves, not yet a science. A psychological descriptive account of the givenness of ideal objects, and especially the objects of the formal sciences implies that the epistemology of the formal sciences, appears as a branch of an empirical science. The paradox of this consequence is that the epistemology of the formal sciences of a-temporal ideal objects has the status of a branch of an *empirical* science. The upshot is that Stumpf's position, in spite of his rejections, once again implies again psychologism. Quite apart from the possibility of returning to old paradigms of epistemology, first of all Neo-Kantianism,[10] the paradox creates a dilemma for the understanding of phenomenology. One horn of the dilemma is to live with that paradox. This is the choice of naturalistic psychologism. The other horn of the dilemma is to apply phenomenology and phenomenological descriptions immediately to epistemology of the formal sciences and the empirical sciences.

Husserl's choice was to apply phenomenological descriptions immediately to epistemology.[11] The subtitle of the second volume of the *Logical Investigations* is *Investigations Pertaining to a Phenomenology and Theory of Knowledge*.[12] The assumption that phenomenology can be applied in epistemological investigations about the formal sciences and, in general, to ideal objects implies that phenomenology cannot be understood as descriptive psychology. Seen with hindsight, the transition began in the first edition of the *Logical Investigations* and came to a preliminary end in the reflections on the methods of such investigations in *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy I*[13] and in *"Philosophy as a Rigorous Science."*[14]

Phenomenology is in this phase of its development the method not only of epistemology, but also of all other disciplines of philosophy, especially including ethics and value theory. The reflective phenomenological attitude is the reverse of

[10]Husserl criticized the Kantian and Neo-Kantian interpretation of the a priori as transcendental psychologism several times in the *LI*. For his critique of Kant's mistaken theory of the a priori, cf. also Hua III, 145; Hua VII, 198f. Categorial structures are not immediately given in the acts of consciousness. They are objective correlates of the acts of consciousness in which they are given.

[11]Stumpf rejected Husserl's new conception of phenomenology after Husserl rejected the definition of phenomenology as descriptive psychology in the second edition of the *LI*. See Spiegelberg 1960 vol. I, 65f. Husserl criticized his own characterization of phenomenology as descriptive psychology in the first edition of the *LI* in the preface to the second edition. Descriptive psychology is descriptive phenomenology in the old sense, i.e., it is not the description of experience or classes of experiences of empirical persons or of natural events in general.

[12]*Untersuchungen zur Phänomenologie und Theorie der Erkenntnis*. The usual translation *Phenomenology and Theory of Knowledge* is an abbreviation.

[13]In Hua III.

[14]In Hua XXV.

the natural attitude. The world as the totality of states of affairs is immediately given for the natural attitude in direct intention. But what is already given in direct intention in the natural attitude is given in oblique intention as the correlate of the intentional acts of consciousness. The transition from the natural attitude to the phenomenological attitude requires the phenomenological or transcendental[15] phenomenological reduction. The reduction "brackets," i.e., it abstracts from the givenness of the world in direct intention of the natural attitude, but it has the objects and the world precisely in the way in which they exist as the correlates of intentional acts in oblique intention.

Phenomenological descriptions in oblique intention are interested in the analysis of the general structures of consciousness, not the individual self-experiences of the subjective consciousness of the phenomenologist. Consciousness is given to itself in phenomenological reflection as the structure of ego-centered intentional acts together with their correlates, the intentional objects, and its temporal horizons in inner time-consciousness. It is, hence, necessary for phenomenological investigations to give a phenomenological justification for the intentional acts and methodical steps of the intuition of essences. The development from phenomenology as descriptive psychology to a pure phenomenology as phenomenological epistemology has caused some difficulties for the understanding of the status of justification.

Carl Stumpf already recognized the problems of the cognition of ideal objects in his eidology and offered solutions in the framework of his descriptive psychology. Husserl offered a widely accepted justification for the method of eidetic intuition, but he still characterized phenomenology as descriptive psychology in the first edition of the *LI*. He rejected this interpretation later in *Ideas I*, and in the introduction to the second edition of the *LI*. The earlier understanding of the nature of phenomenology in the *LI* is misleading because (1) the attempt to find a justification of ideal objects in a phenomenology as descriptive psychology ends in the paradoxes of psychologism and (2) the step from phenomenology as descriptive psychology to pure phenomenology changes the understanding of the nature of phenomenological investigations, but does not imply any changes in the descriptive analyses on the level of the rejected earlier understanding of phenomenology.

A second problem is that the structure and some passages of *Ideas I* can easily be misunderstood. Together with the problem just mentioned above, this problem has caused the misleading assumption that the intuition of essences and the phenomenological reduction are two independent methodological pillars of phenomenological research. *Ideas I* treated the problem of the intuition of essences in the first part before introducing the phenomenological reduction. The

[15]The Kantian version of "transcendental" implies the hypothetical construction of the unity of transcendental apperception indicated by the "I think" as the highest condition of the possibility of experience that is itself not given in experience, i.e., not a phenomenon. To use "transcendental" in this sense as an adjective for phenomenology is, hence, a flat contradiction.

fourth chapter of the second part about special reductions that are included in the phenomenological reduction explicitly brackets the material eidetic disciplines and pure logic as *mathesis universalis*.

However, it is not too difficult to refute this thesis in the context of the *Ideas*. It is obvious that the cognition of essences of objects given in direct intention is in brackets under the phenomenological reduction. But this does not mean that the description of consciousness, of intentional acts and their intentional objects is a description of an empirical history of subjective experiences. It is a description of the material essences, the essential structures of consciousness.

A further basic methodical distinction for the analysis of the intuition of essences is the distinction between formal and material essences. The essential structures of consciousness are material essences. The methodology of the intuition of material essences presupposes the methodical explication of the formal essences of formal ontology and pure logical grammar. The phenomenological reduction brackets mathematical theories, and even the theory of the structures of logical deductions, *but not* the formal structures of objects in general, *Gegenstände überhaupt*.[16] The task of formal ontology and its correlate, pure logical grammar, is the phenomenological analysis of this structure as a *mathesis universalis*. The methods applied in formal ontology and pure logical grammar that are of significance for the analysis of the intentional acts in which material essences are given will be considered in Sect. 2.2. The task of Sect. 2.3 is then the analysis of the intuition of material morphological and exact essences.

2.2 Wholes and Parts, Formal Ontology, and the Idea of a Mathesis Universalis

A preliminary assessment of the basic significance of the theory of the whole and the parts for a phenomenological epistemology presupposes a correct assessment of the significance of the theory for the phenomenology of logic. The first version of the theory of the whole and the parts was published in the *Logical Investigation II*. What is said there about logic, more precisely about pure logical grammar or *apophantic* logic[17] presupposes the first steps in the development of the theory of the whole and the parts and is itself the presupposition for the further development of the theory. Pure logical grammar is the theory of apophantic forms of complex independent unified wholes of meaning, *Bedeutungskomplexionen.* Apophantic forms are also called categorial forms or, in short, *categories*.[18] Categorial forms

[16] Hua III, §59.

[17] The term “apophantic” is derived from Greek *apophansis*, the technical term for judgment, more precisely for what is meant by judgment in the Aristotelian tradition.

[18] This use of the term “category” is much broader than the Kantian understanding of categories as forms of functions in judgments.

are structural wholes with parts that are the *categorial matter* and the forms of these wholes are determined by syntcategorematic parts, the connectives including the copula. Categorial forms are given in *categorical intuition* and categorial intuition presupposes formalizing abstraction. Formalizing abstraction requires *variations in imagination* in which the syncategorematic parts are fixed and the categorial matters are varied.[19] Formalizing abstraction and categorial intuition can also be applied to *noemata*, intentional objects in general of a formal ontology as the correlate of a formal apophantics.[20]

Husserl himself emphasized the significance of the theory of the whole and the parts for the further development of his phenomenological research in a remark at the end of the preface to the second edition of the *Logical Investigation*s. Seen from the viewpoint of the development of pure phenomenology in *Ideas I*, what he had in mind is the development of the theory of the material ontologies that determine the material categories of the objects of a material region. The method of imaginative variations that is necessary for the clarification of material essences is relevant for this theory and presupposes the formal structures of the formal ontological region as methodical guidelines for variations. A detailed account of the relation between formal and material essences and their constitution in imaginative variations will be given in the next section.[21]

Thirty years after the *Logical Invetigations* another version of the theory in Husserl's manuscripts was published by Landgrebe in *Experience and Judgment.*[22] *Experience and Judgment* added the theory of collections, sets, and units, or in short, what is usually called set theory. The problem whether this theory can be understood as a special case or an independent extension of the theory of the whole and the parts will be considered later in part III. According to *Formal and Transcendental Logic* and already before in *Ideas I,* pure formal logic includes, beyond pure formal grammar, the theory of definite manifolds, i.e., axiomatic systems that are closed under the principle of non-contradiction. Hilbert's general normative meta-mathematical theory of axiom systems is, according to Husserl, a realization of his idea of a *mathesis universalis* on the level of a pure formalism.[23]

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[19] According to a phenomenology of logic variables in formalized languages refer to contents that can be varied and constants that refer to the syncategorematic parts of well formed expression.

[20] A summary of Hua IXX/1 *LI* II, Investigation III, §§23, 24, and Investigation IV can be found in Hua III, esp. §10–15. See also Hua VII, *FTL* Appendix I (*Beilage I: Syntaktische Formen und syntaktische Stoffe)*. Cf. Seebohm 1990 on categorical intuition. Husserl's phenomenology of logic and formal ontology presupposes, according to the interpretation of Jacob Klein, an "Aristotelian theory of abstraction." Cf. Hopkins 2011, 525f. The problems with this interpretation is that Husserl's references to Hilbert and other contemporaries are neglected, cf. below Sect. 7.2.

[21] Hua III, §16.

[22] Husserl 1972, esp. §§29–32.

[23] Hua III, §72, Hua XVII, §31; The problems connected with the relation of the principle of non-contradiction and the principle of completeness in Goedel's proof that appeared after the *FTL* could not be mentioned in the *FTL* and has not been mentioned later in Husserl's writings. Cf. Sect. 7.2 below.

A *mathesis universalis* is, hence, a meta-mathematical theory and not mathematics. A phenomenological epistemology requires more, first of all the theory of exact material essences.[24]

More will be said about *mathesis universalis* in Part III, Sect. 8.3. The Fourth Logical Investigation offers in addition material examples for the application of the theory to the phenomenological analysis of the structure of objects of sensory experience.[25] *Experience and Judgment* offers a corroborated phenomenological analysis of the application of the theory to the structures of sensual experience on the level of passive synthesis. This application justifies the claim that the categories of formal ontology are applicable to all regions of material ontology. The theory is, therefore, of basic significance for the method of phenomenological descriptions in general. Husserl mentioned in the second volume of the *Logical Investigations*[26] that a formalized axiomatic mathematical account of formal theory is desirable, but is not a presupposition for its application to phenomenological descriptions. Adequate accounts of formalized axiomatic theories of the whole and the parts, often called mereologies, and of phenomenological semantics have been published in the last decades of the last and in the beginning of the present century.[27]

A whole is a sum total (*Inbegriff*) of contents that are all covered by a single unifying (*einheitliche*) foundation. A whole is an independent whole if it is given without the aid of further contents, or, in terms of *Experience and Judgment*, because it can be given as the same in the context of a changing background. The contents of such a totality are called parts. The unity (*Einheitlichkeit*) of the foundation means that all contents are either immediately or mediately connected by foundations with every other content.[28] The contents mentioned in these definitions are the parts of the whole. Two types of parts can be distinguished, independent and dependent contents. "Piece" is another term used for independent parts. "Dependent moment," sometimes also "abstract moment,[29]" are other terms for dependent parts.

A precise definition of "piece" and "moment" presupposes distinctions between different types of foundations. Foundations connecting parts have formal properties. They can be one-sided, reciprocal, and concatenations of one-sided or reciprocal.[30]

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[24]Cf. the next section on exact essences, and on mathematics see Sects. 7.1, 7.2 in Part III.

[25]Hua XIX/1, Investigation IV, §13.

[26]Hua XIX/1, Investigation III, §§22–25.

[27]E.g., Null 1983; Smith 1982; Fine 1995; Wiegand 1998, 2000, 2001, 2003, 2007.

[28]The chosen translations of the German terms here in Investigation III, §21 are different from the terms chosen in Findlay's translation vol. II.

[29]The term "abstract moment" means that the moment cannot be given by itself. It can only be given as an abstract property, e.g., red, of an independent whole. It can be considered by itself only with the aid of an isolating abstraction bracketing the whole in which it is given.

[30]These formal properties of foundations seem to be counterparts of some formal properties of relations, namely of asymmetrical, symmetrical, transitive, and intransitive relations. There are, nevertheless, essential differences between foundations and relations. More will be said ar the end of this section.

Moments can only be given in foundations connecting them with other moments. Clusters of moments connected by foundations are pieces only if the cluster includes an abstract moment of the genus extension and displays more or less sharp contrast phenomena in at least one of the other genera of moments in the cluster.[31] Pieces as parts of a whole are relatively independent parts only because they can be phenomena distinguished by contrast, and they belong immediately to the concrete whole as a totality of contents related to each other in a structured system of foundations. Such systems include the contrast phenomena between the moments of the structure that do not belong to the genus extension.[32] The unifying foundation covering all parts of the whole mentioned above is, hence, a structured system of foundations between the parts.[33]

What has been said about wholes, parts, pieces, moments, and types of foundations in the *Logical Investigations* and in *Experience and Judgment* is sufficient for the analysis of independent wholes and their parts, e.g., for the analysis of the hyletic correlates of passive synthesis in primordial sensual experience. But in natural languages the terms "whole" and "part" often refer in many cases to other, more complex types of wholes and their parts. A solar system can be called a whole with the sun and the planets as its parts. Organisms are called organic wholes and their parts are called their organs. Social communities, (e.g., a family or a state) are called wholes and their parts are their members. Furthermore, what has been said in the *Logical Investigations* about the wholes of pure logical grammar is sufficient for the analysis of logical propositions and, as mentioned, of sentences in natural languages. But it is also possible to call a consistent and complete formal axiom system or a rule system of natural deduction a whole. The second canon of hermeneutics, the art of the interpretation of texts, has been called the canon of the whole and the parts.[34]

The independent wholes and their parts discussed in *Logical Investigations* and in *Experience and Judgment* can be called first-order wholes. They are wholes of the first-order, because their parts are not themselves independent wholes. The parts of the complex wholes mentioned in the examples are, however, themselves already independent wholes. Such complex wholes can be called wholes of a higher order. The parts of such wholes can be first-order wholes, but they can also be wholes with parts that are themselves already independent wholes, e.g., the parts, members of a family as a whole are themselves as living organism wholes of a higher order.

[31] A material example is, e.g., seeing the more or less sharp contrast between a red spot and its blue background in their spatial extensions.

[32] Such foundations within extensions appear as relations in the context of pure logical grammar and in the grammar of natural languages, e.g., above, below, later, earlier.

[33] Husserl used the term "unifying foundation," but this term can be misleading. The parts are not one-sidedly founded in the whole. The givenness of a whole of the parts means, in the proposed interpretation, that they are unified in the whole by a system of relations.

[34] Cf. Seebohm 2004, §§25ff. It is obvious that some of the types of wholes just mentioned must be of central interest for the epistemology of the social and the historical human sciences.

Neither the *Logical Investigations* nor *Experience and Judgment* offer a formal account of the structure of wholes of higher order but *Experience and Judgment* mentions that the relations and properties of relations are constitutive categories for the structures of collections of first-order wholes given together in a common background. Such collections of related wholes are categorial objects of a higher order. The question is whether some types of such categorial objects can have formal ontological structures that can count as the formal structures of the wholes of a higher order mentioned above.[35] No explicit answer to this question can be found in *Experience and Judgment* but it can be shown that a positive answer and with it a formal ontological definition for wholes of higher order, is compatible with the context of *Experience and Judgment*.

Structures of collections of objects determined by relations are intentional objects of active synthesis. The wholes of the first-order with parts that are held together by unifying foundations are phenomena given in the hyletic field. As such they are given for passive synthesis, and can be given in addition as intentional objects only if contrast phenomena in the hyletic field trigger a response of active intentional consciousness. After this response, they are pre-given as potential intentional objects of active synthesis on the level of a pre-predicative but nevertheless already categorially formed sensual experience in secondary passivity.

The presupposition for formal ontological theories is a formalizing abstraction. Given formalizing abstraction all the material aspects of phenomenological analysis in *Experience and Judgment* just summarized are in brackets. They are not relevant for the residuum of the abstractive reduction, a general formal ontological theory of wholes and their parts. This general formal theory is not restricted to wholes with parts that belong to the whole sinpy because they are parts of a unifying system of *foundations*. The question is whether such a theory can admit additional categorical structures for wholes with parts that are already themselves wholes connected by unifying systems of *relations*.

Going beyond *Experience and Judgment* it can be said that the differences between collections as categorial forms of a higher order are determined by structured systems of relations. It is, hence, possible to distinguish between more or less open systems and (b) closed systems. The latter case can serve as *definiens* in a definition for wholes of higher order and their parts: Wholes of higher order have parts that are themselves independent wholes and all these parts are connected with all other parts in a unifying closed system of relations. This definition needs several comments (1) about the wholes of a higher order with parts that are themselves independent wholes and (2) about the unifying system of relations of such wholes.

(1.a) The parts of wholes of the first order are dependent or only relatively independent parts. The parts of wholes of a higher order are independent wholes. The parts of wholes belonging to the lowest level of the wholes of higher order are independent wholes of the first order. But the parts of wholes

[35] For instance Husserl 1972, §§33, 34.

of higher order can be taken by themselves as already independent wholes of a higher order. Wholes of a higher order always belong to one element of a series of well ordered levels of a higher order, i.e., a higher order whole of level n with parts that belong, as wholes, to level n − 1 can be itself a part of a higher order whole on level n + 1.

(1.b) Two types of independent wholes of higher order n − 1 that are given as parts of an independent whole of level n can be distinguished: the first type of independent higher order wholes of level n − 1 belonging to wholes of higher order n are able to belong to more than one whole of level n[36]; independent wholes of order n − 1 as parts of the second type can only exist as parts of one and only one independent whole of order n.[37]

(2.a) The demarcation criterion in the distinction between the unifying system of parts in wholes of the first order and in the wholes of higher order is the difference between foundations and relations. Foundations share some of the formal properties of relations, but foundations are "relations" between dependent moments that can not be given only in the context with other moments and between pieces as relative independent parts of wholes, pieces are collections of dependent moments with at least one dependent moment of the genus extension, and they are one-sidedly founded in contrast phenomena of the qualitative moments in the collection of dependent moments separating them from the background. Pieces as relatively independent parts of wholes can be distinguished from other pieces in a whole or a collection of pieces only because they are all together one-sidedly founded in a unifying structured system of contrast phenomena. The unifying structural system of a whole of the first order is, therefore, a system of foundations. Relations are more than simple n-adic predicates referring to two or more objects or individuals. N-adic predicates in natural[38] and in formal languages usually refer to relations, but they can also refer to relatively independent pieces in unifying system of foundations in wholes of the first order. Relations between individual objects

[36]Members of social wholes are perfect material instances of this formal type. A child of parents in a family can be at the same time a student of a university, a soldier in an army etc. According to the standard terminology of the social sciences members of social wholes can have different social functions or roles in more than one social whole but also in open systems of social collections of individuals.

[37]With a grain of salt. it could be said that the organs of an organism are also perfect material instances of such parts. The grain of salt is given, e.g., with materially possible surgical transplantations of organs or parts of organs. The restriction in this material instance of the formal structure of the second type is that they cannot function *at the same time* in two different organisms. Unfortunately, the term "organic whole" is often used as a metaphor for wholes of a higher order that are by no means covered by the formal definition given for the second type.

[38]The problem of natural languages is that they have many grammatically different expressions that can refer to relations, namely verbs, nouns, adjectives and their inflexions, and particles. This list is not complete. What can be added is that such systems are different in, e.g., Indo-European, Finno-Ugrian and language families in East Asia. Research in this field would be interesting as a link between formal and historical linguistics.

in the formal ontological theory of categorial structures of collections and wholes of higher order and their parts are relations between independent wholes.

Relations have formal and material properties. Their material properties are one-sidedly founded in certain material properties that are dependent moments of the related independent wholes. Such properties can be represented on the formal level by second-order predicates. Foundations have formal properties, but beyond that no further material properties. They "relate" dependent moments and cannot bear within themselves any further dependent moments. They are foundations and nothing else beyond that. The unifying function for the parts in wholes of a higher order are structural systems of relations, their formal and material properties, and the material properties, moments, and pieces that are required as one-sided foundations for the relations between the parts of wholes of a higher order.

It is, furthermore, possible that a structural system of a whole of higher order n is grafted upon and one-sidedly founded in the structural system of relations of a whole of higher order $n-1$. A structural system $n-1$ is more or less modified by the structural system of wholes of order n. The system of order n can be restricted to the parts of the whole $n-1$ but it can be and in most material cases is grafted on additional other wholes or collections of independent wholes of order $n-1$.

(2.b) Two different types of higher order wholes and their parts have been distinguished in (1.b). According to what has been said in the end of (2.a) a third type can be mentioned. A whole of a higher order of the third type can itself be the foundation of a superstructure that adds additional modifying properties of relations between the parts and requires additional modifying properties for the related parts.[39] A *caveat* must be added. The given definition of wholes of higher order is a definition of an ideal case. The comments on the cases mentioned above indicate that such wholes are not closed in the strict sense because parts of such wholes can also be parts of other wholes, etc. It is, furthermore, often difficult in concrete cases to decide whether all the independent wholes of order n that are parts of a whole of the higher order $n+1$ are really immediately or mediately connected by relations with all other parts. In short, it difficult to decide in concrete cases whether the concrete whole in question is a closed system of independent wholes in the

[39]The structured unifying systems of unicellular organisms can exist by themselves, but additional structured systems of the relations of cells in higher organisms can be grafted upon the unifying system of relations in unicellular organisms. The basic social-biological system of family relations can be the substrate first of additional customary relations and then beyond that even of legal relations.

strict sense of the definition or an almost closed collection of independent wholes of the higher order n + 1.[40]

It is possible that further fundamental ontological and logical investigations can discover additional formal types of wholes of a higher order. But the given list is almost sufficient for the investigations of part II. What is missing is only an analysis of the formal structure of "genetic foundation" and "generative foundation." Husserl introduced the distinction between static and genetic phenomenology after the publication of *Ideas I* between 1917 and 1921, and the distinction between genetic and generative phenomenology more than 10 years later in the wake of his *Cartesian Meditations*. The first task of genetic and generative phenomenology is to discover the *genetic* or *generative* foundation of unifying eidetic structures of collections of objects or wholes of the first and higher orders in genetically or generatively prior unifying structures of collections or wholes of the first and higher orders.

Genetic or generative foundations have, with more than one grain of salt, a certain similarity with Aristotelian formal causes. The material unifying structures of wholes and collections are the phenomenological counterparts of Aristotelian essences. The material formal causes can be compared with genetic and generative foundations. But the phenomenology of time-consciousness provides in addition an account of the *formal categorial structure* of genetic and generative foundations. This account presupposes the phenomenological analysis of the material and the formal structures of subjective and intersubjective time-consciousness. Genetic constitution is usually understood as the counterpart of subjective static primordial passive and active constitution. Generative constitution is understood as the counterpart of static intersubjective constitution in Husserl's writings and in the literature.[41]

Husserl's own analyses of primordial genetic constitution are first of all interested in the structures of the passive constitution of perception, association, and habits, the genesis of subjective consciousness. His generative phenomenological analyses are interested in structures belonging to cultural anthropology,[42] e.g., the distinctions between normality and abnormality, homeworld and alienworld, etc. Generative phenomenology is understood as the counterpart of subjective genetic constitution. If, however, generative constitution is understood as the intersubjective counterpart of the genesis of subjective passive and active constitution, they need a common denominator. The common denominator is that both presuppose temporal

[40]Cases in which almost closed connections are called "wholes" occur very often in the human sciences. Given the complexity of their subject matter, it will be in most cases impossible, but also often irrelevant, to ask for a final decision.

[41]Cf. Sects. 2.3 and 3.2 below for a more detailed explication of the difference of "genesis" and "generation." Cf. also Steinbock 1997 and Welton 1997.

[42]Husserl also often used the term "ethnology." How to distinguish between such a phenomenological ethnology and ethnology as an empirical human science is a question that causes additional problems. Without further comments the distinction, e.g., of homeworld and alienworld could be understood as a distinction belonging to Alfred Schutz's *static* phenomenology of the social world or, in Husserl's terms, to the static phenomenology of the lifeworld.

structures, and with them the problem of the constitution of inner subjective time consciousness and of the intersubjective experience of time as a shared objective transcendent time. It is, hence, sufficient for the analysis of the formal structure of genetic and of generative foundation to analyze the formal structure of this common denominator.

The structure of the temporality of inner time-consciousness is the pre-given formal structure for all levels of experiencing consciousness. Both the horizon of protention (primordial expectation) and the horizon of the continuum of retentions, together with their hyletic contents, are one-sidedly founded in the actual Now. The actual Now and its structure stands; it is the *nunc stans*. What emerges in the actual Now and its protentional horizon and then flows off in the continuum of retention includes the hyletic contents.

The pre-given structure of inner time-consciousness is the foundation for the structure of the temporality of active intentional synthesis. The horizon of passive protention is the foundation for the horizon of active expectations on the level of active intentional synthesis. The material content of expectations is originally determined by passive associations between presently given contents and contents hidden in the continuum of retentions.

The dimension of retentions of passive inner time-consciousness is on the level of active intentionality the horizon of the past, the horizon for the intentional acts of memory and reproduction. The intentional objects of memories are clusters of past states of affairs. To remember this or that aspect of such a cluster, e.g., the neighborhood in a town, means to recall several features without representing a sequence of events in past time phases. Memories provide the material for reproductions of a past period of my inner lived experiences and their objects. Reproductions refer to contents of memory, but they add the distinct representation of the temporal sequence of the contents as temporal sequences of events. Intersubjective time consciousness is one-sidedly founded in subjective inner time-consciousness. Intersubjective time is in addition consciousness of shared intersubjective time and, as such, the consciousness of the shared objective time of shared transcendent objects.

Two further questions emerge with this: the question of the how of the givenness of Others in my own subjective experience and that of the analysis of the specific structures of the shared horizon of the future and the shared horizon of the past in intersubjectively given transcendent temporality. These questions will be considered in the next chapter. A genesis or a generation is a temporal development of material states of affairs. Such a development given as an intentional object is a sequence of events that happened in the past. It is, therefore, an object given first in the subjective reproduction of past events and then in the reconstruction of "what was really the case" in intersubjective investigations. The difference between subjective reproductions and intersubjective reconstructions of past events is a *material* difference. The difference is essential and will be considered in Sect. 3.1 in the next chapter. Of interest in the present section is only the formal structure of reproduced or reconstructed temporal sequences.

Formal ontological investigations presuppose formalising abstraction. All material differences of the material essences of objects are in brackets for this abstraction. Thus the material differences between subjective reproductions and intersubjective reconstructions and their intentional objects are not of significance for the formal analysis of the temporal structure of the sequence of past events. Genetic and generative foundations both presuppose the formal structure of sequences of reproduced time phases: a time phase n is the immediate successor of its predecessor, the time phase n − 1. The time phase n − 1 is, hence, the one-sided foundation of the time phase n.

What has to be added for the definition of "temporal (genetic or generative) foundation" is only what has been said above about collections and wholes of higher order n and their parts, the wholes of higher order n − 1: The unifying categorial structure of a whole of higher order n – the two types 1 and 2 mentioned above in (1.b) and the third type mentioned in (2.b) – is temporally founded in its parts, the wholes, or (type 3) the whole, and their unifying categorial structure of higher order n − 1 if and only if the wholes of higher order n − 1 are given in a time phase n − 1 and the whole of higher order n is given in the time phase n.

Two remarks must be added: (1) The term "foundation" is *prima facie* used in this definition as a "relation" not between dependent moments, but between wholes and their unifying structures. What is really meant is, however, the application of the *temporal* foundation of a formal state of affairs in the formal time phases n and n − 1. Time phases considered by themselves are dependent moments within the dependent moment temporal extension, and this extension has the formal structure of a well-ordered set of immediate successors and predecessors. (2) Seen from the viewpoint of formal logic, one sided foundations are replicative conditionals.[43] The necessary condition of the replicative conditional in the case of a foundation is *not* merely that the foundation is the consequent of a generalized conditional that has not yet been empirically falsified and is, in this sense, empirically true. A foundation is an essentially necessary condition. If there is a red object, then this object is necessarily a visually extended object.

2.3 Essences and Eidetic Intuition

The method of eidetic intuition was for many readers of the *Logical Investigations* and *Ideas I* in the first half of the last century the *conditio sine qua non* of a pure phenomenology and phenomenological philosophy. The question is, of course, what the methodological justification for this new method is. Apart from the empty

[43] Implicative conditionals refer to sufficient conditions that admit predictions presupposing positing the *antecedens* in the second premise of a *modus ponens*. Replicative conditionals refer to necessary conditions that admit retrodictions in a modified *modus ponens* in which the consequent is assumed in the second premise.

assertion that some people have the gift of eidetic intuition and others do not that was the usual answer of the members of the Göttingen School was:

1. Essences can be discovered in free fantasy variation, and
2. Husserl's phenomenological analysis of the givenness of formal ontological and logical ideal objects had once and for all cleared the ground for further phenomenological discoveries of all kinds of material essences.

Without denying the merits of the Göttingen School, it can be said with hindsight that this understanding of the *Logical Investigations* and the first part of *Ideas I* was not guided by a precise understanding of the intentions of the author. Considering (2), Husserl's main intention was to use his analyses of the formal ontological and logico-grammatical categories as the groundwork for a future phenomenological epistemology of all sciences and their methodologies.[44] But this tacitely implies that the investigation of *formal* ideal objects has a methodological priority for the eidetic intuition of *material* ideal objects.

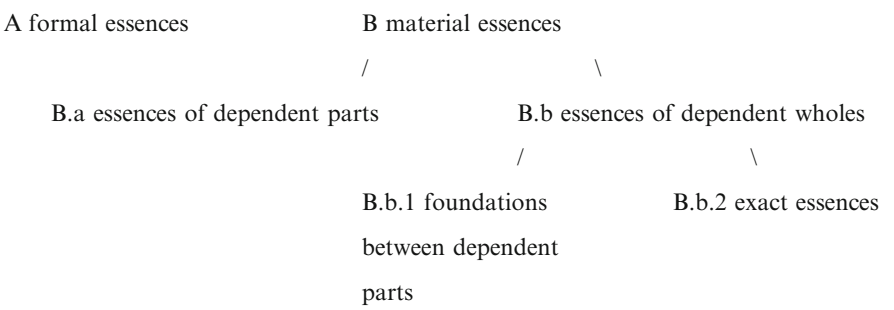
A remark about a possible "worldly" theory of the a priori and the method of eidetic intuition, e.g., in geometry but also a formal ontology must be added. In the *Logical Investigations* Husserl ceitized Kantian, Neo-Kantian, and other theories as a psychologism that fails to recognize the character of the a priori as a realm of ideal *objects*.[45] Phenomenologists in the Göttingen tradition, but also some in the later Freiburg tradition, rejected the transcendental-phenomenological reduction, but insisted on the possibility of an "eidetic reduction" recognizing the objective character of the a priori. However, the controversies in the *Freiburg* tradition and later in the tradition of the *New School,* e.g., between Schutz and Gurwitsch, have a much more complex background and can only be considered in the context of the questions that will be discussed in the next section. But from what has been said in the first section about Husserl's turn from descriptive psychology in the first edition of the *Logical Investigations* to pure or transcendental phenomenology in the second edition and *Ideas I* it follows that a theory of eidetic intuition for a phenomenological theory of knowledge is not possible as a "worldly" theory in the natural attitude. Such a theory would necessarily end up in empirical or transcendental psychologism or some other kind of relativism. For Husserl even Kant's account of the a priori was still a transcendental psychologism.[46] Of course, this does not mean that eidetic intuition recognizing a priori structures is impossible in the natural attitude. It also does not mean that worldly theories of eidetic intuition and ideal objects are impossible. They are possible, but given what has to be said about the paradox of subjectivity in the next section, they will necessarily end up in the pitfalls of relativism.

[44] Hua XIX, 2, *LI*, 2nd ed. Introduction §7.

[45] Hua XIX 1, §38.

[46] For a comprehensive account of different types of transcendental psychologism in Husserl see Seebohm 1962, §§3 and 28.

The problem of the static and genetic structures of the intentional acts in which essences are given can be postponed. An analysis of the different types of essences and their givenness reveals already against (1) that more is required that just free fantasy variations for the intuition of essences. A classification of essences and laws of essence can distinguish between the following:



Formal essences are of the categories and the laws governing categorial structures of formal ontology and pure logical grammar. Categorial structures are more or less complex combinations of related categories. The relations between categories in categorial structures are foundations. The analysis of categorial structures is first of all interested in the laws of foundations. The givenness of formal essences presupposes formalizing abstraction. A minimum of material content is left even on the highest levels of generalizing abstraction. Formalizing abstraction abstracts not only from the contents of all empirical material concepts. but also from all contents given in the eidetic intuition of material morphological essences (B). Only formal categories and categorial structures are possible objects after the formalizing abstraction. Formalizing abstraction implies *vice versa* that the categories and categorial functions admit the *possible* variation of material contents belonging to one and only one certain type of categories or categorial structures. To vary material contents that do not belong to these types is *impossible*.

A *caveat* must be added. The modal particles "impossibility, possibility, necessity" ought not to be understood as the logical possibility, impossibility, and necessity of deductive logic. A conjunction of contradictory statements is, for instance, a logical impossibility for deductive logic. Impossibility on the level of pure logical grammar indicates grammatical nonsense in a complex cluster of meanings (*Bedeutungszusammenhang*). Statements or other complex meaning structures are impossible in this sense if they violate the possible categorial structures of complex meaning structures. Logical impossibility on the level of well-formed sentences refers to conjunctions of contradictory statements. For pure logical grammar contradiction is a well-formed formula and not nonsense.

The second easy case is the case of the material categories of dependent parts and the material laws of the foundation relations between them (B.b.1). What is of interest is the specific character of (1) the essence of specific material dependent parts or moments and (2) the laws governing the foundations between them.

1. Dependent parts are the attributes of substrates, i.e., of independent wholes. Considered by themselves, they are also called abstract parts or moments. Species of abstract moments like red or a specific shape given in a spatial extension are abstract moments belonging to a genus of abstract moments, e.g., visual quality or visual extension. They are always first given as dependent parts or attributes of concrete substrates. To consider them by themselves in a second step requires an isolating abstraction, i.e., the abstraction from the concrete substrate in which they are given. This abstraction is sufficient for the cognition of the essence of an abstract moment. It is, for instance, sufficient to have one impression of a specific red as an attribute of one concrete object to discover the essence of this red after the isolating abstraction. This essence can now be fixed and can be discovered again as the same red in a variety of other substrates. It does not matter whether such a variation is determined by concrete experiences or free fantasy variations. The advantage of free fantasy variation is, however, that it immediately demonstrates the independence of the essence "red" as an ideal and not as a real object.
2. The immediate condition of the givenness of red and in general of visual qualities requires its givenness together with another dependent part, some spatial extension. The formal ontological technical term for this condition is foundation. "Red has its one-sided foundation in a spatial extension" means that the shape of the visual space can be varied without modifying the red. But it can also be said *vice versa* that a certain shape of visual extension can be identified as the same if and only if the contrast phenomena separating it from its spatial background can be represented as identically the same in a free variation of the visual representations of the contrast of at least two visual qualities. A specific shaped piece of visual space has its one-sided foundation in contrast phenomena between two different species of the genus visual quality.

Exact essences (B.b.2) are originally given in concrete substrates with a dependent moment of the genus extension. The exact essence, e.g., of a straight line, is, according to its definition, the *shortest* connection between two points. The definition indicates that the fantasy variation is in this case by no means free. It guided by a strict rule for a goal-directed linear progress toward an ideal limit. Together with the meta-mathematical formal ontological theory of colligations or sets and units, the theory of exact essences is of central significance for the reflections on the methodology of mathematics in a phenomenological epistemology.[47]

The incomplete sketch of the intuition of essences of abstract material moments (B.b.1) already indicates that the simple reference to free variation is insufficient. The intuition requires first of all the act of isolating the abstract moment in a pre-given concrete *substrate*, i.e., a category of formal ontology (A). The eidetic intuition of clusters of two or more material abstract moments presupposes in addition a formal ontological categorial structure of *foundation*. Variations of

[47] See above the remarks in the beginning of Sects. 2.3, 8.1, and 8.2 in Part III on mathematics.

representations accordingly require that one well-defined *formal ontological aspect* of the representation of an object is *fixed* and the other is *varied*.

The case of exact essences (B.b.2) presupposes from the outset the formal ontological distinction between "substrate" and "dependent part." It is also obvious that each step in a uniform progression towards an ideal limit has its foundation in one and only one preceding step and is itself the foundation for one and only one succeeding step in the progress. More can be said in a formalized logic of relations about the categorial form of the relations between units in a linear progress of this type, but what has been said is sufficient to indicate again that the variations in imagination are in this case not free. They are governed by strict rules defined in terms of formal ontological categorial structures.

Case (B.a), the intuition of essences of independent wholes, the substances or substrates of traditional philosophy, is the difficult case. The preceding considerations of cases (B.b.1) and (B.b.2) have shown that variations in imagination are necessary but also that they are free only within the limits of certain rules. The rules governing the variations of eidetic intuitions are applications of the formal ontological laws for categorial structures of dependent parts of independent wholes. It is, therefore, plausible to assume that the application of the laws for categorial structures of substrates qua independent wholes and for the relations between them is a necessary requirement for the eidetic analysis of the structures of concrete wholes.

Empirical concepts used for the recognition of individuals belonging to the same species are already complex. Assuming that all attempts to discover the essence of independent substrates starts with a pre-given concept of the substrates, the first step is to find some heuristic strategies for beginning with the analysis of concrete wholes. The discovery and justification of such strategies requires more than a preliminary survey of the system of different types of essences and their interdependencies. What is required is now the postponed phenomenological analysis of the intentional acts in which essences are given.

One of the misleading assumptions of early readers of the first volume of the *Logical Investigations* and even of the first part of *Ideas I*[48] was the strict separation between the cognition of ideal objects in a quasi-Platonic intuition and the cognition of real objects in sensory experience and empirical conceptualization. An additional second assumption is immediately implied in this misunderstanding, the assumption that the theory of eidetic intuition and the theory of the phenomenological reduction are two *independent* methodological principles of phenomenology. But a problematic situation that triggered the invention of a theory is by no means an epistemological justification for this theory. The problem of the cognition of ideal objects induced the transition to pure phenomenology. However, the

[48]Cf. the first part of *Ideas I*: *Wesen und Wesenserkenntnis* i.e., "Essences and the Cognition of Essences" (my translation). The misleading impression is that this part can be understood as an explication of methodical principles that can be given before and outside the phenomenological reduction.

epistemological justification of the cognition of essences is a task of phenomenology itself, phenomenology understood in the beginning as descriptive psychology in the first edition of the *Logical Investigations* and then as pure phenomenology after the phenomenological reduction in *Ideas I*.

The examples in the analyses of formal ontological structures in the *Logical Investigations* already refer to the objects of sensory experience. The analyses of the intentional acts in which the formal and then the material essences and laws of essence are given in part I of *Ideas I* presuppose the structures of inner time-consciousness discussed in §81 there. The lectures on inner time-consciousness are also presupposed in later analyses of the hyletic field, passive synthesis and association, and the pre-predicative origin of the formal ontological and logico-grammatical categorial structures in the *Experience and Judgment*. Following *Experience and Judgment* it can be said that the basic pre-predicative categorial structures of formal ontology are already present on the level of the apperception of the material of passive synthesis in intentional acts of pure sensory experience. The pre-predicative formal ontological categorial structures of sensory experience determine the predicative structures of pure logical grammar. The categorial structures of pure logical grammar determine the predicative structures of meaning and complex clusters of meanings. Pure logical grammar is, therefore, the a priori framework for material empirical concepts and predications on the level of wholes and parts of the first order.

It has already been mentioned at the beginning of the last section that categorial intuition, formal essences, and with them formalizing abstraction are the methodical presupposition for the discovery of material morphological and exact essences in eidetic variations. They provide the framework for methodically guided fantasy variations. Given this as the first premise and then the brief summary of the phenomenological analyses of *Experience and Judgment* as the second it follows that eidetic intuition is independent from and even opposed to empirical concept formation must be rejected. A phenomenological analysis of the intentional acts in which material essences are given must first presuppose the genesis of empirical predication and concept formation.

When Adam named the animals, he must have been able to recognize a lion and to distinguish the lion from the elephant strolling by behind the lion. The ability to recognize sensual empirical objects is the presupposition for giving names regardless of whether they are names of individuals or a species of individuals of concrete objects, but also of dependent abstract moments. The problem of sensual universals, *prima facie a contradictio in adjectio*, was already a problem for traditional philosophy. According to Kant images are always images of individual objects. Sensible universals are schemata, pre-conscious rules for recognizing sensible representations that are covered by the scheme, e.g., rules of the scheme that is presupposed by and then connected with the name of a species, e.g., “dog.” A scheme is a set of rules determining the production of a series of different images or the ability to subsume a given image under the scheme. Transcendental reflection can discover that the formal framework of the categorical structure of understanding of possible objects is also the formal framework for the rules guiding the power of imagination.

The material structure of schemata is, however, always a product of an art of the power of imagination that is hidden in the depth of our souls.[49] Seen from the viewpoint of phenomenology, this hidden art of the power of imagination is the "art" of passive associative synthesis. Experience and sensual experience presuppose the hyletic field. The structures of the hyletic[50] field are the structures of inner space and inner time. The actual now is the now of presently given impressions, the horizon of protention is the primordial openness for new impressions in the hyletic field, and the continuum of retentions is the dimension of the flowing off of the hyletic content of the actual now and its protentional horizon in the continuum or retentions. The contents of passive synthesis in the continuum of retentions are not given in temporal succession.[51] They are associated in passive synthesis. Passive synthesis guided by similarity or, in modern terms, by gestalt structures is the phenomenological explication of Kant's art of the power of imagination that is hidden in the depth of our souls.

A digression considering the use of the term "concept" and related terms in traditional formal logic (especially from Descartes to Kant) in modern formalized logic, and in Husserl and phenomenology is necessary to avoid misunderstandings. Formal logic from Descartes to Kant and beyond but also already Scholastic logic distinguishes between an intensional and an extensional interpretation of logical terms. Most logicians of the twentieth century, especially those in the positivistic tradition, prefer the extensional interpretation, i.e., they prefer, like W.v.O. Quine, strictly extensional *nominalistic* term logics. *Terms* have for them only an *extension*, i.e., the extension of sets of objects to which they can be applied.

Traditional logics from Descartes to Kant preferred the intensional interpretation of logic. Terms have extensions only if quantifiers are added. Without that terms refer to c*oncepts* and this reference is a reference to the *intension*, i.e., the meaning of a term. The doctrine of concepts as a theory of the categorial structure of concepts is already the first discipline of formal logic in the tradition of Aristotelian logic. It is present in the doctrine of ideas, the *ideae innatae*, the innate ideas, and the *ideae adventitiae*, the empirical ideas, in the Cartesian tradition of the *Logic of Port Royale*. The technical term for the Cartesian ideas in the logic of the schools was *conceptus* and this term was translated as *Begriff* by Christian Wolff and used by Kant in his formal logic, in his transcendental logic, and in his distinction between empirical concepts and concepts a priori.

[49] Kant KGS III, *Critique of Pure Reason*, B 180f, cf. B 103. See Makreel 1990, Chap. 2, esp. 29ff. See also Grünewald 2009, 255 for a similar interpretation of Kantian schemata and Husserlian empirical conceptualization and essences.

[50] Greek *hylē* is Latin *materia*. On the level of passive synthesis "hyletic" can always be read as "material" and vice versa. The hyletic field is, seen in this way, a field and not a collection of atomic sense data or impressions.

[51] The givenness of temporal succession in the past presupposes the active synthesis of memory and in addition of reproduction; see below, Chap. 3, Sect. 3.1.

This tradition and its explication in the context of an empirical psychologism was Husserl's problem before and in the *Logical Investigations*. His theory of eidetic intuition and material and formal essences is not only meant as a rejection of psychologism, it is alo the phenomenological solution of the problem of the constitution of the difference between concepts a posteriori and concepts a priori, between the *ideae innatae* and the *ideae adventitiae* as intentional *objects* without presupposing Cartesian metaphysical assumptions or a Kantian transcendental psychologism. The intension of concepts a priori and a posteriori, i.e., empirical concepts refers to an empirical type or to a pure essence, and the application of a concept refers to objects. There is no confusion in this respect in Husserl.[52]

Setting aside the question whether and how far active concept formation presupposes linguistic structures, it can be said that from the very beginning that active conceptualization presupposes an active variation of the contents of the schemata as products of passive associative imagination. It is an activity of varying, abstractively isolating dependent and independent parts, and adding and subtracting dependent parts in concepts of substrates. Such an activity can follow rules. The most significant set of rules includes the logical rules for defining genus, species, and specific differences, applying the rules of Aristotelian induction to levels of concepts of higher universality.[53] The upshot is that the formation of empirical concepts already presupposes on its lowest level, the schemata of passive associative synthesis and the formal ontological categorial structures of first level wholes and parts; the active variations of the isolating abstraction that isolates concepts of attributes in concrete substrates and the generalizing abstraction that leads to concepts of higher universality; and finally it presupposes a framework that distinguishes between logico-grammatical possible and impossible empirical concept formations.

The intuition of material essences has, hence, its genetic foundation in pregiven empirical concepts. What is added is the work of a "free" variation, i.e., a variation not guided by experience, passive associations, or free fantasy in the narrower sense,[54] but by the structures of the categories of formal ontology and pure logical grammar. The formal essences are given in formalizing abstraction. Formalizing abstraction presupposes that the abstraction from all material contents can be already be applied to the categories of concept involved in forming empirical concepts. What is added in the intuition of material essences are variations discovering and distinguishing the *foundations* in categorial structures in first-order wholes and the *relations* in the structure of collections of wholes and higher-order wholes.

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[52]See Husserl's explication of the meaning of concept (*Begriff*) and essence (*Wesen*) in Hua III, §22.

[53]More precisely, the rules of the *Categories* and the *Topic* of the Aristotelian *Organon.* This type of induction and its logical implications must be strictly distinguished from the induction of predictions and causal connections.

[54]Free fantasy variation in the narrower sense creates images, not schemata in the Kantian sense, out of images in poetry and mythology: golden mountains, lions with human heads, human bodies with the head of a falcon, vampires, and so on and so forth.

Given this background, a first strategy for the analysis of morphological essences of concrete substrates is to apply the techniques of the analysis of the essences of dependent abstract parts and of the foundations connecting them to certain simple aspects of concrete substrates. The second strategy is the application of the principle of generalizing abstraction. Concepts of concrete objects of a higher degree of universality are less complex than concepts of a lower degree of universality. The second strategy is to thus restrict the investigation in the beginning to concepts of a high degree of universality.[55]

However, even the two heuristic strategies taken together are not able to warrant a complete analysis of the morphological essences, morphological ideal types of a lower degree of universality and correspondingly of a higher degree of complexity. The analysis is as such restricted to the relevant aspects of the pre-given concept. In such cases, e.g., "medieval town," it is better, following Schutz but also *Experience and Judgment,* to talk about types and ideal types or, in the terminology of *Ideas I*, noematic systems.[56] The construction of such morphological ideal types requires additional viewpoints that can be found in the specific categorial structures of the material region of empirical sciences, e.g., the specific structure of organisms in the life sciences or of social interactions and social institutions in the social sciences, such as the ideal types of Alfred Schutz. Detailed analyses of such structures will be necessary in Part III, Sect. 8.5, and Part IV, Sect. 10.4.

2.4 Intersubjectivity, the Paradox of Subjectivity, and Ultimate Grounding

The problems connected with the phenomenological reduction and later added reductions, the egological reduction and then the primordial reduction, within the residuum of the phenomenological reduction cause further critical reflections and discussions. The critical reflections on the reduction are immediately connected with the problems of the givenness of other persons, in short Others, and in general of intersubjectivity and the lifeworld. Husserl himself noticed later[57] that the phenomenological reduction could easily be misunderstood as a reduction to the subjective consciousness of the phenomenologist, i.e., as solipsism. It was,

[55]This is precisely the strategy proposed in *Ideas I* on regional ontology, see Hua III, §9, 23f.

[56]Husserl, 1972, section III, §83b; see Schutz 1932, §§37, 38 and 43 on the foundation of sociological concepts and ideal types in the everyday conceptualizations of the social world. See also Grünewald 2009, 252, cf. 124. Grünewald's phenomenological explication of Weber's ideal types as noematic systems in his interpretation of *noema* and *noesis* in *Ideas I.* The difference between his explication and the explication of Schutz's adaptation of Weber's ideal types mentioned above is only a terminological difference. Noesis and noema are other terms for intentional acts, *cogitationes,* and intentional objects, *cogitata*, in the *Cartesian Meditations*.

[57]Hua I, §42.

furthermore, obvious that a solution of this problem is a necessary condition for a possible phenomenological epistemology of the social and human sciences.

An additional problem for the critical discussions was Husserl's idealistic "metaphysical" self-interpretation of the transcendental ego and of a transcendental intersubjectivity. The critical discussions of this context began in Husserl's conversations with the members of the phenomenological circle in Freiburg in the early 1930s. The background of the conversations was material taken from the *Cartesian Meditation,*[58] probably also Husserl's remarks about his research in other unpublished lectures, e.g., the Vienna lectures and manuscripts.[59] In addition it was of significance that Aron Gurwitsch's investigations on the pure ego[60] and Alfred Schutz's phenomenology of the social world[61] had been published before and during this early stage of the discussions in Freiburg.

Husserl's later writings have been published in the *Husserliana* beginning 1950. The publications show that the problems of solipsism, the givenness of Others, intersubjectivity, the social lifeworld, and the epistemology of the human sciences were already of central significance in Husserl's investigations in the second decade of the twentieth century. It is neither necessary nor possible to give an adequate interpretation and evaluation of the different viewpoints and positions of this material in an introductory section of this systematic phenomenological investigation.[62] What is necessary is to give an account of the solutions for the above-mentioned problems that will be used as guidelines in the following chapters. This account includes a critical explication of the structure and the problems of the paradox of subjectivity in *The Crisis of European Sciences and Transcendental Phenomenologys*.[63] Husserl discovered the paradox of human subjectivity as the paradox of being a Subject (*Subjektsein*) for the world and at the same time being an object (*Objektsein*) in the world.[64] The discovery of the paradox in the *Crisis* presupposes, as mentioned, the phenomenological analysis of intersubjectivity, and this analysis presupposes in turn the egological and the primordial reduction. Seen with hindsight, however, it is already possible to find relevant implications of the paradox in the explication of the phenomenological reduction and the phenomenological attitude in *Ideas I.*

[58] Cf. the editor's introduction Hua I. Husserl had distributed typescripts of the completed German *CM*, (not only the French version that was reviewed by A. Schutz) to the members of the Freiburg circle; cf. Embree 2009a, 177f.

[59] *Philosophy in the Crisis of the European Humanity* 1935, Hua VI, 314–348.

[60] Gurwitsch 1929.

[61] Schutz 1932.

[62] For a short discussion of such viewpoints as they have emerged in the historical development of the phenomenological movement, see Part V, Sect. 11.3.

[63] Hua VI, §§53, 54; cf. Seebohm 1992. A concise account of Husserl's ontological interpretation of the paradox of subjectivity and his way out in the direction of the absolute being of the ego can be found in Hopkins 2010, ch. 15, 210.

[64] Hua VI, §53; see note 70 about the meaning of *Subjekt**sein*** and *Objekt**sein*** in German.

Relevant material for Husserl's own answers to the problem of a Cartesian ultimate grounding and the paradox of subjectivity is now also available in *Die Lebenswelt*.[65]

1. The technical phenomenological term *evidence* refers to the mode of awareness in which content is given in living experience for possible descriptions. Consciousness is given to itself in the phenomenological attitude in *apodictic* evidence, i.e., any doubt and in general any reflection on its self-givenness once again implies the evidence of self-givenness, and so on in an indefinite iterative regress. A critical reflection on the evidence of the givenness of objects in direct intention shows, on the contrary, that such evidences are always *dubitable*, *provisional*, and can be "crossed out" and replaced by other evidences in the future.[66] Only the world as the sum total of all possible objects is given in *presumptive apodicticity*, i.e., the evidence of the givenness of the world is not touched by negations or modifications of previously given evidences of the existence of states of affairs.
2. The abbreviating formula for the universal structure of consciousness, i.e., of all intentional acts and their objective correlates, is *ego cogito cogitatum*. The function of the ego in the structure can be understood in *two* ways. First it can be understood as a dependent part like the intentional acts and their objective correlates. As such it is the focal center, the unity of all intentional acts and their correlates in the temporal dimensions of the living present. This interpretation is binding under the assumption that phenomenological analyses as eidetic analyses have to presuppose the categorial structures of formal ontology as a methodological guideline according to what has been said in the preceding sections. For the second interpretation, the ego is in addition understood as the active and unifying source of intentional acts, i.e., as the transcendental activity of the unity of apperception in the Kantian and Neo-Kantian sense. As such it has in addition the function of a necessary condition of experience that is not itself a part of experience.
3. It is a phenomenological finding that intentional acts of consciousness in oblique intention presuppose, either immediately or mediately, an act of direct intention. In other words, all reflective acts of consciousness are one-sidedly founded in intentional acts referring to objects in the world as their correlates in direct intention. It is furthermore essential that objects given in direct intention and the world as the sum total of objects are transcendent, i.e., they do not belong to the temporal sphere of immanence of synthetic intentionality. Closer considerations reveal that this structure refers to and presupposes the structure that has served as

[65] Hua XXXIX, texts 23, *Beilage* XIX, XX and text 24. See also text 25, the rejection of the Cartesian radical doubt in the existence of the world. For an explicit reference to the paradox of subjectivity see 251.

[66] Even a theorem in the natural sciences that has been confirmed up until now in experimental research can be disconfirmed by further experiments in the future.

> criterion for the apodicticity of the self-givenness of consciousness (1). Even an indefinitely extended regress of iterated reflections on reflections is in its beginning one-sidedly founded in an intentional act in direct intention that has its objective correlate as an object in the world.[67]

The evidence of the givenness of the world in presumptive apodicticity in direct intention is, hence, the foundation of the self-givenness of subjective consciousness in oblique intention. No paradox is involved (1)–(3). The difficulty of this description of the self-givenness of subjective consciousness is, however, that phenomenology can be misunderstood as solipsism. In particular the thesis that subjective consciousness as a necessary being has its intentional objects in the world as more or less contingent beings implies *prima facie* that phenomenological explication of the residuum of the reduction has the character of the self-entertainment of a solitary subjective consciousness. The minimum requirement for phenomenology as a rigorous science is that it is possible to present such explications and analyses to co-subjects who share the methodical approach of the phenomenological attitude. Science is an intersubjective enterprise. The problem of solipsism will vanish if it is possible to give a phenomenological explication of the givenness of other persons, in short Others, and intersubjectivity. The analysis of the givenness of others leads, however, together with (1)–(3) to the paradox of subjectivity.

Husserl's first steps toward a solution of this problem, the egological and then the primordial reduction, already caused difficulties for the members of the circles in Freiburg and New York that will be considered briefly in the end of this chapter. Both reductions are abstractive reductions, i.e., their residuum is an abstract aspect within the residuum of the phenomenological reduction. These two reductions were not mentioned in *Ideas I,* but seen from a systematic point of view and not from the viewpoint of the interpretation of the text it is possible to locate their systematic place in the context of *Ideas I*. The *Ideas I*[68] offered a list of specific reductions that are implied by the phenomenological reduction. The reductive bracketing of the immediate givenness of formal and material essences in the natural attitude indicates that the specific kinds of objects in question require special analyses of the intentional acts in which they are given. The egological and then the primordial reduction are in the proposed systematic interpretation nothing more and nothing less than two further reductions belonging to this systematic context.

Presupposing the givenness of the Other and intersubjectivity within the residuum of the phenomenological reduction, the egological reduction has to determine where, how, and to what extent intersubjectivity is implied in the constitution of the transcendent objective correlates of subjective consciousness. Given, e.g., objects on the lowest level of active synthesis, the level of pre-predicative sensual experience, objects are given as transcendent objects in different

[67] To the best of my knowledge, no explicit account has been given for (1) in *Ideas I* or elsewhere by Husserl.

[68] Hua III, §61.

aspects and perspectives. As moments are given in the syntheses of subjective consciousness these perspectives are given one after the other in the flow of inner time-consciousness. The back side of the object will be seen or has been seen, but is not seen now if the front side is present in the actual Now. The object as something in its own right, rather than something belonging to the unity of the flow of subjective consciousness, is only given under the assumption that all aspects and perspectives not given in the actual Now are still present in this actual Now. This assumption presupposes, however, that some modification of myself, i.e., some possible Other, is able to experience the other perspectives in the temporal phase of just the actual Now in which I experience the front side of the object. Modifications of this structure have to be present in all experiences of objects in subjective consciousness.

The egological reduction presupposes the *possible* givenness of Others. The main concern of the primordial reduction is the *actual* givenness of Others. The reduction brackets the intentional constitution of all objects given for subjective consciousness that imply in one way or the other the givenness of Others. The bracketing presupposes the egological reduction because the main consequence of the analyses under the egological reduction is the strict separation between the sphere of ownness (*Eigenheit*) of subjective consciousness and the sphere of the intersubjectively given transcendent objects. The residuum of the primordial reduction is the primordial sphere of subjective consciousness and the next question is the how of the givenness of the Other within this primordial sphere. A detailed account of the phenomenological analysis of the givenness of the Other and intersubjectivity will be given below in the next section. Here it is sufficient to highlight the aspects of this analysis that are of central significance for the explication of the paradox of subjectivity.

The Other, the *alter ego*, is originally given as the other living body. This givenness has its foundation in the self-givenness of one's own living body in the primordial sphere. The other living body is not given as a correlate of intentional acts of the ego, since the abstractive primordial reduction brackets the givenness of transcendent objects as correlates of the syntheses of active intentionality. Instead, the residuum of the reduction is the primordial sphere of passive syntheses in the hyletic field. The ego-pole surfaces in this field only if it is awakened, i.e., attracted or rejected by contrast phenomena. The other living body is, therefore, given in passive synthesis in the hyletic field. Its givenness is an immediate associative appresentation.[69] The Other is associatively appresented as a part of the pre-given field in which the ego emerges as an ego attracted or repulsed by contrast phenomena. The appresentation of the Other as other living body is then the foundation of the experience of one's own living body as one living body among

[69] See Hua I, §§52–55. Appresentation is not a simple Diltheyan *Einfühlung*, empathy. I experience the other living body as such before, and sometimes completely without making an attempt to try to imagine how the Other "feels" her/himself in her/his body; see Sect. 3.1 below.

other living bodies, all given in passive synthesis. This structure, together with the awakening of active intentional acts of subjective consciousness, is the genetic foundation of intersubjectivity.

The analysis of the original givenness of the Other and intersubjectivity implies significant modifications in the meaning of "transcendent objects" and "transcendence of the world" as correlates of active intentional synthesis in direct intention. Intentional objects are given as transcendent objects in the residuum of the phenomenological reduction of *Ideas I* only because the unity of objects does *not* belong to the temporal unity of immanence of the subjective consciousness. Guided by the egological and then the primordial reduction, further explications of the sphere of immanence and the correlated objects indicate that the givenness of transcendent objects is a correlate of the givenness of Others, of intersubjectivity. The first criterion of transcendence is negative. The object is transcendent because it does *not* belong to the sphere of immanence. The second criterion is positive. The object is transcendent because it is given as an intersubjectively given object. Further phenomenological analyses reveal that the emergence of the givenness on the one hand of the Other and intersubjectivity and of transcendent objects on the other are correlated dependent parts of the structure of the givenness of the world. They are both together one-sidedly founded in the passive synthesis of contents of the hyletic field and in passive associative synthesis. They already emerge as correlates on the lowest level of the intentional synthetic activity of the pre-predicative sensual experience of objects. Given this structure, it has to be said that subjective consciousness with transcendent intentional objects is given to itself in the world because it is given to itself as a member of an intersubjective community, and this intersubjective community is in turn immediately given as a correlate of the givenness of transcendent objects. This analysis adds serious modifications and extensions to the analysis of the foundation of intentional acts in oblique intention in intentional acts in direct intention in the residuum of the general phenomenological reduction mentioned above in (3). Intentional acts in direct intention and their correlates, the transcendent objects and the transcendent world in the positive sense, presuppose the primordial self-givenness of subjective consciousness as a member of an intersubjective community in a common world, more precisely in a common lifeworld.

Two interpretations of this structure are possible, the *epistemic* interpretation and the *ontic* interpretation. The epistemic interpretation is sufficient for the purposes of a phenomenological epistemology. Of interest for the epistemic interpretation are only the scope, the limits, and the quality of the evidences in which the objective correlates of synthetic intentional activities are given in direct and oblique intention. The ontic interpretation is grafted upon the epistemic interpretation. Epistemic categories are understood as indicators of a metaphysical ontology speaking about necessary being, contingent being, absolute being, etc. The apodicticity of the evidence of self-consciousness indicates that the subject is a necessary being and is prior to the being of the objects and the world given for it in dubitable or presumptive evidence as contingent beings. The formulation of the paradox of subjectivity in the

Crisis presupposes the ontic interpretation: *being* a subject (*Subjekt**sein***) for the world and at the same time *being* an object (*Objekt**sein***) in the world.[70]

The emphasis on *being* in the first part of the formulation implies that subjective consciousness, as a necessary being has the contingent being of the world as the totality of objects that are contingent correlates of its synthetic intentional activity. The second part says that subjective consciousness has itself and its objective correlates given in oblique intention only because subjective consciousness too is given to itself as a contingent being among other contingent beings in the world. This is a paradox.

The following explications can show that the situation is different for the epistemic interpretation. No paradox is involved for this interpretation

1. Objects, Others, and the world are given for subjective consciousness in different qualities and degrees of evidence as correlates of the web of synthetic intentional acts *in direct intention*.
2. Subjective consciousness is given to itself in *oblique intention* in apodictic evidence. Epistemic apodicticity means that a critical reflection on the evidence of the self-givenness of reflecting subjective consciousness re-enacts the evidence of the self-givenness of subjective consciousness in the living present of the actual Now and its protentional and retentional horizon. This is in turn evident for the next reiterated critical reflection, etc. in a possible indefinite regress. In addition, the infinite regress of critical reflections warrants that epistemic explications and analyses are always open for further critical epistemic modifications and revisions. A first critical reflection reveals that the apodictic evidence of the self-givenness of subjective consciousness in oblique intention has its one-sided genetic foundation in intentional acts in direct intention.
3. The evidence of the existence of objects and states of affairs given in *direct intention* is always open for counter-evidences in the future horizon of the experience of objects and, therefore, is dubitable evidence. In other words, critical reflections on evidences of objects given in direct intention are not able to re-enact, by themselves, the evidence of the givenness of the object in question. The evidence of the givenness of the world as the sum total of transcendent objects is not dubitable. It is given in open presumptive apodictic evidence. Apodicticity means in this case that the evidence of the givenness of the world as the sum total of all intentional objects is independent from the evidences in which objects are given in the world. That the apodicticity of this evidence is presumptive means that the world is given as an open horizon for changes in the evidences in the givenness of states of affairs in the world.
4. The intentional objects given in *direct intention* are transcendent objects in the positive sense. They are not only transcendent because their unity does not belong

[70] *Die Paradoxie der menschlichen Subjektivität: das Subjektsein für die Welt und zugleich Objektsein in der Welt,* Hua VI, §53. The verb "being" in the English translation can be understood as an indicator of the subject-predicate relation. The German terms "Subjekt*sein*" and "Objekt*sein*" are, on the contrary, ontological terms for two kinds of beings.

to the temporal unity of inner time consciousness; they are also transcendent in the positive sense as objects given for an intersubjective community. The positive criterion of transcendence implies that the evidence in which objects are given for subjective consciousness is, according to (1), the evidence of the givenness of the world for the *perspective* of a subjective consciousness.

5. The phenomenological explication of the evidence in which Others and intersubjectivity are given is the correlate of the evidence in which intentional objects are given and *vice versa*. This implies in turn that objects and the world can be given in direct intention as transcendent correlates in the positive sense only because subjective consciousness is given to itself as a member of an intersubjective community in the world.

What is said in (1)–(3) is a strictly epistemic version of what was said above in the initial three points concerning the paradox of subjectivity. What is said in (4) and (5) is the modification and extension of what was said there about the residuum of the universal phenomenological reduction incorporating the results of the analyses following the egological and the primordial reduction. No paradox is involved. The epistemic definition of the apodictic evidence of the self-givenness of subjective consciousness in oblique intention (2) is not only compatible with evidence that intentional acts in oblique intention have their foundation, in intentional acts in direct intention (1) and (3), but it is also compatible with epistemic evidence that the correlates of intentionality in direct intention, the objects and the world, are transcendent in the positive sense. What is said in (4) and (5) is a compatible explication of (1)–(3) because the apodictic self-givenness of subjective consciousness in *oblique intention* presupposes as its foundation the givenness of the world as the totality of the objects given in *direct intention*. (b) The *transcendence* of the world as the totality of objects in the *positive sense* presupposes the reciprocal foundation of its givenness for an intersubjective community; the givenness of an intersubjective community has its genetic foundation in the givenness of the Other as a living body and the givenness of the Other presupposes the reciprocal foundation of the givenness of the other living body and one's own living body on the level of passive associative synthesis.

Hence, the subject is given to itself in apodicitic evidence in *oblique* intention only because a transcendent world in the positive sense is given for the subject in its intentional acts in *direct intention.* A transcendent world in this sense can be given to the subject as a correlate of its synthetic intentionality only because this subject is also is given for itself in *direct intention* in its living body in the world. No paradox is involved. What is involved is the epistemic distinction between oblique intention and direct intention and the explication of transcendence as transcendence in the positive sense.

The epistemic interpretation is the general methodological framework for a phenomenological epistemology. A phenomenological epistemology in the narrower sense is interested in critical phenomenological reflections on the methods and the methodologies of specific empirical disciplines and sciences. A phenomenological epistemology in the broad sense as a general theory of knowing is interested in the

different qualities, scopes, limits and temporal dimensions of the *evidence* in which the objective correlates of intentionality are given. As a general theory of knowing, it also includes all practical activities that imply knowledge about the environment, the purpose and goal of action, and the means to realize the purpose. Epistemology in this sense is a critical reflection on the intentional activity of consciousness and its objective correlates. The main concern is to characterize the types and degrees of the validity of the evidence implied in the experience in which the intentional objects are given. However, phenomenology as *descriptive* epistemology is not interested in descriptions of the flow of the individual lived experience of a particular consciousness. Instead, it is interested in the description of the essential structures of the correlation between intentional acts and intentional objects in their temporal dimensions in inner time-consciousness. The epistemic interpretation in (1)–(5) warrants in addition that phenomenological epistemological analyses can be presented to the members of an intersubjective community of phenomenologists and is, therefore, open for intersubjective critique.

Some final remarks about the phenomenological reduction, and its relation to the various additional reductions that have been mentioned in Sect. 1.1 and in the present section, are necessary before turning to the ontic interpretation. It can be said with hindsight that it is possible to give a systematic account of the need to introduce additional reductions after the introduction of the phenomenological reduction. The need has its roots in the transition from phenomenology as descriptive psychology to a pure phenomenology and its application to a phenomenological epistemology. Descriptive psychology is already able to give a sufficient analysis of the operations of the mind, the intentional acts, in which formal and material essences are given. The paradoxical situation was, however, the claim that descriptive psychology, i.e., an *empirical* discipline, is able to provide the epistemological justification for the cognition of atemporal essences. The main purpose of the phenomenological reduction was to avoid psychologism and to demonstrate that phenomenological analyses of the structures of subjective consciousness can be immediately applied to epistemological problems. As in a phenomenological epistemology, here too the descriptions of pure phenomenology are also not interested in the individual lived experiences of a subjective consciousness. They are interested in the universal essential structures of the intentionality of consciousness and its correlates, the intentional objects. What is left is only the object in general as the intentional object given in the phenomenological attitude after the phenomenological reduction. It is neither necessary nor possible to borrow the epistemological justification from descriptive psychology. Pure phenomenology itself has to give this justification within the residuum of the reduction. The explicit additional bracketing of the givenness of a pure *mathesis universalis* and material essences serves as an indicator of a special problem that was and is of central significance for the method of pure phenomenology.

What is comparatively obvious for the bracketing of material and formal essences is not so obvious in case of the egological and primordial reduction. Phenomenology as descriptive psychology is a mundane discipline. It is embedded in the natural attitude, and the givenness of other persons, intersubjectivity, and especially the

intersubjective community of researchers in a common world is simply presupposed as given. Thus it is beyond question that descriptive psychologists are able to present the results of their research to an intersubjective community of researchers in the world.

However, after the phenomenological reduction, the world and with it intersubjectivity and the givenness of the Other is bracketed together with the bracketing of the natural attitude. The task of the egological and the primordial reductions is, therefore, to determine the specific problems of the givenness of intersubjectivity and the Other as specific aspects within the phenomenological reduction. They need not be understood as reductions that have been added later to the phenomenological reduction. The phenomenological analyses that have been summarized above in (1)–(5) have shown how Others and intersubjectivity are given, and how the subject is given to itself in direct intention as a member of an intersubjective community of Others in the world in addition to its self-givenness in oblique intention.

In addition, however, this analysis justifies the claim the analyses of pure phenomenology can be presented to an intersubjective community and are, hence, open for intersubjective critique. Husserl applied the ontic interpretation not only in his explication, but then also in his solution for the paradox of subjectivity in the *Cartesian Meditations* and in the *Crisis*. The path of ultimate grounding (*Letztbegründung*) starts with the apodictic, i.e., necessary being of a transcendental ego, discovers in addition and behind the ego a transcendental intersubjectivity, and finally discloses beyond this a kind of absolute primal ego (*Ur Ich*) as the absolute and ultimate functioning (*letztlich fungierend*) source of the constitution of transcendental intersubjectivity and subjective consciousness. Husserl nevertheless rejected the metaphysical constructions of traditional philosophy including the dialectical constructions of German idealism.

The main question for the methodological considerations of this chapter is how it is possible to apply phenomenology and a phenomenological epistemology to ontology without the support of additional metaphysical constructions. A short glance at the application of descriptions and additional metaphysical constructions in modern philosophy can be used as a first hint toward the solution of this problem that will be considered again in the conclusion of this investigation.

The epistemology of the empiricists from John Locke to David Hume and later John Stuart Mill used descriptive methods. Husserl characterized their method as descriptive psychology.[71] Metaphysical considerations based on arguments for a sensualistic idealism or a naturalistic materialism can occur. Moreover, closer considerations show that descriptive approaches are also essential for the rationalistic tradition. Descartes's first "Meditation" is an example, but Kant's analysis of a possible experience in his transcendental deduction also presupposes his descriptive analysis (*Zergliederung*) of the structure of experience.[72]

[71] Hua VI, §58, 211.

[72] Seebohm 1982, 145f.

Kant's highest and ultimate condition of a possible experience is the unity of transcendental apperception. This unity of transcendental apperception and later the intelligible I in his practical philosophy are given in a hypothetical construction, and they are not accessible as objects of experience. Fichte went beyond Kant with his claim that the I as an absolute I is immediately given in intellectual intuition and offered in addition a method to construct a deduction of the a priori structures of experience and the material of sensibility from and within the absolute I.[73] The I was dropped in the further development and finally replaced by the absolute spirit and Fichte's deductive method survived only as a fore shadowing of Hegel's dialectical method.

Husserl's application of phenomenology to metaphysics has nothing in common with the metaphysical constructive proofs *more geometrico* of modern rationalism before Kant. There are, however, some similarities with Kant's hypothetical constructions and the attempt of the German idealists to go beyond Kant. Precisely these dangerous affinities have been the reason for avoiding the term "transcendental" in the considerations about a phenomenological epistemology in this part. Husserl had used the term "transcendental" since *Ideas I* and the terminology he used in his later applications of phenomenology to ontological-metaphysical problems is borrowed from Fichte and even from Hegel. This absolute primordial ego is sometimes also addressed as Hegelian objective spirit, probably in a Diltheyan interpretation of the term and beyond that by interpretations of Fink.[74]

The ontic interpretation is grafted upon the phenomenological analyses that are explicable as epistemic interpretation. Hence, the phenomenological epistemological investigations in the following chapters and parts can neglect the problems of the ontic interpretation and the possibility of the application of phenomenology to metaphysical problems. But the paradox of subjectivity will surface again in some disputes in the theory and philosophy of science in the past century. The concluding remarks in Part V, Sect. 11.1 must, hence, return to the problems of the ontic interpretation and its ontological implications, and will then be able to add a systematic survey of the different epistemic and ontic interpretations in the development of the phenomenological movement.

[73] Cf. Seebohm 1985b, 1994b; Jalloh 1988, 189.

[74] Hua VI, §54b, 55; see also Hua I, §62. For additional material, see Fink 1958, 256, 261, 271f.

Chapter 3
The Material Methodological Presuppositions of a Phenomenological Epistemology in the Structures of the Lifeworld

3.1 The Primordial Sphere, the Givenness of the Other, and Animalic Understanding

It is a truism of present everyday understanding that communities in the lifeworld are communities of individuals. The individuals are, on the one hand, self-subsisting entities and, on the other hand, they are determined by the community and their existence depends on the community. This self-understanding of everyday experience is sufficient for the practical purposes of human actions and interactions in the lifeworld. It is not sufficient for phenomenological descriptive reflection on the constitution of the lifeworld as the primordially pre-given world. It is also not sufficient for the interest of a phenomenological epistemology interested in the generative foundations of the empirical sciences in the pre-given lifeworld and its constitution. Only the aspects of the structures of the constitution of the lifeworld that are of interest for a phenomenological epistemology will be considered in the following summary.[1]

What is left after the egological and the primordial reduction bracket all contents of consciousness and self-consciousness that imply the givenness of the other individuals, in short Others, is the primordial sphereof consciousness. Since the

[1]The German version of the *Cartesian Mediations* was not published before 1950, but the shift in Husserl's position including the turn to the problem of intersubjectivity, the lifeworld, and the distinctions between the transcendental, the egological, and the primordial reduction has been discussed by the members of the Freiburg circle in exile at the New School in New York. The modifications and extensions of the following accounts, especially concerning hyletic contents, the Here and the There of inner space, and animalic understanding, are similar to the analyses of Cairns 2007, 313f and 317ff. and Embree 2012, ch. 3, 4, and 5. More on the constitution of the lifeworld is now available in Husserl's manuscripts from 1916 to 1937 in Hua XXIX.

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primordial sphere is given for phenomenological reflection after an abstractive reduction, it is not a concrete whole by itself. It is an abstract genetic foundation of and in individual consciousness and self-consciousness in the lifeworld. The primordial sphere is in itself a whole of lower order and has, taken for itself, a complex structure of first-order dependent moments and foundations.

What has to be distinguished are dependent moments determining the general structure of the primordial sphere, the hyletic contents and their associative fusions and contrasts: (1) the dependent moments in the structure of the inner time-consciousness of the primordial sphere, namely the actually present contents in the actual present, primordial memory (i.e., the continuum of retentions of contents flowing off into the past) and the openness for new contents in primordial protentions; (2) the dependent moments of the structure of the inner space of the primordial sphere, the one Here and its contents and the manifold of Theres and their contents surrounding the Here and its contents.

The contents of the primordial sphere are the contents of the hylē given in contrasts and fusions as brute reality in primordial *aisthesis,* primordial sensibility. Brute reality is the quasi-objective realm of what is not yet understood as a something, a definite object with certain properties. Fusion and contrasts are constitutive for the passive associative synthesis of temporally changing configurations of contents.

The contrast of the inner and outer is the one-sided foundation for all levels of active synthesis. The inner contents are constitutive for the inner self-givenness of the body in the Here. Primordial self-experience is nothing more and nothing less than this primordial self-givenness of the body in the Here. The outer contents are given in the manifold of the There outside the body. These contents are the realm of the quasi-objective *aisthesis*, primordial sensibility given for primordial lived experience in passive synthesis. Such contents given together in contrast phenomena in a more or less articulated background of other contents are the primordial objects in the There. Primordial self-consciousness and primordial consciousness and its contents are reciprocally founded in each other, i.e., they cannot be given by themselves outside the correlation.

The body is given in primordial self-consciousness in sensual feelings inside the body, but also partially as an object of sensual perception from the outside in primordial *aisthesis*. Inner and outer are both present in the self-*aisthesis* of the body. All contents of primordial *aisthesis* are given as changing in primordial time and moving in inner primordial space. The present Here moves into a There that is the new Here with a past Here in the continuum of retentions, and this past Here is now a There for the present of the new Here. The movement happens in the medium of changing inner and outer contents, and this change is given for primordial lived experience of the inside and the outside as kinaesthesis.[2] The inner and outer synthesis in the movement of the body, is an activity in passivity. What is given as active is the body but the contents given in its movements are given in

[2]For a detailed account see now Behnke 2009.

passive synthesis. Active intentional activity emerges only if the attention of the ego of the experiencing consciousness[3] is awakened by contrast phenomena in its changing hyletic field.

The decisive next step in the genesis of the next level of the constitution of the lifeworld in passive synthesis is the givenness of the other living body. Two aspects can be distinguished. One's own body is partially given in contents given in the inside of the Here and partially in the outside of the manifold There. Secondly, the living body feels itself in its kinaesthetic movements, its primordial activities. The other living body is given from the outside and in its movements and such movements can be experienced as immediately interfering with the movements of my own body in bodily contact. What is not immediately given is the inner self-experience of the other living body, its primordial self. This inner is appresented in an *associative* transfer guided by the similarities of the givenness of one's own body from the outside and its kinaesthetic movements. The other living body, in short, the Other as the other animate loving body are given in associative passive synthesis as a part of primordial experience and this means as a part of immediate brute reality.

We do not first recognize dead physical objects in active intentional acts and believe that some of them have their own lived experience with the aid of some inference by analogy. The primordial encounter with inanimate bodies is reciprocally founded in the experience of other living bodies.[4] Dead physical objects are transcendent objects given for an intersubjective community. What is appresented in the associative transfer on the basis of indexical signs in the behavior of the other living body are its drives and feelings. The associative transfer is the first level of sympathy in its original Greek sense, feeling with and through the Other in appresentations.

Appresentation is the foundation for the understanding of the other living body in its life expressions. The life expressions of the other living body trigger as actions of the other living body immediate reactions of one's own living body and vice versa. This exchange can be called animalic understanding.[5] The understanding is, using the terminology of C. S. Peirce, indexical. Life expressions on this level are indexicals, not symbols. Animalic understanding has the structure of the immediate opposition of actions and reactions, of secondness. It is, therefore, misleading to call animalic life expressions signs of a body language. Linguistic signs are symbols.[6]

[3] Husserl 1972, (1973), §§5–19 and Hua XI, §§28, 29. See also Gurwitsch 1929.

[4] See Gurwitsch 1979, esp. pp. 74–76 and Cairns 2007, 319, about the problem of the primordial givenness of inanimate and animate bodies.

[5] The adjective "animalic" is mentioned in *Webster's Encyclopedic Unabridged Dictionary*. In this investigation it not only includes the understanding of animals by animals or humans, but also the understanding of animalic life expressions of other humans by humans. What is said in Cairns 2007, 314 and 321 on sense transfer and organism is similar to what is said above about animalic life expressions and animalic understanding.

[6] This does not mean that certain higher animals are not able to understand symbolic significations, but most animals can do without it and humans can do without it in primitive encounters with other

What emerges in and with the encounter with others on the level of passive synthesis is the intersubjective lifeworld as the structured whole of real objects and events. The primordial "objects" of one's own body are hyletic configurations outside of the body in the multidimensional There. They belong to the immanence of the primordial sphere. An object shared between the one's own living body and the other living body given in interactions is given as a shared transcendent object beyond the primordial sphere with its distinction between the Here of the own body and the Theres outside the own body. In this sense it is a transcendent object belonging to a transcendent reality that is not only beyond the primordial sphere, but also beyond the sphere of inner subjective intentional activity and its experience. Transcendent objects are immediately given together within a shared intersubjective space and a shared intersubjective time of a community. The structures of intersubjective space and time determine the social structures between consociates, contemporaries, predecessors, and successors and their immediate and fixed life expressions.

An immediate consequence of the distinction between the primordial subjective constitution and the intersubjective constitution of objects is the need to distinguish between *two* types of transcendence of objects. The correlates of intentional syntheses or cogitative types are intentional objects. The syntheses belong to the unity of immanence. The unity of the intentional objects is a unity that does not belong as a dependent part to the unity of immanence, and is in this sense transcendent.

This type of transcendence must be distinguished from the transcendence of intersubjective static but also generative constitution. The transcendent objects of sensory subjective experience are already given, as mentioned above, in different temporally changing perspectives. The unity of transcendent objects, e.g., for sensory subjective lived experience is given in temporally changing different perspectives, but, for the very same reason, it is only given as an empty presumption in the living primordial present. The presumption implies that the perspectives of the transcendent object that are not actually given could be given for Others, though they are not actually given for my subjective experience in the actual Now. Presupposing the givenness of Others; the actual experience of the actual perspectives of Others refer to the same transcendent object. The presumption of identical transcendent objects in my subjective lived experience has ultimately its foundation in the possible actual presence of Others. The positive criterion for the givenness of an actually existing identical *transcendent* object is the givenness of the object in intersubjective experience, and this intersubjective experience is also the presupposition for the discovery of the privacy and uniqueness of my own subjective experience.

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animals including other humans. For Peirce's distinction between index and symbol, see Peirce CP 2.205–2.207. On appresentation see Hua I, §§51, 52, 55.

3.2 A Typology of Understanding

"Understanding" has many meanings. Two inseparable aspects can be distinguished in "understanding" in the broadest sense. It is, on the one hand, the understanding of life expressions as indicators of the intentions and feelings of Others and, on the other hand, the understanding of the reference of life expressions to intersubjectively given states of affairs. In both of these aspects to be able to understand implies possible misunderstanding and not-understanding of life expressions.[7] Life expressions are already given on the level of animalic understanding and then on all higher levels as life expressions of one's own or of other living bodies. Life expressions in this broad sense have always an "author."

Two types of life expressions can be distinguished, immediate life expressions and fixed life expressions. Immediate life expressions have their genetic foundation in animalic life expressions. They are given in the actual present and its immediate past. They are given in the past as past immediate life expressions in one's own memories or as life expressions in the memories of others. Fixed life expressions can be given intersubjectively in the actual present, but they can also be given as life expressions of authors of a distant past beyond the scope of subjective memories and as the same again in the future.

Three types of understanding immediate and fixed life expressions can be distinguished: animalic understanding, elementary understanding, and higher understanding. Animalic understanding of animalic life expressions is the genetic foundation of elementary understanding and higher understanding. The three types, and especially elementary and higher understanding, presuppose each other in a complex system of one-sided genetic and reciprocal foundations.[8]

Elementary understanding is the understanding of actions, of interactions with others, of others as participants in interactions, of the material, the means, and the goals of actions and interactions. The raw materials offered by the *natural environment*[9] in a lifeworld are understood as "as good for something," as means and

[7]To call not-understanding a kind of understanding seems to be awkward, but the expression "I do not understand" presupposes the assumption that there is something that can be understood.

[8]The terms "elementary understanding" and "higher understanding" have been introduced by Dilthey GS 7, 207–213; SW 1, 228–234. See also Seebohm 2004, §12 and §14. Animalic understanding as genetic foundation of both is not mentioned by Dilthey.

[9]The term "*natural* environment" can be interpreted in the context of Hua XXXIX text 4, 6, and 30 as referring to the originally "surrounding world" (*Umwelt*) of the *natural* attitude. Cultural worlds have their deepest genetic foundation in the *original* pre-givenness of the world as "surrounding world." "Natural environments" in this sense are the immediate foundation of theoretical systems of higher order understanding of nature in philosophical or scientific systems. On the natural attitude and its correlate in the surrounding world, in *Ideas I* and its significance for the development of Husserl's concept lifeworld as historical world in Husserl's later writings, cf. the interpretation in Moran 2013.

goals in the practical world.[10] The means in actions and interactions are tools. The products of using tools are artefacts used for the fulfillment of the needs of everyday life. Tools of humans are seldom found in the natural environment as materials that are as such immediately useful for something; instead, tools are themselves artefacts produced by other tools. Actions are understood as actions in which "how to do something" with tools is understood and Others are understood as participants in interactions, i.e., they are understood only in their functions and roles in the web of elementary understanding.

Tools that are used in actions and interactions refer to each other, to the tools that have been used to produce them or are used for their maintenance to the raw materials; to the actions and interactions in which they are used; and to the produced artifacts used for consumption. The objects used for consumption, the interactions, and the raw materials refer vice versa to the system of tools used to shape and produce them. To use something found and even roughly prepared by an individual, animal or human, is to use a tool in a very broad sense. Tools used within a referential system of tools, raw materials, products, and interactions are tools in a strict sense. Only tools in this sense are of interest for elementary understanding in the practical world. Tools, interactions, raw materials, and artifacts can also be considered as a sign system. As signs, these parts of elementary understanding are more than indexical signs. They are symbols and they signify themselves, but they do so in their function for the system of elementary understanding, thereby pointing to all other parts of the system as their interpretants.[11]

The system of elementary understanding is a system of goal-directed interactions. Successful interactions presuppose immediate life expressions that can serve as signifiers for all elements of the system before and after the interactions happen in the actual present. Such a sign system is a linguistic system in the broadest sense. Human discourse is originally oral discourse that is usually accompanied and supported by gestures, and can even be replaced by a system of visible gestures. It is possible but irrelevant for the present purpose to invent fictive cultural lifeworlds with other types of immediate life expressions. It is a matter of terminological convenience to use for all such cases the notions "oral communication," "oral discourse," and "oral tradition" for the purposes of a descriptive analysis of the general structures of the lifeworld.

The essential point is that the system of significations is a system of present immediate life expressions, and that this system has to have at least the degree of complexity of the system of the above-mentioned elements and aspects of interactions in elementary understanding. Imitation is of crucial significance for

[10]The world of elementary understanding is approximately coextensive with Schutz's practical world. See Embree on Schutz in Embree 1977 comparing Schutz and Gurwitsch. Cf. also Embree 1988b, esp. 121f, 127f. The practical environment is according to Hua XXXIX texts 31, 32 in the pre-given world genetically one-sidedly founded in the pre-given world as natural environment, cf. fn. 83.

[11]Peirce CP, 5.372–5.376.

the social process of learning how to use tools and recognizing their purposes in everyday practical life, but cooperation in the interactions of elementary understanding requires linguistic communication. The linguistic system required for communication in elementary understanding is, however, restricted to commands, information, and short explanations of "how to do." Its task is to support the already otherwise sufficiently articulated context of elementary understanding.

A terminological remark is necessary before turning to the level of first-order higher understanding. The "natural environment" mentioned above is already originally given for elementary understanding. The objects given in this environment are, as mentioned above the raw materials, the tools, the artifacts, and *consociates*, i.e., the Others who are understood in the interactions in animalic, elementary, and higher understanding in the present and its immediate past and future horizon. They are given on this level in the world of practical goal-directed interactions, and these objects are as such concrete first-order wholes, i.e., the independent wholes of the theory of the whole and the parts of the *Logical Investigations* mentioned in Sect. 2.2. The practical world, the environment for elementary understanding, is a partial dependent structure within the structure of a cultural lifeworld in general. This structural system of intentional objects as an environment given for elementary understanding can be called "natural" because it includes more that a "practical world" as a system of practical interactions. It includes the experience of disturbing and destructive powers that are always able to disrupt, to interrupt, and to destroy systems of goal directed practical interactions. It is even present as the understanding of the frightening possibility of the complete destruction of all conditions of the practical world and elementary understanding.[12] The first and main task of *higher understanding* is "to make sense," to understand and explain the blind forces, human forces included, behind the natural environment as a correlate of elementary understanding.

What is understood in higher understanding is the lifeworld as a whole and its essential aspects. Higher understanding is contemplative. It presupposes time that is not dominated by the needs of the practical activities of elementary understanding. Of interest for higher understanding are all relevant aspects of elementary understanding. Of interest for higher understanding are, furthermore, the social structures of the lifeworld and changes in the social structures, including customs such as fashions and styles, as well as customary laws and written laws with their distinctions between right and wrong in interactions. Of interest are, moreover, significant deeds of members of the community that have changed structures of the lifeworld in the past, significant changes in the natural environment of the lifeworld, and encounters with foreign lifeworlds. The manifestations of higher understanding are cults, artefacts serving cult activities, myths, prophetic

[12]This type of environment can also be called natural environment last not least because it is just that what is left of the environment of elementary understanding in the methodological abstraction that is constitutive for the natural sciences; cf. Sect. 4.3.

revelations, poetry, philosophical reflections, and finally the sciences.[13] Discourse in higher understanding serves as a mirror of the understanding of the whole context of the lifeworld or essential aspects of the lifeworld. Elementary understanding is blind without higher understanding, but higher understanding is empty without elementary understanding.

3.3 The Static Analysis of Social Interactions in the Lifeworld

The everyday subjective and objective understanding of actions and interactions in the social lifeworld is the pre-given empirical basis for generalizing abstractions and beyond that for the construction of ideal types that can serve as methodological tools in the social sense. What has been said about morphological types and ideal types as constructions is sufficient for the purposes of an analysis of the general structures of the lifeworld. More has to be said about the construction of ideal types that can be applied in the social sciences.[14] The following descriptions also presuppose what has been said in the previous sections about the givenness of the Other, intersubjectivity, animalic understanding, elementary understanding, and higher understanding.[15] Given this framework, Schutz's descriptive analysis of social interactions can be used, with some modifications and extensions, in this section.[16]

The structure of intersubjective interaction in the social lifeworld has two spatial and two temporal dimensions: the spatial dimensions of consociates and of contemporaries, and the temporal dimensions of successors and of predecessors. The systems of interactions include intentional expectations and memories of actions and reactions of others beyond the scope of face-to-face relations in the present. Such dimensions include different degrees and kinds of absence.

The absent is foreign in different dimensions and to different degrees. Some successors were known in the present as younger members of the social lifeworld. People living in the present usually believe that their present rules of behavior,

[13] Almost nothing is said in Hua XXXIX about objects of higher understanding, cf. text 17, §2, 164f about religion and science.

[14] Schutz adopted the term "ideal types" following Max Weber (see Schutz 1932, §44), but he later rejected the Neo-Kantian implications in Weber's understanding of the term; cf. the detailed discussion in Sect. 10.4 below.

[15] Schutz 1932, §50, presupposed for his investigations the immediate givenness of the social lifeworld and assumed that the phenomenological question of the how of the givenness of the lifeworld is not relevant for his purposes. The later discussions of Schutz and Gurwitsch indicate that this assumption causes problems. See Sect. 4.5 below.

[16] See Schutz 1932, §§36–41.

values, etc., will also be valid in the future. This expectation is usually disappointed in periods of social change. Social change, whatever the cause, creates fear, despair, and eschatological hopes in the present of a social lifeworld.

Absence in the present is the absence of contemporaries beyond the scope of consociates. Consociates are contemporaries in one's own immediate cultural lifeworld. Contemporaries outside this context are absent, foreign to one's own lifeworld, to different degrees. The realm of what is absent in the present is the field of ethnological research, i.e., research interested in present foreign geographical and cultural contexts. Absent for the present social lifeworld are dimensions that cannot be understood within the framework of types of interactions, including linguistic interactions, in one's own lifeworld. The absence is present as misunderstanding and not-understanding in the encounter with foreign contemporaries belonging to other cultural lifeworlds. Even if such encounters are not necessarily hostile in the beginning misunderstanding and not-understanding usually breed ethnocentric hostility.

Absence in the dimension of the past is the absence of predecessors. Two types of this absence can be distinguished. (1) Predecessors are present because their actions and interactions, including the effects of such actions, predetermine the framework of possible activities of those living in the present and their successors. However, they are presently absent because their past actions and interactions can no longer be changed or modified in the present of the social lifeworld. (2) The second type of absence is an analogue of the absence of contemporaries. There are actions and interactions of predecessors in the past that cannot be understood within the framework of the ideal types of actions and interactions in the present. The amount of possible not-understanding and misunderstanding of predecessors grows with the increase of the temporal distance separating the present and the past phases of the social lifeworld and its present naïve understanding of the past.

The dimension of the past as a dimension of absence is the dimension of tradition and of history in the lifeworld. It is, therefore, necessary to return to the analysis of the primordial structures of temporality and the genetic foundations of intersubjective temporality in the lifeworld.[17] The main purpose of the preceding analysis of the temporal structures and genetic foundations of predecessors and of the past dimension in a social community was to keep the door open for the phenomenological analysis of the dimension of the structures of generation and historical development. However, the analysis given is also presupposed for the phenomenological analysis of ideal types like "predecessor," "contemporary," "tradition," and "history," that have already been used in the static analysis of the social lifeworld.

[17]Schutz 1932, §50 presupposed for phenomenological descriptions the immediate givens of the lifeworld as a whole in the *present* in direct intention, but the presentation of the Other is not an immediate presentation of the Other and it is it is difficult, even impossible, to reduce the givens of the past in subjective reproductions and intersubjective reconstructions to a primordial immediate awareness.

Two temporal sequences can be distinguished in the process of the subjective reproduction of past sequences of events: the sequence of reproducing intentional acts in the present and the intentional object of the reproduction, i.e., the temporal sequence of reproduced past events.[18] To assume that both sequences are connected by an unbroken chain of events that are not reproduced is natural and justified. It is justified because both phases belong to the unity of primordial inner time-consciousness. The problem is, however, that the distinction between the temporal sequence of reproducing and the series of reproductions also happens within the flux of inner time.

The complex formal structure behind the unity of the reproduced and the reproducing sequences can be discovered with the aid of an attempt to close the temporal gap between the sequences of reproductions and reproducing by simply counting time phases of a series of reproduced contents starting with a deliberately chosen time phase in the past and trying to determine the number of the actual Now in this series. *Prima facie* one should expect that the actual Now ought to be reached in the process of a reproduction of time beginning in a finite temporal distance in the past. But this is not the case. After the last time phase of the reproduced sequence has been reached, e.g., a sequence of four distinct impressions of red, blue, green, and yellow, the series of reproduced time phases hits the phase of the first reproduction of red. The next sequence is then the sequence of the reproduction of the reproduction of red, blue, green and yellow, and so on *in indefinitum*.[19]

The past is given for an intersubjective community in the lifeworld in reconstructions. It has been shown above at the end of Sect. 2.2 that subjective recollections of the past sequence of events and the intersubjectively reconstructed temporal sequence of past events have the same formal temporal structure. What has to be added now is that two correlated temporal sequences can also be distinguished in the intersubjective reconstructions of the past, namely the reconstructed sequence of the past events and the sequence of reconstructing in the present.

The contents of the intersubjectively recognized reconstruction are different memories and reproductions of contemporary members of the community and the reproductions of reproductions of predecessors. The contents are present in the medium of immediate and fixed life expressions of contemporaries and predecessors. The reconstruction of sequences of past events as a synthetic intentional activity implies, hence, intersubjectivity, and its intentional objects are sequences of past events. Events are not simply facts. They are understood as facts that have meaning and significance. Reconstructions have, therefore, the character of *interpretations* of the *tradition* of the community. A tradition, regardless of whether it emerged in an ongoing sequence of reproductive activities or is traced back

[18]Subjective reproductions presuppose the material of memories. With regard to the structures of subjectively reproduced and intersubjectively reconstructed past series of events, see Sect. 2.2 above on the temporal structures underlying genetic and generative foundations.

[19]See. Seebohm 2004, 221; cf. Cantor 1962, 168–169, 195, 390ff.

to some social authority, is itself an authority governing the present life of an intersubjective community. That it is an authority means that it ought to be *applied* in the community. Interpretation and application are both present as correlates in the reconstruction and the steady growth of a tradition.[20]

What has been said in the preceding digression is presupposed and must be kept in mind in all static analyses of the significance of predecessors for social interactions. Predecessors are present in the medium of the tradition of a lifeworld. They are present in the beginning in the individual memories of consociates, and later in the tales about what happened in a more distant past of older contemporaries. Such tales can be memorized and reproduced through generations in the oral tradition as the medium in which predecessors can be re-presented in the present lifeworld. Beyond that, predecessors can be *re*-presented in the present lifeworld only with the aid of fixed life expressions,[21] monuments or texts. Monuments are buildings, paintings, sculptures, but also tools and all other traces of the activities of predecessors, and this means that the predecessors are appresent as the authors of the fixed life expressions. Oral traditions can be supported by monuments. Written or literary traditions presuppose written discourse. Written discourse is able to re-present the whole literary tradition of a culture including myths, prophecies, poetry, histories, i.e., written reports about what happened in the past, and finally there are philosophical and scientific texts.

Generative phenomenology is able to give a more detailed account of the different types of the givenness of predecessors and their past in the present lifeworld. As already mentioned, Husserl introduced the distinction between static and genetic phenomenology between 1917 and 1921 and the distinction between genetic and generative phenomenology more than 10 years later in the wake of the *Cartesian Meditations*. The task of genetic and generative phenomenology is the analysis of the genetic or generative foundations of the constitution of transcendent objects. Genetic constitutions and genetic foundations are usually understood as counterparts of subjective static primordial passive and active constitutions, and generative constitutions and foundations are usually understood as counterparts of static intersubjective constitution in Husserl's writings and in the literature.[22] The temporal structures determining genetic and generative foundations have been considered in the preceding section, and the distinction between subjective primordial constitution and intersubjective constitution of the transcendence of objects has been introduced at the end of Sect. 2.4. The formal ontological structures of genetic and generative constitutions and foundations have been analyzed at the end of Sect. 2.2.

[20]This analysis of the underlying temporal structures of the interplay of interpretation and application is of basic significance for the epistemology of the historical human sciences. See below n. 98 on Gadamer 1965.

[21]According to Dilthey monuments as well as texts are fixed life expressions of past predecessors. Schutz's term "sign" is too broad. There are many other types of signs.

[22]Cf. Steinbock 1997 and Welton 1997.

3.4 The Generative Structures of Socio-Cultural Developments in the Lifeworld

Oral discourse in a cultural lifeworld without written discourse can reach consociates only in a limited spatial distance, and the past of the predecessors is present for such cultural lifeworlds only in oral tradition. Oral traditions are restricted to the subjective memories of consociates, the tales of old consociates, and beyond that only in memorized sagas and myths. Oral discourse is an immediate life expression. Written discourse is a fixed life expression. Words in oral discourse are symbols that refer to intersubjectively given objects, people included, and these objects refer in turn to other objects in the systems of elementary and higher understanding. Written discourse refers in addition to oral discourse, and this indicates that socio-cultural lifeworlds with oral but without written discourse are the foundation for the generation of socio-cultural lifeworlds with written discourse.[23]

Fixed life expressions of authors in a distant past can be given as the same again in the present and in the future. Written discourse can also be sent into another spatial environment over large distances. Whether the written discourse is hieroglyphic, (i.e., uses first of all signs for kinds of objects) or alphabetical is irrelevant, and it is also irrelevant what other types of "writing" can be fancied or created with modern technologies.

Written discourses refer back to an author of a past elementary or first-order higher understanding of her/his contemporary state of affairs in the broadest sense. Second-order elementary understanding is immediately implied in first-order elementary understanding. The life expressions of others are in this context understood only as indicators of the function of Others in the context of a social interactions, and not as an understanding of Others as Others. *First-order higher understanding* is the creative understanding or interpretation of and in the present lifeworld. A task of *second-order higher understanding* is to understand the written discourses representing the tradition of a present cultural lifeworld. Second-order higher understanding has two aspects, the interpretation of the text and the application of the text in the present cultural situation of the interpreter. Both aspects are inseparable. They presuppose each other in a reciprocal foundation.[24] To separate them requires an abstractive reduction. The term "higher understanding" will be used from now on exclusively for first-order creative higher understanding,

[23]The assumption that written discourse in a lifeworld without oral discourse can function as a substitute for oral discourse in communication in the present has to presuppose communication via immediate bodily life expressions as its own necessary substructure.

[24]Gadamer 1965, part II, section II, esp. 1.b and 2.a, 2.c. The problem of the relation of interpretation and application is one of the basic problems for philological hermeneutics and of basic significance for the epistemology of the human historical and systematic or social sciences. The separation of interpretation and application in the human *sciences* presupposes the possibility of an abstractive reduction that is able to separate interpretation and application. See below esp. Part II, Sects. 5.3–5.5, 7.1; and Part IV esp. Sects. 10.2 and 10.6.

and the terms "interpretation" and "application" will refer to "re-creative secondary higher understanding" in the following sections, chapters, and parts.

Interpretation of what is pre-given in the tradition in cultural lifeworlds without written traditions is restricted to the oral repetition of what has been memorized in generations of predecessors. Whether or not the re-created repetitions of what has been created and then memorized through generations in the tradition corresponds to the first-order creative understanding can only be determined in authorized decisions of shamans, priests, or chieftains. There are no presently given "facts" that could be used in arguments against the authorized decisions. What seemed to be different in a past present phase remains hidden behind the activities of present discourse and communication in later phases.

The situation for the interpretation of the sources for systems of first-order understanding in cultural lifeworlds with a written tradition is radically different. Written traditions have the potential for the generation of complex static interrelations and generative foundations. Such structures are present to different degrees in all cultural lifeworlds with a written tradition. Of basic significance is first of all the generative interplay of application and rejection of the truth claims of texts and their interpretations. Whole texts together with the tradition of their interpretation and even whole literary traditions can be rejected or recognized as the warrants of eternal truth for and in the present situation of a literary tradition.

The application of texts in the present needs interpretations. Whether an interpretation of the text really represents the original meaning of the author, e.g., as a prophet, lawgiver, or poet is always questionable in the present. The main task for the survival of the written tradition of a cultural lifeworld is to create standards for the interpretation of the original truth of the holy texts. The interpretations need justifications, and the source for the justifications in the present in *archaic* societies are again the authorized decisions of "professionals," e.g., of the priests of polytheistic and monotheistic religions and their hierarchies. Authorized interpretations of texts in a literary tradition can be applied, but they can also be rejected by other authorities as false interpretations. If the rejection is radical, the false interpretation will be forgotten in later phases of the development.

The situation can be radicalized if the truth claims of texts and, even whole traditions of texts representing the higher understanding of past periods that does not seem to be applicable in the present, are rejected as false and replaced by texts with new types of higher understanding. The sudden emergence and acceptance of a new system of higher understanding demands the more or less complete rejection of a past tradition as a "false tradition" in such cases. If the turn is radical, the rejection implies the command to destroy all texts and monuments of the old tradition. What is left is the memory that this tradition is false, morally rotten, and that it is not worthwhile, or even dangerous, to know parts of this tradition.

The rejection of certain aspects of old traditions can be partial and temporarily limited. In such situations they are able to be "fashionable" again. A re-birth is possible even in case of a more or less complete rejection of a tradition as "false" and the command to destroy all texts and monuments of the old false tradition. Some fixed life expressions can survive the destruction. The old tradition was

forgotten, but it can be re-discovered and brought to life. The rejection itself will now be at least partially rejected, and attempts will be made to apply parts of the old tradition in a new and different cultural context. Such a return "back to the sources" of an old tradition, connected with a turn against essential parts of the younger tradition, is a renaissance. It is a reformation if the rejection is restricted to a tradition of interpretations and applications of the original sources of older levels of the tradition.

A second aspect of the generative development of cultures with a written tradition is the evolution of different types of literary meta-genres. In the first archaic phase of the development, one literary meta-genre represents all aspects of creative higher understanding in a lifeworld. This higher understanding comprises the higher understanding of the natural environment and the forces behind changes in the natural environment as well as changes in the social environment and its distribution of political powers, of customs and laws, of wisdom, of significant technological inventions in elementary understanding; reports about what happened in the past; and of poetry. All of this appears in the mythologies of animistic and polytheistic religions and in the collections of the teaching of prophets of monotheistic religions. The contents are different in different archaic cultures, but the formal common denominator is that only one meta-genre represents all relevant aspects of the lifeworld and that the interpretation of this meta-genre has its justification in the authorized decisions of professional elites.

Archaic literary traditions have the ideal potential to generate a system of different literary meta-genres in literary traditions, e.g., legal literature, poetry, theological literatures, or philosophical literature reflecting different aspects of the lifeworld; treatises about technological inventions, philological literature reflecting the literary tradition; and finally, the literature of sciences. The systems of different meta-genres are different in different literary traditions. Seen from a formal point of view, archaic literary cultures are wholes of the second-order $n - 1$ and as such are the foundation for literary cultures with a complex literary system as wholes of the second order n.

The structures and generative foundations of the development of a literary tradition are correlates of changes in the social structures of a cultural lifeworld. In the early phases of the development of a literary culture, the trust in the truth and unity of the oral and/or written tradition is a necessary condition for the stability of the social structures of archaic cultures. The trust in the tradition and the need to apply it again in the present and its future horizon vanishes step by step in the development of a literary tradition with different meta-genres, with the increase of the amount of rejections of parts of the old tradition, and with their replacement by new "truths." The development of, e.g., an independent legal literature and/or independent philosophical reflections about right and wrong, good and evil, and last but not least nature is the generative foundation for partial rejections of the contents of the religious literature, and finally even of religion itself. Poetry and art freed from the fetters of their functions in religious services and cults can secularize certain religious contents and give preference to worldly perspectives.

This stage in the development of a literary tradition is the generative foundation for the possibility of a period of crisis in this literary tradition. Indicators of a crisis are the emergence of a naïve and/or philosophical skepticism denying truth in the tradition because the authorities of the tradition contradict each other. The counterpart of an educated skepticism is a philological scholarship teaching that the tradition with its tensions and controversies represents an ideal universe of truth and humanity. A crisis of a literary tradition indicates a crisis of the correlated socio-cultural system of a lifeworld. The warrant of a stable social and political system of a cultural lifeworld in such periods is a secular system of legislation, political power, and laws. Such situations are the generative foundation for *possible* universal rejections of the old tradition and the emergence of a new cultural and literary tradition. Additional conditions determine whether or not the critical phase in an old tradition will be rejected and replaced by a new beginning. Such additional conditions, as for example an accumulation of intercultural encounters, can trigger a yearning for a system of higher interpretation that restores the original archaic unity of the social structures and the worldview of the lifeworld on a higher level. The old tradition will be completely rejected if such a new system of higher interpretation is successful.

There are, furthermore, external generative foundations for more or less radical changes in the development of a culture and its literary tradition. Whether external factors occur and whether or not they introduce change in a cultural lifewold is an empirical question. However, it is possible to determine material ideal types of external factors and the relations between the factors and a cultural lifeworld. The ideal types have a common formal structure. The cultural lifeworld is a whole of a higher order $n-1$ entering a relation with a member of a collection of the higher order n.

External factors can be changes in the natural environment. Some changes in the natural environment of a lifeworld are natural events, and some are also side effects of human activities on the level of elementary understanding and its technological development. Such changes will generate destructions and then more or less radical modifications of the elementary and higher understanding, and with it the cultural tradition of a cultural lifeworld. Other external factors can be intercultural encounters. Several types of such encounters between two or more different cultural lifeworlds can be distinguished. Archaic cultural lifeworlds with oral or written traditions are originally restricted to a narrow intersubjectively given space, the homeland of the lifeworld. Encounters with contemporaries outside the homeland and their tradition are encounters with foreigners. The encounters can be peaceful if they are restricted to the level of elementary understanding, i.e., the exchange of products, tools, and raw materials. The encounters can be violent if contents of incompatible systems of higher understanding are involved. The outcome is reciprocal not-understanding and rejection.

Encounters remain peaceful if the homelands of different cultural lifeworlds are sufficiently separated in space and the encounters are restricted to occasional individual contacts, e.g., Marco Polo's contacts with China for Europe. The encounters can be more or less violent if the homelands intersect, e.g., between the Muslim culture of the Turks and Byzantium. The outcome *can* be the complete

destruction of the foreign cultural lifeworld; it can be one-sided or reciprocal partial adaptation and/or partial distortion and re-interpretation of the contents of the traditions; and it can be in the end the symbiosis of different traditions of different social groups within one cultural lifeworld.

The situation is different for the encounter between cultural lifeworlds with highly developed literary traditions and cultural lifeworlds with oral traditions or archaic written traditions. A highly developed written tradition is a correlate of a culture with complex technological, economic, and political structures and last but not least military technologies. Special geographical factors can save cultures with an oral or archaic written tradition in the case of such encounters. In all other cases the oral tradition will effectively vanish in few generations. Only some folkloric customs and old fairy tales will be left. Cultures with an archaic written tradition have some chance of surviving as subcultures, and even have the chance of a partial revival in a "renaissance," a re-discovery of their roots in written sources and monuments.

But the successful survival of a culture in repeated intercultural encounters also has serious consequences. The cultural lifeworlds in large and partially secularized empires have complex literary traditions that have lost their archaic unity in a maze of reciprocal rejections of partial aspects of the tradition. The influence of partially integrated contents of foreign literary traditions is a significant factor for an accelerated disintegration of the cultural tradition.

3.5 Causal Relations and Facts in the Lifeworld

Precise definitions of causation (i.e., causes, circumstantial or initial conditions, laws of nature, facts, and causal explanations) presuppose the natural sciences and reflections on the methodology of the natural sciences. They belong to the conceptual framework and the worldview of cultural lifeworlds with sciences. Such lifeworlds have their immediate generative foundation in pre-scientific lifeworlds with a specific literary tradition. Beyond this earlier pre-figurations of the understanding of causation can be found on all levels of the generative development of lifeworlds. Such old layers of the understanding of causation are still present in everyday behavior in a lifeworld with sciences.

Regular change of contents is already a necessary structural element on the primordial level. The experience of regular changes in the primordial past is the presupposition of more or less reliable primordial primary expectations and of the genesis of habits. The experience of disappointments of primary expectations followed by the partial or complete destruction of habits is a painful primordial experience. This structure is the genetic foundation for lived experience on the level of animalic understanding.[25]

[25]For a thorough account see Behnke 2009, §4 on protentionality and §5 on bodily protentionality.

Regular change in states of affairs of identifiable objects experienced in the past is the presupposition for the confirmed (and occasionally disconfirmed) expectations of elementary understanding. This structure is the foundation for the distinctions between raw materials, tools, artifacts, and human actions and interactions. The raw materials are experienced as the material conditions, the tools are understood as the means, and the created artifact is understood as the purpose and end of human actions and interactions. Outside this context the raw material is meaningless and the tools are also meaningless as tools. They have meaning for elementary understanding only in their relation to the purpose and the act of the actor(s) who want to create the purpose of the action. In a purposeful act the cause that moves is the act, the end is the artifact, and the raw material is the material condition. Tools serving a means either belong to the material conditions or are themselves artifacts.

Actions as causes are of interest for elementary understanding only as immediate or mediated parts of interactions of consociates. Complex interactions require first of all rules of conduct for participating consociates. The rules are the laws of customs. Actions of individuals or groups of individuals interrupting the interaction and causing damage are understood as breaking the laws and are punished, sanctioned by the community of consociates involved in interactions. Secondly, complex interactions require leadership, and with it command and obedience. The role of the leader(s) will once again be defined by customary law. On higher levels of social interactions, leadership is entitled to give additional laws and to determine sanctions. This step already presupposes a cultural lifeworld with a written tradition. The actions of lawgiving are causes of a higher order. They have their material conditions in the pre-given social structures. The means are the techniques and tools of social and political power.

For elementary understanding, causes are actions, and the moving forces behind the actions are the goals that have to be achieved, the artefacts and the social structures serving the goal-directed interactions of the community in actions of the second order. The material conditions are the raw materials and the system of tools. The systems of tools are the systems of artifacts that have been prepared in the past and are used as means in the present. Both together prepare the opportunity for actions, but in many cases opportunities to act require cases waiting for or finding favorable situations.

The structure of understanding causation and its conditions in elementary understanding is in general the foundation for the experience of causation in higher understanding. What has to be understood in higher understanding is the structure of social and technological actions and interactions just considered. Of central interest is also change in the whole structure of elementary understanding or at least essential parts of it and its social implements. Such outstanding changes can be called events in the narrower sense. Beneficial or destructive events of this kind are understood as caused by extraordinary higher powers. Serious changes of this order are, on the one hand, caused by outstanding individuals or groups of individuals either within a social and cultural lifeworld or encountered in intercultural contacts. Such events can be technological inventions causing essential changes in the system of tools and artefacts or changes in the social structure of a lifeworld. But changes

can be caused, on the other hand, by events in the natural environment of a lifeworld. The natural environment is in general understood as a beneficial or destructive power beyond the limits of elementary understanding.

The old Latin meaning of *causa* and *factum* can be used as a guiding thread back to their pre-scientific original meaning. The meaning of *factum,* i. e., something that has been made, implies that a fact is caused by the action of somebody who was the *causa* of the *factum,* i.e., the one who has done it and is, therefore, responsible for the *factum* and in this sense guilty. What was done is worthwhile of being reported in *historiae* if it is of religious, political, legal, or technological significance.

Higher understanding of causation is, hence, first of all the attempt to develop systems in which such powers can be understood. Different types of such systems of higher understanding can be distinguished. Some religions, including animistic and polytheistic religions, understand such events (and beyond this the whole natural environment) as caused by good or evil spirits or benevolent or hostile gods or the one God in monotheistic religions. What they have in common is that they project the structures of what can be understood in elementary understanding, including the understanding of causation, into the "beyond" of divine *creative* powers that cause events in the natural environment in a way that cannot be understood as an analogy of the "efficiency" of a tool as a cause. It can only be understood as an analogy of the creation of artifacts.

Divine causation is also of significance for human actions. God(s) demand and punish disobedience. In the more sophisticated contexts of book religions they give laws and define punishments for actions against the law. It was also possible to develop the idea of laws of nature in monotheistic religions as systems of higher interpretation. God created the world and the "cause" for the laws of nature (i.e., the laws for causes that determine regular change in the natural environment, especially celestial changes) is the will of God and his commands. The law of nature for human beings is the moral law, and humans can sin against this law. Nature, however, obeys its law without exception. Extraordinary events in nature are possible, but once again they have their cause in the will of God.

The first aspect of the understanding of causation in a pre-scientific lifeworld has its one-sided foundation in the activities of elementary understanding. Causation is understood as regular change following actions using tools[26] to reach desired goals in the medium of raw material taken from or in the natural environment. The pre-scientific philosophical understanding of causation with its distinction of *efficient*, *final*, *formal*, and *material* causes is at least partially the outcome of reflections on this structure on the level of higher understanding. The second aspect has its roots in observations of dramatic changes in the regular course of nature. They are understood following the model of significant human actions causing changes in social but also technological structures. Changes in the natural environment are understood as actions of divine powers. The third aspect is given with the

[26]This aspect of the understanding of causation is "mechaniistc," *mechanē* understood in the old Greek sense as using a tool as a means to realize a purpose.

explanation of the undisturbed regular change in the natural environment following "eternal laws of nature," and in general the understanding of the universe as a law-governed universe. The cause of such laws is the will of God.[27]

The deepest layer in the generation of the understanding of causation in the lifeworld is the tension between the present and its immediate future horizon in the fulfillment or disappointment of expectations. What is expected and then present or not present are facts, transcendent states of affairs. Facts in this sense are given in intersubjective experience in different perspectives. Doubts about "what is really the case" are possible. But the perspectives of Others can be "verified" because it is also possible to move into the place of the Other and vice versa within the immediate future horizon of the present.

The situation is different for the past horizon of the present and especially for the dimension of a more distant past present. Facts in the past are given intersubjectively only as reproduced facts. A reproduction of past facts presupposes subjective memories of the participants in the reconstruction of the temporal sequence in which the past facts have happened. An exchange of perspectives is impossible. In the intersubjective reproduction of a discussion one person remembers what she/he has said, the other what she/he has heard. A dispute about what has really been said is impossible in case of immediate life expressions. It is impossible to share the contents of the memories of the Other in original evidence. Additional evidence is necessary if witnesses of past facts contradict each other. A decision is possible only if "hard evidences," i.e., traces of what has happened, are available for an intersubjectively acceptable final decision in a dispute about what really happened in a past temporal sequence.

Traces are, on the one hand, effects of past events and actions in the past that are still given in original evidence in the present. Traces of this kind must be distinguished from reports about what happened. Reports are fixed life expressions in written discourse created by authors in the past. Traces and reports together are able to decide questions about past facts in disputes about reconstructions of what really happened in the past. But even traces can contradict each other, and *final* answers to the historical question of what was really the case are impossible. What seems to be final can always be challenged with the discovery of additional traces.

Facts given as past facts can be explained. The problem of causal explanation is to find the preceding cause for a reproduced past fact. It is a retrodiction, and as such is precisely the reverse of a prediction. A prediction is the expectation that a not yet given fact will be given in the future horizon of the present in which another fact, the cause, is already given in original evidence. Causation has two different temporal aspects in the lifeworld; the one-sided foundation of predictions is the actual present and its future horizon. The one sided foundation of an explanation is a past present and its past horizon. The different temporal structures imply different intentional objects. The problem of expectations and predictions in elementary understanding

[27] See, for example, Thomas of Aquinas 1882, I. II qu. 91, art. 1; qu. 93 art. 1–3 on the eternal law, i.e., the laws of nature (not the natural law!) and their origin in the reason of God.

is the confirmation or disconfirmation of a causal rule governing the successful application of tools to raw materials in actions and interactions. The criteria for confirmations and disconfirmations are expected but then also presently given facts. What is in question is the causal rule, not the facts. Explanation applies causal rules to a temporal sequence of reconstructed facts. The causal rules are presupposed and are not in question. What is questionable is whether or not this or that involved fact was really the case. The explanation is disconfirmed with the assumption that the assumed fact was in fact not the case. The underlying causal rule is by no means disconfirmed or weakened. The explanation is disconfirmed because the application of the rule is pointless.

Chapter 4
The Lifeworld and the System of the Sciences: First Steps Toward a Phenomenological Epistemology

4.1 The Emergence of the Human Sciences in the European Tradition

The "pre-history" of the social and the human sciences in Classical Antiquity and in the Middle Ages is different. The social disciplines of law, ethics, politics, and even economics were been respectable disciplines of practical and normative philosophy ever since Plato and Aristotle. In the Roman Empire the law and administration grew into a special professional discipline, jurisprudence. The practical experience of the jurists was then the source for their theoretical reflections on the theoretical principles of justice, the law, and lawgiving in the Hellenistic period and in the Byzantine Empire.[1]

In the Middle Ages the law, politics, and economy were respectable practical disciplines in the medieval interpretation of the Aristotelian system of philosophical sciences in the universities. Jurisprudence itself had the rank of a higher faculty, but the law also had together with the other social disciplines its place in theological-philosophical systems.[2] Especially after the full integration of the Roman law system in Bologna, the theoretical reflections of Roman jurists were of special significance in such reflections about the law, lawgiving, and the distribution of political power in the European tradition.

Except for the Aristotelian theory of poetics, history and philology never achieved the rank of academic disciplines. They also had no also place the *artes liberales* in the Middle Ages. However, history was of significance in Greek Classical Antiquity. The Greeks knew *historiai* as a literary genre. A *historia*, a narration, was for them a report about events and facts in general, including

[1]The systematic collection of the Roman law in the *Codex Justinianus* has been of basic significance for the development of law systems in the Middle Ages.

[2]Thomas of Aquinas 1882, II. II. qu. 95–97.

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"histories" about animals, precious materials, etc. such as the "*Historia animalium*" of Aristotle.[3] Later, the genre was taken in the narrower sense of histories about human deeds of predecessors in the past that are of significance for contemporaries, especially as examples for moral praise or blame. *Historia* as a literary genre in Classical Antiquity with its branch of epic poetry had its own Muse, Clio.

The birthplace of historiography in the proper sense was Rome and first in the history from the time of the founding of the city, the *Ab urbe condita* of Livius. The first "world" chronicles added the Greek interest in *historiai* about foreign cultures to the *historia* of the Roman Empire. This tradition was still alive in world chronicles of Christian monks in the Byzantine Empire, now including in addition the history of salvation. When speaking of history and historians in the period of Classical Antiquity it should be kept in mind that in the beginning the span of the historical time for early historians writing world histories was 150 years, e.g., for Ephoros, and if myths are excluded, only 50 years are left. Even much later, in the history of Diodoros, again including myths, it was limited to the last 500 years. The main interest of such histories was only the significance of past events and deeds for the present.

In the age of late classical Hellenism, the study of histories about predecessors and their deeds was a part of *philologia*[4] and not a science. Philology included grammar and collections of hermeneutical rules for the interpretation of texts, first of all the theory of the levels of interpretation. The goal of the philologist was universal erudition, and with it, the universal wisdom and the ideal of true humanity that can be found in the treasure house of literary tradition. The task was not only to interpret an old and complex literary tradition as the source of "truth, goodness, and beauty," but also to apply this wisdom in concrete situations. Rhetoric, as the art of application, was the necessary complement of philology as the art of interpretation. Interpretation and application were there understood as two sides of the same coin in the philological-rhetorical syndrome of late Classical Antiquity. For the philologists philosophy was only a part of the literary tradition and of the universal wisdom of the philologist. The philosophers, however, defended their access to truth with a version of Plato's argument against the poet/prophet in the *Ion*: The philologist, and by implication the historian, knows only what has been said and what was the case, i.e., the facts, but he does not know the truth.[5]

Philology in this sense presupposes and has its historical generative foundation in a highly developed and complex literary tradition. The task of the interpretation of the tradition in archaic literary cultures requires only the thorough knowledge of the verbal meaning of the holy texts and the application of the implied laws to judgments about social behavior in the society and religious rituals. The philologist-rhetorician was, on the contrary, a secularized interpreter of the tradition and was not

[3]This meaning of the term "history" is still present in terms like "museum of natural history" as a collection of precious stones and all kinds of curious and surprising objects.

[4]Seebohm 2004, §2.

[5]Plato 334c.

recognized as an authorized official interpreter of a religious tradition. The task of the philologist was to understand and to defend a complex tradition that was partially contaminated by reciprocal rejections and contradictions as a unity representing the ideal of humanity. Skepticism emphasizing the contradictions in the tradition was, hence, the companion and counterpart of *philologia* in late Classical Antiquity.

The understanding of texts and monuments beyond the horizon of the presently given horizon of one's own tradition was a problem that occurred for the first time in the Renaissance and Reformation of the European tradition. The slogan "back to the sources" once again has its genetic foundation in a specific structure of the literary tradition. The structure presupposes the rejection of large parts of the tradition of Classical Antiquity in the Christian "cultural revolution" in late Classical Antiquity beginning with the closing of libraries and the destruction of temples at the end of the fourth century and ending with the expulsion of the philosophers under the emperor Justinian in 529. The literary heritage of Hellenism and Classical Antiquity vanished almost completely, even in the schools for the administrators of the empire. Traces of the heritage survived hidden in private and state-related libraries in Byzantium.[6] Much of the Latin literature was lost in the following centuries with the decline of Rome and the final victory of the Teutonic tribes in the West. A part of what was left in the East in Persian, Arabic, and Jewish medieval culture reached Western Europe via Spain in the twelfth century and was re-interpreted (and partially misrepresented) in the context of the Christian scholastic heritage. Greek sources reached Italy after the fall of Byzantium.

The second presupposed historical foundation is the humanistic rejection of these misunderstandings and not-understandings along with a critical turn against the literary tradition of the Middle Ages and the rejection of a large part of the tradition of the Catholic Church in the Reformation. The humanists of the Renaissance rediscovered the classical discipline of philology and used it in their interpretations of the texts of the classical literary tradition. This tool was then also used by Protestant theologians. The final consequence was the rejection of the medieval tradition as a tradition of the "Dark Ages."

One of the essential side effects of this new attitude toward the past in the Renaissance was an interest in forgotten, partially destroyed, and buried monuments, i.e., the architecture and the arts of Classical Antiquity, and their recognition as standards of beauty and humanity. This interest was the first step in the development of classical archaeology as an academic discipline. Given philology and classical archaeology as disciplines, the history of Classical Antiquity could be established as a discipline, a field of research. Philology and archaeology not only provided the material for the new historical understanding and reconstruction of the history of Classical Antiquity, but they offered the methodical standards both for the rediscovery of forgotten and not-understood texts and monuments and for eliminating not-understanding and misunderstanding in their interpretation.

[6]For a detailed account see Seebohm 2004, §2, 21f.

The experience of the past as a past present that has become foreign to one's own present tradition in its fixed life expressions can be iterated. A significant iteration of this attitude of hermeneutical and historical consciousness was the rediscovery of the culture of the Middle Ages and, as a consequence, the significance of the history of the Dark Ages in the first decades of the nineteenth century.

The experience of what is foreign and has even been rejected and forgotten in one's own tradition, together with the experience of highly developed foreign cultural lifeworlds[7] in the sixteenth, seventeenth, and eighteenth centuries was the presupposition for the genesis of the historical human disciplines of philology, archaeology, and history as sciences. The predecessor's past understanding of documents and monuments in the own present tradition was not only viewed with suspicion as a mistaken representation of forgotten past cultures, and its worldviews; the radicalized new attitude in the understanding of fixed life expressions also implied that the understanding of the past in the present can be (but is not necessarily) distorted by misunderstanding, and the task was to correct such misunderstandings.[8] This attitude demanded a methodologically guided critique of pre-given interpretations.

The final arbiter of critique for the Enlightenment was reason. The task of human reason was to criticize the truth claims of the tradition, i.e., to distinguish between irrational, superstitious truth claims and rational truth claims that have been helpful and significant for the progress of human reason in history. *Prima facie* this idea of critique is and was not compatible with the attitude of the philological-historical disciplines. It was a critique and in many cases an at least partial rejection. of past cultural traditions from the viewpoint of the present, and in this sense was a-historical.

For the historical human disciplines critique was not a critique of what was or had happened in the past, but a critique of the understanding of the sources in the pre-given tradition, including past interpretations of the sources within the human studies themselves. An evaluation of the truth claims of the sources, i.e., the question of possible applications or rejections, was not of interest in their field of research. The task was to interpret the sources of past and present foreign cultures and their historical development in their own context. The slogan was: all cultures are "immediate to God." Their life expressions have their value in themselves and ought not to be judged from the outside. This universal and methodically radical turn "back to the sources" was understood by the contemporaries as a turn against the Enlightenment, and as a defense of the truth, beauty, and virtue of the world of Classical Antiquity or the Middle Ages, or even the cultures and the traditions of present subcultures. The achievements of the human studies in history, philology, and archaeology have been used in the critique of the Enlightenment by the romanticists and German idealists. But in spite of what Gadamer says about the

[7] First China in the seventeenth century and then India.

[8] Schleiermacher 1959. The original version of his lectures on hermeneutics of 1809/10, only published in 1985, is the first hermeneutics that can be considered as a methodology of philology as a science.

romanticism of Dilthey,[9] romanticism and traces of the influence of philosophical idealism gradually vanished in the further development of the historical human sciences of the nineteenth century. Historical positivism (and later historicism) was the guiding ideology of the historical disciplines. Seen with hindsight, their idea of critique, understood from the methodological point of view, had some essential features in common with the Enlightenment. The methodology of the historical human sciences implied the demand for a radical critique of the tradition of interpretations of past cultures, of their texts and their monuments, including interpretations that already followed the methodological guidelines of research in the historical sciences.

In his *Enzyclopaedie und Methodenlehre der philologischen Wissenschaften*,[10] the methodologist Boeckh already distinguished between lower grammatical hermeneutics and critique and higher hermeneutics and critique. Grammatical critique has to decide the question whether or not seen from the grammatical and in general linguistic point of view the sources have been corrupted in the course of the tradition, and, if corrupted, how these corruptions can be removed. Higher critique has to decide whether the pre-given interpretations of the sources are appropriate, i.e., whether they are compatible with the context to which they belong. According to Droysen's *Historik,*[11] higher critique asks whether the material of methodically interpreted sources is sufficient or insufficient for the reconstruction of the past in its totality.

The existence of these new disciplines had consequences. First, not only classical philologists (and later philologists of other languages and literatures) but also historians and archaeologists received chairs at universities. Very soon these disciplines were called *sciences*, e.g., the "*science* of classical antiquity" (*Altertumswissenschaft*). Humanistic disciplines and later also the studies of foreign cultures in general had already been recognized as respectable academic disciplines since the sixteenth century. The question why and how the claim of these disciplines to be sciences (*Geisteswissenschaften*) can be justified was raised in the nineteenth century. It was an urgent question because the generally accepted assumption of the time was already that the methodology of the natural sciences is the ideal paradigm for the recognition of other disciplines as sciences. The problem lurked in the background of academic teaching and research in Germany after the reform of the German universities by Wilhelm von Humboldt. In the beginning, this was a problem for the historical human sciences. It was only in the second half of the nineteenth century that it dawned on some that the social sciences might have more in common with the historical human sciences than with the natural sciences.

[9] Gadamer 1965, I.1.a.

[10] Boeckh 1966. These lectures were given before the middle of the nineteenth century and were 1886. For other significant hermeneuticists of the nineteenth century, see Seebohm 2004, §8.

[11] Droysen 1977. Droysen's booklet *Grundriss der Historik* was nothing more that a short guideline for the students of his lectures. The lectures themselves and other material were not available before the critical edition of his works in 1977.

4.2 Dilthey's and Rickert's System of the Sciences

The proposal of Dilthey and Rickert to solve the problem with the aid of a strict separation between the natural and the human sciences is not without difficulties. Some have been already mentioned in the last part of Chap. 3, but the main problem left was and is that the separation is not a sufficient answer to the question why and in what sense the human sciences can be called sciences if they are not able to apply the methodological guidelines of the natural sciences. It was a crucial question because in the nineteenth century positivism was already an influential rival of Dilthey's and Rickert's proposal. The main question was and still is why and how it is possible to defend the claim that the disciplines of the humanities are not only of significance for the arts, for erudition, and for prudence in politics and the giving and application of laws but can also be recognized as empirical sciences.

August Comte invented the term "positivism" for his philosophy, a philosophy that recognized only the methods of modern science as warrants of truth. Mill adopted the term and used it for his own system, and it is his system, not the system of Comte, that was of basic significance for the further development of the positivistic theory of the sciences in general, and especially of the human sciences as sciences that are able to apply the methods that have been developed in the natural sciences to the "sciences of the mind."

John Stuart Mill developed a unified system of the sciences that treated the human sciences, in his terms the "sciences of the mind" or "moral sciences," as a branch in the last part of his system. The common ground of science is experience, understood in terms of the tradition of empiricism. The warrant for the objective validity of the sciences is formal and inductive logic.[12] An essential part of inductive logic was a theory of the logic of experiments as a methodology for the justification or rejection of hypotheses, their verification and falsification. Mill's reflections on political, social, and economic theories and the theory of the law and last but not least history have been and are still of outstanding significance. The natural sciences represented the new paradigm of what can count as a science and what cannot. According to John Stuart Mill the "sciences of the mind" and associated disciplines have to use the methods of the natural sciences.

Mill was nevertheless of significance for Dilthey's system of the human sciences. Dilthey never challenged Mill's theory of the natural sciences. He also recognized with Mill that psychology is the methodological foundation for all other human sciences. More about Mill's influence and its limits will be said in Part IV, Sects. 10.1 and 10.3. For Dilthey psychology as understanding and analyzing psychology was also an empirical science, but it is neither necessary nor possible to apply inductive methods of experimental research of the natural sciences in psychological research and in general in empirical research in the human sciences.

[12]Mill 1977 (1st first ed. 1843).

According to Wilhelm Dilthey, the natural sciences and human sciences have different goals. The aim of the natural sciences is to *explain*, the aim of the human sciences is to *understand*.[13] Heinrich Rickert distinguished between the *nomothetic* natural sciences interested in the universal laws of nature and the *ideographic* cultural sciences interested in descriptions of individuals in the broadest sense, including individual persons, events, works of art, worldviews, and cultures in his *Kulturwissenschaft und Naturwissenschaft*.[14] Both Dilthey's system and the Neo-Kantian system introduced a strict epistemological opposition between the human or cultural sciences and the natural sciences.[15]

The basic epistemological principles guiding the separation of the natural and the human sciences in Dilthey and Rickert are compatible. According to Dilthey the natural sciences are interested in causal explanations, but causal explanations presuppose the discovery of causal *laws*. They are, hence, according to Rickert, *nomothetic*, they posit laws. Discoveries of causal laws presuppose the methodology of Mill's inductive logic, the logic of experiment and observation. The basic category of the epistemology and methodology of the human or cultural sciences is, according to Dilthey, descriptive and analyzing understanding. The goal of understanding is to understand individual life expressions, i.e., the human sciences or cultural sciences are, as Rickert said, *ideographic*, descriptions of what is individual and unique in the broadest sense: individual persons, events, works of art, worldviews, and cultures.

This distinction was challenged by the positivists of the nineteenth century and later by the analysts. According to the positivists (following Mill's epistemology) and later the analysts a discipline is a science if and only if the discipline is able to apply the same (or at least similar) methodological rules and principles that are applied in the natural sciences. The final answer of the analysts is that human sciences are sciences only because they are able either to find causal explanations for facts and to discover causal laws justifying the explanations or to apply causal laws and theories provided by the natural sciences in their explanations. This problem

[13] Dilthey GS I; SW I; *Einleitung in die Geisteswissenschaften,* 1883.

[14] Rickert 1926, (1st ed. 1899), English ed. 1962.

[15] The term "sciences of the mind" but also "moral sciences" of J. S. Mill's *Logic* of 1843 was given in German translations of his works as *Geisteswissenschaften*. It is difficult to decide whether the Hegelian tradition had an influence on the translation. The editors of the American translation of Dilthey's works decided to translate *Geisteswissenschaften* with the term "human sciences." Schutz, following Rickert, sometimes preferred *Kulturwissenschaften*, cultural sciences. From the epistemological point of view, this term has the advantage of avoiding the metaphysical connotations of the term "*Geist"* but also of connotations of "human" as a predicate used in terms for branches of the natural sciences or the technological application of natural sciences, e.g., in medical technologies. The terminology of the following investigations will use "human sciences" because it is not advisable to "deconstruct" systems of already established terminological traditions in the sciences.

will be considered in detail in Sect. 6.1 below. Understanding, interpretation etc. are more or less respectable mental activities like writing poetry, but "disciplines" relying on such activities are not sciences.[16]

The classification of the human sciences by Dilthey introduced the distinction between the historical human sciences, including history, philology, and archaeology, and the systematic human sciences, including psychology, sociology, economics, and jurisprudence.[17] Psychology, though it is *prima facie* only one of the systematic human sciences among others, is of basic significance for Dilthey's epistemology. Psychology is a human science, and its first epistemological category is, therefore, understanding and not causal explanation. According to the second epistemological principle, psychology does not admit causal explanations because its method is pure description. The third principle is that psychology is a descriptive and analyzing (*zergliedernde*) science and this implies that psychology is not only interested in the ideographic understanding of individuals, but also in the analysis of the general structures of understanding. But if so, then psychology provides the basic methodical guidelines for a general theory of understanding, i.e., methodological principles for the other systematic human sciences and for the historical human sciences.

However, both Dilthey's strict separation of the human and the natural sciences and his distinction between the historical and the systematic human sciences have weak spots. The case of psychology already causes difficulties, for Dilthey psychology was understanding psychology, and in this sense it is a human science. But psychology was also descriptive psychology, and descriptive psychology has been used as a preparatory discipline for experimental research with the goal of this research being the discovery of causal laws. Thus descriptive psychology can be of significance for understanding in the human science, but it can also be of significance for psychology as a natural science. It also has to be taken into account that human behavior is in some respects similar to animal behavior and can be considered as an object of the life sciences. Psychology is in this sense an extension of the life sciences, more precisely of animal psychology, and, therefore, of the natural sciences. Clinical psychiatry has always used the methods and results of physiological research. It is, furthermore, questionable whether predictions,

[16]Even today some could be inclined to consider the thesis that the human sciences would not cease to be respectable disciplines if they had their proper place in a faculty of the humanities. This would be a new type of "lower faculty," and the "higher faculties" would be the faculties of the natural sciences, i.e., physics, chemistry, biology, and, perhaps, because of its applied mathematics, economics. There is no doubt that naturalists, analytic philosophers, and some scientists assume that precisely this is the status of the "Faculty of the Liberal Arts" especially in American universities. Given the influence of Dilthey and others in the development of the *Geisteswissenschaften,* such considerations are less influential in the battle of the "two cultures" in continental Europe.

[17]Schutz replaced Dilthey's term "systematic human sciences" with "social sciences"; cf. also Sect. 4.3 below.

causal explanations, and discoveries of causal connections will never occur in descriptive and understanding psychology as well as in the other human sciences.

The social sciences use methods that are similar to the methods of the natural sciences. The methods of statistical causal research and its epistemological problems surface in the life sciences, but also in the systematic and even in the historical human sciences. The historical human sciences apply techniques and viewpoints borrowed from the natural sciences, especially in archaeology and paleontology.[18] Causal explanations can be found in history and are of central significance for the epistemology of history. Not only psychology, but also the other systematic sciences, especially economics, are interested in the discovery of causal connections and deliver reliable predictions for comparatively small social contexts.

The position of positivism and later analytic philosophy is, hence, *prima facie* at least in part convincing, especially in the systematic human sciences and first of all in psychology, but also, e.g., in economics. The difficult cases for this positivism are the historical human sciences. Causal explanations following the logic of implicative conditionals are rare in the historical disciplines and can be easily challenged by critical historical research.[19] To the best of my knowledge, nobody has even tried to explicate the methods of philological interpretations of, e.g., *Genesis*, the *Iliad*, Hesiod, or the *New Testament* with methods borrowed from the theory of science of the analysts. The epistemological attempts of analytic philosophy in this respect will be reviewed in Part II. The review is necessary because the phenomenological analysis of the general structures of pre-scientific lifeworlds has shown that causal conditions and predictions are essential aspects of elementary understanding and that the idea of causal laws and strict determinism can be an essential aspect of higher understanding. In the last instance, these sciences always presuppose human encounters, either between the researcher and the person or group of persons as objects of research or the observed encounters of persons. But such encounters presuppose understanding.

4.3 Critical Remarks About the Traditional Division Between the Natural and the Human Sciences

The task of this and the next section is to give a survey of the problems, but not yet of possible solutions, of Dilthey's and Rickert's strict separation of the human and the natural sciences. The reasoning for the separation of both Dilthey as well as Rickert used epistemological categories. The problem is that neither Dilthey nor Rickert mentioned a general epistemological criterion for the distinction between a discipline and a science that covers the human as well as the natural sciences. It can be admitted that understanding is the basic epistemological category for the human

[18] Cf. Part IV, Sect. 9.1.

[19] See Sect. 6.2 below.

disciplines while nevertheless denying that they can be recognized as empirical sciences. Mill's positivism has shown that the natural sciences are sciences because their methods are able to distinguish between hypotheses about causal laws that can be accepted as true and others that must be rejected. The human disciplines are honorable disciplines, disciplines of arts in the old sense of Classical Antiquity along with philological and historical scholarship interested in ideographic understanding of historical and presently living persons, cultural monuments, historical events, etc. Humanistic studies and scholarship are respectable disciplines because they are useful for the improvement of the moral and cultural progress of human mankind, but they cannot be recognized as sciences.

A final decision whether a strict separation of the natural and the human sciences is acceptable thus presupposes an epistemological justification for their claim to be sciences. Rickert's thesis about the nature of the human sciences presupposes the Neo-Kantian version of Kant's practical philosophy, the Neo-Kantian theory of moral and other values. Dilthey's approach is different and of immediate significance for the development of a phenomenological epistemology. After reading Husserl's *Logical Investigations,* Dilthey agreed with Husserl's arguments against naturalistic psychologism in the first volume and with the phenomenological solutions for the problems of the ideal objects of logic in the second volume. He even characterized his own methodological approach in psychology and the human sciences as phenomenology.[20] Offended by Husserl's attack in "Philosophy as a Rigorous Science" against historicism as another type of relativism,[21] he started a correspondence with Husserl. In his later manuscripts Husserl recognized Dilthey's psychology as a phenomenological psychology in his sense and Dilthey's project of a universal human science as an immediate predecessor of his transcendental phenomenology.[22] *Prima facie* this Husserlian appraisal of Dilthey's work includes Dilthey's distinction of the natural from the human sciences. However, Husserl's epistemological arguments for the separation in the *Crisis* are not compatible with Dilthey's reasoning.

Nature as an object of the natural sciences presupposes an application of *mathesis universalis* to the exact essences of time, space, and matter. The categorial structure of the world as sum total of objects of the natural sciences also implies, hence, the mathematical idealization of causality. The thesis of naturalism is that the nature of the natural sciences is the objective true world behind the lifeworld or, in Kantian jargon, the world of things themselves discovered by the sciences behind the

[20] Cf. Makkreel 1975, 59–73, 274–279; Seebohm 1985a, 99, 103 and also 1987, 26f.

[21] Hua XXV.

[22] Hua IX, *Phänomenologische Psychologie,* Beilage III, 1926 on Dilthey's psychology and II, 1928 on Dilthey and the human sciences, 354–364. Grünewald's critique of Dilthey's conception of psychology and psychology as the foundation of the human sciences (Grünewald 2009, 180–182, cf. 118) is not compatible with Husserl's evaluation of Dilthey's position in his later manuscripts and lectures. On Husserl's evaluation of Dilthey's psychology as a path to transcendental phenomenology see Ströker 1987 chapter VI. On Dilthey's influence on Husserl's evaluation of the historical human sciences see Seebohm 1985a, 1987, and 2013.

lifeworld as a world of appearances. Seen from the viewpoint of phenomenological reflection, this objective true world is the residuum of an abstractive idealizing reduction. The abstraction brackets the generative priority of the experience of reality in the concrete lifeworld and with it essential aspects of the real objects in the lifeworld.[23]

The empirical basis of the natural sciences in the lifeworld is the natural environment and only the natural environment, i.e., the natural sciences bracket all ethical, aesthetic, and moral values, all purposes and actions, goals of actions, etc., of objects in the world as the sum total of objects in a cultural lifeworld. The Neo-Kantian thesis that what is in brackets for the natural sciences are only those values and actions realizing values that are the empirical basis of the cultural sciences[24] is misleading. Values and purposes are essential abstract moments of concrete things and events, and states of affairs are what they are for the human sciences in a concrete cultural lifeworld. Abstractions *presuppose* an empirical basis and cannot *serve as* an empirical basis for a science of the lifeworld. A task of the human sciences is to understand values as abstract aspects of a concrete historical socio-cultural reality.

Dilthey's thesis that the human sciences are sciences of understanding points in the right direction; it is, however, vague and ambiguous. What is understood, i.e., known in the broadest sense in the lifeworld, is the correlate of intersubjective understanding. Several levels and aspects of understanding in the lifeworld have been distinguished, and all of them share the structure of the temporal and spatial horizons of the lifeworld. The understanding of states of affairs in the lifeworld and its temporal structures imply, furthermore, causal relations as essential structural moments of the experience of practical activities, of significant actions, and of significant events in the natural environment.

Husserl's epistemological account of the natural sciences implies, hence, a rejection of the epistemological criteria of Dilthey's as well as of Rickert's separation of the natural and the human sciences. The natural sciences presuppose a *idealized* mathematical concept of causality but Husserl never explicitly denied that causality and also efficient causality is a basic categorial structure of the lifeworld as the empirical basis of the human sciences.

Husserl's account of the natural sciences offers, on the one hand, new perspectives, but on the other hand also presents some problems for a phenomenological epistemology of the natural sciences. A first problem is that his account of the natural sciences is certainly applicable to theories of the "hard" sciences, physics and chemistry, but it is questionable whether it also covers the life sciences, e.g., Darwin's theory of evolution.[25] A second problem is that the *Crisis* mentions

[23] Hua VI, esp. Sects. 3.3, 8.5, and 9.1.

[24] About the significance of values in the theories of the basic categories of the social and historical human sciences in Windelband, Rickert, and Weber, cf. also Grünewald's interpretation and critique of the Neo-Kantian approach in Grünewald 2009, 136ff., 172.

[25] More will be said about this problem see Part III, Sect. 8.5.

the distinction between theory and experimental praxis in physics along with the significance of technology without analyzing the problems of the logic of experiment and observation.[26]

The publication of the *Crisis* offered a new perspective for the epistemology of the human sciences. The world as the sum total of the objects of the human sciences is the lifeworld. The lifeworld is the generative foundation for the abstractive reduction of the natural sciences and it is, therefore, in brackets and outside of the domain of the abstractive reduction. The new criterion for a strict separation of the human and the natural sciences implies some of the old problems along with some new problems. A first problem is that not very much is said about understanding as an epistemological category of the human sciences. The second problem is that much is said about the lifeworld and intersubjectivity, but virtually nothing about the epistemological problems of the methodology of the human sciences.

The preceding critical reflections indicate that the attempt to use the category of causality and mathematical idealizations as criteria for the distinction between the natural and the human sciences is not convincing. Causal relations are legitimate categories for the human sciences because causal predictions and explanations are already essential categorial structures in the lifeworld. Mathematical idealizations are essential for the hard natural sciences, but they are only of limited significance for the life sciences. Methods used in the life sciences can be applied in psychology and social human sciences. What is left is a critical review of the separation of understanding and explanation from the viewpoint of the distinctions in the typology of understanding introduced in Sect. 3.2 above. *Prima facie* it seems to be promising to assume that the human sciences are sciences of understanding and that the causal explanations of the natural sciences cannot be characterized as a type of understanding. Closer consideration indicates, however, that this assumption is threatened by serious ambiguities.

Several types of understanding and life expressions and each with its significance for different aspects of the lifeworld have been distinguished: animalic understanding, elementary understanding, and first-order higher understanding and second-order higher understanding. First-order higher understanding is the *creative* understanding of the context of the lifeworld as a whole and of partial aspects of the lifeworld. Such aspects include structures of political power, of custom and law, of trade relations, of intercultural contacts, of the production of goods, and last but not least, of the natural environment. There is, on the other hand, second-order higher understanding, the *re-creative* understanding of the manifestations of first-order creative understanding in immediate and fixed life expressions, the *interpretation* of life expressions.

Seen from the viewpoint of these distinctions, the human sciences are not sciences practicing elementary understanding or first-order higher understanding. If this were the case the human scientist would be a prophet or a poet or a lawgiver or a

[26] See Hua VI, §9 g.

natural scientist. These all create different types of first-order higher understanding. The understanding practiced in the human sciences is re-creative second-order higher understanding. They are "interpreters" of the life expressions of Others. To call the humanistic disciplines sciences of understanding without adding that the understanding of the human sciences is a secondary understanding that can be called interpretation if it is a methodologically guided secondary understanding leads to absurd consequences.

The correlate of understanding is the lifeworld in general. If the natural "sciences" were to bracket understanding including creative understanding, they would bracket the lifeworld in general. The first absurdity is, hence, that a lifeworld with sciences, i.e., our present lifeworld, is a *contradictio in adjecto*. It is absurd to assume an abstraction from the lifeworld in its entirety that leaves the natural sciences and their universe of objects in a nowhere outside the lifeworld. The sciences are always sciences in a lifeworld with sciences, and this type of lifeworld can be distinguished from genetically earlier types of pre-scientific lifeworlds. One of the essential requirements of the method of the natural sciences is that observation in the natural sciences has at least the potential to be intersubjectively accessible observation. This means nothing more and nothing less than the accessibility of the observations in the lifeworld of the natural scientists. Required for the solution of these problems is, hence, a detailed analysis of the implications of the bracketing of certain aspects of the lifeworld, a bracketing that determines the constitution of the ontological region of the natural sciences, and with it the separation of the human and the natural sciences. Some preliminary hints about these implications can be given.

What is genetically earlier still exists on genetically later levels as a one-sidedly founding abstract structure. Hence there must be a common ground for both the human and the natural sciences and this common ground is the lifeworld. *The abstraction that is constitutive for the natural sciences must be understood as an abstraction of certain essential structures of the lifeworld in general and not of the lifeworld in general.*

Natural science is a type of first-order creative understanding of the lifeworld. Presupposing the explication of the static structures of the lifeworld in general in Sect. 3.1, it can be said that the natural sciences are interested in the understanding of the natural environment of the lifeworld in general and bracket all other first-order interpretations of the lifeworld and its natural environment, e.g., in religious revelations, metaphysical contemplations, etc. It is, therefore, a serious contender and a challenge for other "worldviews."

The understanding of the natural environment in systems of creative higher understanding has, hence, its immediate foundation in the encounter with the natural environment in elementary understanding. Elementary understanding is, therefore, of basic significance for the explication of the foundations of the natural sciences in the lifeworld in general. According to the analyses in Sect. 3.5 above, in the context of encounters with the natural environment in the social lifeworld causality is the causality of actors, and is as such always understood as a final cause. It is the

purpose of the action that guides the actions and the choice of means of the actor. This pattern governs practical actions on the level of elementary understanding in the encounter with the natural environment.

In addition, elementary understanding is interested in causes that can be used as reliable means in the pursuit of the goals of practical life. Of interest is the understanding of factors, effective causes, that produced a desired effect in the past and support, therefore, the expectation and prediction that they will also "work" in the future. Productive elementary understanding is in addition interested in inventions, the discovery of new effective causes for old or new desired useful effects. It is possible to abstract from the context of purposes of elementary understanding in the social lifeworld. What is left after the abstraction is the pre-scientific generative foundation for a possible development of the natural sciences in the lifeworld in general.

The analysis of the generative foundations of the natural sciences in the lifeworld presupposes, on the one hand, the analysis of the generation of a lifeworld with natural sciences from pre-scientific socio-cultural lifeworlds. The analysis presupposes, on the other hand, the epistemological analysis of the methodology of the natural sciences. However, the static description of the foundations of the natural sciences in the lifeworld already indicates, however, some basic structural aspects of the analysis of the generation of the natural sciences. First of all, it is obvious that the emergence of the natural sciences presupposes the generation of a cultural lifeworld with a literary tradition and a developed system of literary genres. Of significance in this context is, secondly, a tradition of studies in geometry and arithmetic (in phenomenological terms, of the study of mathematical exact essences) and the application of such studies on the level of elementary understanding.[27]

The foundation of the humanistic disciplines and then the human sciences in the lifeworld in general is secondary higher understanding, the interpretation of the immediate or fixed life expressions life expressions of Others including consociates, foreign contemporaries, and predecessors. The horizon within which life expressions of predecessors are of interest for interpretation is the horizon of the interpretation of the tradition of the lifeworld. Immediate life expressions, including actions on the level of elementary and higher understanding, need interpretation if and only if they are not understood or after the discovery that successful communications have been distorted by misunderstanding.

The first stumbling block for a further explication of the foundations of the human sciences in the lifeworld is the ambiguity of elementary and higher understanding, on the one hand, and of first-order and second-order understanding, interpretation, on the other. If they are lumped together, the outcome will be what can be called interpretationism or hermeneuticism, the night of the analysis of understanding in which all cats are grey. The second stumbling block is a strict separation between the social or systematic and the historical human sciences.

[27]The lever was a useful tool before discovering the law of the lever. Gunpowder was used before the natural sciences explained how it was used in guns and rockets. Detailed explications of the generative foundations of the possible emergence of the natural sciences will be given in Part III.

4.4 Critical Remarks About the System of the Human Sciences in Rickert, Dilthey, and Schutz

Dilthey's distinction between the systematic and the historical human sciences should not be understood as a taxonomic distinction between two classes of sciences. The sciences in such systems of classification, e.g., as science of art, state, society, and religion, etc., are "fog-banks that obstruct our view of reality."[28] Understanding in all of them requires that they are understood as aspects of socio-cultural reality as a whole. The investigation of the external organization of a society is the task of all the systematic human sciences: law, economics, and ethics.[29] The historical experience of individuals is the point where all of the aspects of external organizations intersect. The systematic human sciences are, hence, a necessary extension of the historical human sciences in Dilthey's system. History is in the center of the human sciences, and understanding in history presupposes the understanding of the individual. Through their intersections, psychic unities develop the lasting social structures, and through these the progress of history. Descriptive psychology is, therefore, presupposed in all human sciences.[30] Apart from his reflections on hermeneutics,[31] Dilthey's reflections on the human sciences ought not to be understood as an epistemology of the human sciences. The short last chapter of book I of his *Introduction* emphasizes the necessity of a future epistemological foundation for the human sciences that is still a *desideratum*.[32]

Not much about the distinction between the historical and the systematic or social human sciences can be found in Husserl. It can be assumed that he expected that Schutz would provide the phenomenology of the social world. Schutz distinguished the social human sciences and the historical human sciences.[33] His approach has the advantage of offering not only a phenomenological analysis of the social world, but also some steps toward a theory of science (*Wissenschaftslehre*) for the social sciences that will be considered in Part IV, especially in Sect. 10.4,[34] but not much is said about an epistemology of empirical research in the social sciences. His phenomenological descriptions include the dimension of predecessors as a

[28] Dilthey GS 1, book I. ch. 11, 93.

[29] Ethics in the context of the human sciences is not understood as a philosophical discipline. What is meant are the customs distinguishing between right and wrong, good and bad, within the context of a certain socio-cultural lifeworld.

[30] See for instance GS 1, SW 1, book 1, ch. 7–13. For a comprehensive account see Makkreel 1975, part I.1, esp. 55f, 63–72.

[31] For a detailed account see. Sects. 5.2 and 5.3 below.

[32] Dilthey GS 1; SW 1, book I, ch. 19. Dilthey praised Husserl's *LI II*. Husserl offered what he was looking for: a system of logic including a theory of the whole and the parts that could be presupposed in the human sciences.

[33] Embree 2009d, section 1.

[34] See esp. Sect. 10.4 on ideal types and the postulate of adequacy of phenomenological descriptions.

structural aspect of the social life-world.[35] He mentions history and also occasionally hermeneutics in remarks about the application of the law in jurisprudence. There are references to Dilthey but he said nothing about the phenomenology of the historical world.[36] History appears in Schutz as an extension of the social sciences. A summary of basic problems concerning the system of the human sciences can serve as a preliminary exposition of the investigations of Part II and Part IV of this investigation.

The first problem is the status of psychology, its relation to the human sciences in general and then especially to the social sciences. A superficial survey already reveals differences and disagreements. For Dilthey but also for Schutz psychology is of central significance for the human sciences. For Dilthey, however, psychology as understanding psychology is as individual psychology of significance for the understanding of immediate and of fixed life expressions in the systematic as well as in the historical human sciences. For Schutz psychology is neither empirical psychology nor a descriptive psychology interested in the individual as the point of intersection of the aspects of socio-historical reality. He understood his psychology as phenomenological psychology in Husserl's sense, and Husserl's psychology is indeed the guiding thread for Schutz's phenomenological psychological reflections preparing the analysis of the structures of the social world.[37]

Thus compared with Dilthey's approach, Schutz's psychology must be characterized as social psychology. Whatever is of interest for psychology is also of significance for the structures of the social world and vice versa.[38] The problem of the status of psychology was also central for the controversy between Schutz and Gurwitsch after 1940 that will be considered in the next section, because this discussion is also of significance for the epistemic interpretation of phenomenology and for a phenomenological epistemology.

A second problem is that according to Shutz the social sciences include the past horizon of the immediate present in lived experience, but also, beyond that, the dimension of predecessors in a distant past and, therefore, the historical dimension. Conversely, for Dilthey the historical reproduction of the past cultural lifeworld is the presupposition of understanding the law system, the structures of political power, the economic situation, and other social systems in the present. It is possible to show that this opposition can be understood as an opposition between two correlated perspectives on a shared common region of objects. Some preliminary considerations can prepare the analyses in Part II and Part IV.

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[35] See Schutz 1932, part 4, section (E) "The World of Predecessors and the Problem of History."

[36] See Embree 2008b; 2010a about Schutz on hermeneutics, the historical human sciences, cultural science in general, and Schutz's relation to Dilthey.

[37] See Schutz 1932, parts 2 and 3; cf. Embree 2008a; Embree 2009d. Schutz nowhere lists psychology together with sociology, economy, and the law as a special discipline of the social science and said nothing about the epistemology of psychology as an empirical science. This problem will be considered in Part IV, Sects. 10.3 and 10.4.

[38] Embree 2003.

The empirical basis of reflections on social structures start with observations of life expressions given in the present, together with the immediate temporal horizons of predecessors and successors in lived intersubjective experience. Life expressions in the present can be immediate life expressions, including the observation of actions and oral discourse but also fixed life expressions, written discourse, buildings, towns, factories, temples, and churches. The empirical basis for historical research, the facts for the historian, are fixed life expressions, texts and monuments of authors in the past given in the present. The final task of comprehensive historical research is to reconstruct the past reality of a more or less foreign lifeworld in the past with the material of the philological and archaeological interpretations of the fixed life expressions, texts, artifacts of elementary understanding, and monuments.

The observations of social research refer to immediate and fixed life expressions given in the present and in the immediate past of the present but the immediate past of the present is steadily vanishing at its fringes into the horizon of the historical past, and for the present this past given only in fixed life expressions. The fixed life expressions for the reconstruction of a past reality include vice versa the dimension of the social structures of a past present in a more or less foreign cultural lifeworld.

The difference between the temporal horizons of immediate and fixed life expressions imply the differences with which causal relations are given for the historical and the social perspective. Expectations implied in pre-given causal rules of elementary and higher understanding in the lifeworld can be satisfied or disappointed in the present, and new guesses about hitherto unknown causal relations can be disappointed or confirmed in the present. In the contrast, events in the past only admit causal explanations of what has already happened. The historical perspective has its empirical basis in fixed life expressions referring to what happened in the past, and what happened in the past admits causal explanations. But while the historical perspective admits only causal explanations, the perspective of the social sciences includes the possibility of confirmations or disconfirmations of predictions and, therefore, also permits the discovery of new causal rules and causal explanations for events in the immediate past horizon of the present.

The third problem is that the system of the social sciences is not a system of separable disciplines. The science of the law is about social phenomena and presupposes acquaintance with other types of social phenomena, first of all with the economy and the distribution of political power in a society. Investigations about economic and political phenomena presuppose vice versa some knowledge of legal structures. None of these and other aspects belonging to the context of a concrete cultural lifeworld can be considered as an independent entity outside the context of the social world. The explication of the structures of this context is, therefore, relevant for the determination of the empirical basis of the social sciences.

The situation is even more complex in case of the historical human sciences. History is not only the comprehensive historical science including the history of political structures, of the law, of economy, of literature, religion, the arts, and architecture. History presupposes the work of philological and archaeological interpretations of the sources for the reconstruction of a past reality. But philology and even archaeology are vice versa incomplete without research that is,

strictly speaking, historical research. The biographies of the authors of, e.g., the literature of the past used for purposes of philological interpretations presuppose historical investigations. In addition, archaeological discoveries and interpretations need knowledge about the historical development in past cultural lifeworlds. Different levels and aspects of a past socio-cultural lifeworld are of significance for the empirical basis of the historical human sciences. Given the correlation of the social and the historical human sciences, they are also relevant for the social sciences.

What has to be mentioned is, furthermore, that it is not the privilege of the historical human sciences to discover *foreign* past cultural lifeworlds of predecessors in the past. Ethnology or cultural anthropology is interested in *foreign* cultures of contemporaries in the present and, hence, is a social science. Ethnology recognizes that contemporary foreign cultures have their own foreign tradition and their own historical horizon. Ethnology prepares the ground for new fields for historical research. It is, furthermore, of significance that cultures, especially cultures without a written tradition, that have been given for ethnological research in the past are now only accessible with the aid of the methods of historical research studying not only the fixed life expressions of the culture, but also the fixed life expressions that are the reports of ethnologists in the past.[39]

The fourth problem, the problem of the inseparable unity or possible separation of interpretation and application, has been discussed almost exclusively as a problem of hermeneutics, i.e., of philological interpretations in literature. The interpretation of the law in jurisprudence has been mentioned as an example and even as the prototype of the necessary unity of text interpretation and application.[40] Closer considerations reveal a structure of a higher degree of complexity. A text is a law text according to the rules of the genre of law texts if the text offers (1) a general description of a *social interaction* and (2) a descriptions of a sequence of other *social interactions* that ought to realized in the *future* if a case of the social interaction (1) has happened in the *past horizon* of the *present interpretation/application* of the law in a court of law. The application of the text of a law in a court of justice is, hence, more than a recognition that the text of the law represents the tradition of truth and justice of the cultural lifeworld. Jurists in a court of law are interested not only in the philologically guided interpretation of laws, but also in the application of the law to *presently* given cases of social *interactions* and in the social *interactions* of the administration of justice that are required by the law and its application in the sentences or decisions of a court of law.

Thus it follows that, presupposing the system of the human sciences of Rickert, Dilthey, and Schutz, the problem of the unity of interpretation and application does not emerge in the context of philological *historical* research; instead it emerges in the context of interpretations in a social science that is interested in the present and in

[39]Many such cultures vanished in cultural contact with cultures with a literary tradition in the first half of the Twentieth Century.

[40]Gadamer 1965, part II, II, section 2.a; for a detailed critical discussion of this thesis see Part IV, Sect. 10.4 below.

the past only to the extent to which the past is relevant for the present. Of interest is, therefore, how the past can be present in the decisions in court in *jurisprudence,* and beyond that, in the *science of the law* as a social science.[41] The science of the law recognizes that the application of the law in jurisprudence presupposes the correct interpretation of the *presently* valid law system, the so-called positive law, and in addition the correct interpretation of the positive law requires the application (!) of the results of the history of the development of the law system and its applications, a development that culminates in the presently applied system of the positive law.

The *history* of the law is a branch of the historical human disciplines and is interested in a past that is present only in fixed life expressions of authors in the *past*. Jurists interpreting the positive law that has to be applied here and now have to presuppose results of the research in the history of the law. Judges and lawyers *in court* are, hence, interested in the interpretation of the law, but first of all in the application of the law to certain cases in the *present*. These cases are presently known in a court of law in the understanding of immediate life expressions given in the present or of fixed life expressions by authors in the past horizon of the living present. The "science of law" is, hence, a social science, but it presupposes the history of law, philologically guided interpretations of law texts that ought not to be applied in the present because they do not belong to the present system of the positive law. They belong to a positive law that has been applied in the past but ought not to be applied in the present.

This problem is, however, not only a problem for the science of law. It also surfaces in theology and practical philosophy, and it will be shown in Part IV of this investigation that it is also a problem for economics and political science as empirical sciences as well. The problem of the relation of interpretation and application in jurisprudence indicates, hence, a general problem for attempts to analyze the differences and the relations between the historical and the social sciences.

What has been said up until now already indicates that here too the generalized problem of the necessary unity or possible separation of interpretation and application in the social sciences can be reduced to the problem of the intersubjective temporal structures that are of significance both for the distinction between the historical and social or systematic human sciences and for their interdependencies. A short recapitulation of the main viewpoints mentioned in Sects. 3.4 and 4.1 are of interest for a critical review of these difficulties and their significance for the possibility of a separation of interpretation and application.

Cultural traditions have been called "archaic" in Sect. 3.4 if they are not able to separate interpretation and application. Archaic living traditions representing the *past* of a cultural lifeworld for the present of this cultural lifeworld can survive only if they are *applied* in the present of this cultural lifeworld. The center of

[41] What can be given is only a first glance at the problem that plagues the distinction between the historical and the human sciences. A detailed analysis of this will be given in Sects. 10.6 and 10.7 below.

the horizons of intersubjective time is the living present of consociates. The past horizon of intersubjective time is the horizon of predecessors and the predecessors of predecessors, the "authors" of the tradition that represents the past in the present. The original expectation in the present is that the successors will and ought to follow the tradition. The consequence is that smaller or larger parts of the tradition can be rejected and then be forgotten in the past of an archaic cultural lifeworld. The unity of interpretation and application/rejection of the contents of the tradition is, therefore, of central significance for the "survival" of archaic non-literary and literary traditions. To defend the unity and truth of the tradition is the task of professional interpreters of the tradition, but it is also their task to determine which parts of the tradition must be rejected as false.

The lifeworld has not only temporal dimensions, but it has also spatial dimensions. The spatial dimension in the present distinguishes life expressions of consociates, contemporaries belonging to one's own lifeworld and its tradition and contemporary foreigners belonging to other *foreign* concrete lifeworlds with other traditions. This dimension is the dimension of cultural encounters between different lifeworlds. It is, hence, also the task of professional interpreters to determine what can be tolerated and what must be rejected in encounters with foreign cultural lifeworlds and their traditions within one's own tradition.

The accumulation of texts representing the literature of authors of past periods of one's own *literary* tradition along with the literature of foreign traditions that has been imported through intercultural encounters in the past horizon of the present, can reach a critical phase in developed literary traditions. The truth claims of sets of texts that are still present as fixed life expressions can be rejected but the rejection requires interpretations, and in this case interpretations of texts and traditions that cannot be applied. Beyond that there can be situations in which different opposed partial traditions that apply/reject different parts of the tradition belong to one and the same present complex literary tradition. The original necessity of the unity of interpretation and application is dissolved if such situations are themselves parts of a literary tradition for interpreters of texts belonging to this tradition in the present.

The sketch of the structures of such developments in Sect. 4.1 indicated that the historical distance between the present of interpreters and the authors of texts in the past belonging to such situations is the immediate generative foundation for a possible separation between the interpretations and applications/rejections of the truth claims of texts in the historical human sciences. The problem of the unity of interpretation and application is in such situations only a problem for texts that are of immediate significance and have to be applied in practical social interactions in the present such as law texts in jurisprudence. The problem is, hence, a serious problem not for the historical but for the social human sciences.[42]

The social sciences and psychology can, however, rely on other methodological criteria that warrant objective validity, criteria that are not available for the historical

[42]More about this problem in the next section and in Sect. 10.4 below.

human sciences. Research in the social sciences and psychology has its empirical basis in observations of events given in the present and the immediate past of the present. Such observations can serve as the antecedents in hypothetical assumptions, i.e., conditionals referring to causal connections with predictions of future events in the consequents that have the potential to be tested in quasi-experimental tests and can then be applied in explanations and predictions. Though the social sciences are sciences of understanding and not under the abstractive reduction that is constitutive for the natural sciences, they nevertheless share basic methodological criteria that warrant objective validity with the natural sciences.

4.5 An Outline of the Basic Problems of a Phenomenological Epistemology of the Empirical Sciences

One of the consequences of the ontic interpretation of the transcendental-phenomenological reduction, and with it the absolute ontological priority of a transcendental ego mentioned in Sect. 2.2, is that the claim of the empirical sciences and especially the natural sciences to offer theories about "how things *really* are" and to have ontological significance in this sense is void. Husserl preferred the ontic understanding of the transcendental phenomenological reduction, but other phenomenologists, first of all Alfred Schutz, preferred an interpretation of the reduction that has the lifeworld as its residuum, and understood phenomenological research as reflective analyses of the structures of the lifeworld. In this medium the lifeworld is experienced as the *real* world.

According to what has been said in Sect. 3.1, the encounter with reality in the lifeworld is immediately implied in the encounter with the hyletic field as correlate and foundation for all passive and active intentional acts and syntheses. The empirical sciences emerge in the pre-given lifeworld as specific cogitative types belonging to the level of higher understanding, but this implies that they have their one-sided generative foundation in the encounter with the brute reality of the lifeworld of elementary understanding. It is the immediate experience of this brute reality, which is genetically earlier and still present in all the different interpretations of this brute reality in different cultural contexts, that is constitutive for the recognition of the independence of this reality in the encounter with the natural environment in all human cultures. It is, furthermore, this experience, this feeling of this reality that transcends all interpretations, that is constitutive for the recognition of transcendence in pre-philosophical and pre-scientific religious "worldviews."

Given the strict opposition between these two opposed types of understanding the transcendental phenomenological reduction and its residuum, it is advisable to start with first steps toward a phenomenological epistemology with a critical reconsideration of the two alternative *ontic* interpretations of the phenomenological reduction in the phenomenological movement after Husserl. The understanding of

phenomenology in Schutz has been challenged by Gurwitsch.[43] It is, hence, possible to start the critical reconsiderations with a survey of the viewpoint of an *epistemic* interpretation of the transcendental phenomenological reduction beginning with a summary of the main viewpoints of this controversy.

For Schutz phenomenology is not a transcendental phenomenology that implies transcendental idealism. Instead it is a mundane phenomenology and the phenomenological reduction can be understood as a psychological-phenomenological reduction. Phenomenological psychology for Schutz is not only the phenomenological foundation for psychology as a human science, is in addition the phenomenological analysis of the constitution of intersubjectivity and its objective correlate, the lifeworld, and only for this reason the foundation for an epistemology of the empirical social sciences as well. Seen from a systematic point of view, however, his position is ambiguous because for Schutz psychology is also social psychology, and as such an appendix of sociology as an empirical science. The phenomenological analysis of the structures of the lifeworld has priority over the analyses of phenomenological psychology. A systematic explication of this ambiguity together with references will be offered below in Sects. 10.2 and 10.5.

1. According to Schutz, all problems connected with the phenomenological reduction bracketing the world and admitting only pure consciousness as its residuum are irrelevant for a phenomenological *Wissenschaftslehre*, theory of science, of the human sciences because (1.a) The reflections of a phenomenological psychology are, as reflections on the natural lifeworld given in direct intention sufficient for the distinction between the natural and the social sciences; (1.b) the constitutive phenomenology of the lifeworld given in direct intention is sufficient for the epistemological theory of the human sciences; and (1.c) phenomenological psychology as social psychology is the epistemological foundation for the social sciences, and it covers everything that is relevant and can be said about members of a social world as individual subjects.
2. Following Gurwitsch and Cairns it can be said on the contrary that (2.a) the subject matter of a phenomenological psychology as a mundane phenomenology is first of all the living body as a psychosomatic unity and then given as the psychosomatic unity in the lifeworld; (2.b) the analyses of the structures of consciousness of pure phenomenology in the phenomenological attitude are as such of significance for a mundane phenomenological psychology and not vice versa; and (2.c) the analysis of the givenness and the formal and material structures of the lifeworld presupposes the analysis of the givenness and the structures of the sphere of ownness, the primordial sphere.[44] Finally (2.d), one additional problem must be mentioned, the problem of the epistemological status of ideal objects.

[43] What is called here the Schutz-Gurwitsch controversy is only one aspect in the context of their discussions. Of significance is also the problem of thematic relevancy and ego-relevancy, cf. Embree 1977; 1988a, 2003; 2009b, 237f.

[44] In other words: the egological reduction is a special aspect of the phenomenological reduction, see Sect. 2.4 above.

> The theories of the natural sciences presuppose the phenomenological justification for the givenness of formalized mathematical essences and exact material essences. The theories of the socio-cultural sciences presuppose ideal types, i.e., the categorial structures of material essences. Science presupposes, hence, ideal objects in general as necessary implements of scientific theories. But the domain of possible objects given in the phenomenological attitude is according to (1) restricted to the social lifeworld with social psychology as a basic discipline. The restriction of phenomenology to a mundane phenomenology of the social lifeworld once again invites psychologistic or sociologistic interpretations of ideal objects.[45]

Schutz and others rejected the transcendental phenomenological reduction because they rejected the idealistic, almost Fichtean, consequences of the *ontic* interpretation of the transcendental phenomenological reduction in the *Cartesian Meditations*, an interpretation that has been considered above in Sect. 2.4. Presupposing, on the contrary, the *epistemic* interpretation of the transcendental-phenomenological reduction and the phenomenological attitude, it is correct to say with (1.b) that the social lifeworld is given in *direct intention* for subjective consciousness as an intersubjectively given transcendent social world. This whole context is, however, given for the phenomenological attitude in *oblique intention* as the universal structure of the social lifeworld.

This takes care of the first problem of the controversy, i.e., (1.a) versus (2.a) and (2.b), concerning the question whether the sphere of ownness is a necessary structural aspect of the participating subjects as psychosomatic unities, living bodies, in the social world or not. Presupposing the epistemic interpretation, the sphere of ownness can be discovered with the aid of the egological and the primordial reduction as the genetic foundation for all higher levels of active intentional and intersubjectively determined consciousness. But as mentioned above in Sect. 3.1, these reductions are implied as correlates of abstractive reductions within the residuum of the universal transcendental-phenomenological reduction.

The epistemic interpretation of the phenomenological reduction is, hence, able to deal with the problem of psychologism or sociologism in epistemological reflections on the human sciences (2.d). Epistemological reflections on the natural as well as the social sciences have to use independent phenomenological reflections on the givenness of formal and material essences and their application in the empirical sciences. In addition they have to presuppose phenomenological reflections on the static and genetic constitution of the structures of experience in the lifeworld on the level of pre-predicative passive synthesis and the structures of sensual experience.

According to the *Logical Investigations* phenomenological investigations offer a general theory of knowledge, a *Theorie der Erkenntnis*. In the phenomenological and Neo-Kantian tradition, but also elsewhere "epistemology" is understood in this

[45]Except for some hints about Husserl's reflections on logic, almost nothing can be found about the methodology and epistemology of the formal sciences in Schutz.

broad sense as a term for a general theory of knowledge.[46] The present investigation is interested in "epistemology" in the narrower sense. It is a phenomenology of *scientific* knowledge of the *empirical* sciences and their methodology as a part of a theory of scientific knowledge in general, i.e., of a *Wissenschaftslehre*, theory of science, and a theory of scientific knowledge is in turn a part of a theory of knowledge in general, including the knowledge implied in elementary understanding of practical knowledge. In contrast, a phenomenological epistemology in the broad sense is interested in *all* subjective intentional acts and intersubjective activities because all of them imply "knowledge," understanding, of their intentional objects as their correlates. Thus it includes the phenomenological reflections on intentional acts and syntheses in the practical activities of elementary understanding and in systems of first-order higher understanding such as religion, poetry, arts, etc., that refer to practical actions and interactions.

A phenomenological theory of knowledge in the narrower sense is interested in critical reflections on the scope and limits of pure theoretical knowledge. It can be called a phenomenological theory of science, i.e., a *Wissenschaftslehre* in the sense of Schutz. Science in this broad sense is a genus of higher understanding. Other genera of higher understanding include contemplations of practical purposes, e.g., religions promising salvation and fine arts promising aesthetic experiences. As pure scientific knowledge theoretical knowledge presupposes an abstraction from all practical purposes. In addition theoretical *scientific* knowledge already implies the claim to be objectively valid knowledge.

Seen from the viewpoint of phenomenological epistemology, objective validity is the objective correlate of intersubjective validity in principle. The term "in principle" means that the intersubjectivity is not restricted to the relative intersubjectivity of this or that concrete cultural community. The main problem for a phenomenological epistemology in the narrower sense is, hence, the justification of the claim that objectively valid knowledge is possible, along with the question of how it is possible in different regions of intentional objects and the task of determining the limits of this knowledge in the sciences.

Solutions for the problem of offering criteria for objective validity in traditional *universal* philosophical systems, e.g., the system of Hegel, have the advantage (or disadvantage?) that they are always ultimately self-referential. Such ontic claims are, as mentioned above, a priori in brackets for the epistemic understanding of the transcendental-phenomenological reduction. Left for other parts of a general phenomenological theory of science, a *Wissenschaftslehre,* is a phenomenological epistemology, i.e., an epistemology that is interested in the general structures of possible justifications of the claims of objective validity in other types of sciences.

Subjective actions and intersubjective interactions on the level of practical life in elementary understanding and higher understanding, e.g., in the fine arts, already follow methodical rules. The pre-scientific justification for the rules is the experience that they usually helped to realize the goals of actions and interactions

[46]Cf. e.g., LI 2010.

in the past. Sophisticated activities on the level of lower understanding in the crafts, but also on the level of higher understanding such as cult interactions, memorizing sagas and myths, or the interpretation of texts that are significant for the tradition are usually called disciplines. Reflections on methods presuppose methods that are already practiced. A discipline presupposes a doctrine of methods as a more or less systematically ordered collection of rules and general methodical principles. A doctrine of methods presupposes reflections on methods that are already used in the discipline.

Doctrines of methods of a discipline always have practical goals. The emergence of a science has its generative foundation in disciplines and their practical goals. The goal of the sciences and their methodologies, though they might admit practical applications of their results in technologies, is first of all theoretical knowledge. However, sciences need more than a doctrine of methods. Scientific research requires a methodology. A methodology is a doctrine of methods together with the epistemological justification for the claim that these methods can serve as warrants for the intersubjective validity in principle, i.e., the objective validity of the application of the methods.

Doctrines of methods and then methodologies are descriptions that always implicitly refer to cogitative types, i.e., more or less closed systems of intentional acts and active syntheses in which certain types of intentional experiences of objects are given. The task of a phenomenological epistemology is the analysis of methodologies as such along with cogitative types and their objective correlates. A phenomenological analysis is, in this sense, interested in what scientists do, and not in what they ought to do according to pre-given normative principles. Such descriptive accounts are, however, accompanied by critical reflections on possible justifications for the claim that the methodology does or does not warrant intersubjective validity in principle for its results.

A methodology of a science has to determine the type of admitted theoretical constructs guiding the search for promising hypotheses. It determines, secondly, the basis, the type of objects that can count as objects of the science. This determination presupposes a *methodological abstraction*, i.e., the determination of a limited ontological region of objects with a common formal and material categorial structure[47] in the residuum of the abstraction, with all other types of objects always bracketed. The universal realm in which such abstractions are possible is the lifeworld. Closely connected with the problem of methodological abstractions is the problem of how far and in what sense scientists are or can be so-called "disinterested observers," "value free" in their judgments, etc.

The "first axiom" of a phenomenological epistemology is that the basic structures of the lifeworld in general that have been considered in chapter II are the generative foundations of the methodological abstractions that are constitutive for sciences. From the very beginning scientists are not isolated Cartesian subjects discovering

[47] "Category" and "categorial" are here and later in this investigation used in precisely the sense determined in the explication of the meaning of these terms in Sects. 2.2 and 2.3.

criteria of objective validity by themselves. Objective validity is first relative to intersubjectivity for a community, and, seen from a phenomenological point of view, the ideal of scientifically objective validity is the correlate of intersubjective validity in principle. In science, intersubjective validity in principle is not an absolute validity as "absolute evidence." The conditions of intersubjective validity in a science are determined by the methodology of the science. Intersubjective validity in principle can only be reached by those who follow the principles of the methodology. No relativism is implied because the methodology determines from the outset what can count as an object of a science.

A methodology must, hence, determine the methods that can serve as warrants for the confirmation or disconfirmation of the assumed judgments, the (hypotheses of the science) about the objects of the basis in the residuum of the abstractive reduction. The objects of the *formal* sciences are ideal objects. They are given in eidetic intuition and formalizing abstraction. In case of the formal sciences, the methodological abstraction that determines in its residuum the type of objects that can be objects of the formal sciences is formalizing abstraction. The methods of the formal sciences are formal proofs or decision procedures that serve as warrants either for verifications of hypotheses assuming that certain well-formed formulas are theorems of the system, or for their falsification, the denial that they are theorems of the system.

Of interest for this investigation is, however, first of all the system of the *empirical* sciences, the natural as well as the human sciences. Not very much has been said in Husserl's writings and the phenomenological literature after Husserl about the specific *epistemological* problems of the empirical sciences. Of interest for empirical sciences in general are objects that are accessible in *intersensory observations*. Seen from the viewpoint of a phenomenological epistemology, this means that the observables are, *as intersubjectively accessible* observables given as observable objects in the *lifeworld*. Even positivists and analysts admit that observations are of interest for the empirical sciences only if they can be "intersubjectively verified," but positivists and analysts are usually not interested in analyzing the implications of this methodological principle. It is essential to note that the terms "intersensory" and "intersubjective" are meaningless in the residuum of the methodological abstraction that is constitutive for the natural sciences because an explication of the term "intersubjectivity" necessarily implies references to contents that can only be given in the secondary understanding of life expressions in the lifeworld.

Two types of objects for empirical sciences given in intersensory intuition can be distinguished:

1. It is possible to abstract from all properties of objects, for instance ideal objects or objects mentioned in (2), that cannot be given in immediate intersensory observations in the *present*.
2. It is possible to include in the residuum of the abstraction what is not immediately present, but can be appresented in the present in life expressions of other living bodies that are given as intersensory observables in the lifeworld. The additional content of intersensory observations (2) is, roughly speaking, what can be given in the secondary understanding of immediate and fixed life expressions.

The methodological abstraction that is constitutive for the *natural sciences* admits in its residuum only observable objects of type (1) and excludes observable objects of type (2). This abstraction brackets, therefore, all aspects in intersensory given observables that imply appresented contents. A detailed analysis of this abstraction will be given in Sects. 7.1 and 7.2. The immediate objects in the residuum (1) have to be accessible in intersensory (i.e., intersubjectively accessible) sensory observations and only such observables can be admitted as relevant for the methodology of the natural sciences. The methodological abstraction of the natural sciences determines the region of observable objects that are relevant for the natural sciences, but it does not imply that the *theoretical entities* of the natural sciences have to be accessible in intersensory observations. Descriptions of the theoretical objects of physics presuppose in addition the language of mathematics, and this language originally refers to ideal objects, not to real objects. The epistemological problems connected with the application of mathematics in the hard sciences will be considered in the extensive analyses of Sects. 8.3, 8.4, and 8.5.

What theoretical entities are for the natural sciences in general is determined in at least logically compatible statements or in axiomatic systems of statements. Such statements, the so-called "laws of nature," are universalized conditionals that refer in the antecedent to causal conditions and in the consequent to effects of causal conditions. A methodology of the natural sciences must be able to determine criteria that are able to justify the claim of such statements to be universal and to determine the specific character of this universality. Universalized conditionals of this type are called hypotheses before they are tested with the aid of the criteria, i.e., before they are tested in experiments that are able to decide whether their claim to be universal can be confirmed or disconfirmed. The natural law only covers cases of what is. Laws understood in social contexts determine first of all what ought to be. A philosophically conscious metaphorical transfer from the understanding of the latter meaning of the term "law" to the former ought to be aware of the monotheistic implications of such a transfer. The criteria can be found and have been found in descriptions, and that means phenomenologically acceptable descriptions of what natural scientists in the lifeworld do and have done by Herschel and Mill. Analysts have added logical and methodological refinements that will be considered in Sects. 7.2 and 8.1.

A methodology of the natural sciences has to justify why and how predictions of events in the near future but also in longer distances in the future, are possible. It must, furthermore, justify how and why such universalized conditionals can be used to provide explanations in the past and to determine what has really happened in the past in connection with further observations in a history of nature. The problem of natural history and its relation to history as a human science will be considered in Sect. 9.1. Natural sciences also require methodological guidelines for the determination of the conditions that are able to justify predictions of events.

The objects of the empirical basis of humanistic disciplines are according to (2) life expressions, and their theoretical goal is the scientific interpretation of the meaning of the life expressions. What is meant in life expressions are contexts of lower and higher understanding. The objects in the empirical region

of systematic human sciences, i.e., psychology and the social sciences, are life expressions of contemporaries given in the present including fixed life expressions and immediate life expressions. The historical human sciences are restricted to fixed life expressions of predecessors in the past context of a more or less foreign lifeworld. *Prima facie* it is more promising to ask first for the justification of the claim of the systematic human sciences to be empirical sciences.

Like the natural sciences the systematic human sciences have an interest in the discovery of causal relations and causal laws. This is possible because facts given in the region of objects for the systematic human sciences are *presently* given immediate and fixed life expressions. However, discoveries of causal relations in this field presuppose interpretations, and with this presupposition the epistemological question whether and how interpreted life expressions can be the referents of judgments about causal relations. Seen from here, it is better to start with the historical humanistic disciplines. The facts in the empirical basis of historical human sciences are *only* fixed life expressions of authors in a more or less distant and foreign past, and the problem of causal relations is reduced to the problem of historical explanations. History is not and cannot be interested in the discovery of causal laws in the present. It is interested in historical facts in the past, and it is meaningless to test predictions of the effect of a cause in the past. What was the effect of a cause in the past has already happened as an event in the past.

A *caveat* must be added. Human sciences, and especially the historical human sciences, will be analyzed as *empirical* sciences, i.e., as human sciences applying the methodology of philological-historical research that will be analyzed in Part II. Human sciences are usually defined as recognized academic disciplines using all kinds of methods, including interpretation schemes that imply explanatory schemes and, hence, vaguely defined causal relations.[48] It is also more or less implicitly recognized that the final goal of the human sciences is not merely the interpretation of the meaning of fixed life expressions but beyond this the application[49] of this meaning for and in the context of the present system of first-order higher interpretations. Such universal schemes of interpretation imply more or less explicitly and in different ways a certain primacy or priority of the human sciences over the natural sciences. Of basic significance for a phenomenological epistemology of the empirical sciences is that Husserl himself also defended such a priority in his writings since *Ideas II*.

Reading *Ideas II* and later works of Husserl, e.g., the *Crisis*, the reader is left with the impression that in the case of the natural sciences the residuum of the abstractive reduction is a region without a soul (*entseelt*) and as such is opposed to the concrete

[48]Such schemes guide, e.g., psychoanalytic interpretations of events and/or texts and works of art and their authors, but also deconstructions of texts. The earmark of such interpretation schemes is: one size, i.e., in such cases the same theoretical background, fits all; cf. below esp. Sects. 6.1 and 6.4.

[49]Of central significance in this respect is Gadamer 1965 in the wake of Heidegger's fundamental ontological interpretation of "understanding."

lifeworld, whereas the lifeworld is the ontological region of the human sciences. This region is the spiritual world (*geistige Welt*), and the spiritual world has priority over the material world. This is, of course, more than one step in the direction of an *ontic idealistic interpretation* of the transcendental-phenomenological reduction and is not compatible with an *epistemic interpretation*. Thus according to the ontic interpretation of the residuum of the transcendental-phenomenological reduction, the region of the human sciences is the lifewold as the spiritual world, and Husserl was, therefore, able to say that transcendental phenomenology is coextensive with Dilthey's spiritual world (*geistige Welt*).[50] The problem with this account of the region of the human sciences is whether the human sciences can still be recognized as empirical sciences at all, because in this case it is not possible to determine the realm of observable objects that are objects for a methodology in the residuum of a methodological abstraction. In other words, it is difficult to distinguish between the human sciences as empirical sciences and phenomenological descriptive analyses.

The foundation of the empirical basis of the methodological abstraction of the natural sciences is the encounter with the natural environment in the lifeworld. This methodological abstraction brackets all practical interests, purposes, and values of elementary understanding and all other systems of higher understanding. Since the attitude of the natural sciences as a genre of higher understanding is determined by this methodological abstraction, a natural scientist is in this sense a "disinterested observer and researcher" of nature after the reduction. The interest left is a theoretical interest. Other interests and their objects have a place in the residuum of the abstraction of the natural sciences only if they can be "explained" as "epiphenomena." An answer to the question of what "explanation of epiphenomena" might mean can only be given after the epistemological analyses in the following chapters of this investigation.

A consequence of this understanding of the abstractive reduction that is constitutive for the natural science and assumes the *ontological* priority of the lifeworld or the world of the spirit (*geistige Welt*) as the domain of the human sciences[51] is that it is questionable how "disinterested" observations and empirical research will be possible for the human sciences. Arguments by analogy can be misleading, but they

[50] See Hua IV, esp. §§49, 53, and 64, cf. Seebohm 2013.

[51] The *Crisis* and *On the Origin of Geometry* is in the center of the interpretations of Husserl's turn to history in Hopkins 2011, 174ff and Moran 2013 chapter 5, but history is already of significance in *Ideas II* in reflections on Dilthey, Rickert and others interested in the epistemology of the human sciences, cf. Seebohm 2013. Of interest is in this respect that the appendices XII and XIII of Hua IV reveal an ambiguity in Husserl's account of the historical human sciences. What is said about history and the historical or spiritual world as a world given in the natural attitude in XII is precisely that what is said about the lifeworld as the world given in the natural attitude in XIII. The *Crisis* and related manuscripts in Hua XXXIX neglect the epistemological problems of a scientific "history of facts." What is of significance are reflections on the "meaning of history" as universal history, its teleology etc., in short what has been called "philosophy of history" since Hegel, i.e., metaphysical considerations beyond attempts to develop an epistemology of history as a science, cf. Moran 2013, 143–147.

can be useful guidelines in the search for promising assumptions. The originally guiding interest of interpretations is the need to restore communications and interactions and, therefore, always connected with applications and rejections. The assumption by analogy is that the interest in involvements in interactions, in applications and rejection must be bracketed if the studies in the humanistic disciplines can become human sciences and the attitude of the human scientist can be understood as the attitude of a "disinterested observer."

There is, of course, the epistemological question of the presuppositions of the possibility of the attitude of a "disinterested observer." It is, therefore, worthwhile to presuppose at this point not the ontic but the epistemic interpretation of the transcendental phenomenological reduction in order to indicate a possible partial explication of the meaning of "disinterested observer" with the model of methodological abstractions as necessary implications of the methodologies of sciences.

The human sciences are, according to Dilthey but also others, e.g., Alfred Schutz, understanding sciences. Presupposing what has been mentioned above about the typology of understanding, it can be said that within the lifeworld, the human sciences are only interested in and reduced to the region of *secondary understanding* of first-order elementary and higher understanding of *Others*, i.e., the understanding of the meaning of immediate and fixed life expression of contemporaries and predecessors as observable objects. All other aspects of the lifeworld given in first-order elementary and higher understanding of the interpreter are excluded. This abstractive reduction that determines the region of the human sciences in general can also be understood as a partial explication of the meaning of "being a disinterested observer" in the human sciences. It can also be considered as an analogue of the methodological abstraction that determines the region of the natural sciences in general as the region that is originally given as the natural environment, an independent part of the structure of the lifeworld.

What follows are some hints that require further analyses, but are sufficient for a preliminary outline of the tasks of a phenomenological epistemology and a preliminary answer to the question why this investigation begins with history as a science, then turns to the natural sciences, and considers the systematic human sciences, i.e., psychology and the social sciences, at the end in Part IV.

The goal of the philological-historical method (and of archaeological methods) is the interpretation of fixed life expressions of author(s) in the past. There is, hence, within the residuum of the first abstraction the specific methodological abstraction of the *historical* human sciences. This reduction is implied in methodologically guided secondary interpretations of what life expressions meant in their own temporal context in the past, and not in the present temporal context of the interpreter.[52] What is excluded or bracketed in such *interpretations* are all *applications* and *rejections*, all evaluations of the contents of the interpreted fixed life expressions from the viewpoint of the first-order elementary and higher understanding in the present temporal context of the interpreter. The structural foundation that admits

[52] A detailed explication will be given in Sects. 5.3 and 5.4.

such a separation of interpretation and application is the temporal distance between the lived intersubjective time of the author(s) of the fixed life expression in the past and of the interpreter in the present.

History as a science is a special case. History and histories are usually understood as narrations about sequences of events that have happened in the past. A separation of interpretation and application in such narratives as products of creative writing is possible, but it presupposes in these cases the results of *history as a science*. Historical narrations that can count as reports of the results of history as a science emerged only together with and after the emergence of methodologically guided historical research. Scientific historical research presupposes interpretations of historical sources including pre-scientific historical narrations, that apply the methodology of the philological-historical method. A detailed analysis will be given in Sect. 5.5. Beyond that, however, historical research is first of all interested in the reconstruction of what *really* happened in the past. What history adds to philological research is the reconstructive determination and explanation of past sequences of events in the general framework of intersubjective time.

In its interpretations of the meaning of the actions, interactions, and events in the past for the past history is still bound to the methodological abstraction of the philological-historical method, but history transcends the limits of this abstractive reduction because its reconstructions presuppose the spatial and temporal structures of the lifeworld in general. History accordingly includes dimensions of the lifeworld that also belong to the natural environment and this means the basis of the methodological foundations that are constitutive for the natural sciences. In this respect history has the potential of serving as a mediator in the alleged strict opposition between the natural sciences as sciences of explanation and the human sciences as sciences of understanding. In this respect the relation between history and the social human sciences is of crucial epistemological significance.

The period in which history as a science is able to apply the methodology of the interpretation of fixed life expressions of predecessors is limited. The history of cultures without a literary tradition, i.e., so-called pre-history, is still accessible for archaeological research, but even archaeological research is in this period increasingly replaced by research in paleontology. Paleontology is, however, already a discipline of natural history, and research in paleontology must exclusively apply explanations taken from the natural sciences, explanations that have been used in history as a human science in its reconstructions only as additional sources for the reconstruction of temporal sequences of events and in explanations. A final evaluation of the significance of pre-history, archeological research, and paleontology for the status of the historical human sciences in the system of the sciences will be given in Sect. 9.1.

The second historical phase in which the methodology of fixed life expressions of predecessors in the past is no longer applicable is contemporary history. The temporal distance that provided the foundation of the possible separation of interpretation and application of fixed life expressions of predecessors decreases and finally vanishes in a past that is only given as the past horizon of the actual present of interpretation. It is, hence, difficult to find a convincing epistemological justification

for a possible separation of interpretation and application and for the claim that research in contemporary history can offer "objectively valid" interpretations of "disinterested" interpreters. The systematic human sciences are first of all interested in social events in the actual present and their immediate past and future horizon. Thus they share the basic methodological difficulty of contemporary history. A possible of coping with this difficulty is the *diagnostic dialogue*, a method that will be considered in Sect. 10.3.

The systematic human sciences are interested not only in explanations of events in the past horizon of the present, but also, like the natural sciences, in predictions of future events. Research carried out with the aim of proposing well-grounded hypothetical predictions presuppose research interested in events in the past horizon of the present, the realm of contemporary history, and beyond that the results of historical research about relevant developments in a more distant past.[53]

It will be shown in Part IV not only that the social sciences are a necessary extension of history, but also that they presuppose and imply history as a science as their foundation. Both together are sciences that presuppose interpretations, but they also imply the *first-order* elementary and higher understanding of the natural environment of the lifeworld of the interpreter. This first-order understanding has to be bracketed in the interpretations of philology and archaeology, but it will turn out that even the philological-historical method has its historical aspect, and history as the science of the reconstruction of what was really the case is more than an understanding science or, in the terminology that has been introduced above, a science of interpretation, i.e., methodologically guided second-order understanding. Setting aside what will be called genuine historical explanations, history can borrow explanatory results from the natural sciences for its reconstructions of past real temporal sequences and explanations. In addition the social sciences can borrow results of the natural sciences for the determination of initial conditions that are relevant for predictions in the social sciences. History as a science and the social sciences are sciences in a lifeworld with natural sciences, and the natural environment is given for them in this context not only as the natural environment of the lifeworld, but also as the region of the higher understanding of the natural sciences.

A *caveat* has to be added. The critique of Dilthey's and Rickert's epistemological reflections on the system of the sciences will have consequences for the critical re-evaluation of Husserl's phenomenological reflections on the difference between the natural and the human sciences and the relations between psychology or history and transcendental phenomenology in the following investigations. Of significance are first of all the epistemological problems of the interdependencies between the human sciences and the natural sciences; the partial foundation of the social human sciences in history as a science; and history as a science with a

[53]First of all, the history of technology, of economics, of the law, and of political history all provide necessary material for the development of the "constructs" that are of interest not only for explanations, but also for predictions in the social sciences. Cf. Sects. 9.2 and 10.4.

methodology that presupposes the methodology of the sciences of interpretations of fixed life expressions, especially philology (and the interdependencies between these problems are significant as well).

What can be found in this respect in Husserl's later writings on history and the relation between history and phenomenology[54] will be at least partially incompatible, i.e., materially eidetically and not merely formally inconsistent, with the results of the following epistemological investigations. It will, however, be possible to show that the solutions for the three problems that are offered in the following investigations are compatible with the interpretation of Husserl's phenomenological analyses of the structures of the lifeworld in general that has been offered in Chap. 2. What has to be added are only the compatible extensions to Husserl's analyses, first of all in Sect. 3.2, the typology of understanding and in Sect. 3.5 on causality.

[54] An interpretation of all essential aspects of Husserl' s phenomenological account of history can be found in Ströker 1987, esp. ch. IX, but also in chs. X and XI. The interpretation includes numerous references to the German literature about Husserl and history.

Part II
The Methodology of the Historical Human Sciences

Chapter 5
History as a Science of Interpretation

5.1 Doctrines of Methods of Humanistic Disciplines and the Problem of the Developments of Methodologies for the Human Sciences

The materials of the historical humanistic disciplines are fixed life expressions authored in the past, and especially in a distant past that is more or less foreign to the present. The methods of the historical human sciences presuppose each other in various ways. History is the reconstruction of a past real lifeworld and its historical development. The presently pre-given facts for historical reconstructions are first of all the already philologically interpreted texts. This does not imply that historians have to wait until philologists have interpreted the texts. Usually historians are themselves well trained in interpreting texts reporting events and actions that have been of significance for historically relevant developments, e.g., annals, contemporary historiographies, and legal sources, including treaties and reports about diplomatic activities.

Philologists are first of all interested in literature belonging to other branches of higher understanding in a past lifeworld: poetic, religious, and philosophical texts. They are less interested in the interpretation of law texts and texts of the natural sciences. However, philological research also presupposes historical research. Questions belonging to the interpretation of a text often immediately imply questions about the author and her/his biography. A biography is, however, a historical reconstruction of a past reality and has to use the methods of historical research. Finally, philological research is incomplete without research in the field of the history of poetry, of religions, of philosophy, and last but not least, of the sciences, and this research too once again implies historical investigations. The method of philological research has, therefore, often been called the philological-historical method.

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Modern historical research presupposes in addition archaeological interpretations of presently given artifacts and monuments created in a past lifeworld. Archaeological interpretations can use interpretations of texts with information about the use and the purpose, i.e., the meaning, of artifacts and monuments whenever this is possible. This possibility is, however, restricted to historical archaeology. The situation is different in pre-historic archaeology, i.e., in the case of past lifeworlds without literary traditions.

The development of methodologies for the historical human sciences has its generative foundations in the development of philology, archaeology, and history as disciplines that had not yet been recognized as sciences before the nineteenth century after the emergence of the natural sciences in the sixteenth century. It will be useful to have a look into the development of the doctrines of methods of the historical human disciplines before the emergence of the ideal of hermeneutics as a methodology first for philology and then for classical archaeology and history. A possible methodology beyond a doctrine of methods for history as a science presupposes first of all a methodology for the interpretation of historical sources and the determination of the scope and the significance of this methodology for historical research. It is, hence, necessary to start with philology.

The methods of philological research are of basic interest for the doctrine of methods of the historical human disciplines. Philologists reflecting on their methods already discovered in the age of Hellenism general methodical viewpoints for correct interpretations. A first group of such rules has been derived from the theory of the levels of hermeneutics.[1] The presupposition for correct interpretation is the correctness of the grammatical interpretation of texts, including as higher levels etymology, the explanation of historical facts and technical terms, and finally, the interpretation of rhetorical and poetic figures. The highest level of hermeneutics was the level of aesthetic and literary criticism.

The theory of the *levels of hermeneutics* implies analogues of falsifications and verifications of proposed interpretations. Interpretations of style and genre are falsified if they presuppose errors in the grammatical interpretation of the text. Interpretations of the genre can be falsified if they presuppose errors in the interpretation of the style of the text. Falsifications of assumptions on the grammatical level can falsify in addition assumptions concerning interpretations of style and assumptions on the level of generic interpretations.

A *caveat* must be added. This use of "true" and "false" means "satisfies a pre-given norm" or "does not satisfy the norm" for philology as a discipline. The philologists of Classical Antiquity and later the humanists of the Renaissance understood the rules of grammar and all other rules derived from higher levels of interpretation not only as rules for correct interpretations, but also as normative rules

[1] Hermeneutics or the art of grammar was the name for a doctrine of methods in Classical Antiquity, in the middle Ages, and in the tradition of the humanists. But the name was also had been used later for the methodology of philological-historical research in the nineteenth century. cf. Seebohm 2004, §2.

for the correct use of language in oral and written discourse. The knowledge of the language and its grammar was considered as an independent presupposition for possible interpretations of texts. The theory of literary genres was also understood as a normative guideline for writing and for literary criticism.

A second general viewpoint for a system of methodical guidelines for hermeneutics was the *canon of the whole and the parts*. Sextus Empiricus already discovered the circle of the whole and the parts as a basic paradox that can be used for the skeptical destruction of the ideal of truth of the scholars, i.e., the philologists.[2] A basic methodical rule of protestant biblical hermeneutics in the age of the Reformation recommended that the main task of understanding is to understand the *scopus* of the text. The *scopus* is the leading intention of a text revealing the whole of its meaning. The understanding of the leading intention of the whole of the text is the presupposition for interpretations of the meaning of the parts of the text. Several formulations for this principle which was later called the second canon of hermeneutics, can be found in the philological research of the humanists before the nineteenth century.[3]

A methodology reflects and modifies the general methodical viewpoints and canons of a pre-given doctrine of methods. A modified theory of the levels of hermeneutics was necessary for the development of hermeneutics as the methodology of philological research. Boeckh distinguished lower and higher levels of interpretation and criticism. The lower level is the level of the objective conditions of texts, grammar, and the historical context; the higher level is the level of subjective conditions, and includes individual and generic interpretation and critique. Boeckh also distinguished different types of wholes, including the whole of the language, the whole of the historical context, the whole of the works of an author, and the whole of the text in generic interpretation and critique without referring explicitly to older formulations of the second canon.

It was Schleiermacher who proposed the general formula for the methodical rules that can be derived from the first canon of hermeneutics, i.e., the canon of the whole and the parts. He also proposed in his second canon a methodological principle that that can be used as a warrant of objective validity in interpretation[4]:

> The meaning of each word in a given place must be determined according to its being together with the surrounding words.

Schleiermacher's second canon is a canon for grammatical interpretation and critique, the parts are the words and the next surrounding wholes are the sentences. Dilthey generalized Schleiermacher's canon. He understood the canon as a meta-canon for methodical rules of the human sciences in general, and discovered that it is

[2] Sextus Empiricus 1949, in the title *Against the Professors,* the "professors" are the philologists.

[3] For the *scopus* principle see Seebohm 2004, 27, 44. For formulations of the second canon cf. Betti 1967, §16, 219–225.

[4] Schleiermacher 1959, 116f.

this canon that implies the famous circle of the whole as the circle of hermeneutics.[5] After Dilthey this circle of hermeneutics had a remarkable career, beginning with Heidegger's "circle of understanding" as a principle underlying all understanding.[6] It is, however, obvious according to *Being and Time* that the circle of understanding ought not to be understood as a methodological scientific principle in any sense. That the "circle of the whole and the parts" has a general ontological significance was known before Heidegger. Plato, for instance, already knew the problem of the whole and the parts as a problem in ontological reflections on being qua being. This career of the canon of the whole and the parts will be of significance in the following sections.

It is of significance for the understanding of these following sections to keep in mind what has already been mentioned: the doctrine of methods of philology as a discipline before the nineteenth century, Schleiermacher, Boeckh, and others. The question of the final task of the theory of the levels of hermeneutics and the canon of the whole and the parts are not merely rules for the interpretation of texts. These rules have also been understood as rules for the standards of correct or incorrect writing of texts. This understanding of the rules implies that the claims for truth in texts in the broadest sense ought to be applied by the interpreter. It can be admitted that the doctrine of methods, e.g., of the humanists before the nineteenth century, is able to prove that violations of the rules of grammar can lead to misunderstandings and "falsify" interpretations of the meaning of the text on higher levels if the interpreter and not the author of the text itself is responsible for the grammatical mistake. But if such violations occur in the sentences of the text, it is also always possible to assume that the author violated the rules of grammar and has to be blamed for that.

Misunderstandings in interpretations of the genre and with it the *scopus*, the leading intention of the texts, are possible on the level of generic interpretations. But when violations of the rules determining a literary genre occur in the text itself and these violations are discovered in an interpretation of the text, they do not falsify the interpretation. Seen from the viewpoint of the normative understanding of philological hermeneutics, they indicate that a text violates a norm and ought to be blamed for this violation on the level of literary criticism, the highest level in the theories of the levels of hermeneutics developed in late Classical Antiquity.

The final task of the humanistic studies of the literary tradition was to discover the ideal of true humanity. The unity of interpretation and application of the tradition of the old philologists and humanists is not broken. Their main purpose was, therefore, educational. Interpretation and application are not separated. But application always implies possible rejections. The methods of philology as a discipline had to serve a higher normative purpose. Its task was to decide the truth or falsity, the application or rejection of the truth claims not only of the interpretation of a text, but of the text itself. Interpretation and application/rejection are inseparable correlates.

[5] Dilthey GS 7, 217f; 243f; SW 3, 237f; 262f.

[6] Heidegger 1977, §32.

There is no room for a distance between the interpreter and the text, the researcher and his object. This distance is, however, the "presupposition of the possibility" for a methodology that can count as a warrant of intersubjectively recognized objective validity. A pre-scientific understanding of rules for interpretations of texts always implies normative aspects. But it is precisely the normative aspect that has to be bracketed in a methodologically guided interpretation of texts. It is not compatible with the systems of the hermeneuticists of the nineteenth century and with Schleiermacher's first canon of hermeneutics.

Archaeology has a short history. It emerges as a discipline in the Renaissance immediately together with the re-birth of interest in the literature of Classical Antiquity and the old ideal of philology in the humanistic interpretation of these sources. Normative viewpoints dominated the understanding of the re-discovered and partially "unearthed" monuments of Classical Antiquity. The arts and the architecture of the Greeks and the Romans were understood as archetypes of beauty and true humanity. Approximately until the middle of the nineteenth century the normative attitude, and with it the immediate unity of interpretation and application were an essential aspect of archaeological research. Archaeology became a part of "the sciences of Classical Antiquity" after the attempts of Boeckh and others to develop the methodology of philology in the nineteenth century. The next step toward a general historical archaeology was the growing interest in monuments of the culture of the Middle Ages, and then also those of East Asian and other cultures. The final step in the nineteenth century was then the discovery of so-called pre-historical cultures, the emergence of pre-historical archaeological research.

The development of a doctrine of archaeological methods in the nineteenth century was from the very beginning accompanied by methodological reflections. Some loose remarks about the methods of archaeology are possible and necessary to prepare the discussion of the central methodological problems in Sect. 5.4. These preliminary considerations already indicate that a methodology of archaeology cannot be reduced to the methodological problems of the historical human sciences as "sciences of understanding." The methods include aspects belonging to the methodology of the systematic human sciences, and even of the natural sciences and natural history.

Prima facie the essential methods of archaeology seem to be the methods of "digging out" and in general of the discovery of its objects, and the methods of determining the material and the age of the objects. Such methods use technologies that have been developed by the natural sciences. But such methods have also been used in other branches of the historical human sciences and the life sciences. Paleography, the search for and the dating of old manuscripts as a discipline of philology, and even paleontology as a life science have used and still use similar methods.

Essential for archaeology and paleography as branches of the historical human sciences is that the objects discovered are fixed human life expressions belonging to a past foreign human lifeworld, and not presently given traces of organisms of past periods of natural history. The goal of the search for the objects of archaeology is the

discovery of precisely such fixed life expressions. The essential task of archaeology as a branch of the historical human sciences is the interpretation, the understanding of the meaning of such objects.

The distinction between historical archaeology and pre-historical archaeology is of basic significance for a survey of the possible methods of archaeological interpretation. The methods that can be applied in the interpretation of artifacts belonging to elementary understanding and of monuments belonging to higher understanding without a literary tradition and the methods used for past lifeworlds with a literary tradition are different. Interpretations of pre-historical artifacts and monuments are interpretations of fixed life expressions of cultures without a literary tradition. Historical archaeology is restricted to cultures with a literary tradition.

The meaning of artifacts belonging to elementary understanding, including monuments as products created with the aid of tools and pre-given materials, can be understood without additional written information in cultures without and with a literary tradition.[7] What is required is first of all the understanding of possible applications of the tools to raw materials. This implies knowledge of the natural environment of the past cultural lifeworld. It implies, furthermore, the presently available immediate understanding of possible actions of the human body, and finally presently known conditions of successful communications via immediate life expressions in general. Such information can be gained in *quasi-experimental* actions of the interpreter in the present and can be backed by information borrowed from the natural sciences. Additional information can also be gained with the aid of comparative methods. Ethnology as a systematic human science is able to provide rich materials for comparisons with presently accessible cultures without a literary tradition. Such interpretations of artifacts of pre-historical cultures always have the character of complex reconstructions. They are reliable insofar as they presuppose aspects that belong to the structures of *elementary understanding* in the lifeworld in general.

Archaeological interpretations of monuments of pre-historical cultures in terms of the culture itself are impossible. Reports written by past contemporary authors belonging to a foreign culture with a literary tradition, e.g., the reports of the Spaniards about the highly developed Indian cultures in Middle and South America, are dubious methodical crutches. Left are only comparative methods assuming parallels between presently known non-literary cultures provided by ethnology.

Interpretations of monuments in past foreign literary cultures in terms of the culture itself are possible to the degree to which written materials about the meaning of the monuments for the contemporary systems of higher understanding of the past foreign lifeworld are available. An interpretation of, e.g., what a statue of a god in Classical Antiquity, an icon in a Greek or Russian Orthodox medieval

[7]There are aspects of cultures in past historical periods that have been neglected in the literature of these periods, because they belong to the realm of the elementary and higher understanding of illiterate working classes or because they belong to the secret traditions of sophisticated arts in the guilds of craftsmen.

church, or sculptures and paintings in Roman Catholic medieval churches meant for the contemporaries presupposes the interpretation of contemporary literature. Their main significance was certainly *not* that they are works of fine art of a high aesthetic quality. The upshot is that interpretations of monuments in cultures with a written tradition presuppose philological interpretations of contemporary texts with reports about the meaning and significance of the monuments. In such cultural contexts, archaeological interpretations and their historical dimension are, therefore, an essential part not only of the history of the arts and architecture, but also of the history of ideas of past cultural lifeworlds.

Reflections on methods of *history* as a discipline have to distinguish between methods of historiography and methods of historical research. Essential for such reflections is the distinction between the simple historical search for historical sources and higher-level historical research, including historical critique. Only historical critique is able to develop methodological criteria for intersubjectively convincing decisions of open historical questions.

In the beginning history was a special type of literary genre for narrations about what has happened, and such narrations of significant events and actions that happened in the past, i.e., history, are understood as historiography. Taking further steps of the development of history into account, two types of historiography can be distinguished. On the first level we have narrations about what happened in the immediate past of the present. In other words, they report what happened in their now past contemporary history: annals, histories about past significant chains of events, e.g., the Peloponnesian war of Thucydides, autobiographies, and memories. Higher-level historiographies are narrations of historical developments of deeds and events in larger periods in a more or less distant past. They have to use the reports of the first level and other sources, such as treaties, files of legal decisions, and other material.

The writing of historiographies on the first level already presupposes the gathering, and in some cases also the possible critical evaluation, of information. It implies historical research, reconstructions of a past reality. Such methods of investigation presuppose in the beginning nothing more than the methods of questioning what happened and why and how it happened in the past horizon of everyday experience in the lifeworld. What really happened, what was the case, is a historical fact. Asking for facts of the immediate past in everyday experience implies asking for causal explanations. How causes and explanations are originally understood in lifeworlds without science has been mentioned in Sect. 3.3 above.

Only lifeworlds with sciences can also use scientific causal explanations and their understanding of causes. Well-known sophisticated models for such investigations of what really happened and why it has happened are the investigations of responsible journalists or criminal investigations in the court of law. Such disputes can trust or doubt the reports of the memory of witnesses, i.e., oral discourse, other immediate life expressions, and written documents. They can rely, furthermore, on "silent witnesses" of traces of the past that can be found in the natural environment. Finally, they can rely on or doubt the reports of oral or written traditions for more distant phases of the past horizon of the present.

The available materials for the type of research that is presupposed in historiographies of the second level are historiographies belonging to the first level, and in addition other written documents. The research can be accompanied by critical assumptions. Such critical assumptions are restricted to the question whether the sources are trustworthy or whether they lie or partially hide or bend the truth, or whether documents (and especially legal documents) are falsifications.

The selection of the sources and the critical evaluation of the material in historiographies are not only guided by an interest in finding out the truth about what happened. In the last instance, the guiding intentions behind such historiographies reporting the outcome of historical research always imply norm-guided evaluations. Historiographies are, like some other literary genres, *prima facie* valuable for the present because they can be used for entertainment. Their main purpose is, however, to convince the reader that their interpretation of what happened ought to be applied in the present, but this means vice versa that their way of understanding and evaluating the past is determined by the present situation of the historiographer in her/his present cultural lifeworld.

The early Roman histories are collections of reports about deeds of famous Romans that can serve as normative examples of Roman virtues. Histories of the life and the deeds of saints as well as biographies of famous persons demand admiration and imitation. The goal of histories about the life of prophets serves in addition the task of propagating their teachings and demanding that everybody ought to follow these teachings. The final goal of histories of towns like Rome, and of later empires and nations is to praise their significance and fame and to demand the promotion of the common weal of one's own community in the present. Universal histories and world histories understand historical development as the history of religious salvation or as the secular salvation of humankind through the progress of human reason.

Without entering into the discussion of epistemological problems, some remarks are possible about changes in the web of relations between historical research and the genres of historiography as consequences of methodologically guided historical research. Research in history as a discipline presupposes methods. Research in history as a science requires a methodology that can serve as a warrant of intersubjectively recognized objectivity for the evaluation of the confirmation or disconfirmation for proposed interpretations and reconstructions. Without this a simple search for sources, even if it is accompanied by critical remarks about the sources, can be called research only in a restricted sense. But methodologically guided critique is not only critique of the sources; also it implies a critical check of past historical research, and this means critique both of historiographies of the second level and of historiographies based on historical research that is already methodologically guided.

The new situation causes changes in the system of historiographies. We have, on the one hand, a new genre of writing history now including articles in journals and books about special research problems. Reports about events in the past are now connected with reports about the research procedures applied;, with rejected assumptions in other available historiographies, information about justified results

in the literature; and last but not least, with attempts to determine whether or not open questions can be decided with available primary sources and other information.[8] Apart from biographies and comprehensive historical narrations about historical development in certain periods for laymen or as a source of quick information, all other genres are obliged to indicate their relation to the state of the art in footnotes, quotations, and general references to other literature.

The reconstructions of history can rely on the preparatory work of philological and archaeological research and interpretation of fixed life expressions in general including texts. Historical archaeology can use in addition to its own methods, philological interpretations of texts for the interpretation of archaeological material. This cooperation is indispensable for interpretations of monuments that belong to the level of higher understanding in past cultural lifeworlds. The distinction between history and prehistory is strict seen from a methodological point of view. But this does not exclude that there is, regarding the material, a grey zone between both. First, there exist, as already mentioned, written contemporary sources about cultural monuments within cultures without a written tradition of their own, written by more or less sympathetic contemporary observers belonging to cultures with a written tradition. Secondly, there are some so called eminent texts, e.g., the Iliad, the New and the Old Testament, and the Koran, that can provide guidelines for the understanding of cultural monuments and are available for philological research. Pre-historical archaeology can be helpful for the decisions of some open questions in such cases.[9] Finally, written sources belonging to the first level of historiography of earlier periods report almost nothing about the historical development of the lower classes in a past cultural lifeworld. This implies that they are also silent about sometimes very significant technological and even economic events, e.g., successful new inventions, on the level of elementary understanding.[10] Historical research is in this case restricted to archaeological sources.

These reflections on the material, the presently given facts for the human sciences, and the methods of history as a discipline indicate two necessary distinctions for history, but also for archaeology and philology. There is first the distinction between pre-history and history. Seen from the viewpoint of available material and applicable methods "pre-history" can be defined as the history of non-literary cultural lifeworlds. The available material for historical reconstructions is restricted to artifacts and monuments as fixed life expressions. No material for philological interpretations is available. Only the material for archaeological research and the methods of archaeological interpretation are left.

The second distinction is the distinction between interpretation and application, and especially the issue of the possible application of historical reconstructions

[8]The old technical term for the negative answer is "*non liquet,*" i.e., "there is not enough information."

[9]However, there are sometimes also controversies between philologists and archaeologists, e.g., in the last decade the controversies about the origin of the *Iliad* and the location of Troy.

[10]For instance, the invention of windmills in the Middle Ages.

and applications. The unity of interpretation and application in historiographies and their underlying historical research was not dissolved on the second level of the development of historical literature. What has been said up until now about methodologically guided historical research and historiographies already implies some consequences for this unity. It can be assumed that this unity has to be completely dissolved for methodologically guided historical research, and is also only of restricted significance in historiographies on this level in a lifeworld with sciences.[11]

5.2 The Canons of Hermeneutics: A Critical Re-Examination

The first steps towards a precise epistemological analysis of a methodology for empirical research in the natural sciences were carried out by John Stuart Mill and his immediate forerunners, first of all John F. W. Herschel, at the end of the eighteenth and the beginning of the nineteenth century.[12] A methodology of philology, i.e., a methodological hermeneutics, exists in the first half of the nineteenth century since Schleiermacher and Boeckh.[13] A first comprehensive methodology of history can be found in Droysen's lectures and a short published outline of the lectures, the *Historik*, in the second half of the nineteenth century.[14] Archaeology is a special case. The distinction between artifacts requiring elementary understanding and monuments belonging to the realm of higher understanding, and the parallel distinction between historical and pre-historical archaeology mentioned in the last section, are essential for a methodology of archaeological interpretation. Books on the methods of archaeological hermeneutics in the nineteenth century are almost exclusively interested in methodical problems of historical archaeology.[15]

Philology is the oldest discipline of the historical human studies and it is also the first discipline of the human studies to have established itself as a human science. A methodology of the historical human sciences must, therefore, begin with reflections on the methodology of philology. Historical research presupposes

[11] See Sect. 7.2 below.

[12] The immediate forerunners are Hume, Kant, and Herschel. What was said about methods before, e.g., by Bacon or Locke, is ingenious but partially misleading.

[13] Boeckh 1966. Boeckh called his lectures (published only later 1886) *Encyclopedia and* ***Methodology*** *of the Philological Sciences* (*Enczclopaedie und* ***Methodenlehre*** *der philologischen Wissenschaften).*

[14] Droysen 1977; cf. Seebohm 2004, §10.

[15] According to Blass 1892, papyrology, palaeography, and archaeology are only auxiliary disciplines of philology; Dilthey corrected this classification. (cf. Seebohm 2004, §9, 66). According to what has been said before about the methods and methodologies it is tempting to assume that historical archaeology and philology are correlated disciplines that presuppose each other. Pre-historical archaeology shows, however, that archaeology has in addition its own methodological principles beyond this correlation.

methodologically guided philological and archaeological research. The genuine methodological problems of history are the problem of the reconstruction and interpretation of a past real lifeworld; the problem of its historical development; and the problem of historical explanations.

A *caveat* has to be added. Closer consideration will show that the methods of historical research are also presupposed vice versa in philological interpretation. Problems and disputes connected with the interdependencies of history and philology already surfaced in the literature on hermeneutics in the nineteenth and then again in the twentieth century. It is, therefore, useful to begin with a preliminary distinction between philological research in the narrower sense and philological research in the broader sense. Philological-historical research can be called philological in the broader sense if it includes the so-called efficient history of a text. Philological interpretations in the narrower sense are restricted to the interpretations of texts and their past horizon to the extent to which this horizon is given in traces that can be found in the text.

The first task of a methodology is a critical re-examination of the general principles guiding a pre-given doctrine of methods and the identification of the principles that can serve as criteria of objective validity. Seen from the phenomenological point of view, a methodological principle of a science is a rule for a cognitive attitude. A cognitive attitude is a system of intentional acts of consciousness (in short mental acts) and the act has as an intentional act always an object. The subject of the act, the act, and object of the act are abstract moments in this universal structure. A methodical rule is, therefore, always directed to the subject and the object of the mental act. If a discipline claims to be a science, it needs in addition first methodological principles that can serve as warrants of objective validity for the confirmation or disconfirmation of hypothetical assumptions.

The first principles for the methods of philological interpretation have been called canons of hermeneutics. Emilio Betti[16] has given a systematic survey of such canons together with references to their sources in the older tradition of hermeneutic literature. Betti's classification distinguished between (1) canons that emphasized the independence of the object of interpretation and (2) canons for the attitude of the subject of the interpretation.[17] His classification is guided by his idealistic philosophical background and by a certain preference for interpretations in disciplines like jurisprudence and rhetoric, i.e., disciplines that are interested not only in the interpretation, but also in the application of texts. This approach ends in the discovery of the dialectical character of the process of interpretation. For a more pedestrian approach, however, this "dialectical character" is only an indicator of certain incompatibilities in Betti's system of canons.

There are pre-figurations of Schleiermacher's first canon of hermeneutics in the hermeneutical tradition of philology as a discipline, but his version of the first canon

[16]Betti 1967, §16, 216f.

[17]The objective/subjective distinction of Betti distinguishes between text and interpreter and not, like Boeckh's between the objective and subjective conditions of a text.

is the earliest version that can count as a guideline for an objectively valid decision between confirmed and falsified judgments in interpretations: whatever is in need of further determination in a given speech ought to be determined within the limits of the linguistic context of the author and her/his contemporary audience.[18]

This version is too narrow. It covers only grammatical interpretations. But Schleiermacher's *Hermeneutics* has passages that indicate that the first canon can be also applied to higher levels of hermeneutics. The rule that "a part of the text has to be understood within the limits, i.e., the context of the whole of the text and vice versa" can be understood as a general version of the first canon that covers all aspects of philological interpretation. Another version mentioned by Schleiermacher adds the dimension of understanding the author: the understanding of the whole of the text presupposes in addition the understanding of the original intention (*Keimentschluss*) of the author.[19]

Schleiermacher's thesis that the understanding of the original intention of the author is the key for the understanding of the whole of the text triggered the dispute between the defenders of the philological historical method and the defenders of philology in the narrower sense. More about that will be said below. It is, however, also possible to refer to the intention of a text without mentioning the author: a text ought to be understood according to its original intention. *Prima facie* this formulation is awkward, but it can be understood as an extended paraphrase of the principle of Flavius: the first requirement of interpretations of texts is to grasp the *scopus*, the basic intention of the text. The task is, hence, to find a version for the first canon in the narrower sense without references to the author of the text. The short Latin version of the first canon can serve as a guideline:

> (1) *sensus non est inferendus sed efferendus,* "the meaning ought not to be brought into the text from the outside, it ought to be developed out of the text."

This version is too short. However, connected with the grammatical version of Schleiermacher's first canon, it provides a complete version of the first canon that is sufficient for philology:

> (1.a) The text ought not to be understood out of the context of the interpreter. It ought to be understood out of its own context and out of the context of the contemporary addressees.

A subjective version for the cognitive attitude of the interpreter is as follows:

> (1.b) The interpreter ought to recognize pre-judgments arising from her/his own context. Only a text as an object of the interpreter, and the texts belonging to the context of this text, is of interest in version (1) of the first canon.

Version (2) is one of the extended versions of Schleiermacher's grammatical version of the first canon: the text should be understood according to the original

[18] Schleiermacher 1959, p. 101: "*Alles, was noch einer näheren Bestimmung bedarf in einer gegebenen Rede, darf nur aus dem Verfasser und seinem Publikum ursprünglischen Sprachgebiet bestimmt werden.*"

[19] See Betti 1967, 220f with many references to Schleiermacher's *Hermeneutics* and other sources.

intention of the author. The understanding of the whole of the text presupposes according to version (1) the understanding of the text as a whole presupposes the understanding of the intention, the *scopus* of the text and not the original intention of the author. Two problems can be distinguished in Schleiermacher's extended version of his first canon. The extension mentions the author but, following Betti's[20] interpretation of its context in Schleiermacher's *Hermeneutics,* it also refers to Schleiermacher's extension of his second canon, the canon of the whole and the parts, to include the context of the biography of the author and in general its historical context. It will be shown below that the methodological extension can be understood as a problem of the application of the first canon (1) to the methodical rules of the different levels of higher hermeneutics.

The reference to the author of a text in the tradition of hermeneutics caused serious disputes among the methodologists of the nineteenth century and then in the twentieth century. The main problem for the Nineteenth Century was that the understanding of the text as a whole presupposes the understanding of the original intention of the author. The defenders of philology in the narrower sense claimed, on the one hand, that what is really given for philological interpretations are first of all texts and not authors as persons with biographies in a foreign past cultural lifeworld. A text without an author is for the defenders of the philological-historical method, on the other hand, an empty abstraction. Version (2) has been critizised in the twentieth century by Gadamer for its "romanticism" and "psychologism." Hirsch, following Betti, defended version (2) in his objections against the "banishment of the author."[21]

But neither Gadamer's position on the one hand, nor the position of Hirsch, following Betti and Boeckh,[22] on the other, can be restricted to the simple methodological problems of the opposition between the two versions of the first canon. Without explicitly mentioning the first canon, this methodological aspect of the two versions already surfaced in the nineteenth century in the critique of Boeckh by Droysen, and later in the hermeneutics of Blass and especially Birt.[23]

Some remarks about the three other subjective versions mentioned by Betti are necessary. They are essential in the context of philology as a discipline, but cause serious epistemological problems for philology as a science. The context of the interpreter ought to be in brackets according to version (1) as well as version (2) of the first canon. In addition, however, to bracket the context of the interpreter implies that positive applications or negative applications, i.e., rejections, of the truth claims of the text ought to be bracketed. Applications ought to be bracketed because it depends on the context of the interpreter whether the truth claim of a text can be applied or must be rejected by the interpreter. Philological research guided by the first canon ought not to be interested in the problems of the application or rejection

[20]Betti 1967, 222f.

[21]Hirsch 1967, ch. 1, "In Defence of the Author."

[22]Hirsch 1967, 24f, 112.

[23]Cf. Seebohm 2004, 61ff.

of the truth of the text; it ought to be interested in the meaning of the text and to consider its truth claim as a claim of the text, not as a truth for the interpreter. Interpretation and application are separated.

The first of Betti's subjective versions is the canon of hermeneutic adequacy: the interpreter ought to have a harmonious relation to the object of interpretation. The term "harmonious" implies *prima facie* that this interest ought to be sympathetic. However, the canon is ambiguous. It can be understood as a positive reformulation of the negative and prohibitive subjective version of version (1) of the first canon. According to a second understanding, the canon requires that the interpreter ought to agree with the message of the text. This requirement is by no means implied in the first canon. A text that triggers contempt and rejection in the interpreter can be just as well be reason enough for being interested in a reliable interpretation of such texts and for an additional historical interest in their cultural context.[24]

Betti's second subjective version is the canon of hermeneutical completion, which recommends that the interpreter should complete the text if the meaning of the text is not complete or not clear. But this canon is also plagued by an ambiguity. According to an often-mentioned understanding, the canon demands that the interpreter has to understand the text better than the author. This version is not compatible with the subjective version (1) of the first canon. It makes good sense that, e.g., for texts belonging to certain meta-genres such as philosophical or scientific texts, a philosopher or scientist should check after a thorough philological interpretation of the text whether the judgments of the text provide acceptable or partially unacceptable information about its subject matter and to offer satisfactory solutions for problems that have not been solved in the text. But this task is a task for the philosophical or scientific critique of already established theories, not the task of the philological interpretation of philosophical or scientific texts. According to a second philologically meaningful understanding, the canon of hermeneutical completion requires that the interpreter ought to correct and complete corrupted texts and text passages. According to the methodology of hermeneutics in the nineteenth century, this is a task of lower hermeneutical critique. Proposed corrections or completions are in this case only acceptable if they are compatible with the requirements of the first canon.

Finally, Betti's third subjective version is the canon of actualizing the text, i.e., the interpreter has to emphasize the value and significance of the text for the present situation of the interpreter and her/his contemporaries. This canon is obviously incompatible with both versions of the first canon. It is, however, a meaningful rule for text interpretations in certain professions. The theologian has to interpret the holy texts, but the theologian also has to *apply* the holy text in sermons addressed to the present situation of the congregation. The judge has to interpret the law, but it is also the duty of the judge to apply the law to specific cases. Hence the rule has been and is a meaningful rule for theological and juridical hermeneutics.

[24]Christian theologians can be interested in objectively valid interpretations of the rabbinic literature, but they have to reject it in their own context. One can be interested in the literature of the Nazis, e.g., in Rosenberg's *Mythos des zwanzigsten Jahrhunderts*, without being a Nazi.

The canon of actualizing could, hence, also be called the canon of application. As such, it was indeed a binding canon for the philologists of Classical Antiquity and the humanists. It was acceptable for philology as a humanistic discipline. However, it is not acceptable for the methodology of philological research guided by the first canon. The first canon is a methodological principle of philological research. First methodological principles would not be first principles if they admit any restrictions. The problem of application remains a problem, but it is now the problem of the application of the results of philological research and the function of philological research in the present cultural lifeworld. A final solution for the problem of interpretation and application in the methodology of the human sciences can only be offered in the conclusions of this investigation.

5.3 An Epistemological Analysis of the First Canon

The first canon is the watershed separating philology as a discipline from philology as a science. Together with the extended version of Schleiermacher's second canon it later served in Dilthey's and then Betti's general theory of interpretation as the first principle of the methodology of the historical human sciences. Seen from the viewpoint of a phenomenological epistemology, however, their account is, incomplete and even partially misleading. The term "context"[25] in both versions of the first canon is ambiguous. Three different types of contexts can be distinguished. There is (1) the text as the context of the parts of the text. But the text is also given for the interpreter (2) as a fixed life expression belonging to a past lifeworld. Fixed life expressions are given as life expressions of an author or authors who created them in a more or less distant past time phase. A text is, therefore, given (3) in the context of the tradition of the interpreter, and this means (3.a) in the context of a tradition of texts in a past reality at the time of its creation and (3.b) in the tradition of a past lifeworld of the author of the text and her/his biography.

The task is, hence, to distinguish and analyze the three types of contexts and the two aspects of the third context and their interdependencies in the process of interpretation. The parts of a text are extensive parts and the text as the context of its extensive parts is an extensive whole. During the process of the first reading and (understanding), the parts of a text are given in a temporal sequence one after the other. The understanding of the parts in reading can be interrupted by not-understanding and by doubts whether some parts have been understood or misunderstood. An author of a text who is no longer present as an actual or potential consociate in the present is not able to defend the text against possible misunderstandings. Not-understanding and misunderstanding can only be partially eliminated in a first step by reading and understanding the following passages of the text. The text is given as an extensive whole after the first reading is finished. At this

[25]The German term "*Zusammenhang*" means a reciprocal system of interdependent elements.

point, it is an open possibility for a reader to turn back to the text and to start with a critical check of her/his understanding of certain parts of the text and even of the text as a whole, i.e., the main intention of the text.

Philological interpretations of texts presuppose critical re-reading after the first reading is finished. But philological critical re-reading of a text as a whole is not able to eliminate all partial not-understanding and to discover all misunderstandings. The interpreter has to look for further information in the broader context. It was natural for the philologists of Classical Antiquity and later the humanists, but also for philology as a humanistic discipline in general, that this context was understood as the tradition of the interpreter. Fixed life expressions in general, and especially texts, are what they are only in their significance for the present. Interpretation and application are inseparable for philology as a discipline. The tradition of the interpreters is the context of the interpreter, and this context is the authority that decides whether the message of a text must be applied or rejected.

The first task is to explicate the strict separation between the context of the interpreter and the context of texts as fixed life expressions required by version (1.a.) of the first canon set forth in Sect. 5.2 above. The main problem of version (1.a.) is that the term "context" in "the context of the text" and "the context of the interpreter" is ambiguous. Given this ambiguity, it is tempting to assume with version (2) of the first canon that the separation ought to be understood as a separation between the context of the interpreter and the context of the author of the text, the tradition of the interpreter and the tradition of the author of the text. But the preceding descriptions have shown that the context of the interpreter has its center in the lived experience of the interpreter. The "context of a text" is, however, not the context of a lived experience. It is the intrinsic and extrinsic context of a fixed life expression.

A presently given text, or in general a fixed life expression, is implicitly in addition an indicator, a trace, of its author or authors. But this indication implies the author only as an empty, abstract foreign subject and not as a concrete person. Seen from the viewpoint of version (1) of the first canon, philology is as philology in the narrower sense, restricted to the interpretation of texts. Of interest for version (1) of the first canon are only the text and its contextual relations to other texts; taken together, they are what is given as an object for the interpreter.[26] These contextual relations between texts are referential relations in the broadest sense. The first epistemological problem of (1) is, therefore, the referential structure of this context of texts.[27]

The text by itself is a work belonging to a past reality that still co-presents a past phase of time, the time of its creation, as an abstract moment. This abstract moment implies a quasi-temporal structure of the context of the text and its temporal horizons. What is given in the horizons of such contexts for the cognitive attitude of

[26]This has as a perhaps unexpected consequence that the first canon implies a methodological abstraction. This consequence will be considered in Sects. 5.4, 6.5 and 10.2.

[27]Version (2) is, as mentioned, only meaningful for philology in the broader sense, i.e., for philological-historical research.

philology in the narrower sense is a web of other texts. The quasi-past horizon of a text is its genetic context. It is the context to which the text refers. "Reference" has to be understood in the broadest sense including, e.g., explicit and implicit quotes, adoption of literary contents and forms and stylistic and linguistic adaptations, etc. The quasi-past horizon of a text has the structure of a stemma of texts,[28] a structure of branching roots with many nodes.

The quasi-future horizon of a text is its efficient horizon, the context of texts that refer to the text.[29] The efficient horizon is a stemma standing on its head, i.e., it has the structure of a branching tree. The explication of the efficient horizon presupposes the interpretation of the texts in the future horizon. However, such interpretations are not of significance for the text seen from the aspect of its genetic horizon. The references of the texts in the efficient horizon to the next in the node between its genetic and efficient horizon may harbor explicit and implicit interpretations of the text, but these interpretations are not of interest for philology in the narrower sense. They will be of interest for philology in the broader sense, i.e., for the interpretation of the efficient history of the text.

Seen from the viewpoint of version (1) of the first canon, the bracketed past horizon of the living tradition of the interpreter includes both the genetic and the efficient horizon of the text without distinguishing between them. The distinction between the genetic and the efficient history of the text, on the one hand, and the past horizon of the interpreter, on the other hand, indicates that the simple requirement of (1) to bracket the context of the interpreter is insufficient. The requirement is that the interpreter has to separate the context of the text and its genetic horizon from the interpreter's own past horizon. This past includes and is influenced not only by her/his present cultural environment, but also by her/his knowledge of the efficient horizon of the text.

Hypothetical interpretations of a text taken from this background are false if they are incompatible with the intrinsic context of the text and/or the context of texts in the genetic horizon of the text. Interpretations that are compatible with this background are confirmed. Discoveries of new material in the genetic horizon of a text are also able to falsify hypothetical interpretations that seemed to be confirmed in past research. Hypothetical interpretations that are not yet falsified and not confirmed are open hypotheses that can be falsified in future research. As a methodological principle for philological interpretations the separation of the genetic and the efficient horizon of texts in the context of a text imply a methodological abstraction. In brackets are all texts that belong to the genetic

[28] "Stemma" is a term that was originally used to characterize the genetic relations of old manuscripts. A manuscript has been copied from one or more available other manuscripts, they depend in turn on manuscripts of an earlier generation, etc. For a more detailed account see Seebohm 2004, §35

[29] This context has been called "efficient history," Efficient history requires philological-*historical* text interpretations that reach beyond the limits of philology in the narrower sense.

horizon of the interpretation. Only the texts in the genetic horizon of the interpreted texts belong to the residuum of the abstraction. More about this methodological abstraction can be said in Sect. 6.3.

5.4 The Application of the First and the Second Canon to the Interpretation of Fixed Life Expressions

Texts, artifacts, and monuments are fixed life expressions. The task of philology is the interpretation of texts and the task of archaeology is the interpretation of artifacts and monuments. The first methodological question is, hence, the application of the first canon to all levels of hermeneutics mentioned in the doctrine of methods of philological interpretation. The second question is the possible application of the first canon to the archaeological interpretation of artifacts and monuments created in past cultural contexts with and without literary traditions.

The methodological analysis of the first canon and its methodological implications has used the term "reference" without specifying between different types of such references. The application of the first canon to the different levels of interpretations requires distinctions between different types of reference, and with them, different structures of the genetic horizon of a text. A first consequence of the application is the transition from philology in the narrower sense to philological-*historical* research in different ways on the different levels of interpretation. The second consequence is that this transition requires a re-examination of the second canon. The theory of the whole and its parts presupposed in the second canon is static. The criteria of objective validity of interpretations presuppose not only the text as a whole and its parts, but also the whole of the context of its genetic horizon and the context of texts in its future horizon.

The theory of the levels of interpretations in the hermeneutics of Boeckh, Birt, and Blass in the nineteenth century distinguished lower hermeneutics and higher hermeneutics. Boeckh distinguishes two levels of lower hermeneutics, the level of grammatical interpretation and the level of historical interpretation. Grammar and dictionary, more precisely, "the thesaurus of words and phrases" of a language,[30] determine the objective conditions of a text.[31] This means, however, that the methods of the grammatical interpretation of texts presuppose grammar and dictionary, i.e., they presuppose the results of grammatical and lexicographical research.

[30]For the sake of brevity, the term "dictionary" will be used as shorthand for "thesaurus of . . . " in the following sections.

[31]According to Boeckh, the methodical guidelines of interpretations on the lower level are determined by the objective conditions of a text. Methodical guidelines for the interpretation on the higher level of hermeneutics refer to the subjective conditions of a text; see Boeckh 1966, 81f; 124f; 140f; (1968, 49f.; 89f; 108f.). The subjective and objective conditions are both conditions of the *text.* Betti's distinction between subjective and objective conditions refers to the canons of hermeneutics.

Philology as a pre-scientific discipline has used all texts with approximately the same linguistic background as resources for such research. But it has to be kept in mind that grammar in this sense had a normative function not only for grammatical interpretations, but also for the critique of the quality of texts and, last but not least, for the creative writing of texts.

Given the first canon as the first principle for the methodology of philological research, the situation is radically different. Historical linguistics is presupposed in methodologically guided grammatical interpretations of texts. The term "historical linguistics" indicates that grammatical and lexicographical research has to follow the methodological principles of the historical human sciences. Grammar and dictionary are presuppositions of philological interpretations of a text, but as such they presuppose the research in historical linguistics in this context. The application of the first canon to the level of grammatical interpretation implies, therefore, the application of the methodology of history as a science. It requires the transition from philology in the narrower sense to philological-historical research.

Philological interpretations of a text and the context of texts in its genetic horizon are vice versa also of significance for historical linguistics. Each of these texts in the genetic horizon of a text has its own genetic horizon. What has been a set of texts belonging to approximately the same language is now a quasi-temporal development and with it a historical development not only of grammatical structures of texts, but also (and this is of special significance for interpretations of texts) of the meaning of words. Except for some special cases[32] texts together with their *genetic* and *efficient* horizons as quasi-temporal horizons are the material for historical linguistic research. Grammatical interpretations in philology as a science presuppose the state of the art of historical linguistics, but such interpretations also offer vice versa essential contributions for historical linguistics.[33]

Individual interpretation is the first level of higher hermeneutics in Boeckh's methodology. The interpretation of the collected works of an author already implies the biography of the author, but according to Droysen's critique the biography of the author presupposes the historical reconstruction of the biography. Blass and especially Birt followed Droysen and eliminated the reference to the biography of the author for individual interpretation on the level of higher hermeneutics.

What is left is the question of the authenticity of the text, i.e., the question whether it belongs to a group of other texts written by the same author. Only one criterion is left to decide problems of authenticity, the interpretation and critique of style. The interpretation of style presupposes the interpretation of the genre of the text. Individual interpretation is in this case reduced to a special

[32]Given early phases of the development of written literary traditions in different languages with similar structures, comparative research is able to reconstruct the linguistic context of the common root language of such languages, e.g., the Indo-European languages.

[33]A trivial example: It is natural for a naïve interpreter of the twentieth century to understand the sentence "The lord of the lowlands was a gay person" in a novel of the nineteenth century as "The lord was a homosexual." But what was really meant according to the meaning of the word in the genetic horizon of the novel is "The lord was a person in good spirits."

problem of generic interpretation and critique. The problem of the authenticity of texts can also be answered, and has successfully been answered in some cases with the aid of statistical investigations of the use of words and smaller parts of phrases in texts that are supposed to belong to the same author. But in such cases individual interpretation is reduced to a special problem of lexicographical research on the level of lower hermeneutics. The conclusion can only be that the objects of philology in the narrower sense are only texts, and all questions about the author and her/his intentions and motives are excluded. They are, however, of significance for philological-historical research, but as the term indicates philological-historical research presupposes the methodology of historical research. What Boeckh had in mind was philological-historical research. Blass and Birt had the tendency to reduce philological research to philology in the narrower sense.

The term "historical" in "historical interpretation" in Boeckh's methodology refers immediately to the historical context of the text. This understanding of historical interpretation implies, however, the application of the results of historical research. Philological research is, according to Boeckh, philological-historical research and not only philological research in the narrower sense. As already mentioned, Blass and Birt, following Droysen's critique, eliminated not only Boeckh's individual interpretation and critique as the first level of higher hermeneutics, but also the second level of lower hermeneutics for the same reason. What is left for historical interpretation and critique for philology in the narrower sense as a science guided by the first canon is then the "explanation of technical terms and historical facts" of the theory of the levels of hermeneutics in Classical Antiquity. "Historical" is understood as belonging to histories as reports about facts in the broadest sense. Historical interpretation in this sense is reduced to a special branch of lexicography.

The subjective conditions of Boeckh's individual interpretation and critique as the first level of higher hermeneutics include information about the author of a text and her/his biography. But the interpretation and reconstruction of a biography presupposes historical reconstructions and does not belong to philology in the narrower sense. The reason behind the banishment of the author in the hermeneutics of Blass and Birt is, as mentioned, also Droysen's reason for his strict methodological distinction between the methodological principles of history and the methodological principles of philology, more precisely, philology in the narrower sense.

Prima facie the reasons for the dispute about the "banishment of the author" in the twentieth century are different. Gadamer rejects the implicit psychologism and romanticism of Schleiermacher's version (2) of the second canon. The "original intention of the author" is a psychological category. Hermeneutics is not interested in romantic interpretations of the creativity of the author of a text. In contrast, Hirsch following Betti's theory of interpretation, writes "in defense of the author."[34] The simple understanding of a person or the understanding of a person with the support of some psychological theory presupposes immediate encounters or reports about

[34]Hirsch 1967, ch. 1.

immediate encounters. The author of a text is, however, given only as an empty implication of the text as a fixed life expression. There might be texts that provide sufficient information for the reconstruction of the person, more precisely of the biography of the person. However, such a reconstruction presupposes historical research and with it historical causal explanations. The upshot is that the dispute about psychologism implies and is implied by the methodological dispute about Boeckh's individual interpretation in the nineteenth century. This touches, however, only one aspect of the problem. The problem of interpretation and application is the real problem behind Gadamer's refutation of psychologism.[35]

What is left for higher hermeneutics is, hence, the analysis of the methodological application of the first canon to the level of generic interpretation and critique. The specific type of references of a text to other texts on this level is the quotation of other texts in the genetic horizon of a text. Different types of quotations can be distinguished. A text can refer to other texts in its genetic horizon with explicit or implicit quotations of what has been said by the author of another text. But a text can also refer to another text by adaptations of certain aspects of the other text without mentioning the other text or its author. Preferences for certain types of quotes are different in different meta-genres. Explicit and implicit quotations followed by positive or negative applications and/or critical comments are often used in prose literature reporting or researching certain states of affairs, e.g., philosophical, legal, and scientific literature. Meta-genres like liturgical texts, myths, poetry, and rhetoric prefer adaptations: relevant are style elements, motives, and plot patterns used in texts belonging to the genetic horizon of a text. Such texts can be found in the same genre, but they can also belong to different genres.

The second canon, the canon of the whole and the parts, is, like the first canon of hermeneutics, a universal methodological principle, and it is of special significance for the level of grammatical and generic hermeneutics. The canon has been called the "second canon" because it is the second in Schleiermacher's list. It is, however, also second because the application of the first canon to the levels of interpretation and critique has some serious consequences for the understanding of the canon of the whole and the parts. The canon of the whole and the parts has been understood as a general principle for the philological doctrine of methods since Classical Antiquity. The principle was also somewhat suspicious because it implied *prima facie* a vicious circularity. Following Dilthey, the canon of the whole and the parts has additionally been understood as a methodological principle of the human sciences in general, and especially the historical human sciences. The "hermeneutical circle" then finally received the rank of a universal fundamental ontological principle in the twentieth century as the "circle in understanding" in the hermeneutics of Being and understanding in general.[36]

[35]Gadamer 1965, part II, section II, 2.c The problem whether interpretation and application are separable or not has already been mentioned in the introduction and will surface again in Sects. 6.5 and 10.6.

[36]Cf Heidegger 1977, §32 which explicitly says that the hermeneutics of being has nothing in common with hermeneutics as a method.

The phenomenological theory of the whole and the parts is, on the contrary, a formal ontological and logical theory and not a fundamental ontological theory, and has the advantage that it is not plagued by vicious circularities. The methodology of the historical human sciences is, therefore, able to avoid the alleged logical difficulties of the second canon with the aid of a logical explication of the canon in terms of the phenomenological theory of the whole and the parts.[37] Husserl used the theory of the whole and the parts first of all as a tool for the development of a pure logical grammar, but it is also possible to apply the theory to grammar beyond the limits of pure logical grammar. Words by themselves are abstract and not sufficiently determined moments of concrete meaning on the level of grammatical interpretations. They reveal concrete meaning only in the context of the structures of sentences as the concrete wholes of meaning. Sentences and phrases are first-order wholes of texts as contexts of phrases and sentences. Sentences are connected with sentences in higher-order wholes of meaning in the parts of a text, and as such are concrete wholes of the second order. The structure of these second-order wholes is determined by specific relations and their properties, relations that are one-sidedly founded in properties of concrete wholes of the first order. Texts as extensive concrete wholes are wholes constituted by relations with specific properties between the parts of the text. Seen from a formal point of view, the rules for literary genres are the rules for admissible relations between parts of the texts belonging to certain genres.

The theory of the whole and the parts is a static theory. As such it can be used for the analysis of the application of the second canon to the grammatical and the generic level of philological interpretations of texts. The second canon as a static and as such a-historical principle was the basic principle of philology as a discipline. For philology as a discipline grammar and the system of literary genres have been understood as normative systems of rules for writing texts, interpreting texts, and literary criticism. The situation is different for philology as a science with the first canon as the first methodological principle.

The application of the theory of the whole and the parts is restricted to the formal explication of a text as an intrinsic whole and its parts. The explication of the methodological interplay of the first and the second canon requires more. The second canon by itself cannot be used for a logical explication of the past and the future horizons of texts required by the first canon. What has to be added is a phenomenological account of the genesis of wholes and their parts.

Texts as concrete wholes indicate their genesis in their relations to other texts in the quasi-temporal dimension of their genetic horizon as the extrinsic context of texts. Texts in the genetic horizon of a text are texts of the same language. Every text in the quasi-temporal past horizon in the context of a text has its own quasi-temporal genetic horizon. What is given for grammatical interpretation is a presently given set of texts, but these texts are quasi-temporally ordered and represent different aspects of the genetic development of the language used in the texts. The quasi-temporal relations in the presently pre-given set of texts represent

[37] The following analyses presuppose the material of Part I, Sect. 2.2.

the temporal development of the language in the past genetic horizon of a text. But the text also has a future quasi-temporal horizon, and this horizon ideally includes the present stage of the development of the language – or even different languages – of the interpretation. Seen from here the genetic linguistic horizon of a text can be understood as a concrete temporal, i.e., *historical, development* of the language of the text. As already mentioned, the genetic horizon of a text is a context of texts to which a text refers, and each of these texts in the genetic context of a text has its own genetic context. Referential relations on the generic levels are quotations, and such quotations can be explicit or implicit references to parts of other texts or borrowing motives, plots, stylistic properties, etc., from other texts. The quasi-temporal past horizon considered by itself represents, as the genetic development of the text in the historical past horizon of the text. Since each text in the past horizon of a text has its own genetic quasi-temporal past horizon, and in addition its own future horizon as its effective aspect, both horizons together represent one aspect in the history of literature, the history of poetry, of the sciences, the law, and other aspects of the history of ideas.

The application of the first canon has, however, further advantages. Interpreting the text as a highest node in the stemma of the context of texts in the genetic horizon of a text is able to determine the uniqueness and individuality of the text in its relation to the context of texts in its past horizon. If the future effective horizon of the text is added, the text appears as a unique text in the context of the history of texts of a genre that needs ideographic interpretation.

Texts given as unique individual texts imply more than the abstract reference to an author or authors of fixed life expressions in general. They imply an author as a unique individual who created the text in a unique phase of her/his life. The application of the first canon to the second canon on the level of generic interpretation implies in the last instance the biography of the author. The transition from attempts to transcend philology in the narrower sense with its banishment of the author to philological-historical research is, therefore, the inevitable consequence of the application of the first canon to the second canon and its applications to the levels of lower and higher hermeneutics. The application of the first canon to the second canon implies the justification for the transition from philology in the narrower sense to the historical philological method as the method of philology as a science.

Interpretations of the artifacts of elementary understanding and the monuments belonging to higher understanding in historical archaeology including cult objects, statues, paintings, temples, and the complex social relations of cult activities are able to presuppose philological interpretations of texts and the methods used in text interpretation. Hence methodologically guided interpretations of historical archaeology have to apply the first canon. Philology is, therefore, the final arbiter for the confirmation or falsification of assumed interpretations of artifacts and monuments in historical archaeology.

No texts are available for the interpretation of fixed life expressions in prehistorical archaeology. In this case the distinction between artifacts belonging to

elementary understanding and monuments belonging to higher understanding is crucial. Methods that can be applied to the interpretation of artifacts have been mentioned. Such methods presuppose nothing more and nothing less than the presently available knowledge of the structures of the lifeworld in general and additional knowledge about the natural environment of the pre-historical culture. But the presupposition of the general structure of the lifeworld is the presupposition for the methodological demarcation criteria of the human sciences in general, i.e., the systematic human sciences and the historical human sciences. It is, therefore, also possible that comparative methods used for archaeological interpretations can refer to the results of ethnology as a systematic human science.

Taken by itself archaeology has no problems in its interpretations of artifacts belonging to the realm of elementary understanding such as tools, weapons, houses, fortifications, and traces of agriculture and mining, together with the implied relevant social relations of the members of a past cultural lifeworld and the conditions of a natural environment. Presupposed in such interpretations are the general structures of the lifeworld, i.e., the structure of possible activities of the human body, the structure of the givenness of Others, and the everyday elementary interactions with Others. Comparative methods are useful for complex cases. This background is also sufficient for falsifications of the interpretation of such artifacts. So-called pre-historical cultures in the past are cultures without a written tradition. Only archaeology can provide interpretations of the artifacts created by such cultures, and such interpretations will be restricted in the most cases to the structure of elementary understanding.

5.5 The Application of a Modified Version of the First Canon to Historical Reconstructions

An answer to the question whether history has specific methodological principles presupposes reflections on the specific empirical material and the methods used in historical research. The task of history and its methods is to reconstruct the past reality of a more or less foreign cultural lifeworld. It is an essential property of objects given in a lifeworld that they have been understood in the context of this lifeworld. A historical reconstruction of a past reality is, therefore, per se an interpretation of a past reality. The presently given empirical materials for such reconstructions are texts, monuments, and artifacts. Such materials are the *facts for historical research*. Historical reconstructions presuppose, hence, the methodologically guided interpretations of texts, monuments, and artifacts, i.e., history as a science presupposes methodological principles of philological and archaeological interpretations.

Facts for historical research ought to be distinguished from *historical facts*. Empirical facts are facts that can be given for present and/or future sensory lived experience. Facts for the historian are not such empirical facts. Historical facts are *reconstructed* facts that have been immediately given as facts in a past lived

experience. Historical facts are, therefore, not immediately given facts. They are reported facts. To believe in facts reported in an oral and/or written tradition is natural but naïve. It is always possible to doubt whether it was really the case that a reported fact really happened in a not present temporal and spatial distance. Historical research implies, therefore, historical critique, i.e., reported historical facts are always assumed historical facts that could be falsified by historical research. The distinction between facts for the historian and historical facts is of crucial significance for a phenomenological epistemological analysis of a historical methodology. "Historical fact" is a term for a genus of essentially different kinds of facts, i.e., events in the natural environment, actions, motives for actions, intended or not intended consequences of actions, beliefs, habits, customs, social and legal relations, and cults.

As mentioned in Sect. 4.2, Dilthey suggested that generalized versions of Schleiermacher's first and second canon of hermeneutics can be used as universal methodological principles for the historical human sciences. This suggestion is *prima facie* convincing because all historical human sciences presuppose interpretations of fixed life expressions. Critical phenomenological reflections are, however, able to discover serious additional epistemological problems, especially for history and historical research. The problems connected with the second canon are easier to handle and it is, hence, advisable to start with this canon.

Texts as fixed life expressions are usually pre-given for philological interpretations as extensive wholes, and philological research guided by the second canon starts, according to what has been said above in Sect. 5.4, *after* the first reading in which the text is then a *vaguely pre-given whole* proceeding as a search for an explication of the parts and the relations between the parts that are constitutive for the whole as a structured whole of the meaning. The situation of the historian is not different on the level of the first encounter with the sources that need philological interpretation. But the methodological approach of history as a science is not merely interested the *interpretation* of the *sources*. It is further interested in the reconstruction of a past reality presupposing the philological-historical interpretation of many fixed life expressions and it is finally interested in the interpretation of the reconstructed historical context and development of a past reality. Though the difference between *interpretation of historical sources* and the *second-order historical interpretation of reconstructed real cultural contexts and their developments* is, seen from a methodological and epistemological point of view, obvious, this difference has never been mentioned in the literature of the *Geisteswissenschaften* in the wake of Dilthey including Husserl and Heidegger, or elsewhere.

The *reconstruction* of a past real development as a whole is impossible because even the search for sources, the facts for the historian that offer the material for reconstructions of the historical facts belonging to a past real development, is already an indefinitely open process. It is, furthermore, impossible because there will be never enough material for a *complete* reconstruction of the past reality of a cultural lifeworld as a concrete whole. It is, hence, meaningless to apply the canon of the whole and the parts to the methods of reconstructions of a past real development

in a real past real lifeworld. It is even questionable whether it can be applied to interpretations of a reconstructed historical development in a past cultural lifeworld in the same way in which it can be applied to fixed life expressions in philological and archaeological interpretations.

The problem behind these difficulties is the structure of the historical temporality of a real development of historical facts and events, the temporality of historical research, and the overarching temporal structures connecting them as substructures. The question is whether an application of the first canon of hermeneutics to historical research is able to offer a solution for these difficulties. A *prima facie* innocent version of the formula for the first canon for philological interpretations that could be applied to historical facts is, for instance:

> A historical fact ought to be reconstructed and interpreted not in the temporal horizons of actual historical research, but in the temporal horizon of the historical fact in the context of its past real lifeworld and actual historical research ought to recognize pre-judgments arising from the context of its own temporal horizons.

Research in history as a science must be distinguished from the representation of the results of historical research in historical narrations. It is the narration that offers not merely the reconstruction of a past reality, but also the *second-order historical interpretation* of a past reality. History as a science presupposes as one of its foundations a specific type of the genre "historical narrations." Essential for this type is that all historical narrations reporting specific developments of events or aspects of cultural lifeworlds are understood as partial phases of a universal temporally ordered narration reporting the "history of humankind" from its beginnings to the present of the narrator and its future horizon. However, this type of the genre "historical narration" itself has its generative foundations in the literary history of the development types of the genre "historical narration." This development is of interest for the phenomenological analysis of the structures of intersubjective temporality in different types of experience of the historical past in the present as well as possible applications of the first canon of hermeneutics in the explication of these types of experiences.

The "histories" of Classical Antiquity are originally either (1) simple narrations about events that are of immediate interest for applications (or rejections) of what has been reported in the present because they happened in the immediate past horizon of the present or (2) narrations about deeds and events in the past that are of immediate moral significance for applications in the present. The next steps are (3) historical narrations about developments from the "beginning," the "founding" of a political community to the present of a community representing the tradition for the present of the narrator, together with the demand to preserve and apply this tradition in the future horizon of the present, followed by (4) the development of narrations of universal histories of salvation in monotheistic religions from the creation of the world to the present and beyond that to its end in the future. The historical narration in (4) is restricted to a selection of events that are of significance for the prophetic promise of salvation in the future. Interpretation and application are, hence, again inseparable in this type of the literary genre of historical narrations.

The final step (5) in this development of historical narrations is the idea of a universal world history as a history of the progress of the enlightenment of human mankind from the beginning in the past in cultures without sciences to enlightened cultures with sciences. The historical narrative immediately implies the demand that contemporaries in the present ought to apply the principles of enlightenment in their intellectual and social activities. Interpretation and application are not separated.

The epistemologically interesting step in this development of historical narrations is the step from (2) via (3) to (4) and finally (5). The narration in (4) and (5) does not merely have the character of reporting a short series of events that is of immediate applicative interest for the present; what is of interest is the whole series of events from the beginning of humankind to its end in the present and its future horizon in a ordered and dense temporal sequence. History is understood as a universal history that implies all partial historical narrations as its parts. The second canon is implicitly presupposed in such universal histories, but at the cost of the first canon, because such universal histories are determined throughout by a strict unity of interpretation and application. The past is of interest only to the extent to which it is of significance for present activities.

Connected with this step is a second epistemologically relevant aspect in the step first to (4) and then to (5). Modern representations of history as universal history have been able to refer to annals and chronicles. Annals and chronicles report what happened at their time in the *temporal sequence* of the years, and can be used later by historians as sources for the reconstructions in their historical narratives. Thus in such cases annals and chronicles immediately determine as sources the order of the narrations of historians as temporal sequences. The form of the report in annals as a year after year sequence can always be extended beyond the limits of reported events in the annals in a formal "and so on" to the present of the historian. The idea of universal history is constituted in the idea of an always pre-given formal and-so-on, and it is the task of historians to fill these empty temporal phases with their findings in other sources and to order them according to the sequence.

The formal structure of the representation of time as a two-dimensional linear sequence with a past and future dimension for the time phases of the past present, the actual present, and the future present of facts, real events, is the immediate foundation, the condition of the possibility, of distinguishing and separating the context of historical reconstructions and interpretations and the context of the historical facts in a reconstructed phase of a past historical development. The versions of the first canon of pre-scientific hermeneutical doctrines are methodical rules for the interpretations of texts in a doctrine of methods.

The version that is relevant for philology as a science is the basic principle of the methodology for the interpretation of texts in the context of texts. In this version the structure of temporality is of significance only because the *quasi*-temporal horizons referring to other texts in the context mirror the abstract structures of temporal ordering. The version of the first canon that serves as a principle of the philological-*historical* method includes, beyond the contexts of texts, the contexts of the biographies of the authors of texts, and with this their cultural environments.

This version implies an awareness of the *historical* temporal distance between the context of the interpreter and the context of the text and its author, and this awareness is the justification for the universal version of the first canon that Dilthey had in mind. There are, however, further implications that have been neglected by Dilthey and others.

As a reconstruction of a past reality, history as a science is not restricted to the problem of interpretation, and it is also not restricted to the question whether or not this or that is a historical fact or not. The reconstruction of a past reality implies the reconstruction of the web of relations between different kinds of facts and their place in the temporal order of historical developments. That history is interested in the reconstruction of the temporal development of a past real lifeworld has certain consequences. The first consequence is that the temporal horizons of *historical facts* are not, like the quasi-temporal horizons of a text for philology, temporal because they mirror abstract structures of temporal ordering. The temporal horizons belong to the concrete temporal ordering of facts in a past reality. A real past time phase or period is a real past time period in the past horizon of a present real time phase. The contents of the past phase are foreign and only incompletely represented in the present. The representation of temporal developments in annals and chronicles, and other sources with immediate references to temporal structures and the representation of historical developments in (5) presuppose, furthermore, the representation of time as calendar time, and this formal representation of time presupposes time "as the number of movement of celestial bodies."

This explication of the temporal structures of history is of significance for the analysis of the possibility of the application of the first canon of hermeneutics in historical reconstructions and interpretations of historical developments in a past cultural lifeworld, and in general for the philological-historical method. It is of significance for this analysis because this structure of temporality is a necessary partial structure and foundation not only of the context of the historical reconstructions and interpretations of a past reality but also of the context of the temporal horizons of past real contexts and historical facts of the past reality and its developments. Finally it determines also the understanding of the meaning of "temporal distance" between the context of the interpreting reconstruction and the reconstructed reality. This temporal distance is, therefore, the necessary condition of the possibility of the application of the first canon in historical research, and with it, the possibility of historians to be the "disinterested observers" of historical developments that is required by the first canon.

Calendar time as a system of orientation is an essentially partial structure and is already inseparable from the structures of elementary understanding of practical interactions in the earliest phases of the generation of cultural lifeworlds with and even without a literary tradition. The temporal structures of the lived experience of predecessors in the past are equal to and connected with, the temporal structures of lived experience in the present. This implies that all social interactions in the

encounter with the natural environment in a concrete lifeworld imply the temporal structure of intersubjective temporality as a universal structure in which the web of facts is given.

The structure of intersubjective temporality is a necessarily dependent part of the general structure of the immediate encounter with the natural environment and the immediate secondary understanding of Others in social interactions on the level of elementary understanding. It is, therefore, impossible to bracket that these structures can be included in the bracketing of the own context that is required by the first canon. This sounds *prima facie* awkward in the context of the discussion of history, of the philological-historical sciences in general, of hermeneutics, and of interpretation in the last century. However, these discussions simply neglected certain methods of reconstructions and interpretations that have been and are essential for archaeological interpretations. The meaning of tools and in general artifacts as fixed life expression can be "understood" in a quasi-experimental reconstruction of how these tools and artifacts have been used in the past, a reconstruction carried out in the in the *present of the interpreter*.

The consequences of the foregoing analyses for the application of the first canon in historical research can be summarized as follows: it is not possible to apply the first canon of philological hermeneutics requiring the separation of the context of the interpreter and the context of the interpreted texts or life expressions in general to the general structures of intersubjective temporality and elementary understanding in historical research and philological-*historical* research. These structures must be presupposed and cannot be bracketed in the reconstruction of past reality on the level of elementary understanding. However, the first canon can be and must still be applied to reconstructions and interpretations of contexts that imply impacts of the system of first-order higher understanding in a past real cultural lifeworld. Thus in its application in the methodology of philological-historical research, the first canon also implies a methodological abstraction that needs further analyses in the summary in Sect. 6.5.

A final point has to be mentioned. The structures of elementary understanding imply, as shown in Sect. 3.3, an elementary understanding of causal connections. Presupposing what has been said up until now, it can be expected that further analyses can provide the epistemological justification for the methods of causal explanations that are applied in historical research for events that happened in a past lifeworld. A *caveat* has to be added. The future horizon in a lived experience in the present is open. Expectations and predictions can be fulfilled or disappointed. The future horizon of a historically reconstructed past present is closed. The space for expectations in a present phase of a past lifeworld has been filled by events that happened in the past. Predictions are meaningless in this context, but causal explanations for past events are possible. The real problem of the next chapter will be the epistemological analysis of the methods and the different types of causal explanations in historical research.

Chapter 6
Causal Explanations in History

6.1 Logical Structures of Causal Explanations in History

Several famous essays and chapters in books about historical explanations have been published in the last century in the tradition of Analytic philosophy. The general thesis is that the solution of the methodical problems of historical explanations is sufficient for the answer to the question whether history is a science or not. The first and last strictly logical analysis of historical explanations was developed as a kind of postscript to analytic philosophy of science in its heyday.[1] The theses of this analysis can be summarized as follows:

(1) The logical structures of historical explanations and explanations in the natural sciences are the same.
(2) Historical explanations differ from explanations in the natural sciences only because the causal laws used in history are often borrowed from pre-scientific everyday experience. They admit exceptions and are, therefore, only probable.[2]
(3) Genetic explanations in history can be traced back to this model.[3]
(4) History assumes these causal laws. Facts, not these laws, are the problem of history.
(5) Therefore an analysis of the logical structure of historical explanation can ignore the problems of the discovery of historical facts in historical research.

What is said in (5) is more than a weak spot in the strictly analytic treatment of the epistemological problems of the human sciences. Critical reflections on reports about results in the natural sciences cannot serve as a surrogate for epistemological

[1]The radical version of this theory was first presented in Hempel 1942; cf. Popper 1960, 1962; Nagel 1961, ch. 15.

[2]See Popper 1960, and Nagel 1961, 551f.

[3]See Nagel 1961, 558ff.

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reflections on research in the human sciences. The analytic interpretation of historical explanations was later also a target for the critical objections of the philosophy of ordinary language[4] against the analytic philosophy of language. Historical narrations use written natural language.[5] If a logical analysis of historical explanations is possible at all, then it has to use a logic that has to presuppose the linguistic analysis of natural language, and especially its analysis of the argument forms and rhetorical figures used in natural language.[6]

Meanwhile, the semantics of possible worlds has developed several formalized logical models that deviate from classical logic. The application of these models to certain material regions is difficult, but it can also be said that the semantic model of classical logic has more difficulties in this respect than the semantic possible world models.[7] The problem of the application of the models of so-called post-classical modal logics to arguments and explanations in natural language is that each model can be applied to some cases but not to others. There are, for instance, as many kinds of arguments as there are conditionals, including classical, counterfactual, exact and variably exact, and deontological conditionals as well as conditionals implying temporal relations. A system for all possible models has a certain formal theoretical value,[8] but it is not of practical significance for the logical analysis of all of the arguments and explanations used in natural language.

It is, nevertheless, possible to find, at least with regard to specific regions, a list of rules of deduction that are valid in all models[9] or at least exhibit only insignificant variations in the transition from one model to another. The *modus ponens* (MP), universal elimination (UE), and universal instantiation (UI) belong to that list, and these deduction rules are precisely the relevant deduction rules for the analytic analysis of historical explanations. Thus the logical and then the epistemological interpretation of historical explanations proposed in the analyses of the analytic philosophy of science can serve as a point of departure in this chapter. The task of this chapter is then to develop, step by step, the necessary corrections and extensions of a new account for historical explanations. The necessary transitions, especially for temporally determined relations and counterfactuals, have to be determined. Some of the main leading viewpoints for the corrections and extensions have been already prepared in the previous chapters.

[4]The preferred term "natural language" will be used in this chapter and later instead of "ordinary language." The language not only of poetry but also of philosophical and other discourses, especially the discourse of historiography, belongs to natural languages (plural!), but it is not the idiom of the ordinary language of everyday interactions and communications.

[5]The classic is Scriven 1959.

[6]Toulmin 1958. follows in his logic the leading ideas of Strawsons conception of logic.

[7]See Tragesser 1977, 25, 90ff.

[8]Lewis 1973, esp. 118ff.

[9]One of the minimal requirements is that the *modus ponens* remain valid for conditionals. See Lewis 1973, 9, 26f.

Historical presentations are a special case of the use of natural language. The literary genre for such presentation is historiography, the genre of historical narrations, the reports about historical facts. According to the classical analytic interpretation, history is about facts and historical research is restricted to the task of discovering the facts, the events that happened in the past. Historical narrations presuppose the presently available results of historical research and historical critique, but historical narrations will also be subject to historical critique in the future and the critique followed by further historical research. According to points (4) and (5) in the summary of the analytic interpretation of historical explanations at the beginning of this section, this dimension is irrelevant for the analysis of such explanations.

Of interest are only the logical structures and the justifications for the presupposed generalized conditionals of historical explanations in historical reports. The "because" of historical explanations is the "because" indicating a deduction starting with the generalised conditional and the cause of the explanation in the premises. The inference applies UI and MP, and the conclusion determines the explained singular historical fact with MP from the universal instantiation of the generalized conditional. It could be said against this interpretation that conditionals in the present tense in natural language of the form "if . . . then . . . " are usually transformed to "because of . . . it happened that . . . " in the past tense. Seen from a logical and epistemological point of view, the analytic interpretation of the "because" is acceptable, but it is also a simplification that needs extensions and corrections.

The preferred connective in primitive narrations about past real events and facts is the "and." Several types of such conjunctions can be distinguished. One type of the "and" used in natural language has all the logical properties of the "&" of formalized logic. This "and" connects statements about facts without implying temporal relations of facts in the past but this a-temporal "and" is irrelevant for narrations in general and especially for narrations of what happened in the past.[10] The relevant types of the "and" used in historiographies are the "and" of coexistence and the historical "and." The "and" of coexistence connects two or more facts that coexisted in the same limited period of time. The historical "and" connects two events that happened in a time sequence.

The "and" of coexistence can be abbreviated as <&>. The symbols "<" and ">" indicate the temporal limits of coexistence. It shares all the logical properties of the &, but the statements connected with this "and" are true together only in a restricted time period and false in all others. The historical "and" connects statements about facts that happened in a temporal order. The fact mentioned in the first conjunct exists before the second regardless of whether it continues to exist after the emergence of the facts in the second conjunct together with the second or vanishes if the second emerges. &> can be used as a shorthand symbol for

[10]For instance: Caesar was the dictator of Rome and Stalin was the general secretary of the Communist Party in the Soviet Union.

this meaning of "and." The &> implies a transitive and asymmetrical temporal relation, and therefore some logical properties of statements connected by & are valid for &>.

Of crucial significance is that commutation does not hold for &>.[11] Sentences connected by &> in primitive historical narratives are candidates for causal explanations. In this case &> will be replaced by "because." This "because" is an abbreviation for presupposed derivations with either the condition in the premises and the effect in the conclusion or the conditional between two singular facts. The transition from the historical "and" to the "because" requires the replacement of &> by the conditional arrow → of formalized logic. This substitution is not without problems. The order of the antecedent and the consequent in the presupposed generalized implicative conditional and the derivable implicative conditional connecting two singular facts preserve the temporal order of the &>. But the negation of the fact mentioned in the antecedent of the transposition is the consequent of the original conditional and vice versa. The order of the antecedent and the consequent in the transposition is the reverse of the temporal order of the facts mentioned in the antecedent and the consequent.[12]

"Because" is only one of the indicators of explanations used in historical narrations. Of crucial significance is also the "only because." Following what has been said about the function of implicative conditionals for historical explanations one should assume that such explanations presuppose replicative conditionals of the form "A, only if B" or "Only if B, A." Introductions to formalized logic recommend translating sentences with "only if" in front as the antecedent of a replicative conditional in the language of formalized logic, i.e., as "A ← B." This proposal again causes difficulties.

Logic is a-temporal. Therefore a replicative conditional "A ← B" can be replaced by the equivalent implicative conditional "B → A."[13] This conditional is the reverse of the temporal order of the facts required by the underlying historical "A & >B" but

[11] It is, of course, possible to give a formal logical definition of <&> and &> in the framework of a predicate logic with relations. Let A and B be predicates for two events, let T be the predicate "limited period of time," and let F be the predicate "following in time," and I the predicate "happens in," then:

$$< \& >= \text{df}: \ (\text{Ex})\ (\text{Ey})\ (\text{Ev})\ (\text{Ax} \ \& \ \text{By} \ \& \ \text{Tv} \ \& \ \text{Ixv} \ \& \ \text{Iyv})$$

$$\& >= \text{df}: \ (\text{Ex})\ (\text{Ey})\ (\text{Ev})\ (\text{Ew})\ (((\text{Ax} \ \& \ \text{By} \ \& \ \text{Tv} \ \& \ \text{Tw}) \ \& \ \text{Ixv} \ \& \ \text{Iyw}) \ \& \ \text{Fww})$$

It is easier to construct such definitions in the framework of time logic but such logics presuppose the accessibility relations between possible worlds on the meta-level. Nothing is really gained for the problem of translating expressions of relations in natural languages into an equally universal formalized language.

[12] $Aa \rightarrow Ba :: -Ba \rightarrow -Aa$ (TR).

[13] $A \leftarrow B \ :: \ B \rightarrow A$.

the temporal order will be saved in the transposition of the replicative conditional. The conditional arrow of a-temporal logic indicates the order of logical condition and the logically conditioned. Hence the temporal order of the facts mentioned in the antecedent and the consequent in the logical equivalence is irrelevant, and the conditional arrow is even useful because the amount of connectives and deduction rules of formalized logic can be simplified. However, the real conditions and their effects in historical explanations are temporally determined. The reverse of their temporal order creates meaningless sentences.

Some examples taken from possible historiographies can illustrate what has been said. Whether examples can prove its mettle against possible historical critique is not relevant for the logical analysis of the "because" or the "only because" in historical narrations:

(1) Cleopatra died because she poisoned herself with a snakebite.

The generalized conditional in the background is:

(1′) All people, if they poison themselves with a snakebite, will die.

In this case the conditional is an implicative conditional. The required temporal order of condition is saved. The transposition of the sentence would be:

(1″) If Cleopatra did not die she has not poisoned herself.

This sentence is meaningless in a historical context. The temporal order of the real condition and the real conditioned is the reverse of the temporal sequence of real cause/effect relations.

There are cases in which implicative conditionals cannot be applied. Backed by a historical "and" in the sentence "Caesar crossed the Rubicon and became dictator of Rome," a historiography reports:

(2a) Caesar became dictator of Rome because he crossed the Rubicon.

To assume a generalised implicative conditional in the background of this causal explanation is historical nonsense and even an obvious empirical falsehood:

(2a′) All people who crossed the Rubicon became dictators of Rome.

Prima facie a replicative conditional works better:

(2b) Ceasar became dictator of Rome only because he crossed the Rubicon.

The presupposed replicative conditional:

(2b′) Only if Ceasar crossed the Rubicon could he become dictator of Rome.

can be derived from the generalized replicative conditional:

(2b″) All people: only if they cross the Rubicon will they be dictators of Rome by universal instantiation.

Even this is still an obvious falsehood. But the transposition of the replicative conditional causes no problems and sounds more elegant:

(2b‴) Without crossing the Rubicon Caesar could not been dictator of Rome.

Given the difficulties surfacing with the examples (2a) and (2b), it is useful to consider the following extended account of the event in a possible historical narration:

> Caesar was commander in chief of a victorious army. He crossed the Rubicon with his army. After that, his army had free access to Rome. In doing so Caesar violated the law that no commander in chief ought to cross the Rubicon with his army. The purpose of the law was to keep commanders in chief from forcing the Senate to do what a commander wants, first of all to grant him dictatorship.

What this extended historical narration adds is a report about the historical circumstances. Historical circumstances are more or less significant additional conditions existing together with the explained event, but also before and partially after the event mentioned in the report in sentences connected by <&>, the "and" of coexistence.[14] The understanding of the circumstances helps to understand why the action in question, crossing the Rubicon, can count as the cause of the effect. The circumstantial real conditions restrict the possible applicability of the generalized conditional (2b′) "All people: only if they cross the Rubicon will they be dictators of Rome given the historical circumstances mentioned above." The universality of such generalized conditionals is restricted by the limits of a certain time period, but within those limits, their universality is by no means similar to the probable generalizations of everyday experience.

Historical circumstances are also of significance for the question whether counterfactual conditionals are of significance for the logical analysis of historical explanations. Most historians reject counterfactuals like "what would be the case if something else had not been the case" as idle speculations. *Prima facie* this rejection is well grounded, because the crucial deficiency of most historical counterfactuals is the tacit assumption of a historically impossible set of historical circumstances connected with an assumed historical cause by <&>. According to a well-known example different speculations about the consequent of counterfactuals with the antecedent "If Caesar had been the commander in chief of the American forces in the Korean War" are possible. It is possible to conclude either "he would have used catapults" or "he would have used the atom bomb," depending on the tacitly assumed set of circumstantial conditions.

The meta-linguistic theory of counterfactuals in models of the semantics of possible worlds[15] saved at least some classically valid inference rules for logical

[14]The logical function of "historical circumstances" in a genuine historical explanation is an analogue of the "initial conditions" in the methodology of experiments in the natural sciences.

[15]The meta-linguistic interpretation is not able to deal with the difference between strict and variable strict conditionals, i.e., counterfactuals. See Seebohm 1977, 14, n. 36. Lewis 1973. has given a meaningful formal interpretation of such conditionals in his semantics of possible worlds.

deductions[16] and is able to give a rule of thumb for separating meaningful from meaningless counterfactuals. Counterfactuals are meaningful if the possible world in question differs from ours only with respect to very few facts that exist in our world but do not exist in the other world and vice versa. Thus it makes some sense to say that "If Caesar had been poisoned after crossing the Rubicon, he would have had no chance to become dictator of Rome." Counterfactuals are meaningless if they presuppose possible worlds that are incompatible with our world because they are different from our world in many respects. The example mentioned above about Caesar as commander in the Korean War can be used as well as an example of such meaningless counterfactuals. However, even this logical interpretation is not a satisfying argument against the rejection of counterfactuals in the context of historiographies. The task of the historian is the reconstruction of a past actual world and not of a possible world.

The real problem is that the assumed circumstances for the counterfactual are usually the tacit assumption of the combination of an arbitrary selection of a temporally restricted period and another set of circumstances restricted to another historical period for the counterfactual. But such an assumption is impossible for the requirement that all the circumstances of the causal relation must be connected by <&> in a meaningful historical explanation.

Only one special type of counterfactuals is able to satisfy this logical and epistemological requirement, and is therefore admissible in historiographies. With the transposition of a replicative conditional in natural language, e.g., in example (2b‴) "Without crossing the Rubicon Caesar had not have been dictator of Rome," the more elegant version of "If Caesar had not crossed the Rubicon he could not have become the dictator of Rome," the real conditions and the conditioned effects are the same and, as already mentioned above, their temporal order is saved.

6.2 General Epistemological Structures of Historical Causal Explanations

Logic is a-temporal. However, the problems of epistemology are embedded in the concrete temporal dimensions of the lifeworld. Two problems already emerged in the margins of the last section, the problem of the epistemological status of generalized conditionals and the problem of the status of real conditions and of real causes.

Several types of generalized conditionals can be distinguished. On the one hand, there is the strict universality of generalized judgments "a priori" belonging to the ideal objects of the formal sciences, first of all logic and mathematics. On the other hand there are three kinds of empirical generalized conditionals beginning

[16]What remains possible with respect to valid forms of deduction is, of course, very little; cf. Lewis 1973, 26f.

with the generalized conditionals in natural sciences. The specific epistemological nature of such conditionals will be considered in Sects. 7.2 and 8.1. A second kind is drawn from everyday experience: that things have always (or in the most cases) behaved in a certain way in the past leads to the expectation that they will behave in similar ways in the future is the warrant for the weak universality of probable generalized conditionals given in everyday experience. Finally, there are the temporally restricted generalized conditionals.

According to the analytic interpretation of historical explanations, historiography has to "borrow" its generalized conditionals from natural sciences or everyday experience. This is correct for example (1) in the previous section. It did not work for example (2). A less complex example is:

(3) The German legal system was influenced by the *code civile* because (or: only because) Germany was conquered by Napoleon.

The generalized conditional justifying (3) is:

(3′) For all European countries: The legal systems of these countries have been influenced by the *code civile* if (or: only if) the country was conquered in the Napoleonic wars.

(3′) has some special properties:

- It is true for a limited set of historical facts[17];
- it is true for a limited time in the past;
- it is, therefore, not of significance for the present, and can neither be justified nor rejected by present experiences; and
- its truth claim can be justified by historical research only by checking, for all relevant cases, whether or not the generalized conditional is applicable.

The historical explanation in example (3) is a *genuine* causal historical explanation, and the presupposed generalized conditional is a restricted generalized historical conditional. The question left is why it is possible for (3) to use the generalized replicative conditional for the justification of the "only because" in this historical explanation. To find an answer for cases like (3) is easy. The temporal limits for the truth of (3′) are mentioned in its antecedent, "in the Napoleonic wars," and historical research can show that the legal systems of European countries not conquered by Napoleon in this time period, e.g., Britain and Russia, were not influenced by the *code civile* in this time period. Such a simple answer is not possible for genuine historical explanations if the temporal limits of the truth claim of the presupposed generalized conditionals are hidden in the circumstantial real conditions and not explicitly mentioned in the antecedent of the generalized conditional as in example (2).

[17]Everyday experience justifies many strict but restricted generalized conditionals for finite sets of facts, e.g.,: all horses owned by farmer Smith are black. (x) ((Hx & Oxs) → Bx). The relation Oxs implies and indicates the restriction.

Some introductions to logic propose calling conditions in the antecedent of replicative conditionals "necessary" conditions without distinguishing between logical and real conditions or causes. The conditions in the antecedents of implicative conditionals are called "sufficient" conditions. Quite apart from whether or not this makes sense for logical conditions, it is insufficient and even misleading for real necessary or sufficient conditions and real necessary or sufficient causes.

Prima facie it could be said that real causes with certain properties are necessary causes for their effects if and only if it is impossible for causes with other properties to produce the same effect. Causes are sufficient causes if their effect can also be the effect of causes with other properties. This is still insufficient. What has been said by John Stuart Mill and more recently by Karl Popper about experiments in the natural sciences can be used as a guiding thread for a satisfying account of a precise distinction between necessary and sufficient real causal factors.

The task of an experiment is to test a hypothesis, i.e., a generalized conditional assuming a certain cause for a certain effect. The experimenter must first determine the set of the initial conditions in the experimental situation and then add an additional condition. The experiment is successful if the effect of adding this condition fits the prediction of the hypothesis. Given the presupposed set of initial conditions, the added condition is a necessary cause if and only if no other added condition to the presupposed experimental situation is able to produce the predicted effect of the hypothesis. The added condition is a sufficient cause if this is not the case. The question whether some of the initial conditions are only sufficient or whether at least some of them are necessary conditions can then be answered in additional experiments.

A report about the essential facts of a successful experiment is an analogue of historical reports in historical narrations. Returning to the extended version of example (2) in Sect. 5.4, it can be said that the counterpart of the added real condition, the cause in the historical report, is Caesar's crossing of the Rubicon, and that the initial conditions are the counterparts of the historical circumstances or circumstantial conditions of Caesar's action. According to the "only if" of the historical report Caesar's action is a necessary cause. Given the circumstantial conditions no other action of Caesar could have caused the effect he desired. However, the real cause mentioned in the sentence with the "because" in front in example (1) is given the historical circumstances, a sufficient cause. Other poisons were available for Cleopatra given her historical situation.

A historical report as an analogue of a report about a successful experiment is similar to the report about an experiment in some respects, but it is different in others. Comparing both types of reports, the main difference is that the report about an experiment talks about facts that have happened in the past phase of the actual present and can be repeated in a future phase of the actual present. The historical report is, however, a report about historical facts, facts that happened in the past present of a past reality.

A report presupposes empirical investigations about facts. Investigations in the sciences in general presuppose methodologically guided research. The facts of methodologically guided experimental research are given under the abstractive

reduction from essential aspects of the lifeworld required by the methodology of the natural sciences. The discovery of historical facts in historical research presupposes the reconstruction of a past reality. The materials for the reconstruction of the past reality are the facts given for the historian in the present. The real conditions of a past lifeworld (and with them the possibility of causal explanations in history) are either historical facts or refer to historical facts. Historiographic reports offer sufficient material for the logical and also partially for the epistemological analysis of historical explanations. But the crucial epistemological problems are the problems of historical research and critique. The next task is, therefore, an analysis of the types of givenness of real causes and real conditions in the lifeworld.

6.3 The Typology of Real Conditions and Its Significance for the Methodology of Causal Explanations in History

The category "condition" is also of significance for the discussion of epistemological and methodological reflections on history and the social sciences. The problem of levels of types of real conditions presupposing each other in a hierarchical order emerged in the end of the eighteenth century.[18] That changes on the level of technology and economy triggered changes in legal and political structures was obvious after the French revolution. The new discovery was a significant factor for the development of the social sciences, but it was also of crucial significance for the methodology of historical research. Technological and economic material conditions and structures determine material legal and political systems and their ideological superstructures in Marx's historical materialism. According to Droysen, material conditions or causes must be distinguished from formal conditions or powers, and both must be distinguished from efficient causes in history.[19] Material conditions or causes are as follows: (1) nature and the changes of nature caused by human technologies and activities in general; (2) human beings as creatures, i.e., as biological entities, including anthropology, ethnology, races, and mixtures of races and the growth, spread and distribution of the human races; (3) the specific cultural circumstances as results of past human activities; and (4) human purposes, passions, and interests as motives and drives, especially of the masses. Formal conditions or moral powers, as Droysen called them, are (1) the natural communities: the family; the neighborhood; the tribe; and the nation as well as (2) the ideal communities: communication and languages; the beautiful and the arts; truth and the sciences; and the holy and the religions. Along with the practical communities: the society; the commonweal; law and justice; and power and state as the common denominators of all factors mentioned.

[18] Systems of types of real conditions must be distinguished from systems of categories of the social sciences, e.g., the system of Weber's categories. Cf. Grünewald 2009, 97ff on Weber's theory of categories of understanding sociology.

[19] Droysen 1977, 436f; for a detailed account of Droysen's position cf. Seebohm 2004, 69ff.

Neither Droysen nor Marx (nor anybody else to the best of my knowledge) has given a convincing analysis of the epistemological status of the dependencies or interdependencies between such strata of real conditions. The material level of economic conditions is for so-called vulgar Marxism a substructure determining the powerless superstructure of power systems and their ideologies. Sophisticated dialectical Marxism talks about material "dialectical" relations between material conditions and ideologies. The goal of Droysen was to avoid philosophical concepts in his methodological reflections on historical research. Nevertheless, he implicitly applies the Aristotelian categories of material, formal, and efficient causes and he uses Hegelian categories in his classification of the moral powers. Droysen's efficient factors, the "workers," i.e., human actions and actors, could be understood as "causes" in the sense of historical causal explanations. But Droysen's thesis that the driving force behind the actions and actors is the striving for freedom is again similar to the idealistic Hegelian thesis that the final goal of history is the realization of freedom, a goal beyond the limits of possible methodological and epistemological investigations.

The first task for the present investigation is, therefore, to give an explication of the meaning of "types of real conditions." The second task is to present a sketch of a typology of real conditions and of the order in which the types determine or modify each other. The third task is the epistemological analysis of the methodological significance of this typology for historical explanations.

The explication of the meaning of "types of real conditions" has to distinguish between real causal conditions, real factors that cause a real effect (including the real circumstantial factors that are relevant for the causation in a causal relation), on the one hand, and on the other hand, types of real conditions. Real factors in causal relations are singular facts, singular events or actions. The circumstantial real factors of a singular real causation are sets of real factors belonging to different types of real conditions, e.g., all the circumstantial real factors of Caesar's crossing the Rubicon: his victories, his psychological dispositions, the legal situation, the political situation in the Roman Senate, etc. Seen from the viewpoint of a phenomenological epistemology a type of real conditions is as an ideal type given in eidetic intuition.[20] It is given in eidetic intuition as a structural whole of conditions that can appear in sensory experience as causal factors: technological conditions, economic conditions, legal conditions, etc. It is, hence, possible to derive generalized conditionals from certain aspects or properties of an ideal type.

A typology of real conditions is an ordered system of ideal types of real conditions. The order of the system is determined in a hierarchy of generative and static foundational relations. Higher-order types presuppose the givenness of the lower levels, but the existence of lower levels is by itself not a sufficient and necessary determination for the existence of specific factors belonging to the next higher level. In the case of levels of foundations, the logical relation between

[20]Cf. Sect. 2.3; a detailed analysis of the givenness of the ideal types that are presupposed in the social sciences will be given in Part IV, Sect. 10.4.

the condition and the conditioned is the replicative conditional: certain types of technological and economic conditions are given only if a certain type of natural environment is pre-given.[21] Thus it can be said that a certain type of environmental condition is the necessary condition for a certain type of technology, and that this type of technology is, in turn, the necessary condition for a certain type of economic social relations.

Strict empiricism is not able to satisfy the intuitive evidence of the givenness of the necessity of the conditional relations between lower and higher levels of types. The phenomenological theory of the whole, the parts, and the foundational relations between parts and abstract moments in concrete wholes, along with the theory of the constitution of material ideal types in eidetic variations is able to provide a better answer.[22] The levels of the types of real conditions are as follows:

(1) The changes in the conditions of the natural environment of the lifeworld.
(it is not essential but practical to distinguish between (1.a) conditions belonging to the external environment in the strict sense and (1.b) external conditions that can be called internal because they belong to the physiology of the human body.)
(2) the development of technologies on the level of elementary understanding;
(3) the development of economic conditions and systems;
(4) the contents and structures of the culture of the lifeworld comprising:

(4a) normative systems of cultures, customs including the recognized ethical standards, the law, and the systems of political power, and
(4b) worldviews belonging to higher understanding;

(5) the level of individual or collective psychological conditions of human actions.

Theories of hierarchically ordered types of real conditions are of significance for the methodology of historical research and as such are of epistemological interest, but beyond that also of methodological significance for the human sciences in general, i.e., also for psychology and the social sciences. Not very much has been said about their epistemological status and their significance for the epistemological problem of historical explanations. Such explanations refer, as already mentioned, to events or acts as singular historical facts that are causal factors or circumstantial factors in a causal relation. The logical structure of a causal connection between a cause together with circumstantial factors or "initial conditions" is usually interpreted as a singular conditional that can be derived in a *modus ponens* from a generalized conditional.

It is, therefore, impossible to understand the foundations between ideal types of real conditions in the hierarchy of these ideal types of real causal conditions.

[21]The natural environment was the same and agricultural grain production existed long before windmills were invented in the Middle Ages.

[22]Cf. Sect. 2.2 for the background of the following considerations, and on ideal objects in the systematic and historical human sciences in general, see Sect. 10.4.

However, it has been shown above that replicative conditionals can also be of interest in historical explanations, but such singular replicative conditionals are again justifiable only with the aid of logical derivations from generalized replicative conditionals. The universality of the generalized conditionals is for implicative and replicative conditionals an empirical universality. It is, therefore, impossible to understand the foundations between ideal types of real conditions in the hierarchy of these ideal types as real causal conditions. Thus the problem is how both aspects can be brought together in methodological strategies of causal explanations in the historical research.

To determine the necessary circumstantial factors in historical explanations is one of the most difficult tasks for the reconstruction of sound historical explanations. The hierarchy of the typology of real conditions can be used as a system of heuristic methodical rules that is able to guide the search for relevant circumstantial factors as *necessary* factors in historical causal explanations. The first methodical rule is to look for circumstantial factors belonging to the next lower levels in the hierarchy of the types of real conditions: certain real conditions in the natural environment are *necessary* factors for the inventions of new technologies as events that cause changes on the technological level. Historical reports about the act of the invention of a technology have to provide the additional *sufficient* causal factor that is required for a sound historical explanation of the emergence of a new technology. The availability of certain technologies is in turn a necessary circumstantial factor for the development of certain economic structures. Whether or not they will be developed depends again on certain actions or interactions of, e.g., the merchants and bankers in a certain period of the history of the economy.

The system of the typology of real conditions is, as mentioned, relevant for all historical and systematic human sciences. Two short remarks about the specific characteristics and the differences in the application of the typology of real conditions in historical explanations in psychology and in the social sciences are necessary. More will be said in Part IV.

The collective or individual real *psychological conditions* belonging to level (5) are the immediate real conditions of human actions. Droysen mentions passions, motives, and drives as real conditions, but he also emphasizes the difficulties of convincing reconstructions and interpretation of such conditions.[23] The problem is that historical research has no immediate access to the psychological circumstantial and causal conditions for actions of individuals or groups. The references that can be found in biographical data or in biographies and autobiographies[24] usually refer to the social and cultural environment of the *past* lifeworld, and psychological observations in such sources belong to the everyday psychology of the authors of the biographies. References to circumstantial conditions belonging to (3) and (4), the social environment of the actors, can be of interest for interpretations of

[23] Droysen 1977, 188f.

[24] This happens only in cultures in which the individual as such is of interest and individuality is a generally recognized value.

the self-understanding and psychological motives of actors. There is, however, no immediate access to the psyche of authors and actors in the sources.

Considering the arguments of Droysen, a well-known historian and methodologist of historical research in the nineteenth century, it is somewhat surprising to discover that according to the epistemological interpretation of analytic philosophy in the twentieth century, historical explanations have to borrow their presupposed psychological generalized conditionals from everyday psychological experience. Generalized psychological conditionals of everyday experience are undoubtedly essential for causal explanations of the actions of *contemporaries* in the *present* lifeworld. Such psychological explanations are, however, hopelessly contaminated by *present* economic, legal, or political conditions belonging to levels (3) and (4), and, last but not least, the framework of the dominating worldviews in the *present* lifeworld. The assumption that such conditions can be presupposed in historical explanations of human actions in a more distant past violates the first methodological principle of the historical human sciences, and especially of the historical reconstruction of the reality in past foreign lifeworlds. Historical critique is able to reject such violations in historical explanations.

What is left is the assumption that psychology is able to discover generalized conditionals representing real conditions of type (5) that can be applied in explanations of human actions in general. A solution for difficulties of the relation between psychology as a natural and a human science will be offered in Part IV. Several attempts have been made in the first half of the last century to use psychoanalytic theories in explanations of historical facts belonging to general social history as well as to the general behavior and specific actions of famous individuals of the past. That historical critique is able to reject such explanations by proving that the explained historical facts cannot be justified as historical facts is not the main point. The main point is that the status of psychoanalysis as a science – and science was understood here as a natural science – was challenged in the analytic theory of science. In order to save psychoanalysis as a tool for interpretations of art works and in historical explanations of actions of individuals and groups, others tried to defend psychoanalysis as a hermeneutic of the latent but that implies that psychoanalysis belongs to the human sciences.[25]

The typology of real conditions is first of all of basic methodological significance for research in the *social sciences* in the *present* lifeworld and its temporal horizons. The empirical basis for social research is immediate observation of contemporaries and their life expressions in the present. Their fixed life expressions in the immediate past temporal horizon of the actual present can also be understood and, if necessary, methodologically interpreted, in the cultural context of the *present* lifeworld. The first task of historical research is, on the contrary, the reconstruction of the past reality of a more or less foreign lifeworld and its own temporal and cultural context. Historical research presupposes the givenness and interpretation of fixed life expressions belonging to the past lifeworld. Such fixed life expressions are

[25] Ricoeur 1970.

the facts for the historian, and the reconstructed facts of a past lifeworld are the historical facts. The task of historical explanations, and with it the methodical application of the typology of real conditions, is, hence, only the last step in the methodology of historical research. Historical facts that are of significance for the temporal context of the past lifeworld need historical explanations. Historical explanations always imply a context of reconstructed and interpreted circumstantial conditions.

6.4 Historical Critique and the Falsification of Historical Explanations

History is only about facts, and has nothing to say about the generalized conditionals that are presupposed in historical explanations. This thesis is an immediate consequence of the analytic logical and epistemological analysis of historical explanations. Seen from the viewpoint of modern history, it has some puzzling implications. In speaking of history one should distinguish between historiography, historical research, and historical critique. The analytic thesis seems to have some plausibility for historiographies. However, for history as a science, historiographies are nothing other than narrative reports of the results of historical research and historical critique. The thesis that historical research and then historical critique has nothing to say about the truth or falsity of the application of generalized conditionals in historical explanations to certain historical facts and also nothing about the truth and falsity of genuine historical conditionals, is at the very least awkward. It is awkward because the thesis implies that pre-scientific or scientific experience in the *present* and nothing else is the source of the material for the discovery of the generalized conditionals and the epistemological judgments about their truth or probability. But according to the first principle of the methodology of the historical human sciences, the only status that judgments and opinions taken from the context of the *present* lifeworld can have in the context of *foreign* cultural lifeworlds and of *past foreign* cultural lifeworlds is the status of pre-judgments.

The root problem of the analytic model is the tacit assumption that historical facts reported in historiographies have the same epistemological status as facts given in actual present experiences. *Facts* for everyday experience and for the observations and experiments of the natural sciences are given in *present* sensory experiences, and then in memories and expectations belonging to the immediate temporal horizons of the actual present. The historical facts of historiographies are, on the contrary, facts that have been given in a *past experience* of a lifeworld that is more or less foreign to the actual present. The task of historical research is the reconstruction of a past reality and of the *historical facts* belonging to this past foreign reality. The material for the reconstructions of historical research are the historical sources, texts and traces, the fixed life expressions created in the past and given as *facts for the historian* in the present lifeworld.

Historical research and historical critique are inseparable. The first level of historical critique is the critique of the reliability of the texts and traces that are given in the present as facts for the historian. The second level of historical critique is the critique of the reconstructive interpretation of the historical facts of a past reality and its historical development. The question of historical critique on the second level is whether the assumption of certain historical facts in the pre-given reconstructions of historical facts can be falsified. The assumption that certain historical facts are indeed facts of the past reality can be falsified with the aid of the discovery of mistakes in presupposed interpretations of already given facts for historical research or the discovery of new sources and traces as facts for historical research. But the business of historical critique is not only destructive; it clears the ground for the re-evaluation of presently available material and for the discovery of new material for the historian. Further historical research is then able to develop improved interpretative reconstructions of the past reality and its historical facts.

Finally it should be kept in mind that the relevant causes, the relevant effects, and last but not least, the circumstantial conditions of historical explanations are historical facts, and not facts given in the actual present. It should also be kept in mind that the relevant historical facts in historical explanations are events that triggered serious changes in the historical development of a past reality, and that such events belong in the overwhelming majority of cases either to the natural environment of a past reality or to significant actions and interactions of individuals or groups of individuals with or without the participation of the "masses," more precisely, of significant parts of a whole population in a past reality.

After this recapitulation, it is now possible to distinguish two different intentions in the basic question whether and how historical critique is able to falsify historical explanations. We have (1) the question, whether historical critique is able to falsify the application of the generalized conditionals regardless of whether they are probable generalized conditionals justified by everyday present experience, generalized conditionals borrowed from the natural sciences, or genuine historical temporally restricted generalized conditionals.

An answer to this question is straightforward and simple. If historical critique is able to falsify one of the historical facts underlying a historical explanation as the cause, the other circumstantial conditions, or the conditioned effects, then the *application* of the presupposed generalized conditional is falsified, and with it the historical explanation.

1. (2) The second question is whether historical critique is able to falsify the presupposed generalized conditionals of historical explanations as valid generalized conditionals. Two cases can be distinguished:

   (2.a) The answer to the first case is simple. Historical critique is not able to reject the presupposed generalized conditionals if they belong to the following levels of real conditions: already discussed in Sect. 6.3 level (1), the first aspect of level (2) given in present everyday experience or in the methodologically guided experience of the natural sciences in the present; and level (5) if psychology is able to justify them.

(2.b) Historical critique is able to falsify temporally restricted and therefore genuine generalized conditionals. An answer has to distinguish:

(2.b.i) restricted generalized conditionals belonging to the levels of real conditions of the second aspect of level (2) and levels (3) and (4);
(2.b.ii) universally generalized conditionals and restricted generalized conditionals belonging to level (5).

Following the analytic model generalized conditionals used in historical explanations of type (2.b.i) could be understood *prima facie* either as borrowed probable generalized conditionals taken from present everyday social experience of the present social lifeworld, or as methodologically justified conditionals from the present state of the art in the social sciences. But this analogy to type (1) is limited. The universal concepts used in the generalized conditionals of the social sciences are already nothing more than carefully defined idealizations of concepts that have been previously used for the everyday understanding of interactions of consociates in the present lifeworld. A further crucial possibility of interactions in the present social lifeworld is the encounter with contemporaries belonging to present foreign cultural lifeworlds. Expectations guided by the experience of interactions with consociates in one's own social lifeworld are often brutally disappointed in such encounters, and this means that the generalized conditionals supporting such expectations are falsified.

The experience of such disappointments in the present is the justification of the first principle guiding ethnological and ethno-sociological research. According to this principle, all expectations with a background in probable or more or less justified abstract generalized conditionals of the social sciences ought to be carefully bracketed until the social structure of the foreign cultural lifeworld is deciphered by ethnological field research.

The encounter with foreign cultures in the early phase of science and philological research in and after the age of the Renaissance and Reformation was at least an additional motivating factor for the development of the early versions of the first methodological principle of the historical human sciences. According to this principle, immediate applications or rejections of the literature, the arts, the customs and laws, and the worldviews of *past* foreign cultures given as facts for the historian in the present have to be bracketed as well. The first task of historical research (and the first level of historical critique) is the reconstruction of the reality of a past real lifeworld and the events, historical facts, determining its historical development. Causal explanations can already be found in the written sources given as facts for the historian, and the first task of historical critique is to evaluate the sources and to discover misleading information, i.e., to falsify the information given in the original sources.

The consequence is that causal explanations referring to real conditions in the reports of historiographies that belong to case (2.b.i) presuppose restricted genuine historical generalized conditionals and that the falsification of such conditionals is the business of the second level of historical research. Since the limits of the applicability of such generalized conditionals are historical facts according to (1) all

applications outside the limits can be falsified. The main point is, however, that causal explanations referring to real conditions, i.e., to the structure of technological, economic, customary and legal conditions, and finally to the worldviews of a past reality, can be reconstructed only via the interpretations of sources and traces in historical research, and therefore only historical critique is able to falsify such reconstructions.

(2.b.ii) The distinction between psychology as a natural science and understanding psychology as a systematic human science and the problems connected with it has already been mentioned. According to (1) and (2.a) applications of generalized conditionals borrowed from psychology as a natural science can be falsified, but the generalized conditionals themselves cannot be falsified by historical critique. The problems left are the generalized conditionals belonging to the generalized conditionals of present everyday psychological experience and the generalized conditionals of understanding psychology. They will be considered in Sect. 10.1.

Many historical causal explanations of type (2.b.ii) presuppose generalized conditionals belonging to everyday psychological experiences. Such explanations, though *prima facie* plausible, originally guide the expectations in the *present* lifeworld. Usually they implicitly refer to the real conditions belonging to the second aspect of level (2) and levels (3) and (4). Because they are co-determined by such implications, they can be falsified together with them according to (2.b.ii). Understanding psychology can justify generalized conditionals about human sociability and aggressiveness, sexuality, creativity, etc., on a high level of universality. Such conditionals are not relevant for historical causal explanations because they say something about the general human condition and nothing about the real conditions determining causal explanations for a certain historical situation. They are relevant only together with the modifying real conditions of the specific historical conditions that belonging to levels (2), (3), and (4). But such generalized conditionals can again be falsified because of their specifying implications belonging to case (2.b.ii).

An additional difficulty for psychological causal explanations of historical facts is that a diagnosis, i.e., the theoretical explanation for mental diseases of a patient, presupposes a precise description of the *presently* given symptoms as facts for the psychologist. A significant part of these facts have to be found in methodically guided interviews. It is, however, impossible to apply this method for securing relevant facts in psychological historical explanations in a foreign past reality. The material for such psychological explanations has to be reconstructed by historical research. But the available historical sources for the reconstructions are infested with the everyday psychological explanations used in the foreign past reality in question. Anything that has been discovered this way is once again an object for the possible falsifications of historical critique.

What is left is to illustrate what has been said with an example.[26] According to F. W. Maitland, Elizabeth I was the first sovereign who "*etceterated*" the full title of her father, Henry VIII, proclaiming him as King of England, defender of

[26]The references to Maitland and Pollard are taken from Nagel 1961, 552ff.

the faith and after that "Head on Earth of the Church of England called *Anglicana Ecclesia,*" thus hiding her claim to be the head of the Anglican Church. Maitland mentions several plausible historical reasons explaining why Elizabeth I did that. Nagel constructed a tacitly presupposed generalized implicative psychological conditional behind them, referring to "(a) public statements men are expected to issue concerning their ostensible commitment to some policy at a time when definitive commitment is hazardous, and (b) the use of ambiguous language in such statements for the sake of avoiding commitment."

This conditional is, however, a sociological and only in the second place a psychological generalized conditional. Hence it is possible to find restricting specifications that are relevant for historical research and critique. The first restriction is that a feudal king, and even the emperor at this time, would use ambiguous language for a policy that violated the privileges of the pope and the powerful Spaniards as defenders of privileges of the pope.

Nagel mentions that in a footnote (!), after Maitland made the point above that A. F. Pollard checked the available sources again and was able to show that Mary, the older sister of Elizabeth I, had *etceterated* her title before Elizabeth. According to Nagel, this is not relevant for the analysis of the structure of historical explanations because history is only about facts. But with Pollard's discovery, all the reasons about generalized conditionals and the specifying circumstantial conditions mentioned above are not applicable according to (a), and in this sense are falsified for Elizabeth I. They are also not applicable to the new problem why Mary used the etc., because as a Catholic she had no reason to fear the pope.

Seen from the viewpoint of *historical research* Nagel's approach is awkward. It is true, that the logical and epistemological analysis of the historical explanations of a historical fact reported in a certain *historiography* can only presuppose just the historical facts that are mentioned in this historiography. The crucial point is, however, that Pollard's historical research had falsified Maitland's assumption, and with it the application of Nagel's generalized conditionals in the historical explanation of the use of "etc." by Elisabeth I and Mary.

The example can also be used to illustrate the problems of the falsification of restricted generalized conditionals and circumstantial conditions. The problem is why both – to say nothing about their advisors – used the "etc." to abbreviate their title thus hiding or denying or saving the claim of their father to be the head of the Anglican Church. That Mary as a Catholic had no reasons to fear the pope and that Elizabeth I, on the contrary, had a good reason because she favored the independence of the Anglican Church from the pope are factors belonging to the less relevant circumstantial conditions. But there are two conditions that can be acknowledged as relevant causal condition:

(1) According to the law of the church recognized by the Catholic, the Anglican, and the Protestant churches at the time, a woman cannot be a priest, let alone the head of a church. The legal question was already settled in the High Middle Ages. The emperor, let alone a monarch, had no say in the administration of the church and the election of high-ranking church officials.

(2) According to the customs and the law of the time a feudal sovereign had the duty to save all her/his legal titles for her/his followers in the dynasty because every title implied legal rights in economic revenues, political power, and military power.

These real conditions belong to levels (3) and (4). They are restricted genuine historical generalized conditionals open for the possible falsifications of historical critique. What can be added is that Mary would have preferred to scratch the claim of Henry VIII and that Elizabeth I wanted to save it. But this belongs to the specific real psychological conditions of their personal inclinations, i.e., to the less relevant historical circumstances accompanying their actions.

6.5 Interpretation, Application, and Historical Reality: Summary and Transition

Previous discussions of the problem of interpretation and application and the first canon of hermeneutics in the wake of Gadamer's *Truth and Method* usually neglected the difference between the application of this canon in philology taken for itself as a discipline and its application in philological-historical research.[27] The philological interpretation of a text in the medium of its context of texts separates the context of the text and the context of the interpreter, of interpretation and possible application or rejection. But according to Gadamer all interpretations on this level immediately invite the application[28] of the interpreted text in the context of the interpreter.[29] It is a mistake to assume that Gadamer rejected the necessity of methodically guided interpretation of texts as a presupposition for a meaningful application of the interpreted text in the present of the interpreter.[30] He would not deny that the application of the law presupposes an independent interpretation of a law before applying the law to a present case. Gadamer rejected, however, an explication of interpretation and application in terms of history and the methodology of historical research.[31]

[27]Cf. e.g., Dostal 2008; Seebohm 2008; Grünewald 2009, 49, 57–60.

[28]Following Sect. 3.4 above one has to add – contrary to Gadamer – "or rejection."

[29]Examples are the interpretation and application of the law, but also the interpretation of a play and applying the interpretation in bringing into the stage without using the text as a pre-text for deliberate and sometimes rather unconvincing ideas of the stage director, etc.

[30]Cf. Gadamer 1975 in a review of Seebohm 1972. The problem is that Gadamer's critique of methods in Gadamer 1965 criticizes methodologies of philological research as Cartesian methods but neither the methodologies of the human sciences in general nor those of the natural sciences are Cartesian methods *more geometrico*. They are both empirical, not mathematical sciences.

[31]Gadamer 1965, part II, section II, 2.c, 318 ff. insists on the distinction between philological hermeneutics of texts and historics as methodology for the historian.

The methodological abstraction of the first canon of hermeneutics for philology separates, as mentioned at the end of Sect. 5.3, the context of a text and the context of the interpreter. The temporality of the process of interpreting the text is the real intersubjective temporality of the interpreter. The temporality of a text, and of the texts in the context of the past and present horizon of the text is a quasi-temporality. It can be recognized as the real temporality of a past present if and only if it is recognized that a text, like all other fixed life expressions, has a known or unknown author. The quasi-temporality of the text is a derived shadow of the real temporality of the past present of the author(s). The restricted application of the first canon to the pure philological hermeneutics of texts necessarily implies the banishment of the author. The rehabilitation of the author presupposes the transition to the philological-historical method.

The separation of the two horizons required by the first canon is *quasi-temporal*. The text represents a past present with its temporal horizons, but nothing is said about the temporal location of this present in the past of the interpreter. Seen from the viewpoint of the temporal horizons of the text, the place of the interpreter is somewhere at the end of the "efficient history," the efficient future of the text, the quasi-temporal future horizon of texts that refer to the text. The text implicitly refers to an author in an otherwise undetermined past. But this implied reference is not of interest; it remains empty and in brackets for the method of pure text interpretation. The "banishment of the author" is, hence, justified for pure text interpretation, for the philological hermeneutics of the philologists of Classical Antiquity, and for the humanists and their doctrine of methods for philology as a discipline. This implies that all interpretations of philological hermeneutics invite the additional *application or rejection* of the truth[32] of the text in a given interpretation in the present of an interpreter.[33]

Texts are given for *philological-historical* interpretations as texts of an author, and the biography of the author along with the historical reconstruction of the temporal development of a past present are relevant as well. The reconstruction of a past reality presupposes, on the one hand, the philological and archaeological interpretation of fixed life expressions. The fixed life expressions are, on the other hand, fixed life expressions that have been created in the context of the reconstructed past present, and this perspective is, in turn, of relevance for the interpretation of the fixed life expressions. Following the language game of the hermeneutical circle, it can be said that this is the philological-historical "circle" of philological interpretation and historical reconstruction. Of real methodological significance is, however, that the residuum of the methodological abstraction implied in the

[32]The difference between Gadamer's analysis of the relation between tradition and application and the analysis given in Sect. 3.4 above is that the possible applications of the parts or of the whole of a tradition always has as their correlate possible rejections of this part or even the whole tradition.

[33]Gadamer 1965, esp. part II, section II, 2, a. It has to be added that a canon demanding the actualizing of the text was already a recognized methodical rule of the old humanistic philological doctrine of methods, cf. Sect. 5.2 above on the canons of hermeneutics.

first canon in its philological-historical version is now recognized as a foreign real past present separated by a real temporal distance from the present of the historical reconstructive interpretation of the past present. The historian-interpreter is not interested in the truth or falsity of the message of the text for her/his own present; instead she/he is interested in the meaning and significance of the fixed life expression in a temporal context that has the formal structure of a real past present, a present for and in the lived experience of more or less foreign predecessors.

The application of the first canon in the methodology of the *historical* human sciences implies, as mentioned, a methodological abstraction separating the context of the historian from the projection of the facts *for* the historian, i.e., the fixed life expressions, into a past more or less foreign cultural context. The attitude of historical research is the attitude of a "disinterested observation." This means in this case that the meaning and significance of the fixed life expressions is given as meaning and significance for Others at a temporal distance. There is no immediate need to apply or to reject them in the own context of one's own tradition in the present. The attitude of disinterested observation in historical research is in this sense also value-free.

The application of the first canon of hermeneutics in philological interpretations of a text has to refer to a context of texts. The application of the first canon of hermeneutics in historical reconstructions and interpretations of a past reality and its temporal development refers to a reconstructed context of historical facts. The interpreter of a text has to distinguish between

texts in the future horizon, the efficient "history" (more precisely the context of texts that have been influenced by the text) and
texts in the past horizon of the text to which the text refers, i.e., texts in the context of texts that belong to the conditions of the generation of the text.

An assumed interpretation of the text is falsified if it is incompatible with the context of texts in the past horizon of the text. The situation is different for the philological-historical approach. What is of interest in this case is not only the text in its context of texts, but also the biography of the author of the text in the context of the author's situation within the context of a past real lifeworld and its historical development. It is of interest for the philological-*historical* approach because it can be of additional significance for the interpretation of the text.

History is interested in the reconstruction of a past lifeworld and its temporal development, and beyond that, in the place of this lifeworld in the context other cultural lifeworlds that follow it temporally or are geographically foreign to it. History presupposes, hence, a general formal structure of historical temporality, but also of historical space determining the location of the past present and the past location of a past lifeworld. The materials of the reconstruction of a past reality are already philologically and/or archaeologically interpreted fixed life expressions of authors living in a foreign past. The reconstruction of the past reality offers in addition the material for the philological-historical interpretation of the life expressions of authors living in a foreign past that can be located, within a formal spatial and temporal structure in a place that is foreign to the present and the place of

the historian. This formal structure determines the place of the interpreting historian and her/his context *and* the place of the reconstructed foreign past lifeworld and the real distance between them. The structure separates and determines the distance between the historical *and* the philological-historical interpretation of fixed life expressions and their cultural context, and in perhaps the biographical context of their authors as well.

The assumption of this structure is a necessary implication of the methodology of the historical human sciences, of the epistemological justification for Schleiermacher's version of the first canon of hermeneutics, and of Dilthey's application of this canon to the historical human sciences in general: the standard of an interpretation is the context of the author and the *contemporary* audience of the author. However, the explication given for the universalized version of the first canon as the principle of the methodology (and the methodological abstraction) that is constitutive for the recognition of the historical human studies as empirical sciences raises further epistemological question. The methodologically determined attitude of historical research is obviously not possible in all types of concrete lifeworlds. It requires specific generative foundations in a specific lifeworld, and these foundations must in turn have their foundation in structures of the lifeworld in general.

History as a science has to locate the past realities within a common formal temporal and spatial framework in which they are all given together in a universal context. The temporal-spatial framework of concrete archaic and in general pre-scientific cultural lifeworlds is bound to their system of higher and elementary understanding. Encounters with other cultural lifeworlds are understood within this framework.[34] Material structures like the regular movement of *celestial bodies* and the *geographical distribution* of oceans, continents, mountains, and rivers occur as given in relative intersubjectivity in these cultures in different, partially incompatible ethnocentric systems of elementary and higher understanding.

The application of the first canon as a methodological principle in philological-historical research presupposes as one of its foundations a universal Galilean framework of time-space coordinates as the medium for the spatial and temporal localizations of all texts and events including all other concrete cultural lifeworlds in the past horizon of historians and interpreters. The givenness of a culturally neutral system of time-space coordinates has its foundation in the structure of temporality and spatiality in the lifeworld in general.

The objects given in the residuum of the methodological abstraction of the historical human sciences can only be given in a cultural lifeworld that is able to localize both itself and foreign cultural lifeworlds in the Galilean spatial and temporal framework just characterized. Systems of higher understanding in pre-scientific lifeworlds create mythological and religious interpretations that are valid

[34]Perfect prototypes of such self-centered traditions are the chronicles of Byzantine monks, e.g., Malalas or Georgios Hamartolos. History is in this case (but also in derived or similar types) always a universal history of *religio*-centered salvation. The "pagans" have no history. Their history is a meaningless sequence of events, sometimes punished by God, sometimes not.

only in the perspective of their own cultural context. They are in this sense ethnocentric, and seen from the outside, only of relative intersubjective validity.

The first-order higher understanding in a lifeworld with sciences is at least partially also governed by philosophical and scientific theories, and thus implies a Galilean framework in the sense characterized above. This foundation of the spatial and temporal structure of historical reality for historical research is in addition the foundation for possible applications of causal laws borrowed from the natural sciences in historical explanations of changes in the natural environment of a past cultural lifeworld. The epistemology and methodology of historical research on the level of history as a science is, therefore, also able to take into account how such "real causes" and "real conditions" have been understood in pre-scientific lifeworlds and then in a lifeworld with sciences.

What has to be kept in mind for the second-order interpretation of the first-order understanding of the meaning of "cause" and "fact" in pre-scientific higher understanding used in old chronicles and histories is that this old meaning can still be alive in the background of some contexts, though more or less covered by theoretical philosophical and scientific interpretations of "cause" and "fact." The old Latin meaning of *causa* and *factum* already mentioned in Sect. 3.3 can be used as a guiding thread back to the original pre-scientific meaning. The meaning of *factum* implies that a fact is caused by the action of somebody who was the *causa* of the *factum,* i.e., the one who has done it and is, therefore, responsible for the "*factum*" and in this sense guilty. What was done is worthwhile to be reported in *historiae* if it is of religious, political, legal, or technological significance.

The law and its applications in jurisprudence have been used in reflections about "Truth and Method"[35] as a model for the inseparability of interpretation and application and, as a consequence, for downgrading the historical aspect in the task of the interpretation of the texts and monuments of the tradition. What is overlooked, and can be used for a possible rehabilitation of the historical aspect in the philological-historical method, is that an acceptable application of the law to a case requires thorough investigations about what happened in the past horizon of the actual present. To look at some aspects of the logical and epistemological structures of understanding "causes," "facts," and "circumstantial conditions" in legal contexts is, therefore, also useful for the analysis of historical reconstructions of "what really happened" in a more distant past.

Seen from a logical point of view, laws have the character of generalized normative conditionals. Presupposed is a generalized *norm*: "All actors ought not / ought to do X (under certain circumstances Y)." followed by a generalized *normative* conditional defining the sanction: For all actors: "if/only if they do/do not X (under certain circumstances Y) they ought to receive the punishment Z." The final task for a court of law is the application of the law, a generalized conditional, to a particular case.[36] Except for the knowledge of the law, the main work that has to be

[35] Gadamer 1965, part II, section II, 2.c.

[36] A more detailed account of the problems of law and jurisprudence will be given in Sect. 10.6.

done for this purpose is to determine the facts and provide causal explanations of the particular case. The question "what is the case" cannot be answered by immediate observations based on intersensory experience in court. The understanding of the facts is governed by the already pre-given definition of the facts in the law. The main problem is that the facts in question happened in the past phase of the actual present of the investigations. The fact and its circumstances are, hence, reconstructions, and the materials for the reconstruction are reports from witnesses, circumstantial evidence, and documents. It is, furthermore, required for passing sentence that the reconstruction of the facts and the reasons for the application of a law to the facts are *on the records*,[37] i.e., available in a written text, because the reconstruction of the fact and the verdict ought to be available for future review.

The first task of investigations in a court of law is to find out whose action caused the fact. The second task is to determine the circumstantial conditions under which the action took place. Several types of circumstances that may be of interest in different cases of actions can be distinguished. There are circumstances belonging to the natural environment of the action, there are technological and economic circumstances; and finally there is the psychological conditions, including the motives of the actor(s). The typology of real conditions that has been considered above is in this respect also of significance for such investigations. The goal of such investigations is the reconstruction of what happened in the immediate past horizon of the present. Pre-given for the reconstruction are the spatial and temporal structures and together with them the structures of causal relations, including causal relations that have been discovered by the natural sciences in a lifeworld with natural sciences.

The relevant facts for the reconstruction in a court of law are facts in the past horizon of the present lifeworld. Apart from circumstantial evidence and documents, the subjective memories of witnesses, of the accused, and of the other persons involved are still available for the investigation as immediate and fixed life expressions in the hearings of a court of law. The materials for the reconstruction and the reconstruction itself belong together and are linked with each other in the unity of the past and future horizons in the *actual present* intersubjective time phase of lived experience. In most cases it is neither necessary nor possible for secondary understanding of these life expressions to apply the methodological rules of philological interpretations. Historical reconstructions of a real lifeworld in a distant past have to presuppose the same *formal* structure. There are, however, essential differences in the structure of the empirical basis. The available materials for the reconstructions of historical research, the fixed life expressions (written sources and archaeological traces), are not immediately linked with the present lifeworld of the historian. There is no chance to meet the actors, or to ask them or the witnesses, etc., in the present. The fixed life expressions as facts that are given in the present for the historian and the reconstruction of the historical facts and

[37] *Quod non est in actis non est in mundo*: "What is not on the record is not in the world" is a well-known principle of Roman law.

their interpretation are separated. The facts *for the historian* are given in the *actual present* and its immediate past and future horizon for historical research. In contrast, the reconstructed *historical facts* belong to a *distant past present* and its past and future horizon, and it is this *distance* that admits and requires the application of the modified first canon of hermeneutics in historical research.

Two further epistemological problems will surface in re-considerations of this summary of the results of the preceding sections. The first is that a temporal phase in a distant past (and with it the possible causal explanations of what happened in this phase) is indefinitely open in direction of the past horizon of this phase. This implies that historical research can go back in the direction of this past, proceeding from the sequence of temporal phases of cultures with a literary tradition to pre-historical cultures without a literary tradition. Research in this direction cannot be restricted to archaeological interpretation of artifacts and monuments. It will have to use increasing amounts of traces that belong to the material of paleontology. The history of humankind, and with it of the ontological region of the human or cultural sciences, appears in this dimension as an extension of the history of nature.

This foundation of the spatial and temporal structure of historical reality for historical research is in addition the presupposition of possible applications of generalized causal conditionals that have been borrowed from the natural sciences in historical explanations of changes in the natural environment of a past cultural life-world. Such explanations are not restricted to history in the narrower sense. They can be applied, and frequently have been applied in paleographical research preparing philological-historical interpretation of texts and in archaeology, especially in pre-historical archaeology. They are of significance for the transition from pre-scientific techniques in elementary understanding to the steady growth of first mathematical and mechanical and then scientific technologies in the narrower sense since the seventeenth century. It is, hence, impossible to discuss epistemological questions of the human sciences in splendid isolation without considering the fields in which the human and the natural sciences overlap. A strict separation of the sciences of "understanding" and the sciences of "explanation" does not hold water. Thus after the phenomenological reflections on the epistemology of the natural sciences in Part III, it will be necessary to return to the problem of the relation between history as a science and the natural sciences in Part IV, Sect. 9.1.

A past present also has a past future horizon and this horizon is beset with a sequence of events that end in temporal phases belonging to contemporary history. The distance between historical facts and facts for the historian, between the past present and the actual present, shrinks in the steady transition from the future horizon of the past present to the past horizon of the actual present. What shrinks together with the distance is the applicability of the first canon, and with it the abstractive reduction that warrants the status of the historian as a disinterested observer. The advantage is that the material basis of contemporary history is precisely the basis that is, as shown above, the basis also for the investigation of "what was the case" in a court of law. This indicates that this material basis also offers the material for the systematic human sciences insofar as they are interested in the present, and even in predictions referring to the future horizon of the present.

Research in the natural sciences also has the material basis of its observations in the present and is also interested in predictions, but this also causes problems for the analysis of the relation between the natural sciences and the systematic human sciences. An indicator is, on the one hand, that the methodology of empirical psychology shares most of the structures of research in the life sciences. The social sciences presuppose, on the other hand, the results of historical research, especially of social, economic, legal, and political history. These problems will be considered in Chap. 10.

Part III
The Methodology of the Natural Sciences

Chapter 7
The Empirical Basis and the Thematic Attitude of the Natural Sciences

7.1 Basic Problems of the Epistemology of the Natural Sciences

Positivism and later analytic philosophy governed the epistemology of the natural sciences and the sciences in general in the nineteenth and the first half of the twentieth century. The system of the natural sciences proposed by the positivists and the analysts is straightforward. There are the hard sciences, i.e., physics (including astronomy, and astrophysics), and chemistry, on the one hand, and, on the other hand, the soft sciences: the life sciences, but also the social sciences and history to the extent to which causal explanations can be applied to historical facts. The positivistic research program expects that the historical and the social sciences can be *reduced* to psychology, psychology to biology and physiology, physiology to chemistry, and chemistry to physics. This *reduction* is the presupposition of the ontological program of naturalism. The ideal epistemological paradigm providing the norm for what can count as a science for the analytic approach is physics. The analytic epistemology of science of the first half of the last century is normative, and in a certain sense, a Neo-Kantianism without a transcendental subject. There are no a priori forms of intuition and there is no subjective unity of transcendental apperception, but the extensional interpretation of classical logic and formalized mathematics are the normative "presuppositions of the possibility" for a possible science.[1] Logic by itself is transcendental.

[1]Popper's early *Die beiden Grundprobleme der Erkenntnistheorie* written 1930–1932 and published 1979 by Hanssen was still written in the wake of Neo-Kantianism. Popper's positive evaluation but also his critique of the Vienna School shows the traces of the influence of Kant's *Critique* as well as Kant's appraisal and critique of Hume, cf. Schäfer 1988, 35f.

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There has been no intellectual exchange, no bridge between the tradition of analytic philosophy and the tradition of the so-called Continental philosophy, i.e., phenomenology, fundamental ontology, existential philosophy, and the defenders of the human sciences in the wake of Dilthey in North America. Scientific technology was *anathema* for most philosophers in the latter tradition and so was science and in general *das rechnende Denken* (calculating thinking.) There has been an interest in a phenomenological epistemology of the human sciences as sciences of the lifeworld. However, apart from a few but significant exceptions that will be considered below, there has been almost no interest in the epistemological problems of the natural sciences. The first task for a phenomenological epistemology is, therefore, to ascertain whether, where, and how reflective phenomenological descriptions can be of significance for the problems of the epistemology of the natural sciences. A selective and schematic sketch of the development of the epistemology of the natural sciences can serve as a guideline.

The first principle of the epistemology of the natural sciences since Bacon was, and to some extent still is, that the natural sciences are empirical sciences and that the main task of the methodology of the natural sciences is the empirical determination of the truth and falsity of hypotheses, i.e., universal conditional judgments about causal relations. The final arbiter for questions about the truth or falsity of such judgments is sensory experience.

Since Galileo and Descartes the second principle has been that the adequate language for a true philosophy of nature is the language of mathematics. The method of mathematics is the warrant of indubitable truth. Universal judgments of a true philosophy of nature based on experiment and observation can be recognized as universally true only if they are in addition derivable as theorems of mathematically guided theories. More about this will be considered in Sect. 8.2.

According to J.S. Mill's logic of induction and his descriptive analysis of the methodology of experiments,[2] hypotheses about causal laws can be falsified or verified in experiments. The naïve claim that repeatable successful experiments can count as a sufficient criterion of the truth, the final verification of the hypothesis of a universal natural law, was, however, already challenged by Kant. Universal judgments cannot be verified in the empirical natural sciences. They can only be falsified.[3] The verification of hypotheses in experiments means, hence, that they have not been falsified thus far, are in this sense confirmed, corroborated up until now, and remain fallible and able to be falsified by future experiments or observations. Naïve falsificationalism can be characterized as a synthesis of Mill's epistemological account of the experiment and Kant's methodological restriction on the truth claims of affirmative universal empirical judgments. Naïve falsificationism in this sense is an account of the methodology of confirming or rejecting universal

[2] Mill 1977, Book III.

[3] Kant KGS III, *Critique of Pure Reason*, B 819 in "II. Transcendental Doctrine of Methods."

statements about causal connections with the aid of the methods of experiment and observation in the medium of the empirical basis of the natural sciences.[4]

Since physics is the normative paradigm in the positivistic approach the main question is whether experimental research is able to falsify or to confirm not only hypotheses, but also theories. Given theories written in mathematical language, hypotheses can be derived as theorems of the theory. According to dogmatic falsificationism,[5] an empirical falsification of a derived hypothesis implies the falsification of the theory with a simple application of *modus tollens*. Dogmatic falsificationism can be challenged by conventionalism. Theories cannot be rejected by one or some experimental counter examples. First there is always the possibility that a more detailed account of the factors or initial conditions of an experimental situation or an observation will be able to destroy the evidence of the falsifying instance. Then there is the possibility of introducing auxiliary hypotheses that can be used as plausible reasons for the rejection of the falsification of a hypothesis in experiments. There are in addition other methodological criteria providing good reasons for the defense of theories that have to be rejected according to the standards of dogmatic falsificationism: the simplicity, the explanatory power, etc. Answers to these objections of conventionalism and other objections can be given by sophisticated methodological falsificationism.[6]

Further epistemological reflections indicate serious problems in the common ground presupposed on both sides. What serves as the normative ideal of falsificationism and conventionalism are strict causal laws and this presupposes that the language of the theories of the sciences admits and even requires the grammar of the formal and formalized language of mathematics. A first difficulty is that there are "theories" in the life sciences that are by no means written in mathematical letters, e.g., Darwin's theory of evolution. A second problem is that statistical causality is predominant in the life sciences. Mathematical statistics is also of significance for some theories in the hard sciences, but the epistemological significance of the application of statistics in this context is different.[7] A third problem is that, seen from the viewpoint of the normative principle guiding the "textbook" history of the sciences, the historical evolution of the sciences is a steady progress. The immediate experience of the "revolutionary" transition from classical to post-classical physics

[4] Cf. Lakatos 1976, 95f. Lakatos mentions no epistemologists who defended his "dogmatic falsificationism." What has been called "naïve falsificationism" above he calls "naïve methodological falsificationism" as opposed to "sophisticated methodological falsificationism," cf. 103ff and 116ff.

[5] See Popper 1968, esp. ch. IV. Other analysts have not challenged Popper's analysis of experiments in the sciences, cf., e.g., Quine 1996, I. 5, 12f.: and cf. also below on Quine's analysis of observation sentences and Popper's basic statements.

[6] The answer of the sophisticated methodological falsificationism to the conventionalism of Lakatos also includes a sophisticated re-interpretation of Kuhn's crises and revolutions in the sciences. The paradigm is understood as a research program and such research programs have protective belts against negative problem shifts. Cf. Lakatos et al. eds. 1976, 115ff; 135; 155.

[7] On statistical mechanics and the special situation in quantum mechanics, cf. Sect. 8.4 below.

and from classical mathematics to post-classical formalism in the second half of the nineteenth and the beginning of the twentieth century teaches something else. The history of science offers many examples of similar shifts in the research programs of the sciences.

References to what scientists "really did" in the historical development of science, and especially in the recent history of science, already surfaced in the arguments of the conventionalists against the falsificationists and *vice versa*. Their references to this or that concrete example of scientific research initiated a turn in the development of the epistemology of the natural sciences. The history of science was now considered to be the medium and the final arbiter for epistemological questions. This turn is plagued by other difficulties. To characterize the basic historical changes in the sciences as *revolutions* leading from one paradigm, one self-sufficient context of understanding nature, to the next without admitting any rational continuity[8] is not acceptable. The metaphorical use of "revolution" in the context of the history of science is already misleading. Political revolutions cannot be understood as paradigm shifts.[9] The main problem is, however, the thesis that scientific paradigms dominating certain periods in the history of science are incompatible with later or earlier paradigms. The necessary consequence is that the history of science ends in the epistemological trap that threatens the historical sciences in general: historicism and historical relativism.[10]

A paradigm is, presupposing the phenomenological analysis of the significance of tradition for the structure of the lifeworld, a tradition of a literary meta-genre of higher understanding functioning as a norm or authority demanding the continuing application of the tradition. The phenomenological analysis of the structure of

[8] Kuhn 1970.

[9] They are revolutions in an old system of the distribution of political power prepared by long periods of economic, political, and intellectual changes in a society. A politically dominated but economically already dominating social class finally succeeds in a sudden and violent struggle for being the dominating factor in the distribution of political power. This implies, however, that the political revolution is precisely restricted to the political question of the distribution of power in a state. Kuhn never referred to Kant's Copernican revolution. The image behind Kant's metaphor is the image of the revolutions (original Latin meaning of *revolutio*) of the planets including sun and moon around the earth. According to the Copernican revolution of these "revolutions" the planets, including the earth, revolve around the sun. Kant's metaphor connecting the Copernican problem of the revolutions of the stars with the French political revolution called his philosophical revolution a Copernican revolution emphasizing that his revolution, namely, the thesis that the a priori is not in the things, but in the understanding of the things in the transcendental unity of apperception. This really was a universal radical paradigm shift in epistemology. Kuhn's revolutions in the sciences are only modifications of pre-given patterns.

[10] Kuhn 1976, mentions viewpoints that are able to soften the relativistic consequences of his incommensurability thesis of paradigms. He mentions in his defense Quine's problem of radical translation, but this problem is a puzzle for a lingualistic understanding of the problem of translation, i.e., a problem for the epistemology of the human and not of the natural sciences. The real problem is that observation sentences are according to Quine always theory-laden, cf. Quine 1996, I, 2–4. It is questionable whether Quine's problem of radical translations can be used to defend Kuhn's incommensurability of paradigms. Cf. the discussion below.

the generation of a tradition has also shown that tradition presupposes not only the application, but also the rejection of aspects of the tradition. A paradigm as a *norm* is a meaningful part of the generation of a tradition only because it is possible to reject aspects of the paradigm. Rejections are in the most cases more or less partial rejections connected with partial applications of the old tradition. Almost complete radical rejections of a whole system of higher understanding that can be understood as radical paradigm shifts are possible, but there are very few real historical instances for such rejections and there are certainly no complete rejections, in the history of modern science since the sixteenth century. A thorough account of the relevant aspects of the historical process of the development of the sciences and its significance for the epistemology of the natural sciences requires further distinctions. Of significance for the present investigation is, however, first of all that the phenomenological explication of the notion of "paradigm" given above indicates that the recognition of the significance of the history of science for the epistemology of the natural sciences implies the possibility of applying phenomenological analyses in the epistemology of the natural sciences. This indication needs further explication.

A history of science presupposes a methodologically guided philological-historical interpretation of texts belonging to the literary meta-genre "scientific literature."[11] An epistemology of the natural sciences that includes reflections on the history of science presupposes, hence, the recognition of history as a science. A philological-historical interpretation is in this case the secondary understanding of the first-order understanding of nature in scientific texts. The next step is the epistemological analysis of what the scientists have really done, of their activities in their first-order understanding of nature. A method is a collection of rules guiding goal-directed activities. Such a collection can be called a paradigm of certain types of understanding. A paradigm in this sense is, however, too broad for the purposes of the epistemology of the science. Paradigms in the broad sense can be discovered in the history of painting, of music, and of agriculture, etc. The task is, hence, to begin with the analysis of the specific properties of paradigms in the sciences. Sciences claim to provide objectively valid and intersubjectively acceptable systems of knowledge. Scientific paradigms are methodologies, and methodologies are collections of methodical rules, together with the justification of the claim that these methods can be recognized as warrants of the objective validity of the theoretical understanding of a certain region of objects, the region of objects of the science in question. A science can have different paradigms because, seen from the historical point of view, there are significant modifications in the historical development of the methodology of this science. The descriptive analysis of the applied methodologies is the task of a historically guided epistemology.

The epistemological problems connected with the status of descriptions of paradigms, research programs, program shifts, and other descriptive typologies

[11] What follows is a brief recapitulation of the phenomenological analyses in Part I, Sects. 3.4 and 4.5.

in a historically guided epistemology of the natural sciences, and especially the hard sciences, seem never to have been raised in the literature. The reader is left with the impression that such typologies are empirical systems of concepts and categories that presuppose empirically accessible reflections on historical and/or psychological facts. Seen from the viewpoint of phenomenology, this impression implies the epistemological relativism of psychologism and/or historicism. These problems are, however, precisely the problems that can be solved with the aid of the phenomenological reduction. It has been shown in Part I how a phenomenological epistemology and the phenomenological attitude in general is able to incorporate descriptive epistemological analyses (or other analyses) of the activities of understanding as rough sketches of ideal types of complex wholes of different cogitative types and of the web of one-sided or reciprocal static or generative foundations between different cogitative types. What has been said can be immediately applied to two general problems of a historically guided epistemology: the problem of contingent and necessary conditions in the history of science and the problem of whether there is a general paradigm, at least for the methodology of the hard sciences, that includes all methodological program shifts in the history of the hard sciences.

The distinction between contingent and necessary conditions in the history of the sciences, and especially in the hard sciences, has been recognized in the epistemological literature of the end of the last century.[12] The distinction between contingent and necessary historical conditions in the development of a system of higher understanding is a general problem for the methodology of the historical human sciences.[13] Contingent conditions in the general context of a cultural environment are external conditions that determine the acceptance or rejection of significant modifications in a system of higher understanding, but in some cases also of a new system of higher understanding in this context. Necessary conditions emerge as immanent conditions in the development of a system of higher understanding. In the context of phenomenological analysis a necessary condition is a generative foundation. Necessary conditions, e.g., in the hard sciences, are methodological problem shifts on the level of the empirical basis caused by certain experiments or, on the level of the theories, necessary modifications in the mathematical formalism for the solution of hitherto unsolved problems in the theory.

Bur recent epistemological literature also offers a new analysis of the general methodological structures of theories that covers the problem shifts in the history of physics since the sixteenth century.[14] This analysis can be used, with some

[12]Cf. Cushing 1994, on the fate of Bohm's theory, e.g., 45; 144f; 175.

[13]Cf. above Sect. 6.1, 6.2.

[14]Cushing 1994, sections 2.2 and 2.3; the historical fact that this new epistemological approach was triggered by the specific epistemological problems of quantum mechanics is a contingent historical condition. Cushing's description of the structure of theories covers classical as well as post-classical physics.

modifications and a *caveat*,[15] as a guideline for further phenomenological analyses of the methodology of the natural sciences in general, and especially of the hard sciences.

(1) *Empirical adequacy* is the requirement for a phenomenological or semi-empirical algorithmic formula that can be accepted as an adequate representation capable of reproducing observed phenomena.[16] Here the meaning of "phenomena" and "phenomenology" is precisely the epistemological understanding of phenomenology in the nineteenth century as a preparatory discipline for scientific research (see Sect. 2.1 above).

(2) An acceptable *explanation* of phenomena in the hard natural sciences requires a theory written in mathematical language. Different periods in the history of physics presuppose the development of different more or less sophisticated mathematical formalisms. Explanations applying mathematical formalism are deductive justifications of statements in general, and especially of the empirically adequate descriptive statements about phenomena mentioned in (1). This implies that the phenomena are relevant only as measurable observables. The application of a mathematical formalism is sufficient either for the derivation and with it the explanation of hypotheses that have to be tested in experimental research or for the explanation of already confirmed hypotheses. Explanations within the framework of a mathematical formalism are, furthermore, interested in the unification of different mathematical formalisms in formalisms of a higher order and in the reduction of formalisms of lower order to formalisms of a higher order.[17]

(3) Understanding a theory of physics presupposes the interpretation of the underlying mathematical formalism and the explanation of the empirically adequate formulas with the aid of the formalism as a representation of the world, i.e., how the world is seen from the viewpoint of scientific realism. The understanding of a physical process as a sequence of events has the character of a story. The understanding of the formalism in its relation to the explanation of the empirically adequate formulas as a whole is the *ontology* of the theory. The ontological interpretation of the mathematical formalism has also been characterized as belonging to the philosophy of nature and as a meta-physics of physics.[18]

[15]The *caveat* refers to some remarks that seem to imply psychologism; cf., e.g., the short reflections in Cushing 1994, 11/12. The watershed between phenomenology and implicit or explicit psychologism is the understanding of "phenomenon." Cushing's way out is simply to declare phenomena to be the final court of approval for disputes about science.

[16]Cf. Cushing 1994, 10 and 13, on Kepler's first law of planetary motion.

[17]Cf. Cushing 1994, 11 and 13ff.

[18]Cf. Cushing 1994, 11ff, and about ontology, 32; 174; 203; cf. Gibbins 1987, ch. 1, about "meta-physics" and 43ff. and elsewhere about ontology.

It is not necessary that all of these three aspects of a theory be present simultaneously. The focus of the interest of experimental physics is the discovery of semi-empirical formulas on the first level. The corroboration, unification, and reduction of mathematical formalisms that can be applied in the explanations of semi-empirical formulas is the main interest of theoretical physics on the second level. There is no need for the praxis of research in the hard sciences to go beyond the first and the second level and to add an interpretation of the formalism. To remain silent about the ontological implications of a theory has been characterized as the "quietist interpretation," i.e., to be quiet about possible interpretations. The correlate of a quietist interpretation is instrumentalism. Theories in physics are an instrument for the discovery of successful predictions of observable events on the first level.[19] It is of no interest for a radical instrumentalist whether or not also physics implies a higher understanding of nature and the real world. It works for predictions, and what works for predictions can be applied in technologies. Most physicists have, however, shared and share the activist and realist attitude. Ontological interpretations of mathematical formalism are a necessary implement of their research work.[20]

Some remarks about the categories and the terminology used in this account are necessary before turning to the phenomenological problems. The categories used in (2) and (3) are certainly at odds with the basic categories of "explanation" and "understanding" used in the old distinction between the human and the natural sciences introduced by Dilthey and Rickert. It is obvious that this concept of explanation implies much more than simple causal explanations. Explanation includes the explanation of the semi-empirical formula referring to phenomena including the phenomena, given in the observation of simple causal connections. Understanding as ontological interpretation of a mathematical formalism is recognized as an integral aspect of a theory in the hard sciences. This terminology is, however, at least partially compatible with the categories introduced above in Part I and applied in Part II. Understanding in the human sciences was characterized as secondary understanding, as interpretation of fixed life expressions. First-order understanding includes all types of lower and higher understanding of real and ideal objects. The natural sciences in general, but also mathematical formalisms and explanations of phenomena with the aid of mathematical formalism, as well as the ontological interpretation of the mathematical formalisms applied in physics, are types of higher understanding. What is left is a difficulty with the term "interpretation of a mathematical formalism." Such an interpretation is the interpretation and application of an abstract formalism to material structures that can count as material instantiations of the formalism. The ontological understanding of explanations applying mathematical formalisms can be recognized as a specific type of theoretical higher understanding. Since the difference in the contexts in

[19] See Gibbins 1987, 142; Cushing 1994, 2, 11.

[20] Cf. Gibbins 1987. The quietist attitude and instrumentalism, but also positivistic attempts to reduce the problems to an analytic logico-linguistic problem, surfaced in the wake of the problems of quantum mechanics.

which the term "interpretation" has been used in Parts I and II, on the one hand, and "interpretation of a mathematical formalism," on the other hand, is sufficiently clear, it is not necessary to use a new terminological distinction.

It has to be kept in mind that the phenomenological analysis of the empirical basis and the cogitative types of scientific research in *Ideas II* and the *Crisis* is restricted to the situation of the development of the natural sciences and the epistemology of the natural sciences in the second decade of the last century. Husserl as a mathematician knew Hilbert's formalistic treatment of formal logic and mathematics. There are, however, no explicit references in Husserl's writings to problems connected with the theory of relativity and, of course, also no references to the problems of quantum theory. The epistemological background is restricted to the theories of Neo-Kantianism and the positivism of the nineteenth century. The methodological and epistemological discussions of the last century beginning with the Vienna school and Popper, are beyond the historical scope of Husserl's later writings. There are, as mentioned, very few phenomenological investigations with interpretations of the methodology and the epistemology of the natural sciences offered in *Ideas II* and *Crisis*.[21] Some interpretations and further explications of difficult passages and concepts in Husserl's late writings in this literature are in addition of systematic significance for a phenomenological epistemology of the natural sciences. There are also some systematic investigations about the phenomenology of mathematics that are of significance for the epistemology of the natural sciences.[22] It is, therefore, necessary to begin with a brief exposition of Husserl's own phenomenological reflections on the natural sciences and the deficiencies of his account.

The thematic attitude of the sciences presupposes an "abstraction."[23] The abstraction excludes certain regions of intentional objects. Excluded by the abstraction that is, according to the *Crisis*, constitutive for the natural sciences are values, goods, purposes, goals, means, works of art, etc., or in short, all types of objects that are in some sense practical and not theoretical. It is, furthermore, of significance that the abstraction determining the thematic attitude of the natural sciences implies intersubjectivity in principle. Solipsistic psychic contents, the contents of the subjective lived experience of individuals and its perspectives, are excluded.[24]

The description in the beginning of *Ideas II* is not precise. It covers at least *prima facie* not only the theoretical attitude of the sciences, but also a pre-scientific philosophy of nature, e.g., the theoretical ontology of nature of Aristotle or Democritus. Closer considerations of the material in *Ideas II* and the *Crisis* indicate,

[21] Cf. for instance Gurwitsch 1974; Ströker 1987 esp. ch. VII and VIII; Ströker 1987; Harvey 1989. The investigations in Kockelmans 1969, 1985, 1993 presuppose the fundamental-ontological understanding of "understanding" of Heidegger's *Being and Time*.

[22] Ströker 1965; Lohmar 1989; Tieszen 1989.

[23] *Ideas II* uses occasionally "reduction" for "abstraction," cf. Hua IV §§2–4, 25. The *Crisis* uses only abstraction. The precise meaning of "abstraction" and "reduction" needs further explication in the following §§.

[24] Hua IV, §18d, cf. Hua III, §52.

furthermore, that Husserl's main interests are not the sciences in general, including the life sciences, but only physics as the prototype of science. The abstraction that determines the thematic attitude of physics excludes in addition secondary qualities. Secondary qualities are appearances and are relative. Left in the residuum of the abstraction are only the primary qualities as causes of appearances.

The application of mathematics in physics as the basic natural science and its ideal prototype is, according to the *Crisis*, the essential core of the thematic attitude of science in general. Mathematics is the language of the theories of physics. Since Galileo, Descartes, Leibniz, and Newton mathematics has been understood as a *mathesis universalis*, in modern terms as the theory of pure manifolds. Causality is understood as idealized causality, i.e., whatever is said about causes and effects must be said in terms of the *mathesis universalis*.[25] The abstraction that is constitutive for the thematic attitude of modern natural science excludes, hence, all the aspects of the lifeworld that are of crucial meaning and significance for lived experience in the lifeworld. This "alienation" from the lifeworld, and the consequences of a scientific technology for the lifeworld, is the crisis of the European sciences.[26]

What is missing in the account given in *Ideas II* and in *Crisis* is a precise distinction between the soft natural sciences and the hard sciences, especially physics. There are almost no passages in the *Crisis* in which the use of "natural science" cannot be replaced by "physics." What is said in the second part of *Ideas II* about the constitution of animal nature covers only *prima facie* zoology. What is of interest in this section is, however, not zoology as a natural science, but animal nature as animated nature. The main difference between the "soft" life sciences and the hard sciences is that life sciences are also interested in primary qualities of their objects but their descriptions of their objects include also reference to secondary qualities of their objects. Theories in the life sciences, e.g., Darwin's theory of evolution, are *not* written in the letters of the *mathesis universalis*. As mentioned above, their thematic attitude is determined only by the abstraction mentioned at the beginning of *Ideas II*.[27]

It is, hence, necessary to go beyond Husserl, adding to what can be found in the *Crisis* a distinction between *two* abstractions. The *first* abstraction is a methodological abstraction that is constitutive for the natural sciences in general, including the soft sciences. The second abstraction is a methodological abstraction that has in addition the character of a *reductive* abstraction. This second abstraction is constitutive for the hard sciences, especially physics. It implies the exclusion of everything that is excluded in the first abstraction and excludes in addition secondary qualities. Left are only the primary qualities, because only primary qualities can be

[25] A perfect interpretation of Hua VI, §§ 8–10, the last systematic version of Husserl's reflections on the *history* of the mathematics and physics, can be found in Moran 2013 ch. 3. There are, however, as mentioned, other works of Husserl and secondary literature that are of interest for a phenomenological *epistemology*; cf. also below Sects. 8.1, 8.3.

[26] Hua VI, §35.

[27] Hua IV, §2.

legitimate objects for mathematical theories, theories written in the language of a *mathesis universalis*.

It is correct to characterize a mathematical system that includes Cartesian analytic geometry and the infinitesimal calculus as a mathematical formalism, a formalized theory of pure manifolds in Hilbert's sense. This mathematical formalism admits, however, a comparatively concrete interpretation of objects in classical physics. It can be understood as a language that captures the principles of the real nature behind, but not disconnected from, nature as it is given in our experience of the natural environment in the lifeworld in general. The mathematical formalism of general relativity theory, and beyond that the mathematical formalism of Hilbert spaces used in quantum theory, already has virtually nothing in common with the experience of space and event points in space in our lifeworld. The term "*mathesis universalis*" is used *univoce* with the term "pure manifold" in Husserl's late writings. This ambiguity conceals phenomenologically relevant differences between the different kinds of mathematical formalisms that have been applied in classical and post-classical physics.[28]

The thematic attitude of the natural sciences presupposes, as mentioned, the intersubjective givenness of the objects of sciences. This implies that the thematic attitude presupposes the basic structures of the lifeworld. It has been mentioned in the secondary literature that the basic concepts of physics, space, time, mass, force, and energy, have fundamental roots and corresponding concepts in the pre-scientific world of everyday life. The concepts of movement, acceleration, and, last but not least, causality can be added. Phenomenological analyses of these roots are a task of further investigations.[29] An explication of the meaning of "non-scientific world of everyday life" in terms of Part I of the present investigation is possible. The concepts of classical physics have their generative foundation in pre-scientific concepts of elementary understanding, the understanding of the natural environment, the materials, and the tools that are relevant for the activities of practical life. The goals and purposes of elementary understanding are excluded by the first abstraction. The main task of the following sections is, hence, to determine the remaining aspects of the structure of elementary understanding in the lifeworld that can count as the generative foundations for the basic concepts of the soft and the hard sciences in the lifeworld in general. What has to be taken into account in addition is, furthermore, that these concepts of elementary understanding have already been interpreted in the systems of the ontological categories of pre-scientific philosophy on the level of higher understanding. Such pre-scientific philosophical reflections on categories like matter, form, efficient causality, and formal causality are, therefore, also generative foundations for the emergence of the natural sciences in the development of a cultural lifeworld.

[28] More about this will be said in Sects. 8.3 and 8.4.

[29] Ströker 1997, ch. VII, 177f; examples of such investigations can be found in Ströker 1965, part I.

7.2 The Empirical Basis and the Thematic Attitude of the Natural Sciences

Phenomena belonging to the empirical basis of the natural sciences in general within the residuum of the *first methodological abstraction* are given in intersubjective sensory experience, in short: intersensory experience. Objects or states of affairs given in intersensory experience are observables. Intersensory experience, including intersubjective activities, is a necessary partial structure of lived experience in the lifeworld, and as such is the one-sided foundation for all other cogitative types and their intentional objects of elementary and higher understanding. Hence intersensory experience can be given by itself only as a residuum of an abstraction. This abstraction excludes (1) all contents of systems of higher understanding presupposing entities, properties, relations, and structures that cannot be given in pure intersensory experience. Laws of nature given by God and understood as an analogue of laws given by a sovereign, the understanding of the evolution of organisms as following an intelligent design, etc., are not scientific because they do not have the rank of respectable scientific theories. They cannot be accepted as scientific theories because they presuppose entities that cannot be given within the residuum of the abstraction. (2) The abstraction also excludes also all contents of the subjective aspects of lived experience in the lifeworld, especially the experience of subjective decisions to act in this or that direction. (3) The abstraction excludes, furthermore, all practical purposes and goals, in short all "final" causes that govern all intersubjectively relevant human actions in the encounter with the natural environment on the level of elementary understanding.

The thematic attitude of the natural science is not a blind stare at intersensory given observables. It involves an activity, and this activity is guided by an interest in the "laws" of nature. The scientists *work* in the *labor*atory. This interest and this labor is obviously not excluded by the abstraction. The question is, hence, what are the generative foundations of this aspect of the thematic attitude of the natural sciences in elementary understanding in the lifeworld?

Even on the level of passive synthesis, primordial expectation is only an essentially necessary abstract moment of the temporal structure of the experience of the hyletic field. The contents of primordial expectations are reciprocally related to each other in associative syntheses within the continuum of retentions that determine the contents of protentions as primordial expectations. Such expectations can be fulfilled and confirmed or disappointed, "falsified" in the upsurge of new hyletic contents in the actual present. The phenomenological analysis of the lifeworld in general has shown that expectation occurs as explicit expectation and its manifestation in predictions on the level of intersubjective experience. Predictions that can be confirmed or disappointed, i.e., falsified, are according to Sect. 3.5 already necessary abstract moments of the structure of the experience of the natural environment in elementary understanding.

The experience of regular change in the natural environment is the necessary foundation both for all practical actions and for the elementary understanding of

these practical actions. The observation of the natural environment teaches the hunter and gatherer, the farmer, and the craftsmen that some events or actions will be followed by certain desired or undesired states of affairs "because" this has always been the case in the past. It is also known in elementary understanding that the desired or undesired events will not emerge if some circumstances that have been present or not present in the past are missing or added. It is known in elementary understanding that some actions have sometimes helped to achieve desired goals and sometimes not.

Elementary understanding distinguishes, furthermore, several types and aspects of regular changes in its practical activities. Several aspects of such activities can be distinguished (1) It is understood that plants and animals grow, develop into a mature shape, decay, and perish. The elementary understanding guiding herders and farmers knows how to start this creative and re-creative regular change and to use it for the realisation of certain goals. Situations that offer favorable circumstances for such actions are the seasons, and the seasons are governed by the regular, and hence predictable, movements of celestial bodies. (2) What is understood especially in the crafts is that certain materials taken from the natural environment can be shaped by certain actions and means, i.e., tools, to achieve certain desired final goals. What is experienced in this and other situations are causes that produce the desired effect either in the immediate spatial and temporal contact between means and ends, or in a chain of mediated contacts. (3) It is also understood that it is possible to produce materials with desired new properties by mixing two or more other materials. (4) However, there are also situations in which certain events occur because certain objects have the tendency to move in a certain direction or are attracted by something in a certain direction. The forces that are responsible for such sequences of events are forces acting at a distance.[30] (5) Elementary understanding of this type includes, last but not least, some elementary knowledge about arithmetical and geometrical proportions that can be applied in practical activities of the crafts. (6) It is known, and has social consequences; that the decision of a member of the intersubjective community to act in a certain way – regardless of whether the decision is caused by something else or not – is the cause of the consequences of the action.

Elementary understanding is not guided by the theoretical interest in the discovery of causal connections and laws of causality. Instead the interest is restricted to the significance of the knowledge (and everything what is implied in this knowledge) of the causes that can serve as means for the achievement of practical goals. The "what do you want, it works, and it has always been done this way" is the answer to all possible further theoretical questions for elementary understanding.

[30]Examples are the striving of objects "below the moon" to move down to earth, a striving that can be more or less controlled by additional actions and their means, e.g., with bow and arrow; the attraction and repulsion of animals forcing them to move in certain directions, and the forces behind the movement of the celestial bodies influencing selection of viewpoints that are relevant for all of these methods.

The same answer will be given to theoretical questions about arithmetical and geometrical proportions that can be applied in the process of practical activities.

In the beginning, i.e., in classical physics, the natural sciences were understood as a new philosophy of nature. As a new philosophy of nature, it is a partial rejection but also a partial application of the tradition of the pre-scientific philosophy of nature. Except for the radical lingualism of some analytic philosophers, scientists and epistemologists usually acknowledged that the natural sciences can be understood as a new philosophy, more precisely as the ontology of nature. The distinction between pre-scientific and scientific ontologies of nature is, hence, of some significance for the phenomenological analysis of the implications of the first abstraction.

Not all meta-genres of higher understanding in a pre-scientific cultural lifeworld are guided by the interest in contemplative theoretical understanding. The leading interest of religions is the well-being and salvation of individuals and the community. The fine arts and poetry are interested in creating objects for subjective and intersubjective aesthetic experiences. Pure contemplative theoretical understanding is the business of philosophy. Philosophical interest in nature in its own right and not as the natural environment of elementary understanding, presupposes not only the attitude of contemplation, but also an interest in the discovery of the basic categories that are already embedded in the structure of the lifeworld in general and in the experience of the natural environment in elementary understanding. The thematic attitude of a pre-scientific philosophy of nature brackets all practical goals on the level of elementary and of higher understanding without denying that there is in addition also the possibility of a theoretical contemplation of practical life.

The two basic branches of traditional philosophy before the twentieth century, practical and theoretical philosophy, are considered to be more or less independent philosophical disciplines. The "ought" is not reducible to the "is" and *vice versa*. The object of the contemplation, along with the generalizing abstractions discovering the ontological categories of nature and the essential parts and properties of different kinds of natural objects, includes final causes and the subjective aspects of the lived experience of the natural environment in the lifeworld. Seen from the viewpoint of a phenomenological epistemology, generalizing philosophical abstractions have the character of variations of concrete instances in imagination. More about the significance of the pre-scientific philosophy of nature and its significance as a generative foundation of science (and especially physics) as a philosophy of nature will be considered in Sects. 8.3 and 8.4 below.

A pre-scientific ontology of nature is not limited by the first methodological abstraction that is constitutive for the cognitive attitude of the natural sciences in general. This has two significant implications. (1) The empirical basis of a pre-scientific ontology is not restricted to intersensory experience. For instance, it does not exclude onto-theological considerations. (2) It implies, on the other hand, a purely contemplative attitude, and precisely this attitude is not a requirement for the natural sciences. The cognitive attitude of the natural sciences implies, on the contrary, practical activities guided first of all by the interest in the discovery of causal relations in the broadest sense.

The thematic attitude of elementary understanding is interested in actions, forces, means, and ends only to the extent to which they are of interest for the purposes of practical life. But it is precisely these purposes that are in brackets after the first abstraction. Partially guided by the theories about the categorial structures of a pre-scientific philosophy of nature, the thematic attitude of the sciences is interested in the *active* search for causal relations and the different types of matter presupposed in causal relations. It shares the interest of elementary understanding in the discovery of causal connections without being restricted in this search by the interest in the purposes of practical life. And, as mentioned, this interest of the thematic attitude of the sciences is theoretical, but it is not contemplative. It is active because it implies the actions required in experiments or the hunt for opportunities for observations that can confirm or disappoint predictions, confirm or falsify hypotheses.

What is left after bracketing the practical interests of elementary understanding is the interest in the intersensory experience of external objects in the natural environment. What is left in addition is then (1) the knowledge of causes originally used as means, and the interest in the effects of causes and the acquaintance with the properties of *materials* offered by the natural environment; (2) the experience that nature creates and re-creates kinds of animals and plants with certain properties and abilities; (3) the knowledge of the regular movements of the celestial bodies and their significance for favorable timing of actions and interactions; and last but not least, (4) some elementary knowledge about numbers, counting, and geometrical proportions that can be applied in practical activities.

The knowledge implied in elementary understanding and left after excluding the goals of the activities of practical life is an essential part of the generative foundations for the emergence of the thematic attitude of the natural sciences. The pre-scientific experience that an event C is usually followed by an event or sequence of events E in a situation S of favorable material circumstances at the right time is still an essential part of the residuum of the first abstraction that is constitutive for the cognitive attitude of the natural sciences in general.

The cognitive attitude in the residuum is, hence, not reduced to a blind stare at what happens in perception. It is guided by the interest in observable regularities that can be discovered in nature. On this level the category of cause and effect is still an empirical concept, a scheme for many different types of such regularities. If it is understood in addition as an instance of the formal ontological and logical conditional relation between C and E in S, then it is given as an instance of the ideal structure of the cogitative type "theoretical observation" of nature.

Observations and experiments are, according to the early descriptive epistemological reflections of Descartes, Bacon, and others the methods of the natural sciences. A phenomenological reflective analysis of the structure of the cogitative type "observation" and the cogitative type "experiment" shows that observation and experiment are not two distinct kinds of methods. Observation in the broadest sense is the cogitative type in which the observables of the empirical basis of the natural sciences are given. Several types of observations can be distinguished:

(1) observations as pure descriptions of observables, of phenomena, the "phenomenology" as a preparatory discipline of the natural sciences mentioned in Sect. 2.1, where the task is to recognize equal phenomena and to develop taxonomies for the classification of phenomena;
(2) observations of yes/no tests for expectations, predictions that predict an *observable* E after the occurrence of an additional *observable* C in a situation S. Such predictions are called hypotheses. Two cases can be distinguished:

    (2.a) is the case in which the experimenting scientist adds the factor C in a controlled situation S in the laboratory. This is the experiment in the narrower sense;
    (2.b) is the case in which scientists can neither prepare S nor add C in controlled experiments. In this case a test of the hypothesis has to wait for a situation in the natural environment in which S, C, and E are given as phenomena.[31]

The tradition of the empiricists from Bacon to Locke praised observation and experiment, but J.S. Mill, following Herschel,[32] developed the first epistemological analysis of experimental research. His descriptive reflections can be accepted as a phenomenological analysis of the cogitative types determining the activity of experimental research and its objective correlate, the state of affairs of relevant observables for this research for the cases (2.a) and (2.b). Essential for his analysis of the experiment is the precise description of the factors in a situation S that are necessary for the confirmation or rejection of a hypothesis. The necessary factors in S have later been called initial conditions. Seen from a logical point of view, initial conditions are necessary or replicative conditions, and the added causal condition is the sufficient or implicative conditional with C in the antecedent and E in the consequent.[33]

A real condition is a causal condition, and as such it implies the prediction of its effect. The relation connecting a real cause and a real effect is, hence, a temporal relation. For the thematic attitude of the natural sciences predictions are hypotheses about causal laws. A hypothesis is the assumed prediction that a certain factor or causal condition C added to a set of initial conditions in the experimental situation S is the cause for the emergence of a factor E in a temporally following situation S′. A

[31] This was and is the case in astronomy.

[32] Cf. Mill 1977, Book III, especially 390ff. Mill and Herschel are immediate forrunners of the epistemological analyses of experimental research in the twentieth century. The tradition of the empiricists from Bacon to Locke and Hume praise observation and experiment but they never offered an epistemological analysis of the methodology of experiments. What follows is not an interpretation of an epistemological analysis of the methodology of experiments. What follows is not an interpretation of Mill's methods; it is a selection of viewpoints that are relevant for all of these methods.

[33] Popper 1968, ch. 3, sect. 12, 59ff. introduced the terminological distinction between initial conditions and causal conditions in his logico-methodological analysis of the essential factors in experimental situations.

complete enumeration of all factors in S, S′, C, and E is necessary. The enumeration of the initial conditions and their relations in S is particularly crucial, but the enumeration of the factors accompanying E in S′ is also a necessary requirement for convincing experimental tests of hypotheses.

Naïve falsificationism is not able to solve all problems of the confirmation or falsification of hypotheses. They can be solved with the aid of methodological falsificationism. *Falsifying* experimental tests of hypotheses can be challenged with doubts concerning the presupposed experimental situation S, the set of initial conditions that must be present in experimental tests of hypotheses. The experiment will fail to give the right answer if such a necessary condition is missing in S or if an additional initial condition is present in S that prevents the added factor C from producing the effect E. It is in addition also possible that an additional condition in S′ prevents or seriously modifies the effect E. It is the task of methodologically guided research to admit possible disturbances of the assumed experimental situation and to try to eliminate the factors that are responsible for the shortcomings of the experimental situation in S and S′. Reliable experiments and observations in the narrower sense require that all and only the initial conditions required for S must be present not only for the falsification, but also for the confirmation of the hypothesis.

There are, however, complex situations S in which a complete analysis and enumeration of the initial conditions in S is practically impossible. The way out is to compare many instances of S with approximately similar sets of factors and to check the frequency in which an added factor C is followed by E. Causality that can be discovered (confirmed or rejected) with statistical frequencies is statistical causality. Statistical causality of this type is only a problem for the empirical basis of the first abstraction. It is especially of significance not only for the life sciences, but also for the social sciences. Not only organic structures, but also social structures are complex, and many varieties of possibly relevant conditions can be given in different individual cases of the same kind or in different temporal phases of the development of the same individual.

A strict description of the initial conditions in experimental situations is *practically* impossible, though in this case it is possible, and often plausible, to assume that it is possible *in principle*. What can be done in such cases is to select a group of individuals with the added factor C and, if possible, a control group without the factor C. The experiment is successful if the predicted effect E occurs in S′ in a statistically significant frequency in the first group but not in the control group. A still weaker case is the comparison of frequency curves of probably interdependent factors.

Statistical causality on the level of the first abstraction is a solution of the problem of the subjective conditions of the knowledge of the empirical basis of an experimental situation S. Statistical causality in the hard sciences is objective statistical causality, e.g., in the kinetic theory of gases and quantum mechanics. This is not (or at least not only) a problem of the description of the empirical basis. It is at least possible, e.g., in statistical mechanics, to decipher the theoretical background of a description of phenomena by applying the formalism of statistical mathematics with the aid of a deterministic theory of the individual systems behind ensembles

of individuals presupposed in the statistical description. More will be said about this below in Sects. 8.2 and 8.3. A first step in this direction requires preliminary considerations about the *second abstraction*.

To characterize the second abstraction as the exclusion of the subjective-relative secondary qualities and the restriction of science, more precisely of physics, to primary qualities is partially misleading. The *second abstraction* excludes all phenomena given in intersensory intuition, all causal relations, and all theories that cannot be reduced to the language and the logic of *mathesis universalis*, i.e., to different types of mathematical formalisms. The *second abstraction* presupposes, hence, the *first abstraction* and is an abstraction within the residuum of the first abstraction. Thus the second abstraction excludes all qualities, all abstract moments, that are not measurable, but it includes quantifiable relations within and between such qualities. The brightness of colors is measurable; even the distance of a color shade and another color shade in a one-dimensional continuum of color shades between red and blue is measurable. The exclusion of qualities considered by themselves as pure qualities is necessary because mathematical formalisms can only be applied to phenomena that are measurable.

The description just given of the second abstraction implies that sciences under the first but not under the second abstraction are *also* but not only interested in the mathematical explications of the quantifiable aspects of their objects. It is, furthermore, of crucial significance that the second abstraction is a methodological *reduction* because the measurement proportions left under the second abstraction are supposed to *explain* secondary qualities and concrete objects insofar as they are given as objects with secondary qualities. Both the specific character and the significance of this type of explanation need further explication.

It has already been mentioned that rudimentary knowledge about numbers and counting, geometrical proportions, and measurement techniques for spatial and temporal distances are essential implements of elementary understanding in the activities of pre-scientific, practical social life. What is said about the objects of geometry as exact essences in *Ideas I* and the *Crisis*[34] has been considered in Part I. Not very much can be found in Husserl's writings about numbers, counting, and basic arithmetic after his early *Philosophie der Arithmetik*. The problems of the constitution of the ideal objects of geometry and arithmetic as correlates of specific cogitative types and abstractions will be re-considered in the next section. What has to be added in this section are some preliminary remarks about the generative foundations of exact geometrical essences and numbers as mathematical idealizations in the constitution of the lifeworld in general, and especially their significance for elementary understanding.

Space is originally given as the correlate of the Here versus the manifold of the There in primordial subjective experience. This experience is not a passive staring of a passive sensory intuition, but it is a correlate of the kinaesthetic movements of the

[34]Cf. Sect. 2.3 above and Hua VI, §9a, together with *Beilagen* II and III.

living body.[35] Space is given as intersubjective space in intersensory perception and observations and measuring spatial distances is an essential aspect of elementary understanding; the original meaning of "geometry" is "measuring the land." The kinaesthetic foundation of the experience of space is still of significance on this level of the development of elementary understanding. For example, in the beginning parts of the human body served as measuring rods, e.g., a foot length.

Knowledge of geometrical figures and their proportions has also been applied in measuring space and it was also of significance for the practical activities of using and/or producing tools (and understanding their possible applications) on the level of elementary understanding. This knowledge is the original material and the generative foundation for the emergence of rule-guided idealizations and of the idea of an axiomatic system for deducing the theorems of geometry as a system and a literary genre of higher understanding.

The sign matter for the signs of numbers was, like the original units of measurement mentioned above once again originally the human body, first of all the fingers of the hand. The written signs for numbers in Latin are, for instance, originally nothing else than "pictures" of fingers, combinations of fingers, and of hands of fingers taken together, and signs for larger numbers are derived combinations of such signs. Words or written signs for numbers in natural languages are originally predicates for collections of approximately equal counted objects as "individual" units. To talk about numbers as ideal objects in their own right themselves presupposes a special idealizing abstraction. The essence of "three" is given in a free variation of collections of different objects with three members. The constitution of a finite collection of objects presupposes that they are given as approximately equal individual units for intersensory observation. More has to be said about counting, collections, and numbers in the following sections.

A summary of what has been said about the empirical basis of the natural sciences and the abstractions determining the scope of this empirical statement can begin with some critical remarks about the problems of so-called basic or observation statements in the analytic tradition. According to the thesis of naïve empiricism the empirical basis of the sciences is that pure sensory experience is the passive and therefore truly objective medium of knowledge. The requirement that observation must be restricted to pure descriptive observation or protocol statements has had a long pre-history and history in the theory of knowledge and epistemology. It is easy for critical reflection to show that this thesis has serious shortcomings. That science and knowledge require beyond this an activity on the side of the subject, and that this activity is guided by the a priori pre-given structures of consciousness, was the Kantian way out.

The presupposition that basic statements about observables in the empirical basis are strictly separable from theories[36] has been challenged in the analytic

[35]Cf. Part I, Sect. 3.1; Ströker 1965, part I on "Lived Space," is an exhaustive phenomenological analysis of the primordial and intersubjective constitution of space.

[36]Popper 1968, §§7, 8, 28.

tradition, but the proposed solutions still have serious weaknesses and are plagued by puzzles. The first difficulty is that the possibility of intersubjective agreement and disagreement is plagued by the difficulties of radical translation.[37] The second difficulty is that observation sentences about phenomena on the level of science are theory-laden.[38] Things look slightly different seen from the viewpoint of a phenomenological analysis of the structures of elementary understanding as the generative foundation for the thematic attitude of the natural sciences.

Not in all, but in most cases intersubjective agreement or disagreement about intersensory observations on the level of elementary understanding needs oral communication. Language and oral communication are one-sidedly founded in systems of tools and artifacts used in interactions, and interactions are, as mentioned in Sects. 2.3 and 2.4, founded in the givenness of Others as living bodies in a natural environment. A linguist who is in addition a philosophical lingualist is thus convinced that something is given if and only if it is given in language, so that the limits of the language are the limits of the world, will be trapped in the puzzle of radical translation.

The puzzle is a problem for the analytic epistemology first of the human and then also for the natural sciences. However, it is not a problem for a phenomenological epistemology. It is not the lingualist in the arm chair, but the ethnologist and even the traveling tradesmen who will be able to decide whether "gavagai" means "brown," "rabbit," or "jumps" if she/or he observes that the jungle man or woman grabs gavagai, skins it, cooks it, eats it, and offers him a leg of it with a grin. Language is real language only as an essential *abstract* part of the structure of the lifeworld. That observation sentences used in the sciences, whether the human or the natural sciences, are "theory-laden" has *prima facie* nothing in common with the gavagai puzzles.[39] Observation sentences are theory-laden because the observation sentences have to use a restricted system of technical terms and taxonomies.

A science is a science only if it is guided by a methodology, and a methodology determines the intentional objects that can be recognized as objects of the science. But this implies certain extensions and restrictions on the vocabulary that can be used in the observation sentences of the language of the science, and the reasons for the restrictions can only be derived from the structure of the theories, the language used in the explanations, and in the interpretation of the explanations. The ways in which observation sentences are theory-laden presupposes, hence, reflections on the structure of the theory of the methodology of a science, and this structure is always in addition an indicator of the *abstraction* that determines what can count as an object of the natural sciences in general, both of the soft and of the hard sciences.

[37] Quine 1960, ch. 2, §7f.

[38] Quine 1996, I, 1–4.

[39] What is said about theory-laden sentences in the sciences can be reduced to the gavagai puzzle if the terminological limits are supposed to be determined by incommensurable methodological paradigms. Cf. Sect. 7.2 above about Kuhn.

According to a phenomenological epistemology science presupposes intersensory experience. It has its immediate foundation partially in the categorial structures of elementary understanding that have *not* been excluded after bracketing the practical purposes of elementary understanding in its natural environment. The observation statements of everyday life are already "theory-laden" in this broad sense and the observation statements in the sciences are theory-laden because oral communication on the level of elementary understanding is the generative foundation of the restricted interest of science in the laws of nature.

Elementary understanding is the foundation of the natural sciences but it is already a historical fact and beyond that even a generative eidetic impossibility that the natural sciences could emerge without further mediating steps in the generation of cultural lifeworlds on the level of higher understanding. Necessary generative foundations for the emergence of the natural sciences in a cultural lifeworld are in addition a sufficiently developed geometry together with a sufficiently developed algebra and a philosophy of nature, a contemplative reflection on the ontological structure of nature in general.

What is left after the first and the second abstraction determining the thematic attitude of the hard sciences is not an ensemble of sense data given in pure passivity. What is given in pure passivity is the hyletic field. The pure sense data given in the hyletic field are given in intersensory intuition as the already understood correlates of subjective and intersubjective activities of practical life in elementary understanding. The first abstraction already excludes the interest in, and the knowledge of, the purposes and goals of practical life in its natural environment. What is left, however, is the knowledge about causal relations in the broadest sense and the possibility of the application of rudimentary geometrical and arithmetical thought in this knowledge. The guiding interest of the natural sciences within the residuum of the abstractions is not the interest in a methodologically guided broadening and systematizing knowledge about what is useful in the natural environment, but an interest in discovering regular change, the laws of nature in general. The pursuit of scientific truth is an activity like the activities in elementary understanding, this activity implies intersubjectivity. Scientists *work*, they "labor" in the *laboratory*, travel to collect observations or collect reports of other travelers, and they do this in a lifeworld with sciences. This implies that even the thematic attitude of the physicist includes the physicist's ability to read instruments, and this reading presupposes "secondary qualities." The bracketing of the interests of practical life required for the pre-scientific contemplative ontology of the philosopher sitting in the armchair or walking leisurely up and down the hall implies a bracketing of getting involved in any immediate encounters with the natural environment of elementary understanding. In contrast, the first methodological abstraction that is constitutive for the natural sciences brackets the practical interest, the purposes and values determining elementary understanding, but it does not bracket the immediate encounter and active interference with the natural environment of elementary understanding.

This description of the thematic attitude of the natural sciences has consequences that support the validity of the proposed explication of the implements of the two

abstractions. Sciences need instruments, and in the beginning these instruments were provided by elementary understanding, e.g., scales, clocks, measuring devices, etc. No meta-genre of higher understanding, including philosophy, has ever had an immediate impact on elementary understanding. In contrast, science not only presupposes the pre-scientific technologies of elementary understanding from the very beginning, but has then also significant consequences for the further development of practical life and elementary understanding. It is not the sciences considered for their own sake, but the practically significant output of the sciences in the development of new technologies that had and still has serious economic and social consequences. A cultural lifeworld with sciences is necessarily also a lifeworld with scientific technologies in and for elementary understanding. Science depends *vice versa* in its further development on the invention of instruments used for observations and in experiments with the aid of a scientifically guided technology.[40]

[40]Cf. Sect. 9.2 below.

Chapter 8
The Structure of Theories in the Natural Sciences

8.1 The Problem of the Application of Mathematical Formalisms in the Natural Sciences: Historical and Phenomenological Preliminaries

The theories of the hard sciences, physics and astronomy and later chemistry, have been understood in the period of classical physics from the sixteenth to the nineteenth century as philosophy of nature written in the language of mathematics and guided by mathematical principles; According to Galileo, the book of nature is written in mathematical language,[1] and according to Newton the principles of the philosophy of nature are mathematical principles.[2] The paradigm shifts of mathematics and theoretical post-classical physics emerging the nineteenth and the beginning of the twentieth Century have their generative foundations in classical physics and the mathematical theories that have been applied in classical physics. The reflections of an epistemology guided by the historical question of what scientists really did, and then of a phenomenological epistemology, must begin with reflections on classical physics. Of interest is, therefore, first of all the type of mathematics that has been applied in the explanations and the ontological categories that governed the *philosophia naturalis* of the Cartesian and then the Newtonian traditions.

The emergence of physics as a natural science in the modern sense presupposes as its main generative foundation the development of sufficiently developed mathematical theories. A brief summary of some relevant viewpoints taken from the history of mathematics in the Western tradition can provide a preparatory

[1] Galileo, *Discorsi e demonstrazioni mattematichi interno a due nuove scienza*, Arcetri 1638, *Opere prima edizione completa*, ed. E. Alberi, Florenz 1842–56, VI, 171.

[2] The title of Newton's *magnum* is: opus *Philosophiae naturalis* ***principia mathematica***, London, 1687.

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orientation. Rules for the handling of practically relevant geometrical problems have been known and used for the purposes of elementary understanding in several oriental cultures. But Euclidean geometry is the first axiomatic system for the exact essences of spatial configurations and as such is a new prototype of a genre of higher understanding. Geometry as the ideal prototype of a perfect science whose theorems can be deduced from axioms with a set of strictly defined rules was of significance for Aristotle's attempt to develop an axiomatic system of the logic of the syllogism. It was later the ideal prototype for a science in general, and especially for the physics and even the metaphysics *more geometrico* of Descartes and Hobbes.

Numbers, counting, and elementary arithmetical operations were already implements of the elementary understanding of the natural environment in cultures without a written tradition. Number systems surface in the development of cultures with a written tradition. Their significance for elementary understanding grew with the practical applications of astronomical calculations for the calendar, with more or less complex mechanical devices, and with economic transactions. Arithmetic, together with music and astronomy, was, however, also recognized as a theoretical discipline in Classical Antiquity.

Only fragments of the arithmetical literature of Classical Antiquity were available for the early Middle Ages, but arithmetic, together with geometry, music, and astronomy was one of the disciplines in the *quadrivium* in the system of the *artes liberales*. It was, however, also recognized as the art of the masters of reckoning in medieval towns, i.e., an art that had been developed and was immediately applicable for the purposes of practical technical and economic activities.[3] In the early medieval Western tradition this art of reckoning and arithmetic as a theoretical academic discipline was restricted to the art of reckoning with the abacus. The art of the "abacists" was later refined by the techniques of the "algorithmetists." They introduced the Arabic—originally Indian—number system including 0 as a number, along with general formulas using variables for numbers in the definition of the rules for arithmetical operations and in algebraic equations.

Presupposing the progress of algebra culminating with Vieta in the Renaissance, Fermat and Descartes developed analytic geometry, the reduction of geometry to algebra. The next step was the discovery of the differential and integral calculus by Leibniz and Newton. From then on, geometry was not an independent discipline but, together with arithmetic and algebra, a branch of mathematics. The language of a *mathesis universalis* became in addition the ideal prototype and the medium not only for the construction of theories, but also for the deduction of new hypotheses from already established universal causal laws in the natural sciences. Until the beginning of the nineteenth century progress in mathematics was a correlate of the progress of the hard sciences, and mathematics itself was usually itself considered as a natural science.

[3]More about this aspect of the development of mathematics as a science and its significance for economics as a human science will be said in Sect. 10.5.

The situation changed in the second half of the nineteenth century. What is new is the development of non-Euclidean geometries and higher algebra. Lower algebra was restricted to real numbers, including, beyond whole numbers, rational numbers, algebraic numbers, and transcendent numbers. Real numbers and lower algebra were been sufficient for the purposes of the application of mathematics in classical physics. Subsequently, however, the scope of mathematical formalisms was no longer restricted to mathematical theories that can be applied to physics on the one hand and to a philosophical interpretation of mathematics as a natural science on the other. Higher algebra includes imaginary numbers and complex numbers. Riemann developed his modern theory of functions and its application to the problems of Euclidean and non-Euclidean geometry 50 years before Einstein applied parts of this theory in his theory of relativity. Aspects of Hilbert's theory of number spaces (including imaginary, and with them, complex numbers) could be applied later in the mathematical formalism of quantum theory. These problems will be considered in the following sections. The scope of available mathematical formalisms was larger than the scope of their possible applications in post-classical physics. Some extensions of mathematics have not been of interest for the mathematical formalism of explanations in post-classical physics at all.

Frege and after him Russel tried to prove that the foundations of mathematics and the principles of mathematical proofs can be derived from formalized logic and set theory. Gödel discovered the limits of the ideal of completeness for a universal deductive formalism based on axioms. The philosophical implication of the new mathematical techniques triggered philosophical disputes. Frege rejected psychological interpretations of mathematical objects and defended their character as "Platonic" ideal objects. Hilbert, on the contrary, preferred the interpretation of mathematics as a pure formalism. Husserl sided with Frege in his attack on psychologism, but followed Hilbert in his interpretation of mathematical and logical formalisms as objective correlates of formalizing abstractions. The intuitionists following Brouwer and others rejected actual infinities as possible objects of arithmetic, analysis, formalism, and axiomatic theories in the theory of numbers.[4]

As mentioned previously, the first abstraction determines the cognitive attitude of the natural sciences in general. The abstraction has its generative foundation in the immediate contact of elementary understanding with the reality of the natural environment, but it brackets the immediate interest of elementary understanding in the practical applicability of confirmed causal relations permitting reliable predictions and explanations. The cognitive attitude of the natural sciences is theoretical, interested in the causal relations governing nature in general. The discoveries of elementary understanding have the character of a haphazard search for useful materials and applicable causal relations. In contrast, research in the natural sciences presupposes the methodology of the experiment for the confirmation of hypotheses and the explanation of events with experimentally

[4]Cf. Tieszen 1989, chs. 1 and 8, but also *passim* for a thorough discussion of the different schools and their relation to the phenomenological approach in the epistemology of mathematics.

confirmed causal laws. The second abstraction governing the cognitive attitude of the hard sciences brackets all phenomena, hypotheses, and explanations that are not explicable in terms of mathematical theories.

The basic epistemological question connected with the second reduction is why and how mathematical theories can be used as perfect instruments for explications in the theories about causal relations that are accessible under the first abstraction, especially in physics and then in the hard sciences in general. This question immediately implies the second question of why and how all phenomena given in intersensory experience under the first abstractive reduction are explicable in mathematical theories in the residuum of the second abstractive reduction. A phenomenological solution for the problems would be the phenomenological counterpart of the Kantian transcendental justification for the axioms of intuition and the applicability of mathematics to all objects given in experience. Kant's answer presupposes his hypothetical construction[5] of the "conditions (*Bedingungen*) of a possible experience" in the transcendental deduction of the *First Critique*. A phenomenological solution presupposes the analysis of the cognitive attitudes under which mathematical objects and theories about mathematical objects are given *and* the relation of their givenness to objects that are given as real objects of experience, first of all in elementary understanding and then for objects under the first abstraction of the natural sciences.

Kant's solution for the problem of the application of mathematics to physics as an empirical science is restricted to classical physics and is not applicable to post-classical physics. Progress in mathematics was immediately progress for and in classical physics. The situation is different for post-classical physics. The transitions from Euclidean to non-Euclidean geometry and classical analytic geometry to non-Euclidean spaces, from lower algebra to the extensions of higher algebra, and finally the analysis of non-Euclidean spaces with the aid of extended algebra happened before physicists applied a selection of the newly discovered mathematical formalisms. Given this situation, it is a question of terminological simplicity to use "classical mathematical formalism" and "post-classical mathematical formalism" parallel to the distinction of classical and post-classical physics.

Given these distinctions, it is necessary to distinguish between (1) the phenomenological analysis of the cognitive attitude in which geometrical and arithmetical objects are already given in the pre-scientific structure of elementary understanding; (2) a phenomenological analysis of the cognitive attitude and the objects given in it in classical physics and the classical mathematical formalism applied in classical physics, and (3) the cognitive attitude of post-classical mathematical formalisms and their application in post-classical physics.[6]

Several aspects of the problems mentioned have been treated by Husserl in *Ideas I* and *Ideas II*, in the *Crisis,* and in *Experience and Judgment.* There are also

[5]Following the Neo-Kantian interpretation of the transcendental deduction.

[6]Euclidean geometry is the generative foundation for a possible development of non-Euclidean geometries.

helpful recent interpretations of Husserl's phenomenology of mathematics in the literature offering in addition necessary corrections and extensions of Husserl's analyses.[7] These analyses have, however, shortcomings that need preparatory critical comments. The justification of application of mathematical theories to phenomena given in intersensory experience is the basic task for an epistemology of the hard sciences, especially physics. Neither Husserl's writings nor the literature offer an analysis of the application of mathematical theories, its scope and its limits, in the context of empirical research in the natural sciences. The analyses are restricted to mathematical research and are not interested in the epistemological problems of the objective validity of "axioms of intuition" in the Kantian sense. Intersubjectivity is mentioned occasionally in Husserl's phenomenological analyses and in this literature, but the reader is left with the impression that these analyses consider only the cogitative type, the intentional acts and their ideal objects, of the consciousness of individual mathematicians in splendid isolation. A consequence of this approach is the impression that mathematical objects given in categorial intuition have nothing to say about objects in the real world.[8]

Husserl's remarks on the genetic foundations of idealizing mathematical abstractions in *Experience and Judgment* are mentioned occasionally in the literature.[9] What is missing is the phenomenological analysis of the generative foundations of the givenness of mathematical objects in intersubjective generative structures, especially the intersubjective structures of elementary understanding. The generative foundations of mathematical idealizations in elementary understanding are of crucial significance for a phenomenological solution to the problem of the objective validity of mathematical idealizations for real objects given in the spatial and temporal structure of the lifeworld. They are of basic significance because they are still present in the cognitive attitude of empirical research in the natural sciences in the residuum of the first and the second reductions. The restriction to the analysis of the intentional structures of the intentional acts and the intuitions of an isolated idealizing consciousness in which the ideal objects of mathematics are given is a necessary abstraction, but it is insufficient for a phenomenological analysis of the applicability of such ideal objects to real empirical objects in the natural sciences.

According to *Ideas I* and elsewhere mathematical objects are exact essences. Exact essences in this sense are given in axiomatic systems. Geometry is mentioned as an example,[10] but *Ideas I*[11] and then the *Crisis*[12] also use the term "exact essences" in a narrower sense. Exact essences are objects of geometry and not mathematical objects in general, i.e., they are exact essences in their own right

[7] Rosado Haddock 1973, 1987; Schmit 1981; Miller 1982; Ströcker 1987; Lohmar 1989; Tieszen 1989; Hopkins 2011.

[8] Cf. the critical discussion in Lohmar 1989, 210 and 213.

[9] Cf. e.g., Lohmar 1989, 214; and on *E J* in general, 43, 70, 73.

[10] Hua III/1, §8.

[11] Hua III/1 §74.

[12] Hua VI §9a and Husserl 1950, Beilage II and III.

before the relations between such essences can additionally be deduced in the axiomatic system of Euclidean geometry. The exact essences of geometry are given in idealizing abstractions presupposing variations in imagination that are guided by the rule of the linear "and-so-on" toward an ideal limit in space. The rule of the and-so-on in the variations distinguishes exact from morphological essences. Space as the medium of the variation is originally given as an abstract moment of the genus extension. It follows, though it is not mentioned explicitly in Husserl's writings, that the rule of the and-so-on determining exact essences should also be of significance for other abstract moments for the genus extension, first of all time.

Exact essences are, according to Husserl, "ideas in the Kantian sense." The reference to ideas in the Kantian sense indicates that the rule of the and-so-on itself implies temporal sequences. It has been mentioned in Sect. 2.3 that even the variations in imagination required for the constitution of morphological essences cannot be understood as variations of "free" fantasy. They are guided by rules, and these rules are determined by categorial structures given in formal categorial intuition. The rule of the "and-so-on" tacitly implies the structure of linear progress in *countable* steps. It will be shown in the next section that the rule of the and-so-on has its foundation in the categorial structure of mathematical ideal essences in general, including numbers.

What is said about geometry as a theory of exact essences in *Ideas I* and in the *Crisis* is an almost sufficient static phenomenological analysis of the original givenness of the objects of *Euclidean* geometry. It is, however, an open question whether what is said about exact essences as given in and-so-on variations is a sufficient phenomenological account of the givenness of numbers and arithmetical operations. An attempt to give an answer to this question will be offered in the next section.

Ideas I announced a phenomenological analysis of the how of the givenness of exact mathematical essences in mathematical idealizations in general. However, not very much is said is said about natural numbers; about basic arithmetical operations; about the process in which the universe of different types of real numbers (and numbers beyond real numbers) can be generated with the aid of such *operations;* about algebra; and about analytic geometry.[13] What can be found in Husserl's later writings about collections and numbers are some references in *Formal and Transcendental Logic* and the *Crisis* to the treatment of the theory of numbers and collections in the early *Philosophy of Arithmetic* and beyond that in *Experience and Judgment* a phenomenological analysis of the original givenness of finite sets, i.e., collections and numbers in the context of the analysis of categorial structures and their genesis.[14]

The phenomenology of mathematics is restricted to the analysis of Leibniz's idea of a *mathesis universalis* and the theory of definite manifolds following Hilbert's formalistic theory of the system of axiomatic deductive systems in *Formal and*

[13]Cf. the remarks above about non-Euclidean geometries.

[14]Hua XVII 27a and Husserl 1987, §61; cf. Tieszen 1989, ch. 7, §3.

Transcendental Logic. The problems of the levels of generative foundations in the development of mathematics are, hence, reduced to phenomenological analyses of their significance in the context of mathematics as *mathesis universalis* and the theory of definite manifolds.[15] The considerations of the problem of the application of mathematics in the natural sciences in the *Crisis* presuppose this understanding of mathematics.[16] It will be shown at the end of the next section that this understanding of mathematical formalisms causes difficulties.

A phenomenological account of the givenness of arithmetical mathematical objects has to start with the analysis of the abstractions that are implied in the original givenness of collections, i.e., finite sets, natural numbers, and basic arithmetical operations. Such accounts in the literature after Husserl had to translate the psychological analyses of the *Philosophy of Arithmetic* into the context of phenomenological analyses.[17] This translation requires the analysis of the cogitative types in which numbers and finite sets are given. The analysis has to consider two aspects: the characteristic structure of the intentional object, and the intentional acts in which the intentional objects are given.

Following Husserl numbers are objects of categorial intuition. The task is, hence, (1) the description of the specific categorial structures of numbers as objects of mathematical idealizations and (2) the analysis of the specific acts of categorial intuition in which numbers are given.[18] The description of the temporal structure of the intentional acts is an essential implement of (2). To presuppose for this purpose the structure of inner time-consciousness, i.e., time-consciousness on the primordial level,[19] is a misleading consequence of a phenomenology of mathematics that restricts itself to the analysis of the intentional acts of a consciousness in which mathematical objects are given in splendid isolation. Formal categories given for categorial intuition are, however, formal categories for any objects whatsoever.

There are no distinct objects on the level of primary passivity and activity in passivity. Inner time is a temporal flow of hyletic contents emerging in the present actual Now and flowing down in the continuum of retentions. The representation of this flow in Husserl's graph representing the dimensions of the flow can be misleading because the graph represents the phases of the flow in fixed spatial dimensions. The representation itself and the segments in this representation are, however, only intersubjectively accessible spatial *analogues* of the structure of inner time and its hyletic contents. They should not be taken as a descriptive "picture" of inner time-consciousness in the primordial sphere.

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[15] See Hua XVII, §§30 and 31.

[16] Hua VI §9e.

[17] See the evaluation and the critical remarks of Lohmar 1989, 72f, about Miller 1982.

[18] With a grain of salt it can be said that Tieszen 1989 is primarily interested in the problem of mathematical intuition, i.e., in (2), but admits, 175, that a fuller account of acts of categorial abstraction should be pursued, i.e., (1). Lohmar 1989 is primarily interested in (1) but mentions problems of temporality in passing, cf. esp. 60, 97–100.

[19] Tieszen 1989, 103, 107, 148.

It is, however, also possible to apply the graphs to the temporal structures of intersubjective temporality in the lifeworld because the givenness of objects in general presupposes this structure.[20] The analysis of the cogitative types in which natural numbers are originally given in the process of collecting and counting intersubjectively given objects presupposes the analysis of the structure of intersubjective temporality in the lifeworld. The center of intersubjective temporality is the intersubjectively shared actual Now as the center of its horizons, i.e., the intersubjectively shared past and the intersubjectively shared future horizon. In this structure the past is pre-given as a sequence of past temporal phases that is explicable in the intentional acts of reproductions of lived experiences in which events, i.e., intersubjectively accessible states of affairs including distinct objects, have been given. The future is not the empty protention of the emergence of new contents, but the explicit expectation of events in the future horizon of the actual Now.

It is, hence, advisable to begin the analysis on this level and to ask how collections and numbers are given in intersubjective experience, first of all for the intersubjective experience and the temporal and spatial structure of elementary understanding. To start with elementary understanding is furthermore advisable because elementary understanding is one of the generative foundations for the methodology of the experiment of the natural sciences in general after the first abstraction. The analysis of the givenness of numbers, finite sets, and basic arithmetical operations and their application in practical activities for elementary understanding is, hence, a possible key for the solution of the problem of the applicability of the ideal objects of mathematics to the real objects of the hard sciences in the residuum of the second abstraction.[21]

8.2 The Generation of Mathematical Formalisms, Their Application in the Natural Sciences, and Their Foundations in the Lifeworld

A phenomenological version of Kronecker's famous dictum "Whole natural numbers have we by God, everything else is the work of men"[22] is "Natural numbers and basic arithmetical *operations* are given in the lifeworld for elementary understanding, everything else is the work of mathematics as a science belonging to higher understanding." What has to be distinguished is the categorial synthesis of categorially formed representations of objects and categorial intuition as the intuition of the categorial forms as ideal objects.

[20] In the next section Tieszen's analyses will be translated into this intersubjective context, i.e., retention into active reproduction and protention into open-ended expectation.

[21] On natural numbers and counting, cf. Lohmar 1989, ch. 3; Tieszen 1989, ch. 5; Hopkins 2011, part II.

[22] Cf. Lohmar 1989, 21 fn. 23.

The process of counting on the level of elementary understanding presupposes the givenness of collections of things. The things given in a collection must already be categorially formed and intersubjectively given objects. Their categorical form has to fulfill two requirements: they must be given as distinct units, and they are as such wholes of the first order, organic wholes, or wholes of a higher order[23]; and they must be either approximately equal as wholes or approximately equal in one or more of their dependent and independent parts.[24] A collection of things can be pre-given as a whole of the togetherness of things in space in some configuration, such as a collection of apples in a basket or a flock of sheep. Or collections can be given in the temporal process of collecting things as the product or artifact of the activity of collecting. Things in collections given in the process of collecting are connected by "and." This "and" in collections connects things and not judgments or properties of a thing in a judgment. It is the "and" that indicates the act, the operation of *adding* objects one by one into a collection.[25]

Counting presupposes either the collecting of things one by one into a collection or a re-collecting of a pre-given but not yet counted collection of things, starting with a deliberately chosen thing and adding other things one by one. Counting as an intentional act implies intentional objects that are given in two intentional perspectives. On the one hand, there is the presently given number of things in the already counted collection, the numerical quantity (*Anzahl*) of things in a finite *set* of things. On the other hand, the things are given in a temporal sequence of intentional acts starting in a past Now in the past horizon of the actual Now, and this temporal sequence determines and represents the sequential *ordering* of the counted *things* in the collection.[26] In this case and on this level the double perspective of temporality can be represented in a graph.[27]

Counting as the counting of intersubjectively given things implies the recognition of the intersubjective validity of the number of the counted things. This recognition presupposes the intersubjective accessibility of the process of the subjective intentional activity of counting, and this accessibility presupposes life expressions, signs for numbers, and numbering. Such signs refer to numbers and must, hence, be the same for counted things in general. Signs are themselves intersubjectively given things, but their function is not to represent themselves, for as symbols they represent numbers of counted "anythings whatsoever." This step is the first step

[23]To collect red spots on a blue background, apples, and families in a village together in one basket is meaningless for elementary understanding; cf. Part I, Sect. 3.2.

[24]In elementary understanding it also makes no sense to collect and then to count together things like Paris, a lamb, and a dirty spot on a white shirt.

[25]For the following see Lohmar 1989, 52ff. As mentioned above, the following analysis presupposes the structures of elementary understanding. It is not restricted to the analysis of the intentional acts and the intentional objects of subjective consciousness by itself.

[26]The double perspective is the pre-figuration of the distinction between cardinal and ordinal numbers in elementary understanding.

[27]Cf. Tieszen 1989, Fig. 3, 148.

toward mathematical idealizations leading beyond elementary understanding but this idealization once again has its generative foundations in pre-figurations on the level of elementary understanding and in concrete bodily actions.

The most primitive signs designed for representing numbers as generalizing abstraction are series of strokes "/ / /" or "/ / / / /." The representation of numbers with strokes is limited to collections that can be given in intersensory intuition in one glance in the living present. Larger systems require sign systems using signs for counted collections that can be given in one glance in combination with strokes such as the Roman numeral system or combinations of signs for smaller number collections in combination with an additional sign "0" for counting larger collections of things. A simple system of such signs representing the number of anything whatsoever is the abacus. The beads of the abacus are things representing things and collections of things, and the acts of shifting the beads represent (and are on this level identical with) basic arithmetical *operations* adding, subtracting, multiplying, and dividing.

The givenness of things of this type as "units" is the presupposed foundation for possible synthetic acts of collecting them into a collection including as the cases "many things," "one thing," and the limiting cases of "all things" and "no-thing." The old definition of numbers as numbers of units is on this level not a mistake, but it is restricted to the context of counting things and, therefore, an insufficient definition of the formal categorial structure of number. The categorial structures determining the process of an intersensorally accessible counting of things and reckoning operations with the aid of the beads of an abacus are useful devices for elementary understanding, first of all for simple economic transactions, but they are not yet objects of mathematical categorial intuition in their own right.

The first step in this direction on the level of elementary understanding is the application of numbering in measurements. There are properties, dependent parts, or abstract moments of things as wholes that admit continuous increase and decrease. Most of such increases and decreases either immediately refer to spatial extensions or can be translated into changes of spatial extensions with certain devices, e.g., temporal distances with the pointers of a clock and weight with the pointer of a pair of scales. Space is an abstract moment of the genus extension given as a dependent part not only of concrete objects, but also of all relations between concrete objects, including Others as living bodies given in intersensory experience in the lifeworld in general and for elementary understanding.

The simplest case of measuring is the measuring of spatial distances in one dimension of space. Space is an abstract moment and therefore not countable by itself in the same way that concrete objects given *in* space are. To count space presupposes the determination of units in space. Space as a continuum does not itself offer units, but it is possible in elementary understanding to *produce* an artifact that is able to serve as a measuring rod representing a "piece" of a linear one-dimensional extension in space as an artificial substitute for a concrete object given in space. A measuring rod, e.g., a yardstick or a meter, is designed to determine an individual unit of a one-dimensional spatial extension. The use of this unit requires the abstraction from all other properties of the measuring rod. The measuring rod

is supposed to represent—not to be—a measured distance that is spatially not approximately equal but exactly equal to any other spatial unity of the size of the measuring rod. Pre-given distances larger than the yardstick can be measured by repeated steps of measuring.

The first immediate implication of measuring a one-dimensional spatial extension is that adding to a collection of exactly equal distances and counting what is added can proceed indefinitely. The second immediate implication is that the extension of the measuring device can itself be measured by dividing it in exactly equal smaller parts that are able to measure the extension of the originally chosen unit, a meter in decimeters, centimeters, and millimeters, and so on *in indefinitum*. The unit of spatial extension determined by the measuring device is indefinitely divisible in denumerable steps. The third implication is the possibility of using these devices to measure the distances of two points *a*, *b*, in space from a third point *c* between them. Negative whole numbers of things can already be represented on the abacus in calculating borrowing and debts for economic purposes. The counting of spatial units in two directions from a point is the perfect idealized representation of positive and negative numbers and the point *c* representing 0.

The units of measured distances are exactly equal because the units are exact essences. They are *exact essences*, first of all because what is measured is the length of a *straight* line and, secondly, because the two endpoints as limits of the measured distance are, as points, also exact essences. The prototypes of exact essences according to *Ideas I* are the geometrical ideal essences presupposed in Euclidean geometry, the first prototype of a mathematical science. However, *w*hat is said in *Ideas I* and the *Crisis* about the givenness of exact essences needs, as already mentioned in the previous section, further explications.

The medium of the idealizing abstractions of plane geometry belongs to the genus extension and *prima facie* only to the genus spatial extension. The foundation of the idealizing abstraction is in the last instance the realm of the intersensory givenness of concrete wholes of the first order and their spatial relations. The idealizing abstraction presupposes as a preparatory step the abstraction of the dependent part "spatial extension" belonging to this realm of concrete objects. Such an abstraction requires that the abstract moment "spatial extension" can be fixed as invariant in an indefinitely open variation of qualitative abstract moments in imagination. A specific configuration of spatial extension (e.g., in the simplest case a straight line, or else a complex configuration, e.g., a triangle,) can, therefore, only be given *in* a series of variations of contrast phenomena constituted by varying visual qualities in different pictorial representations. Thus, like essences in general, it is not given by itself in any of its pictorial representations.

The second step of the idealizing abstraction, i.e., the step that is emphasized in *Ideas I*, is the variation in imagination that is directed toward an ideal limit, e.g., a straight line as the *shortest* connection between two points. This variation of the "and-so-on" additionally presupposes as its medium the abstract moment of the genus temporal extension, i.e., temporal sequence. The immediate consequence of the idealizing abstraction that is constitutive for geometrical objects as exact essences is that they cannot be given in a sequence of pictorial representations

because they are given as exact essences only as the ideal limit of such a sequence. This type of givenness can be called "quasi-pictorial" because it implies abstractions that are one-sidedly founded in pictorial representations. The temporal aspect of the givenness of geometrical objects is not relevant for geometrical objects as objects of Euclidean geometry, but it will be shown below that it is constitutive for the possibility of measuring spatial distances.

A phenomenological answer to the problem of the "objective validity" of such exact essences, i.e., the possibility of their application to concrete wholes and relations between concrete wholes, can only be found in an analysis of *operations*, practical actions in the lifeworld. Geometrical exact essences as ideal limits of the and-so-on variations cannot be given as such in intersensory experience in the lifeworld. Examples for beginning segments of this progress toward an ideal limit are pre-given in practical rules of elementary understanding. How to produce bodies with approximately plane surfaces and straight edges is an art that is practiced in many crafts, e.g., masonry and carpentry. It is an art that presupposes the production of tools that are themselves artifacts, and is the presupposition for the construction of other mechanical devices.[28] Geometrical laws, e.g., the Pythagorean theorem, have also been applied in geometry as the "art of measuring" the land. The "and-so-on" toward the ideal limit of an idea in the Kantian sense has, hence, its foundation in practical activities of elementary understanding. The presupposition for such beginning segments of an "and-so-on" are objects that are bodies given in the space of the lifeworld and determined by the intersubjectively pre-given spatial-temporal structure of the lifeworld.

Beyond that, the law for the variations in imagination of the and-so-on toward an ideal limit can be determined in this context as the and-so-on of the denumerable progress toward smaller and smaller units of measuring. This is the foundation, the presupposition of the possibility of the application counting equal units of spatial distances in measurement in pre-Euclidean geometry as the art of measuring the land in elementary understanding. The application of arithmetical operations to measuring the land permits calculating the size of the geometrical shapes of two-dimensional surfaces, and beyond that the volume of three-dimensional bodies. The latter is of practical significance for the measuring of fluids.

Measuring presupposes counting and numbers. But in addition, the application of numbers to measurements is the generative foundation for the recognition of numbers as *exact* mathematical essences. The "equal" between one unit and another unit and a certain number of units with the same number of other units has to be "exactly equal." Numbers can be used to count approximately equal concrete wholes of the first order; they can be used to count different kinds of abstract moments, e.g., colors; they can be used to count different concrete objects that have the same abstract moments in common, e.g., yellow things; they can be used to count different colors on a surface of a concrete object or different tones of a melody provided, these are given in contrast phenomena; they can be used to

[28] Hua VI §9, mentions mechanical devices.

count deliberately determined equal segments separated by strokes representing ideal limits on a ruler. The givenness of numbers in counting as an intentional activity presupposes the one-dimensional temporal flow, and this presupposition predetermines the one-dimensional order of numbers in the process of counting.

Numbers are given as ideal objects as categorial structures of counting, i.e., collecting, and with it of simple abacus arithmetical operations that can be reduced to counting. The unity of numbers given in counting lies beyond the categorial difference between the unity of things as concrete wholes, the abstract dependent parts of concrete wholes, and the abstract properties of things, and is equally applicable to all of them.[29]

The possibility of applying reckoning operations to the indefinitely open universe of whole numbers and the indefinite divisibility of a number into fractions of numbers that have themselves a numerical value pre-given in elementary understanding is the foundation for the emergence of arithmetic as a discipline of higher understanding and as a science. The added presupposition is an *abstraction* from the fetters of the practical applications in elementary understanding, i.e., from abacus-arithmetic. Left are numbers and operations with numbers as ideal objects or, more precisely (and in terms of a phenomenological epistemology), as ideal categorial forms of collections, i.e., sets. Numbers on this level are not given in counting.[30]

The basic categories of formalizing mathematical abstraction given in categorial intuition are unit, collection, and number. They have a higher level of universality and are therefore possible predicates of concrete wholes, dependent parts, independent parts, foundation relations, and relations between concrete wholes. Mathematical units are, furthermore, not units that have the character of indivisible atoms. The units are determined as unities only in their relation to exactly equal other units in collections, the one unit and the many units, without determining in what respect they are equal. It is, therefore, also possible to divide these units in collections of subordinated collections of "smaller" exactly equal units. The relation between manifolds and unity on the level of mathematical formalism as a part of formal ontology is a correlation.

[29]The reader of the end of *EJ* and passages in other writings of Husserl is left with the impression that the formal ontological categories of collection and unit are on the same level of universality together with the categories of wholes and parts. It is, however, compatible with Husserl's texts to assume that they are of higher universality than the set of categories comprising the theory of the wholes and the parts. Concrete wholes are units and there are collections of concrete wholes, but their dependent and independent parts can also be considered as units and can be counted, etc. This will be of special significance for the phenomenological analyses of the ontological status of theories in the life sciences in Sect. 8.5.

[30]Hopkins 2011 criticizes Husserl's concept of number for its Aristotelianism and psychologism, i.e., for determining what number is only in the analysis of process of counting; cf. 100, 391, and 400. Hopkins l.c. 527/28 recommends as a remedy to Husserl's analyses in *FTL* and *EJ* Klein's interpretation of Vieta. The problem with this criticism is that Husserl claims to share Hilbert's position and Hilbert's formalism. Hilbert is not mentioned in Hopkins' book. The question is, hence, whether Hilbert can also be criticized for the same type of psychologism and Aristotelianism.

Collections are manifolds with a certain number of units, but such collections can themselves be treated as units. This is already the case with counting and reckoning on the level of elementary understanding. Collections of three apples can be counted if there is a collection of a higher order of, e.g., four such collections. The collections are units because they are exactly equal. A reckoning operation is able to determine the number of all apples in the four collections: $3 + 3 + 3 + 3 = 12$. And the number 12 is also a name for a collection that in turn can be treated with other collections of the same size as a unit. The operation to the left in the equation above has the same power as the operation $4 \times 3 = 12$ and hence $3 + 3 + 3 + 3 = 4 \times 3 = 12$.

The general principle of the correlation of unit and collection is that any number of units in a collection standing by itself (i.e., without being connected with other numbers by mathematical operations to the right of an equation sign or with complex mathematical expression with operators to the left) can be treated as mathematical unit. This principle is also of significance for the mathematical "discovery" of transcendent numbers like π; of the imaginary unit $\sqrt{-1}$[31]; of imaginary numbers as the product of the imaginary unit i and a real number; of complex numbers as the sum of an imaginary number and a real number; and of the ordered sequence of transfinite numbers with the lowest unit ω as units.[32]

In the literature mentioned above, the application of mathematics to physics was understood as the application of mathematical formalisms without raising the further question of possible stages in the development of mathematical formalism and of different types of mathematical formalisms. There is also no trace of an interest in this question in Husserl's phenomenological analysis of the significance of mathematical formalism for a *mathesis universalis* as the theory of definite manifolds in *Formal and Transcendental Logic* and for the application of the *mathesis universalis* to the natural sciences in the *Crisis*. An analysis of the specific structures of arithmetic and algebra as disciplines of higher understanding before the period of classical physics, in classical physics, and then finally in post-classical physics is missing. This approach neglects the potential of a generative analysis of different levels in the development of mathematical formalism and its significance for the scope and the limits of the application of mathematics in the empirical sciences. A historical reminder is appropriate before turning to the problems of a phenomenological analysis of the generation of steps in the development of mathematical formalism.

The constitution of numbers and simple arithmetical operations and of pre-scientific, i.e., pre-Euclidean geometry as the art of measuring space are inseparable in and for elementary understanding. Euclidean geometry and arithmetic/algebra

[31] The root of $-1 = i$.

[32] Almost nothing has been said about mathematical operations and in general about operations on the level of the formal ontological *mathesis universalis* in Husserl's texts and in the literature. What is said here is only sufficient for the purposes of an analysis of the problems of the application of mathematical formalisms to theories in classical physics. It is not sufficient for post-classical physics.

were considered as two different arts[33] in the system of academic disciplines on the level of higher understanding for the millennium after the *Elements* of Euclid. The separation was a consequence of the discovery that theorems about properties of geometrical figures that can be synthetically constructed with straight edge and circle in plain geometry are deducible from a system of axioms without any application of measuring and arithmetical operations, a discovery presented in the first four books of the *Elements*.[34]

The progress of algebra in the late Middle Ages and the Renaissance was the presupposition of the possibility of the generative foundation of the discovery of analytic geometry. The algebraic treatment of geometry, i.e., analytic geometry, is able to solve not only geometrical problems of Euclidean plane geometry, but also the geometry of curved surfaces and the geometry of three-dimensional configurations in space. It is in this sense a systematic extension of the art of pre-scientific geometry and arithmetic considered in the beginning of this section, but it is also a return to the original inseparability of geometry and arithmetic in the activities of measuring on the level of elementary understanding. Geometry and arithmetic/algebra were considered as different branches or aspects of mathematics and not as separate disciplines. This assertion needs further explications.

The points of two- and three-dimensional space are represented in a system of three coordinates, i.e., straight lines with segments of exactly equal length representing numerical values crossing each other at right angles in a common zero point. All points in two-dimensional and three-dimensional spaces can be represented by pairs or triplets of real numbers. Thus by the same token a space as geometrical space is of real numbers; not only straight lines, but also curves in two dimensions, figures on planes, planes with curvatures; and three-dimensional figures of bodies can all be represented in algebraic equations. The indefinite progress of counting can be understood as an indicator of the infinite. Any number of exactly equal chosen units on the coordinates can be increased by adding the next unit in an and-so-on toward the infinite as a mathematical idealization. Likewise, the limit zero is a mathematical idealization in the regress of dividing a unit into smaller and smaller parts of a unit that are themselves units toward zero as an ideal limit given in mathematical idealization that can be represented in the equations of the infinitesimal calculus.

Of special significance for the applicability of Cartesian/Newtonian mathematical formalism to classical physics as an *empirical* science is, furthermore, the theory of transformations, especially Galileo's transformation of vectors and systems of vectors. A vector as a straight line can be determined by its beginning points and its direction in a two- or three-dimensional system of coordinates. Systems of vectors are systems of covariant magnitudes of vectors. A Galileo transformation is the

[33] Arts are not sciences about that which "really is" in the context of the ontology of Aristotelianism. More about this will be said in the next section.

[34] There are some attempts to apply geometry to the solution of arithmetical and algebraic problems, but not vice versa in books written later by other authors.

invariant transformation of vector systems from one system of coordinates (x′, y′, z′) into the original (x, y, z) system of coordinates. A phenomenology of mathematics would have to say more about classical algebraic geometry, but what has been said is sufficient for a phenomenological account of the applicability of this analytic or algebraic geometry and its extensions in the differential and integral calculus to the intersensorially given objects in *classical* physics as an empirical science.

It is also of significance for a phenomenology of mathematics that the application of algebraic or analytic geometry in classical physics can be understood *with hindsight* from the viewpoint of the development of mathematics in the nineteenth and twentieth century as the application of a mathematical formalism. However, the classical mathematical formalism that was applied in classical physics has the special property that its immediate referents are mathematical idealizations and not formal essences given in formalizing abstractions. These mathematical idealizations can be represented in the quasi-pictorial figures of analytic geometry. They are quasi-pictorial because, like the straight lines and configurations of straight lines representing the objects of mathematical idealizations in Euclidean geometry, they serve as indicators for the mathematical idealizations that are present in the progress itself as the ideal limit, which, however, is never given by itself. The medium of the representation of such progresses and-so-on *in infinitum* is, however, the spatial and temporal structure of subjective and intersensory experience in the lifeworld.

The system of coordinates ultimately has its generative foundations in the structure of right and left, before and behind, and above and below determining the possible directions of the kinaesthetic movements of one's own living body and the location of other bodies within this structure.[35] The system of this structure is also given as a multiplied system of systems of spatial orientation in the recognition of the Other and Others as other living bodies. Intersubjectively given objects in space are given in this pre-scientific context as the same objects in different locations in the intersensorially given space of the relative intersubjectivity of a homeworld of consociates. The object, e.g., a bush on a hillside given from the viewpoint of my body as to the right and above, can be given as below and to the left when seen from the viewpoint of another living body to the left and above both my living body and the bush. The object is an intersubjectively given identical object in both perspectives, i.e., it is recognized as a *transformation* of the same object from my perspective to the perspective of the Other and vice versa. The first steps of a progress and-so-on are, as mentioned above, already given in the context of the elementary understanding of practical activities in the lifeworld as the and-so-on in the givenness of simple geometrical figures and the application of numbers and in simple arithmetical operations in measuring.

A terminological remark is necessary before turning the problems of the application of post-classical mathematical formalisms to post-classical physics. Descartes, following Galileo's distinction between the compositive and the resolutive method, distinguished between the synthetic and the analytic method. The paradigm for

[35]Cf. the descriptions in Ströker 1965, part I, section I.

the distinction between the methods was at this time the distinction between synthetic and analytic geometry. Euclid's strictly deductive axiomatic method in plane geometry was the paradigm of the synthetic method.[36] However, according to a widespread thesis of analytic philosophy, geometry was also understood later as an empirical science because it is synthetic. "Synthetic" is in this case understood as "empirical" in accordance with the analyst's interpretation of Hume's and Kant's analytic/synthetic distinction.[37]

The thesis is acceptable for phenomenological analyses if "empirical" means, first of all, that the idealizing abstractions and variations required for the givenness of geometrical entities have their foundations in the elementary understanding of the structure of intersensory experience and secondly that geometry is applicable to intersensory phenomena precisely because it has its generative foundation in this structure. The thesis is not acceptable if it means that geometrical objects are empirical concepts given in variations guiding the generalizing abstraction in which first empirical concepts and then morphological essences are given. Ideal geometrical objects are exact essences given in variations guided by the rule of the "and-so-on" in space toward an ideal limit applied to the pre-given structures of elementary understanding of spatial figures, but it must be underscored that numbers and basic arithmetical operations are also empirical in this sense. Both have their generative foundation in the elementary understanding of and in practical activities.

Physics was a philosophy of nature based on mathematical principles. Progress in mathematics was at the same time progress in classical physics, and mathematics was, hence, usually understood as a branch of natural science. The situation is different for post-classical physics. Not all mathematical theories developed in the nineteenth and the beginning of the twentieth century had been applied in post-classical physics, and the applied mathematical theories were developed before being applied in post-classical physics. The leading viewpoint for the following rough survey of the development of mathematical formalisms in this period is again the problem of the applicability of mathematics, i.e., its objective validity in physics as an empirical science. Three levels in the development of mathematical formalism can be distinguished: (1) the mathematical formalism of the classical algebraic formalism applied in analytic *Euclidean* geometry. (2) the post-classical formalism of extended or higher algebra that can be applied in addition to non-Euclidean geometries of the Nineteenth century; and (3) Hilbert's formalistic interpretation of mathematical axiom systems.

(1) Pre-scientific reckoning is interested in the application of operations and constructions. It is not interested in the operations and constructions themselves. Geometry on the one hand and arithmetic and algebra, on the other, are interested in the operations and abstract relations between any numbers and figures

[36]The methods of non-Euclidean geometries of the nineteenth century have also been considered as synthetic methods in this sense.

[37]Only logically true sentences are "analytic."

> whatsoever, and beyond that, in the system of operations and in the definitions of operations of a higher order in terms of operations of a lower order. The use of variables for numbers and measured distances marks the watershed between pre-scientific reckoning and geometry and arithmetic/algebra as theoretical disciplines of higher understanding. At the same time, it is the first step in the development of mathematical formalizing abstractions.

Variables used in Euclidean geometry refer, e.g., to straight lines a, b, c and angles α, β, γ of triangles in the verbal formulations of theorems and axioms. Variables for numbers in arithmetic are used for the definition of the properties of arithmetical operators, e.g., $a + b = b + a$. They require in addition constant symbols for arithmetical operations. The use of variables in algebra as a theory of equations introduced by Vieta presupposes the use of the variables and constants of arithmetic and adds variables for unknown numbers x, y, z that can be calculated first in equations with one unknown x in linear equations, e.g., in $x + b = 0$ and in quadratic and cubic equations including square roots, cubic roots, etc. Equations with more than one unknown x, y, z, require complex operators of a still higher order.[38]

The main point is, however, the introduction of numbers as a science of *symbolic* numbers, i.e., not definite amount of definite units, but abstract multitudes. The "lower algebra" that was applied in classical physics can already be characterized as the first step of mathematical formalizing abstractions, the step of an algebraic formalism[39] that is restricted to mathematical operations on representations of variables for any real *numbers* "whatsoever" given in categorial intuition. Algebraic formalism has, considered for its own sake, a larger potential and this potential reveals itself in the higher algebra of post-classical mathematics in the nineteenth century and its applications in post-classical physics.[40]

The variables used in the classical mathematical formalism of Cartesian analytic geometry, together with its extensions introduced by Newton and Leibniz, refer to ideal objects that have the character of mathematical idealizations. As mentioned above the idealizations indicated in the graphs of analytic geometry have their foundation in the medium of the spatial and temporal structures of lived experience in the lifeworld. They admit quasi-pictorial representations, i.e., representations that serve as indicators of exact essences given in mathematical idealizations. The

[38] For instance, Σ, f(x), δ f(x).

[39] The first steps from traditional descriptive theories of formal logic to formalized logic have been called "algebra of logic" because of the use of variables for subjects, predicates, logical particles, and sentences. The use of the term "algebra" is in this case a metaphor. The variables do not refer to numbers in arithmetical operations and algebraic equations. On the technique of algebraic formalization that can be also applied in formal logic, see Lohmar 1989, 21f.

[40] Of significance for this problem is Hopkins 2011, 75f, cf. 522 on Klein's interpretation of Vieta's algebra. Klein, like Husserl, did not distinguish between classical and post-classical mathematics and physics, but his interpretation implies that as a symbolic mathematics, Vieta's algebra already had the full potential of application to numbers beyond real numbers.

variables of the classical formalism applied in classical physics is, therefore, also indirectly applicable to objects given in the spatial and temporal structures of the lived experience of the natural environment in the lifeworld.

(2) The referents of the fully developed post-classical algebraic formalism are formal ideal essences given in formalizing abstraction. The "presupposition of the possibility" of the transition from classical formalism to a pure algebraic formalism was and is that the classical mathematical formalisms of analytic geometry and formalistic reflections on the Euclidean axiomatic system in geometry imply problems that cannot be solved in classical mathematical formalism. The transition has two aspects. The first is the transition from Euclidean geometry to the Non-Euclidean geometries. The second is the transition from lower or classical algebra, the algebra that was applied in classical analytical geometry and the infinitesimal calculus, to the extended algebra including transcendent, imaginary, and complex numbers.

Two steps in the development of non-Euclidean geometries can be distinguished.[41] The first step still admits quasi-pictorial representations and the synthetic, (i.e., axiomatic theoretical) presentation of the non-Euclidean geometries. The parallel postulate had been a problem ever since Classical Antiquity. Euclidean geometry presupposes a plane surface as its medium. Given the background of analytic geometry, it was possible to represent curved surfaces in hyperbolic geometries, e.g., parabolic geometry. The parallel postulate can be replaced by other assumptions about parallels, including both the assumption that the sum of the angles of a triangle is not equal to two right angles and the assumption that the length of a straight line is unlimited. The objects of such geometries are still exact essences, mathematical idealizations that admit quasi-pictorial representations.

The second step is the algebraic treatment of non-Euclidean geometries in extensions of classical analytic geometry and the infinitesimal calculus as pure mathematical formalisms, now including numbers that are only accessible in higher algebra.[42] The extended algebra is not restricted to the mathematical analysis of curved surfaces; it also includes the possibility of an algebraic analysis of curved three-dimensional spaces, and in general spaces with n dimensions. Quasi-pictorial representations of such spaces are impossible. It is possible to use quasi-pictorial representations of curved surfaces to indicate some essential features of curved spaces, but such representations are representations *per analogiam*, analogical representations. It is tempting to use the term "symbolic representation" for such representations, but in the context of mathematical and logical formalisms, the

[41] What follows is a brief and rough account of some points that are essential for the specific character of the development of mathematical formalisms at the end of the eighteenth and in the nineteenth century from Lambert to Riemann, taken from the thorough phenomenological analysis in Ströker 1965, part II, section III. On the significance of Riemann's comprehensive account of non-Euclidean geometries and of the higher algebra that is required for the analysis of these geometries in analytic geometry, see Lohmar 1989, 11, 15f. 175.

[42] See Ströker 1965, part II, section III, ch. 3.

term "symbol" is a general term for variables, operators, and even syntactical notation. Quasi-pictorial representations have a strong heuristic value because they are indicators for the rule-guided variations and-so-on in a progress indicating an exact essence in mathematical idealizations. Analogical representations only highlight some structural features of the represented ideal object of a formalizing abstraction and have, therefore, only a weak and limited heuristic value.

The problem of the impossibility of quasi-pictorial representations of spaces with more than three dimensions is of special significance for the application of post-classical mathematical formalisms in post-classical physics. The transition to a four-dimensional system of coordinates still seems to be loosely connected with the formal structures of intersensory experience if the fourth dimension is understood as representing time. However, even a mathematically idealized representation of the temporal dimension of lived experience is only a weakly analogical representation for a four-dimensional space, and there is in general no possibility for quasi-pictorial representations of n-dimensional spaces.

The process of formalizing abstraction begins with the use of variables for any numbers whatsoever of algebra, and this level was sufficient for the development of classical analytic or algebraic geometry. The second step, the development of higher algebra and the algebraic representation of non-Euclidean geometries culminating in the extension of Riemann's approach in pure number-spaces had its generative foundation in the first step.[43] Euclidean geometry and classical analytic geometry admit quasi-pictorial representations of geometrical "spaces" as indicators of the process of idealizing mathematical abstractions. As mentioned, the "spaces" of non-Euclidean geometries admit such quasi-pictorial representations only as representations *per analogiam*.

The transition from Euclidean to non-Euclidean space presupposes, hence, the representations of such geometries in the mathematical formalisms of extended algebra, including extensions of the integral calculus and the differential calculus. The borderline between classical mathematics and post-classical formalisms is the distinction between irrational numbers that can be given as solutions of algebraic equations, i.e., the algebraic irrational numbers, and irrational numbers that cannot be given as solutions of algebraic equations, including the transcendent numbers[44] and the imaginary and complex numbers.[45] All transcendent numbers are irrational, but not all irrational numbers are transcendent.

Such numbers have been mentioned occasionally in the tradition, but a systematic theory of transcendent numbers has only existed since the second half of the nineteenth century, and it has been shown that the set of all transcendent numbers

[43]For a detailed account see Lohmar 1989, I. 1.a.

[44]E.g.: $e = 2.\ 718281828\ \ldots =$ ideal limit of the sequence $n \to \infty$ of $(1/1 + 1/2 + 1/3 + \ldots + 1/n\ \ldots)$ or $\pi = 3.1415926536\ldots$ the most simple case of a transcendent number of a transcendental curve that can only be represented by transcendental functions.

[45]Cf. Lohmar 1989, I.1.b and c.

is non-denumerable while the set of all algebraic numbers is denumerable. Seen from the viewpoint of a phenomenological epistemology classical mathematical formalism still includes formulas whose referents are mathematical idealizations that can be given in quasi-pictorial representations. The watershed between classical mathematical formalisms and post-classical mathematical formalisms is the transition to transcendent numbers. The transition is the necessary consequence of applying the rules for the basic mathematical operations to numbers that, according to Kronecker, were not pre-given by God, but constructed by human operations.

The operations in mathematical theories with irrational numbers are not the same as, but are still isomorphic with, the operations in the theories of rational numbers. This is no longer the case for imaginary and complex numbers. The problems connected with roots of negative numbers have been known since the sixteenth century. The term "imaginary numbers" was introduced by Descartes for the square roots of negative numbers. The applicability of imaginary and complex numbers for the simplification of trigonometric functions was discovered at the end of the eighteenth century. There was no systematic theory of imaginary and complex numbers before Carl Friedrich Gauss, who introduced the number i as the imaginary unit in 1832. What follows is a rough summary of basic formal definitions.

An imaginary number bi is the square root of a negative real number. The real part in bi is any real number b and i the imaginary unit. A complex number has the form $a + bi$. The real part of $a + bi$ is a. The imaginary part is bi. An imaginary number can be defined as a complex number where the real part $= 0$. Complex numbers cannot be ordered like real numbers, i.e., rational and irrational numbers, according to increases of their quantity. The mathematical operations on complex numbers need special definitions. All complex numbers $z = a + bi$ have conjugates. The conjugate of $z = a + bi$ is $z^* = a–bi$. z*is the reflection of z about the axis of the real number, and the conjugate of z*, z**, is z.

It is possible to design graphic representations for complex numbers, e.g., in an Argand diagram. The Argand diagram is a complex plane, i.e., the Cartesian two-dimensional plane of classical analytic geometry. One axis is the axis of real numbers. The other is the axis of imaginary numbers. But this axis is just not Cartesian. What can be ordered on a Cartesian axis in a Cartesian plane are real numbers. but imaginary numbers are not real numbers. The representation is a weak analogy that has only a limited heuristic value.

(3) The final step in the development of mathematical formalism presupposing the other steps as its generative foundations, is Hilbert's formalism. Hilbert's formalism is not only a formalistic interpretation of arithmetical and algebraic operations; beyond that it is a formalistic interpretation of axiom systems and normative principles for mathematical constructions of axiom system in general. It is not of significance for the application of mathematical formalisms in physics as an empirical science. Relevant for the present investigation is the significance of Hilbert's formalism for the phenomenological theory of formal apophantic logic and formal ontology, i.e., the phenomenological analysis of logical and mathematical formalism.

Husserl already mentioned the problem of the theory of definite manifolds for universal mathematics, i.e., the *mathesis universalis*, in *Ideas I* and in *Formal and Transcendental Logic*, he compared the ideal of definite manifolds with Hilbert's normative meta-mathematical principle of completeness for mathematical axiom systems. Husserl's idea of a theory of definite manifolds is, hence, a theory of formalized axiom systems in Hilbert's sense. Husserl distinguished within the *mathesis universalis* between formal apophantics (i.e., formal logic) and formal ontology as correlates, and within formal ontology between the axiomatic system of the theory of the whole and the parts and axiomatic systems of mathematics in the narrower sense, e.g., for arithmetic and geometries. It is obvious but no means clear in Husserl's writings that only axiomatic systems of mathematical formalisms in the narrower sense, and not the *mathesis universalis* in general, is of *possible* interest for the problem of the application of mathematical formalisms in physics.

Recognizing that his project of a *mathesis universalis* and Hilbert's normative ideal of complete axiom system cover the same ground, Husserl emphasized that the philosophical background of Hilbert's and his own discovery are different.[46] Three problems must be distinguished: (1) the problem of an explication of the rational motives behind the request for such radical methodological principles, and the meaning and significance of definite manifolds and the norm of completeness for axiom systems; (2) the problem of the difference between Hilbert's and Husserl's philosophical background; and (3) the question of the possible consequences of the differences in philosophical background for a critical evaluation of the ideal of definite manifolds and of Hilbert's normative principle.

(1) The algebraic treatment of Euclidean and the non-Euclidean geometries in the eighteenth and the beginning of the nineteenth century neglected the significance of the methodological ideal of systems of deductive axiomatic inference, an ideal that was originally realized in Euclidean geometry. The task was, hence, to realize this ideal for arithmetic and algebra and for the application of algebra in analytic geometries. There was a general agreement that axiom systems are meaningless if they admit the deduction of contradictions. Given this and only this principle, it was possible to admit modifications of axiom systems if consistency can be saved.

The answer of the intuitionists or constructivists to such daring extensions of the scope of mathematics was that mathematics must presuppose the original intuition of counting and natural numbers. The existence of kinds of numbers beyond natural numbers can be admitted only if they can be constructed in a finite number of steps of operations. The main victim of this restriction is Cantor's theory of the hierarchy of transfinite ordinals, the "actual infinite" as an object of mathematics.[47] The mathematical and meta-mathematical epistemological challenge was to develop a theory for the justification, the scope, and the limits of axiomatic systems in

[46] Cf. Hua III/1, §72, and Hua XVII, §31.

[47] See Lohmar 1989, 31; cf. Tieszen 1989, 8f., 12f., 46f., 100f.

mathematics. There are no problems in this respect for a Platonic epistemology of mathematics. Mathematical objects are ideal objects, and the realm of ideal objects is larger then the realm of what can be given in the intuition of the intuitionists. The intuition of such ideal objects is the final arbiter of the objective validity and significance of mathematical theories.

Hilbert's formalism implies the rejection of quasi-psychological and meta-physical presuppositions in meta-mathematical theories. The task was, hence, to develop formalistic meta-mathematical restrictions on axiom systems. The syntactic principles for complete axiom systems are as follows: (a) the extension of the system by adding a new axiom that is not derivable from the other axioms implies inconsistency of the system; and (b) all syntactically correct expressions using the symbols that occur in the axioms must be either derivable or refutable. According to the comparison in *Formal an Transcendental Logic* these principles are also principles for the phenomenological ideal of definite manifolds.

(2) Hilbert recognized that intuition, in phenomenological terms intersensory intuition, of finite configurations of signs is a necessary presupposition for mathematical operations.[48] The meaning of signs is, however, not of interest for the analysis of the methodology of the construction of axiom systems. It is of interest only for the application of axiom systems to objects. This "nominalistic" restriction of intuition to the analysis of sign systems is not acceptable for mathematical Platonism, i.e., for Frege's and the Gödel's recognition of mathematical objects and especially mathematical axioms, as ideal objects. It is also not acceptable for intuitionism, i.e., the recognition of mathematical objects as constructions based on the original intuitive givenness of natural numbers.[49]

However, it is not acceptable for phenomenology either. Phenomenology recognizes that signs given in sign matter for intersensory intuition are a necessary presupposition for all intentional acts referring to objective meaning and significance, but signs are signs only if they refer to objects, and this presupposes that they have objective or intersubjectively accessible meaning. Symbols are understood as signs for intentional objects of formal logic and formal ontology given in formalizing abstractions. The objects of mathematical symbols belong to the formal mathematical categories, including individual unit, set (i.e., manifold), ordered set, and finally axiom system.[50] Like mathematical Platonism phenomenology recognizes ideal objects, but it is, in addition, interested in the analysis of the constitution of the givenness of ideal objects.

[48]Cf. the quote in Tieszen 1989, 7; see Lohmar 1989, 204.

[49]Tieszen 1989, ch. 1, offers a survey of the different positions in the epistemology of mathematics in the Twentieth Century and analyses—see the index in Tieszen 1989—of the meaning of "intuition" as a phenomenological category and in Frege, Gödel, Brouwer, Parsons, and others, cf. Lohmar 1989, I.3.

[50]Hua XVII, §33.

However, according to Jacob Klein's interpretation even in the analyses of *Formal and transcendental Logic* and *Experience and Judgment* Husserl was not able to give an account of the genesis of formalizing abstraction in general, and especially of the genesis of algebraic formalisms in mathematics, because he presupposed a psychologistic Aristotelian theory of abstraction.[51] An answer to this criticism has to start by making a distinction within the general problem of "formalizing abstraction." The special problem of formalized representations of *units* and *manifolds* (i.e., multitudes or amounts of units) in algebraic formalizations will be considered below.

Categories have been understood not only in the Aristotelian tradition but also in the tradition of modern empiricism as *highest genera* that can be reached in generalizing abstractions. Husserl distinguished from the outset between *material* essences, essences of abstract moments, i.e., dependent parts, essences of concrete wholes, (i.e., morphological essences), and *formal* essences.[52] It is already the case that the theory of the constitution of material essences in Husserl (who followed Stumpf in this respect[53]) cannot be reduced to traditional theories of abstraction. The phenomenological analysis of the constitution of the givenness of *formal* essences cannot be reduced to any theory of the givenness of material essences because a *phenomenological* analysis of the constitution of *material* essences implicitly presupposes the structures of formal ontology.[54]

Of basic significance for the understanding of Husserl's transcendental-phenomenological reflections on modern formalized logic and a *mathesis universalis* from Frege to Hilbert is in this respect the understanding of the German terms "*Etwas*" or "*Etwas überhaupt.*" A translation with "any*thing*" in English without further comment can be misleading. "Thing" in "any*thing*" can be understood in an Aristotelian context as a "first substance," as a "this here" in general, e.g., possible referents of authentic numbers in the process of counting things, but "*Etwas*" in Husserl's sense is able to refer also to properties, quantities, relations, etc. of first substances. "*Etwas*" in the context of the *Formal and Transcendental Logic* is, hence, able to refer not only to things as first and higher-order concrete wholes but also to abstract moments, i.e., qualities, extensions, and relations, and in addition even to abstract material and formal essences. In short, the referents of "*etwas*" are all possible intentional objects. The "*etwas überhaupt*" is, hence, an explication of the "meaning" of variables "x" in formalized systems in general, of the *mathesis universalis* even before specifying certain regions of intentional objects of special formalized systems.

[51] Cf. Hopkins 2011, §§41, 162, 167, 173.

[52] A prefiguration in the philosophical tradition in this respect is Kant's distinction between formal categories and their schematized counterparts in the axioms of intuition.

[53] Cf. above §1.

[54] Cf. above §§2, 3.

(3) Hilbert's normative ideal of completeness and consistency for axiom systems and therefore also Husserl's theory of definite manifolds as a phenomenological explication of this ideal were refuted by Gödel's proof soon after the publication of *Formal and Transcendental Logic.* Gödel's proof has shown that the methodological ideal of completeness for axiom systems cannot be realized in systems as rich as the *Principia Mathematica*, i.e., systems that imply the Peano axioms, first of all mathematical induction. The applicability of the normative principles is restricted to comparatively simple systems, e.g., an algebraic system for an extensional interpretation of formalized first-order logic.[55] Gödel was a Platonist in this sense and had, hence, no reason to assume that the result of his proof is a partial mathematical skepticism.

The situation is different for a "nominalistic" interpretation of algebraic symbols. There is the need for normative syntactic principles that restrict the arbitrariness of free play with systems of symbols. All of them are acceptable as long as they do not violate the principle of non-contradiction. Hilbert's methodological principles for axiomatic mathematical formalisms are an attempt to develop a meta-mathematical theory that restricts the arbitrariness of free play with symbols in the framework of a nominalistic interpretation of symbol and formalism. This attempt failed, and the failure also implies a failure of nominalistic formalism. Formalistic constructions with symbols that have no restrictions determined by the essence of the objective referents of the symbols are not able to separate meaningful constructions from an otherwise free play with empty systems of symbols.

A first question for a phenomenological epistemology of mathematics and especially of mathematical axiom systems, is whether Gödel's results imply a refutation of the ideal of a *mathesis universalis* as a universal theory of definite manifolds that is itself a definite manifold and, therefore, imply also a refutation of such a phenomenological explication of Hilbert's normative meta-mathematical principles for formalized axiom systems. The second question is whether Gödel's results imply further difficulties for Husserl's phenomenological epistemology of mathematics, first of all for the very project of a *mathesis universalis*. Both questions have been discussed in the literature since the third decade of the last century. The answer to the first question was yes. The final answer to the second question was no. There is no reason for a phenomenology of mathematics to adopt Hilbert's rigorous *normative* principle.[56] Phenomenological accounts are descriptive, not normative. The descriptive result is that there are some axiom systems that are definite manifolds and some others, including the project of a *mathesis universalis,* that are not complete in Hilbert's sense.

Some concluding remarks about Husserl's understanding of ideal essences in general are necessary before turning to the question of the possibility of the application of mathematical formalisms to the empirical sciences in general, and

[55]Lohmar 1989, 191f., cf. 30f.; cf. Tieszen 1989, 8f on Parsons and mathematical induction.

[56]This is also the conclusion of Lohmar 1989, section II, 11 d; 193. Cf. l. c. 11a and b about Husserl's understanding of Hilbert's normative ideal together with the footnotes referring to the discussion of this question in the literature.

especially to the hard sciences. It has been mentioned above that phenomenology, like mathematical Platonism, recognizes mathematical objects as ideal objects. It has also been mentioned that a partial mathematical skepticism is not a necessary implication for Platonists like Gödel. Husserl's phenomenology shared with Frege's Platonism the rejection of psychologism. But phenomenology is, on the other hand, not a "naïve" Platonism. It is not satisfied with the ontological thesis that there are ideal objects, but is also interested in the additional question of the constitution, the structure of the *how of the givenness* of different types of ideal objects for consciousness.

The first steps in the analysis of the "how of the givenness of ideal objects" have already to distinguish three types of ideal objects: morphological essences, exact essences, and formal essences. The givenness of ideal objects in general presupposes abstractions, and abstractions presuppose variations of contents in imagination. Such variations are not "free," but rule-guided. Morphological essences are given guided by the pre-given categorial structures of things as concrete wholes of the first and higher order, including their dependent and independent parts, foundation relations between dependent parts, and relations between independent parts and concrete wholes of the first order. As ideas in the Kantian sense exact essences are given as correlates of mathematical idealizations, variations following the rules of a progress and-so-on toward an ideal limit. The ideal limit is not given as a material essence, but the beginning phases of the progress are still given in the material spatial and temporal structures of the givenness of material things and manifolds of material things in the lifeworld.

The givenness of formal essences presupposes formalizing abstraction. Formalizing abstraction presupposes variations of any material contents whatsoever within the whole scope of one of the formal categorial structures mentioned above. Left in the residuum of the abstraction are the categories and categorial structures given in categorial intuition. The basic categories of formal ontology for any things whatsoever are as, already mentioned, whole of the first and higher order, dependent and independent part, foundation relation, and relation between pieces or concrete wholes of the first-order, i.e., things. The basic mathematical categories are unit, collection of units, and ordered collection and are formal categories of the highest level of abstraction. Unit as a formal ontological category has the highest degree of formal universality, the unity of *Etwas überhaupt.* As already mentioned, this *Etwas überhaupt* does not only refer to some *thing* in general, which would restrict unity to the unity concrete wholes, but it refers also the unity of all other formal ontological categories, including dependent and independent parts, relations, collections of units as units, etc.

What has been said about ideal objects can be applied to the problem of pictorial representations, not only in mathematics but also in physics. Morphological essences are pictorial representations in the strict sense.[57] Quasi-pictorial

[57]Speaking of mathematical Platonism, it should be kept in mind that Plato's Demiurge had to look upon the ideas of animals and plants, morphological essences in terms of phenomenological formal

representations are geometrical drawings in the broadest sense indicating a beginning phase in the progress and-so-on of mathematical idealizations, but not the exact essence, the idea in the Kantian sense, itself. Formal essences, first of all mathematical pure formal structures, admit only quasi-pictorial representations *per analogiam*.

What has been said is sufficient as a preparation for some brief comments on the postponed second aspect of Hopkin's thesis, namely, that Husserl's account of the givenness of units and multitudes in algebraic formalizations of arithmetic is from the beginning to the end (i.e., also in *Formal and Transcendental Logic* and *Experience and Judgment*) insufficient and presupposes an Aristotelian psychologism. According to Klein, a satisfactory interpretation of algebraic formalizations and symbolic numbers has been offered by Vieta.[58] Following Vieta's re-interpretation of Neo-Platonic theories "symbolic[59] numbers," e.g., "the six" and not "six units," have to be understood as being of the *species* per se, i.e., as formations whose merely *possible* objectivity is understood as *actual* objectivity. The merely potential objectivity can be realized as an actual objectivity by the visible letter signs.[60] The variables of algebra have their substitution instances in such symbolic numbers and not in the understanding of the authentic numbers given in the process of counting in the Aristotelian tradition.

Turning to Husserl, it is first of all necessary to notice that the origins of the technical terms used in Klein's analysis of Vieta's algebra are Neo-Platonic re-interpretations of Aristotelian ontological concepts. Without denying the significance of the Klein/Hopkins interpretation of the history of generative foundations in the development of algebra, it is questionable whether they can be accepted as satisfactory explications of what "variable," "constant," "operator," etc., mean in the context of the epistemological problems of formalized logic and mathematics in the twentieth century and, hence, in the context of Husserlian reflections on formalizations in formal logic and formal ontology has been considered above. A discussion of the question whether Husserl's analyses in *Formal and Transcendental Logic* and *Experience and Judgment* are insufficient will end in perhaps endless disputes about problems of interpretation because the textual basis for interpretations is very small.[61] What canbe said, however, is that the

ontology, before creating them. Ideas including ideas of plants and animals are also understood as thoughts of God before the creation in the Neo-Platonic speculations of the church fathers. They are of no interest for the Platonism of a *mathesis universalis* and mathematical and logical objects in general.

[58]Hopkins 2011, §§41, 173.

[59]"Symbol" and "symbolic" in Vieta are, according to Klein, not terms that refer to variables or constants of formalized languages. Instead, they rather refer to the substitution instances of variables.

[60]Hopkins 2011, §§136, 137, and §208.

[61]One also has to keep in mind that the material published in *EJ* in general and especially in §§30 and 31 is a collection of manuscripts.

thesis that the substitution instances for variables in algebra are cardinal numbers that must be understood as predicates of multitudes or sets *is at least consistent* with what is said in *Experience and Judgment* about multitudes.

It is, hence, enough for the purposes of this systematic phenomenological investigation to remember what has been said on number and measuring at the beginning of this section. Even on the level of elementary first-order and second-order understanding the activity of measuring already implies an abstraction from the application of numbers in the process of counting things as concrete wholes. Numbers refer to the sizes of collections of deliberately determined units of extension space. The first step from the counting of things with "authentic" numbers to the "potential" objectivity of symbolic numbers as predicates of multitudes was already done on the level of elementary understanding before it was interpreted in pre-scientific philosophical systems of higher understanding in Plato, Aristotle, and Neo-Platonism.

The leading question of the last two sections was the problem of the application of mathematical formalisms, especially in physics and in the hard sciences in general, to the experience of the reality of the natural environment in the lifeworld. A final answer to this question has to start with a summary of the main analyses of Sect. 8.1. The natural sciences in general (including physics) presuppose the first methodological abstraction. Experience is the touchstone of anything that can be said about the reality of nature. The link that connects theoretical systems of statements by the sciences with experience is experimental research, the checking of hypotheses in experimental situations. Experimental checks presupposes precise description and analysis of the phenomena, the observables that are relevant for specific experimental situations.

The trust in experimental experience has its ultimate foundation in the interest of elementary understanding in reliable predictions for the purposes of practical life. The purpose of a reliable prediction is the elementary understanding of what will happen after a practical action that adds a factor into the context of pre-given circumstances in the natural environment. Reliable predictions on this level already have the logical structure of conditionals and these conditionals can also be used in explanations of what has happened. The first abstraction brackets the practical interests and values of elementary understanding. What is left is the *theoretical* interest in the discovery of causal relations and properties of materials that are relevant for the discovery of causal relations in experimental research. *This foundation of the theoretical cognitive attitude of the sciences in the structures of this experience in elementary understanding is the condition of the possibility of the application of the results of the natural sciences in scientific technologies.* More about this turn "back to the roots" will be said in Sect. 9.2.

The second abstraction excludes all contents and structures given for elementary understanding, and still given under the first reduction, that are not reducible either to descriptions in terms of statements about the measurable properties of the observables (the phenomena that are relevant in experimental situations) or to theoretical systems of statements about predictions, hypotheses and explanations with the aid of confirmed hypotheses that can be written in terms of well-formed

formulas of a mathematical formalism and can be derived from the principles of this mathematical formalism. Vice versa mathematical formalisms are applicable in the hard natural sciences only if they admit the derivation of theorems that can be used as hypotheses and confirmed or disconfirmed in experimental situations. A mathematical formalism, regardless of whether it is a classical formalism applied in classical physics or a post-classical formalism applied in post-classical physics, is of significance for reality and is real in this sense if and only if this is the case.

Two remarks have to be added. (1) It was and is in general desirable but not necessary for the application of different mathematical formalisms to different types of phenomena in physics to find a formalism of a higher order from which the different formalisms are derivable. The formalism applied in classical physics is derivable from relativity theory as a limit case. A formalism from which the mathematical formalisms and quantum theory and relativity theory are derivable, and that also admits the derivation of additional hypotheses that are testable in experimental situations, is desirable but still lacking. It is not necessary for such formalisms to be able to be represented in formalized axiom systems, let alone axiom systems that are definite manifolds obeying Hilbert's normative requirements for the completeness of axiom systems.

(2) Though the application of mathematical formalisms is mandatory for the hard sciences, not all mathematical formalisms have been applied in the hard sciences, and some mathematical formalisms that have been applied in natural sciences can even be applied in the human sciences, e.g., economics. This problem will be considered in Sect. 10.5.

The first level of the foundation for the claim of physics to say something about reality in experimental research ultimately has its foundation in the encounter with the natural environment on the level of pre-scientific elementary understanding. In other words, the ultimate foundation of scientific experience is the pre-scientific experience of elementary understanding, and not the naked sensory experience of the isolated subject of psychologistic empiricism. There is, hence, the additional question whether and how far mathematical formalisms have a foundation in the spatial and temporal structures of the experience of the natural environment in the lifeworld. The phenomenological answer given above in the present section was that such a link is possible with regard to the spatial-temporal framework and the application of numbers in elementary understanding if and only if the immediate objects of the mathematical formalism are mathematical idealizations, ideas in the Kantian sense given in a progress of variations guided by the rule of the and-so-on abstraction that has already its beginning segments in elementary understanding. This is the case for classical physics or, what is approximately the same, as long as the applied formalisms refer only to real numbers and to classical analytic geometry. The classical mathematical formalism applied in classical physics admits, therefore, quasi-pictorial representations of mathematical equations and functions. This is no longer the case for formalisms that admit in addition the application to non-Euclidean curved and/or n-dimensional spaces and/or beyond the application of real numbers also the application of transcendent and imaginary

numbers as well. Pictorial representations in post-classical formalisms and their applications in physics are only quasi-pictorial representations *per analogiam* of formal mathematical relations in number-spaces.

Post-classical physics applied only a comparatively small selection of the mathematical formalisms that were discovered decades before their application in physics. Of significance for the application in special relativity theory is a four-dimensional system of coordinates with the interpretation of the fourth dimension as the dimension of time and the Lorentz transformation, the four-dimensional counterpart of the Galileo transformation for a three-dimensional system. The Lorentz transformation transforms a vector or vector system in a four-dimensional system of coordinates (x', y', z', t') into (x, y, z, t). General relativity theory adds viewpoints taken from Riemann's geometries with curvatures of space.

As mentioned above, mathematical formalisms with complex numbers have been applied in mathematics for simplifications of trigonometric functions with complex functions. Thus they have been, applicable in principle to all oscillating phenomena that can be described in sine wave frequencies. In the beginning such mathematical formalisms have been applied occasionally as simplifications in relativity theory, but first of all for simplifications in the mathematical analysis of varying voltages and currents in the physics of electromagnetic phenomena and electrical engineering with the aid of the phasor calculus. Quantum theory applies such mathematical formalism to vector spaces with infinitely many countable dimensions over the field of complex numbers, the so-called Hilbert spaces. Such spaces have almost nothing in common with three- or four-dimensional spaces or space-times and other modifications of non-Euclidean geometries as long as a vector in such systems can be analyzed with formal mathematical operations on real numbers. Such number-spaces do at least have a last link that connects them with the classical spatial and temporal dimensions of classical physics. But the application of this mathematical formalism, together with the surprising behavior of the quantum phenomena that can be analyzed with this formalism, causes serious difficulties for an attempt to provide ontological interpretations of this application.

8.3 The Ontological Interpretation of Classical Physics

Natural science, first of all physics, tells us what reality is, and above all, what and how nature really is. In terms of the phenomenological analysis of the generative foundations of science in the lifeworld, it tells us what the reality given in the immediate experience of the encounter of elementary understanding with the natural environment when considered "in and by itself." This claim of the natural sciences, and especially the hard natural sciences, is the presupposition for the additional claim that they provide a philosophy and with it an ontology of nature based on mathematical principles. A phenomenological analysis of the generative foundations of the natural sciences can provide a justification for this claim, at least for classical physics and then for the difficulties of the attempt to

find a satisfactory ontological interpretation of post-classical physics, especially for quantum theory. It will be shown below that the difference between the classical mathematical formalisms that admit quasi-pictorial representations and the post-classical mathematical formalisms that admit only quasi-pictorial representations *per analogiam* is of central significance for these difficulties.

Science as a new philosophy of nature emerged in a pre-given context of higher understanding in a cultural lifeworld. Some aspects of this context belong to the necessary historical conditions, i.e., the generative foundations of the emergence of science, but others are contingent. Metaphysics understood as general ontology of being and beings can be applied in a philosophical onto-theology as a possible extension of religions with an interest in a more or less rationally organized system of religious dogmas. Apart from such onto-theological extensions, practical interest in well-being and salvation is the main concern of religions. This interest, together with all other practical interests of elementary and higher understanding is in brackets for the theoretical attitude of the natural sciences. It is, however, also already in brackets for a pre-scientific ontology of nature. A precise answer to the question of possible ontological interpretations of the mathematical apparatus of explanations in physics has to distinguish between pre-scientific ontologies of nature[62] and ontologies of nature in the context of philosophical systems that presuppose epistemological reflections on already existing sciences.[63]

The relation between the natural sciences and religion as a system of dogma is a practical psychological, political, and juridical problem in the first centuries after the emergence of the natural sciences. How these problems have been handled is a question of historical contingencies,[64] but the transition from a pre-scientific philosophical ontology of nature to the philosophy of nature of the sciences implies necessary conditions. The emergence of the natural sciences is a perfect example for the different aspects of a rejection and not an application of a literary tradition that has been considered in Sect. 3.4. The rejected tradition is in this case the tradition of the Aristotelian ontology of nature. Like rejections in general, this rejection has its generative foundation in the pre-existence of a tradition of theoretical understanding of nature just because it is *its* rejection and it is, like most rejections, a partial rejection. It is partial because it applies, with significant modifications, a selection of these basic ontological categories of the rejected philosophical tradition.

Elementary understanding is one of the generative foundations for the emergence of classical physics, but the emergence of physics also requires generative foundations on the level of higher understanding. It presupposes first of all a sufficiently

[62] For instance, the ontology of nature of the Aristotelian tradition.

[63] Ontologies of nature in modern philosophy since Descartes presuppose epistemological reflections on the natural sciences.

[64] Scientists have been prosecuted, and executed, or have (like Descartes according to some of his interpreters) tried to cover themselves by proving that their teachings are in accordance with the teachings of the church. Others, e.g., Newton, have been convinced that science is in accordance with the belief in the wisdom and providence of God.

developed theoretical interest in the categorial metaphysical structure of being in general, and especially in the categorial structure of nature. Secondly, it presupposes a sufficiently developed system of mathematical knowledge.

It is a historical contingency that the Aristotelian tradition was the dominant theoretical philosophy at the time of the emergence of the natural sciences, and it is also a historical contingency that another philosophical ontology, the atomism of Democritus and the Epicureans, was again available in the Renaissance. Nevertheless, basic structures of the Aristotelian and the Democritean ontologies of nature have been of significance for the generative foundations of the emergence of the natural sciences in the European cultural tradition.

A phenomenological analysis of the generative foundations for the possible emergence of the hard natural sciences must, therefore, begin with a short survey of the basic categories of the Aristotelian and the Democritean tradition and their roots in the lived experience of elementary understanding. These roots indicate why and how these ontological philosophical categories could be and have been applied in the natural sciences. It was certainly not the main intention of Aristotle and the medieval Aristotelians to understand the categories of their ontological theories as categories of the structure of the experience of the natural environment in elementary understanding, but many of Aristotle's examples indicate that the concrete lived experience of elementary understanding is indeed the empirical basis of the process of the generalizing abstractions in which the highest genera, the Aristotelian system of ontological categories, are given.

The raw material discovered in the natural environment is the Aristotelian *matter,* and if this is used and shaped in the process of the realization of certain purposes of elementary understanding, it is the *material cause* of what has been realized. Means used in forming the matter according to the intentions guided by the final causes are the *efficient* or *moving* causes. On the level of elementary understanding the art of the application of moving causes is the mechanical art, the *mēchanikē technē*[65] as the art of producing and using instruments, i.e., tools, and machines in the crafts. Efficient causes are in most cases local causes. Living organisms in particular but also human artifacts in the broadest sense have their generation in the realization of a form in already formed matter of a lower level, and can suffer degeneration and finally corruption of the unity of form and matter.

The cause that determines the generation is the *formal cause*. The driving force behind decisions to act in order to achieve certain goals is the *final cause*. Final causes are also behind the striving of certain beings to their "natural place" or their being attracted by other beings. Final causes are non-local causes. Causes determine the course of events and states of affairs in nature, however, it was generally acknowledged that the course of celestial bodies is determined, while the course of events "under the moon" is only partially determined. What happens can also happen by chance and is, hence, partially not determined.

[65]The meaning of *mēchanē* in ancient Greek includes the meaning of *tool* and also of *machine* used as a mechnical tool or device.

It is a historical contingency for the emergence of the sciences that the first moving final and formal cause was understood as God in the monotheistic Jewish and Christian onto-theology, e.g., in Thomas of Aquinas. The formal cause and form is understood as belonging to the "ideas of divine reason before the creation." The formal cause is in this context reduced to the final cause. The naturalistic Aristotelian interpretation of the Averroistic tradition in the medical faculties of the European tradition was different. The final cause was understood as the final phase of the actualization of a form in matter and was reduced to the formal cause.

Even in the interpretation of the Averroists the Aristotelian tradition, was partially incompatible with the categories used in the theories of the natural sciences. (1) The final cause given as the force behind decisions to act in lived experience is excluded after the first reductive abstraction to the observables of intersensory experience. It is excluded because it is given only in subjective lived experience. (2) The formal cause can be tolerated as a heuristic principle in the *life sciences* if it is understood as an independent causal category and not as a correlate of the final cause. The formal cause is, however, not of interest for the *hard sciences*. The formal principles of the hard sciences are mathematical formalisms. (3) Some Averroistic naturalists, but also the Franciscans in the tradition of Duns Scotus, had an interest in observations and crude experiments in the late Middle Ages. Experience was recognized as a source of knowledge in the Aristotelian tradition, but there were no methodological reflections on experiments or on the nature of the empirical basis of intersensory observations.

Nothing can be said about formless matter by itself in the Aristotelian tradition because formless matter has as such no qualities and no relations to anything else. It is a historical contingency for the emergence of the natural sciences that the philosophical ontology of nature of Democritus and Epicurus was not acceptable for the onto-theological mainstream metaphysics in the Middle Ages.[66] It is also a historical contingency that their ontology was re-discovered and of interest again in the Renaissance. Of significance is that the basic categories of the Democritean ontology can be understood as counterparts of the basic categories of classical physics. What exists has to be understood as the product of mechanical efficient causality determined by the movement and the shape of the atoms in empty space.

This philosophical theory has *prima facie* a striking similarity with the ontology of classical physics and was of specific interest for the philosophers of the Renaissance, but it is still a philosophical ontological theory. There are arguments against and arguments for the theory. There is no deductive system of mechanics guided by mathematical principles determining the selection and definition of the categorial system of the theory, and there was no attempt to derive predictions from the basic principles of the system and to test them in experiments.

[66]Quite apart from the unacceptable ethics of the Epicureans, their philosophy of nature and their ontology was incompatible with all attempts to develop a monotheistic onto-theology in the religious tradition of the Middle Ages.

The generation of theories in the hard sciences presupposes mathematical theories for their explanations of empirical phenomena. Pre-scientific ontological categories are acceptable if and only if they can be understood within the scope and the limits of interpretations of mathematical principles. Together with a selection of modified categories from the pre-scientific ontology of nature the mathematical principles determine the "a priori" of the region of intersensory experience that can be recognized as the region of objects of classical physics after the second abstraction. Thus the extensions and modifications of the mathematical principles of classical physics that emerged in the later development of the mathematical formalism applied in post-classical physics have significant consequences for the ontological interpretation of the mathematical formalisms of post-classical physics. Classical physics is the generative foundation of post-classical physics. It is, therefore, advisable to consider the problems of a phenomenological epistemology of classical physics before turning to post-classical physics.

The basic categories of classical physics are infinite space, infinite time, bodies given in empty time and space, movement, acceleration, force, and energy. A mathematical treatment of these categories presupposes the possibility of measuring. The basic presupposition for the measuring and then the mathematical treatment of the categories of shape, mass, movement, acceleration, force, and causality is measuring space and measuring time. This was already known in systems of pre-scientific philosophical physics. It was, in addition, a "disputed question" of pre-scientific philosophical physics whether the world was limited or eternal in time and limited or without limits in space.

A short digression might be helpful for the understanding of time and space as *categories* of classical physics. To call them categories sounds odd from the viewpoint of Kantianism where space and time are forms of intuition and the a priori of sensibility. In a phenomenological context, however, space and time as forms of "sensibility" are the form of the structure of the givenness of the hyletic field in primordial passive synthesis, and on the level of active synthesis and intersubjectivity they are the forms of the structure of objects given in the lifeworld in intersensory experience. Space and time as abstract moments of the structure of experience of reality on the primordial and the intersubjective level are the generative foundation for the idealizing abstractions in which space and time are given as ideal objects in pre-scientific philosophical ontologies, and beyond that on the higher level of idealizing abstraction in classical physics. For phenomenology, the problem of the Kantian forms of intuition is that these forms imply an interpretation of space and time that presupposes the mathematical idealizations. Kant's forms of intuition are not the forms of the spatial and temporal structure of sensory experience in the lifeworld. They are already mathematically formed *concepts* of space and time, and in this sense they are categories applied in the ontology of classical physics.

The structure of the experience of real space on the level of primordial lived experience has its foundation in the separation of the inner and the outer of the

living body.[67] The center of lived space is the Here of the living body and the manifold Theres of other bodies outside the living body. Even on the primordial level this space already has the general structure of above and below, to the right and left, in front and behind one's own living body. In this sense, it is a quasi three-dimensional space. The There can become a Here in kinaesthetic movements, and beyond that in the givenness of other living bodies. Intersubjective space is given with the recognition of actual and potential other living bodies in places in space outside the one's own living body. One own living body can reach the place outside of the other living body only in time consuming kinaesthetic movements in the future and it is actually present only in the recognition of actual or potential Others in the present Now of intersubjective experience.

Intersubjectively given space can be measured. Measurement presupposes fixed standards of measuring rods, ideal units for measuring distances between bodies as well as the volumes of bodies in the outside of the manifold in the There. Measuring presupposes standards of measuring, units of measure. Standardized units of measure are supposed to be equal. The determination of ideally equal units of measure presupposes the same cogitative types of variations and abstractions as those in which individual units as exact mathematical essences are presupposed in counting. But it also shares the type of idealizing abstraction that was required for the constitution of the exact essences of geometry. For elementary understanding "geometry" was, as already mentioned, originally the term for "measuring the land." Measuring as an activity of elementary understanding, is the medium of the synthesis of the mathematical idealizations presupposed in elementary geometry and in elementary arithmetic.

The first abstraction that is constitutive for the cognitive attitude of the natural sciences has been characterized in the preceding sections as having its foundation in the practical interest in predictions and causal relations of elementary understanding. But natural science is interested in predictions and theoretical explanations as such and not because of their applicability for practical purposes. The second abstraction has its generative foundation in the first reduction's theoretical interest in causal relations, but it reduces in addition the scope of the descriptions of observables given in experimental situations to measurable phenomena or phenomena that can be reduced to measurable phenomena with the aid of mathematical formalisms. It is, in this sense, an abstractive *reduction*.

The structure of the infinite space of classical physics can still be represented as the intentional object of this type of idealizing abstractions if

(1) the Here of the primordial experience is represented as the ideal limit, the zero point, in which the three dimensions of above-below, before-behind, and right-left intersect and

[67] What follows is a summary of what has already been considered in Sect. 3.1. On lived space, cf. also Ströker 1965, part I.

(2) the angles of which their crossing are understood (again on the level of exact essences) as right angle, while in addition
(3) the distances in all on the three dimensions of parameters can be determined as measurable; then
(4) given a sufficiently developed geometry, arithmetic, algebra, and measurement techniques, each point in this system the coordinates can be mathematically determined in terms of measured distances from the zero-point, the standing "Here" in the system of the coordinates.
(5) The final step for the constitution of the subjectively and intersubjectively independent category of space in classical physics is the Galileo transformation.

The future horizon of lived experience is the temporal horizon of primordial expectations that can be fulfilled or disappointed. The future horizon on the level of intersubjective experience is comprised of explicit expectations, predictions that can be fulfilled if they are intersubjectively confirmed or disappointed when the prediction turns out to be false. The future is, hence, an open and not yet determined realm of possible events that may or may not happen and not an already determined one-dimensional sequence of events. The past is the horizon of the "flowing off" of events happening in the present and sinking into the past, the continuum of retentions as the realm of associatively structured memories, and beyond that of explicit reproductions of sequences of completely determined events that can no longer be changed. The future is beset with expectations determined by the past, but since expectations can be disappointed, the future is also given as an open horizon of the present for new desired or undesirable contents and events. Future and past are, hence, radically different dimensions in the structure of the experience of temporality in the actual Now of the lifeworld.

The universal *historical* time given as objective time in the lifeworld is already an abstraction that has its foundation in the structure of the time of lived experience. For any deliberately chosen reproduced event in a past present, this past present has its own past as a completely determined one-dimensional *indefinite* ordered sequence of events or facts. It also has an already determined sequence of events in the temporal dimension of its past future horizon. Every actual Now will flow off into the past and will be given as an object in oblique intention for subjective and intersubjective experience. If the Now is given as an object it is, therefore, given as the center of an-open ended one-dimensional order of future and past events. The foundation for the representation of time as a continuum that is indefinitely open in the directions of the past and the future of a deliberately chosen Now is, hence, the experience that an actual Now will always flow off into the past and will itself be a past Now.

The "disputed question" of philosophical ontological and onto-theological theories of time was and is the question whether time is limited or indefinitely open in the future and in the past horizon of lived experience. It was the question whether the world was created and will have an end depending on the will of God, or whether the world is eternal and infinite in space, a self-sustaining entity with a world-immanent prime mover or a world soul according to some enthusiastic philosophers of the Renaissance like Giordano Bruno.

The intersubjectively pre-given continuum of the historical time of events by itself is not measurable. Time is measurable only if it can be projected on movements of bodies in space, first of all the regular circular movements of the celestial bodies in the natural environment, and then, on the level of a further developed elementary understanding, on movements of the pendulum in clocks. Measuring space is the presupposition of the measurement of time.

What can be immediately measured are the shapes and volumes of bodies in space and the movement and the acceleration of the movement of bodies in space and time. Mass, originally given as weight in intersensory experience, can already be measured as weight in elementary understanding with pairs of scales and other more sophisticated devices. Force can be determined in an equation as a correlate of the measured quantities of mass and acceleration. This equation is essential for the explication of the idealized[68] category of causality in classical physics. The energy of a body can be determined in equations in a system of mutually interacting bodies in space and time. Measured force and energy as categories of classical physics determine and define the "efficiency" of the "moving" causes of pre-scientific ontology in the context of classical physics.

Causes and the forces behind them can be local, like mechanical causes, or non-local, like gravitational forces. The causal relations between bodies in motion changing the speed and direction of other bodies are *reciprocal* causal relations that can be defined in terms of mathematical equations. Cause and effect are, therefore, both determined without exception by the same set of ontological categories. In other words, the entities that function as *agens* and those that are the *patiens* belong to the same kind of beings, the beings that can be given in the thematic attitude of physics in the residuum of the second abstraction.

A mechanical and/or gravitational system of forces between two mass points determining the speed of their motion in a system of coordinates can be mathematically represented and calculated as a system of vectors in a three-dimensional system of coordinates x, y, z. It can be shown with the aid of the Galileo transformation that the laws of Newtonian mechanics for such inertial systems are invariant for another system of coordinates x', y', z' and a relative constant speed v parallel to the x-axis.

The purpose of this rough sketch of relevant points for a future phenomenological analysis of classical physics is to demonstrate that the basic structures of the ontology of classical physics can still be understood as idealizing abstractions. The mathematical theories determining the principles of classical physics as ontology of nature presuppose only idealizing mathematical abstractions without admixtures that can only be justified in the framework of strict mathematical formalisms

[68]Cf. Hua VI, §9d, though nothing is said to explicate what "idealized" means in this context; see Ströker 1997, ch. VII, and Harvey 1989, 197 ff., who offers a thorough analysis of the complex background of the mathematical idealizations and their application to the basic categories of classical physics.

presupposing formalizing abstractions. The ontology of classical physics is in this sense still a "natural" ontology.[69]

Four remarks that are of phenomenological interest for the following investigations have to be added. The first, the second, and the third are of significance for the discussion of the ontological problems of post-classical physics. The last is of significance for the ontological relevance of physics for the explanation of phenomena that are in brackets for the second abstractive reduction and beyond that for the critical phenomenological evaluation of the meta-physical ontology of a reductive naturalism.

(1) The laws of Newtonian mechanics for inertial systems are invariant for Galileo transformations, but Newton's theory of relativity already shows that in a closed inertial system, it is impossible to determine whether this system as in rest or is moving moves with constant speed *relative* to its surrounding systems. It is, however, possible to determine accelerations of the "box" caused by external gravitational forces.
(2) Forces determining cause-effect relations in the context of Cartesian mechanics are forces behind local cause and effect relations. Newton's law of gravitation is a causal law for non-local cause-effect relations. The forces behind the causation are forces that act at a distance. Elementary understanding recognizes both local and non-local causes. The experience of weight is already an outstanding necessary part of the structure of lived experience on the level of animalic understanding of one's own living body and its relation to the surrounding bodies, and then in elementary understanding as well. There is also no immediate impact of a local force outside bodies that causes them to fall down to earth if no local cause outside them prevents them from falling down to earth.[70]

There are, hence, no reasons, seen either from the viewpoint of elementary understanding or from the viewpoint of a pre-scientific philosophy of nature, to reject non-local forces in physics. Nevertheless, there were some doubts about and even outright opposition to this extension of physics in the seventeenth century. The motive behind such doubts is historically contingent. The main reason supporting the opposition against non-local forces was that such an assumption could be used as an argument for astrology and other superstitious beliefs.

(3) Elementary understanding is only interested in the question whether or not the application of simple causal relations works. The question whether or not everything in nature is determined by causal laws is not of interest. The

[69]The Newtonian *dictum* that space is the sensorium of God indicates the empirical basis for this analogy in the structure of the lifeworld.

[70]Non-local causes are also recognized elsewhere in systems of higher understanding, first of all in religions. There are divine miracles; there is the assumption of powers of demons and magicians acting at a distance; and there is, last not least, astrology. Such non-local forces are in most cases final causes.

question is only meaningful for the thematic attitude of science after the first and especially after the second abstraction. Except for efficient causality, the problem of determinism/indeterminism was already a problem of pre-scientific ontology of nature. The movement of celestial bodies is obviously governed by strict laws. Things under the moon are not strictly determined. Humans living under the moon do not know whether or not they can reach their goals. Their decisions and their actions are not able to determine the future course of events. The goddess Fortuna or the *blind* Fates govern human actions. The problem of determinism/indeterminism was, however, a serious onto-theological problem for monotheistic religions. The question is whether or not everything that what happens is pre-determined and under the predestination of divine providence and power.[71]

Prima facie there is no place left for causal indeterminacy in classical physics. The general thesis following Laplace on probabilities is that a perfect intelligence, not the human intelligence, is able to predict all causally determined events in the universe. The future as well as the past will be open to its vision. Newton's position was similar, but he admitted that the will of God can cause irregular changes in the solar system.[72] It is obvious that the old onto-theological thought patterns are still of significance for Newton and Laplace. Kant's position is different. In his *Critique* the law of causality is a principle of understanding that guides scientific as well as pre-scientific investigations. It is a *regulative* principle of experience and not a law governing things in themselves. There might be transcendental freedom, the power of starting a new causal sequence of events without being caused from elsewhere, for *noumena*.[73] Assuming that physics is a science about the things in themselves behind the appearances, it is possible to offer a "physicalistic" translation of Kant's thesis: the principles of explanation of classical physics imply, as a rule of research, recognizing of only deterministic causality. It is, however, possible that there are phenomena in experimental situations in quantum theory that seem to indicate that the "things in themselves" that can be discovered in physics do admit indeterminacy in some cases. This problem will be considered in the next section.

(4) The categories of the ontology of classical physics have been called primary "qualities." Seen from the viewpoint of the old Aristotelian list of categories, such primary qualities are quantifiable qualities and belong, therefore, in this respect to the category of quantity. Seen from the viewpoint of a phenomenological epistemology, such primary "qualities" are the "qualities" that belong to the residuum of the second abstraction. They admit a strict explication of their meaning in terms of mathematical principles.

[71] The question is, first of all, whether God or not has left some room for the human will to sin.

[72] Cushing 1994, 11.3.1.

[73] Kant KGS III, B 561 f, Transcendental Dialectic, ch. II "The antinomy of pure reason" section 9, III.

Secondary qualities (colors, sounds, smells, touch, and bodily feelings) belong to the residuum of the empirical basis of the first abstraction but not to the residuum of the second abstraction. The ontological thesis of classical physics is that secondary qualities are appearances that are "caused" and can be explained with the aid of properties of primary qualities as qualities of substances that can be considered as the "real" things in themselves. There is sufficient experimental evidence for this explanation, but there is also an epistemological problem. The question is what "causation" and "explanation" mean in this case. The relation between primary and secondary qualities cannot be reduced to mathematically explicable causal relations. Such causal relations between entities are restricted to primary qualities. They are reciprocal and can be expressed in mathematical equations.

The thesis that primary qualities cause the secondary qualities refers, on the contrary, to a one-sided necessary and sufficient causation. Cause and effect belong to different ontological categories. Assuming the phenomenological analysis of the abstractions that are constitutive for the natural sciences, the thesis implies that phenomena given in the residuum of the second reduction are able to explain phenomena given in the residuum of the first abstraction but not in the residuum of the second reduction. What is given in the residuum of the first abstraction can be *reduced* to phenomena of the second abstraction. The second abstraction is, hence, an abstractive *reduction*.

8.4 The Difficulties of Ontological Interpretations of the Mathematical Formalisms in Post-Classical Physics

An analysis of the difficulties with the ontological interpretation of the application of mathematical formalisms to phenomena given in experimental situations that do not occur in classical physics but are relevant for the epistemology of post-classical physics has to start with a brief explication of the general structures of such difficulties. The next step is then a survey of the different types of difficulties in different fields of post-classical physics before turning to a phenomenological analysis of the difficulties.

According to what has been said in the preceding section, there are no serious problems in principle for the ontological interpretation of the theoretical entities of classical mathematical formalism in classical physics.[74] The theoretical entities of classical physics are interpretable as mathematical idealizations that admit quasi-pictorial representations in the spatial structures of intersensory experience. Hence in their application of their *ideal* mathematical objects to phenomena given in experience, they admit ontological interpretations that are immediately applicable

[74]E.g., the Cartesian ontology of *res extensa* and the Kantian transcendental ontology of the objects of experience with the aid of the principles of pure understanding and, first of all, the axioms of intuition.

to *real* objects given in intersensory experience. The situation will turn out to be different in post-classical physics, first of all because the theories do admit only analogies of quasi-pictorial representations and secondly because it may even be the case that an adequate description of the phenomena in terms of well-formed formulas of the applied mathematical formalism are already incompatible with quasi-pictorial representations.

The assumption of classical physics that waves as movements of particles in electromagnetic fields and optical experimental phenomena obey the laws for inertial phenomena presupposes a fluid matter, the ether that fills empty space, but there is no experimental evidence for the ether hypothesis. The solution for this problem in post-classical physics is Einstein's special theory of relativity. Simultaneity of spatially separated events cannot be given in immediate perceptual observation. Co-temporality needs, hence, a definition reducing simultaneity to immediate results of measuring. The reduction presupposes the assumption of the constant speed of light in empty space together with the derivable theorem of the addition of speeds for relative speeds and the Lorentz transformation.

The application of the Lorentz transformation of relativity theory in physics is not, like the application of the Galileo transformation, a transformation of inertial systems in a three-dimensional system of coordinates. It is a transformation of inertial systems in a four dimensional continuum (x, y, z, t) to another inertial system in (x', y', z', t'). The consequence of the assumption that the coordinates referring to time t and t' can be different is the relativity of co-simultaneity. Events that are seen from the viewpoint of one inertial system as simultaneous are not simultaneous for others.

The main consequences are (1) the Lorentz contraction: the extension of a moved body is smaller in the direction of its movement than the extension of the body for an observer who shares the movement of the body; and (2) the Einstein dilatation of time: the progress of a clock is faster for an observer who shares the movement of an inertial system than the progress of a clock for an observer outside the system. Finally, (3) the mass of a resting body is smaller then than the mass of the same body in movement. Energy is defined as equal to the product of mass and the square of the speed of light. Events in the four-dimensional "world" as the totality of events are, according to Minkowski, "world points."

The transition from the special to the general theory of relativity presupposes in addition the curvature of space.[75] Given this presupposition and the context of the four-dimensional "world" and its "world points," cause-effect relations are local, and this implies that what appears as the non-local causal laws of gravitation in classical physics have to be understood as local cause-effect relations in the context of this mathematical formalism. However, the formal system preserves a strictly deterministic interpretation of causality.

The mathematical formalism used for explanations in the special theory of relativity has the advantage of a simple theory of higher universality that covers

[75]Cf. §30 above about Riemann spaces.

the experimental evidence for optical and electromagnetic phenomena, rejects the ether hypothesis, covers inertial phenomena, and preserves the theorems of classical physics as approximately true for comparatively small velocities of the movement of bodies in comparatively small time-space systems, for instance our galaxy and a little bit beyond. There is sufficient evidence provided by observations and experiments for the theory in astrophysics, and there were no objections against its application in nuclear physics before the second decade of the twentieth century.[76]

The mathematical principles of the philosophy of nature of classical physics had its generative foundation in mathematical idealizations given in rule-governed eidetic variations of quantitative phenomena in the lifeworld. Formalizing abstraction excludes the intuitive background. The transition to a four-dimensional continuum is *prima facie* a comparatively small step on the level of formalizing abstraction in mathematics. Going back to what has been said above about the transition from Euclidean to non-Euclidean geometries, such transitions require more than certain modifications of some principles of Euclidean geometry. Only analogues of "pictorial" representations in the non-Euclidean geometries in four- and more-dimensional continua, with and without curvatures, can be given in intersensorially accessible geometrical constructions of figures in three-dimensional space. What can be said about such continua must be said in terms of a formalistic extension of analytic geometry without quasi-pictorial representations.

The mathematical formalism of relativity theory can prove its mettle because it can be applied in explanations of experimental phenomena given in intersensory experience, but an ontological interpretation of the formalism behind the explanations has no generative foundation in the lifeworld. The "world" and the "world points" of an Einstein/Minkowski world are "entities" on the level of the ideal objects of formalizing abstraction. They are "things in themselves" behind their appearances in the space-time system of classical physics. The re-definition of the basic categories of physics in terms of this formalism is incompatible with the structure of the experience of body, weight/mass, movement, acceleration, force, energy and causality defined in terms of these categories. The non-local forces behind causations in the lifeworld and in the world of classical physics are local causations in a four-dimensional "world."

Seen from the viewpoint of the defenders of Cartesian mechanics against Newton's laws of gravitation, that sounds good, but there is no ontological interpretation of "local" and "non-local" for "world points" in the Einstein/Minkowski "world" that can be traced back to the lived experience of the locality and non-locality of causes given in the lifeworld for intersensory experience. What can be said is that what appears as a non-local force for comparatively small distances in the world of classical physics and in the lifeworld are "really" local forces in the world of relativity theory.

[76]Cf. below about von Neumann's proof that the application of hidden variables in the context of relativity theory is incompatible with the mathematical formalism of quantum theory.

Seen from the point of view of the *history* of *philosophy*, another question is what it would really mean if we were to assume that the astronomical observation *now* of what has happened in a *distant past* shortly after the "absolute *beginning*" called the "big bang" refers to a possible pictorial or quasi-pictorial representation of that "bang." Such an assumption is a pain in the neck of the intellect comparable with the pain in the neck of a Scholastic intellect that was confronted with the assumption that God created the world in time and space and not before and outside of time and space.

The mathematical formalism applied in quantum mechanics is a Hilbert space. Hilbert spaces are number-spaces for complex numbers and have denumerably infinitely many dimensions. Their state vectors for quantum systems are of unit length or zero length and are determined by complex numbers. Hilbert spaces are spaces of state vectors, and not of locations in a space. State vectors can be represented by the sum of orthogonal state vectors. They are not restricted to three dimensions and can be multiplied by complex numbers. An immediate application of this formalism to the measurements of experimental situations is not possible, because it implies complex numbers. A special operator, the Hermetian operator, is required to represent vectors in a Hilbert space as vectors in the phenomena of experimental situations given in "real" space, i.e., with values that are real numbers with a linear ordering and, therefore, able to be values of observables in experimental situations.[77]

The mathematical formalism of quantum mechanics is able to explain all relevant experimental phenomena and to derive all empirically relevant hypotheses. The problem of quantum theory is that the whole context of mathematical formalism, the explanations of empirical evidences with the aid of this formalism, and the empirical phenomena considered by themselves, admit different ontological interpretations. It is, furthermore, of significance that these interpretations require more than a selection and re-interpretation of the ontological categories of classical physics or even of relativity theory. The categories of classical physics immediately refer to "real" being and beings in direct intention, and in this respect they share the naïve realistic attitude of pre-scientific ontologies. Interpretations of quantum theory have to add reflections on categories in oblique intention and these additionally imply epistemological viewpoints. More will be said below. Some of the interpretations have shortcomings, but two of them, the anti-realistic Copenhagen interpretation and the realistic Bohm interpretation, cover the ground.[78]

The main reason for the epistemological problems is the application of mathematical statistics for the explanations of experimental phenomena in quantum mechanics. This has nothing in common with the type of statistical causality, the measurable degrees of probability of causal connections, on the level of the first methodological abstraction. There are, in addition, significant differences between the application of statistical mechanics in classical physics and in quantum

[77]For a precise explication, see Gibbins 1987, 89–92.

[78]More precisely, this was at least the state of the art in the last decade of the last century.

mechanics. Probability in classical physics is defined as relative frequency in an ensemble. Pre-given are observable causal interdependencies between the changes in observable phenomena of ensembles in experimental situations.[79] All the initial conditions are known in such experiments and identical measurement results are given in repetitions of the experiments.

Particles moving in a system of particles in classical physics have, each taken by itself, a determinate position and momentum at any given time. The laws of force of mechanics determining the movement and the position of the particles can be calculated if the number of the particles is a small system of particles. Given this a priori background it is possible to *explain* the properties of the ensemble. The situation is different in the case of quantum theory. There is no possibility of explaining the frequency phenomena with the aid of a theory that has been confirmed by independent experimental evidences and is able to determine the position and the momentum of individual particles in the ensemble.

Reflections on the so-called logic of quantum mechanics are not able to solve this problem. The Hilbert space applied in quantum mechanics is a highly abstract object, but the logic of the mathematical formalism applied in quantum theory is classical; the mathematical calculation of frequencies and probabilities applied in quantum mechanics are also classical. Here the term "classical" means that the mathematical formalisms applied in quantum mechanics are formalisms within the limits of classical logic, not a post-classical modal logic.

The problem is that the logic of statements in descriptions of the observables of experimental situations in quantum experiments is not classical. A basic statement of the elementary language of quantum mechanics is of the form: the value of the dynamic variable d for the system S at a time t lies in range D. The lattice of closed subspaces in a two-dimensional Hilbert space for conjunction and disjunction is, however, non-distributive.[80] It is sufficient for the leading intention of this section to highlight the logical properties of the language.[81] The value for the f, f—case of "P v Q" is "?." "?" means "uncertain," and the value for the t, f—case of "– P" is also?. There are, correspondingly, restrictions on the rules for conditional proof, the v-elimination, and double negation.[82]

It is more than questionable whether a non-classical modal-logical representation of the strange features of the observational language of quantum mechanics is able to solve the problems of its ontological interpretation. *Prima facie* the value "?" says something about the "uncertainty" of statistical probabilities. An answer has to

[79]For instance the causal relation between the temperature and pressure in the kinetic theory of gases.

[80]Gibbins 1987, 92 f: (A & B) v (A & C) implies logically A & (B v C) but not vice versa.

[81]For a detailed account of the background in the descriptions of the relevant phenomena in quantum mechanics and of the basic statements of quantum mechanics "bottom up," cf. Gibbins 1987, part II, sections 6 and 11; cf. 146.

[82]Cf. Gibbins 1987, 134f. He mentions in addition some logical truths of classical logic that turn out not to be valid in quantum logic.

keep in mind that a complete quantum logical account of quantum mechanics has to develop a complete account of a mathematical formalism of quantum mechanics that is able to replace the classical mathematical formalism applied in quantum logic. This would imply a meta-logical possible world semantics for quantum logics. The attempt to apply it to the ontological problems of quantum theory leads to absurdities.

Quantum logic is, hence, nothing more and nothing less than a re-formulation of the ontological problems on the level of a formalized modal logic, and not a solution for the problems.[83] The approach of physics to the problems of the logic of the elementary language of the basic statements of quantum mechanics is bottom up; in contrast quantum logic is a top-down view of the problems of quantum mechanics, and it might even encourage some ontological theses that can be and have been challenged with good reasons from other positions.[84]

Quantum theory is restricted to ensembles and is not able to say anything about individual quantum systems, but it is possible for an ontological interpretation to assume such hidden variables that determine individual quantum systems behind the frequency phenomena of quantum ensembles. Einstein introduced the first version of the hidden variables. Einstein's assumption of hidden variables presupposes the special theory of relativity and implies, therefore, both indeterminacy relations and the rejection of non-local instantaneous action at a distance. The objections have some weight because the theory of special relativity seemed to be applicable to subatomic and electromagnetic phenomena in the old quantum theory before 1925.[85]

The problem of Einstein's position is not only that there was and is no experimental evidence for such hidden variables. Presupposing the mathematical formalism of Hilbert spaces and the Hermetian operator, it has been shown that no state of a quantum system can assign simultaneously definite values to all quantum mechanical observables.[86] The assumption of hidden variables can only be saved for a non-relativistic space and time background, with the additional assumption that the values of hidden variables depend in addition on the measurement apparatus.[87]

The main motive behind the temptation to assume hidden variables is the assumption that quantum mechanics is incomplete without hidden variables. The first problem of assuming the completeness of quantum mechanics is that quantum systems can be interpreted as systems of particles and as system of waves.[88] There are mathematical problems and serious experimental counter-evidences for the assumption that reality is wavelike and the frequency associated with the system is

[83] Gibbins 1987, 144.

[84] Gibbins 1987, 166.

[85] Cf. Gibbins l987, 8ff., on Einstein.

[86] Cf. Gibbins 1987, 122f., on von Neumann and others.

[87] Cf. Cushing 1994, 42ff., on Bohm; more on the Bohm interpretation will be said below.

[88] For detailed descriptions of the two-slit experiment see Gibbins 1987, 36f., 41, 147–51.

the frequency of the wave function. The particle theory also has shortcomings. The basic problem for the particle theory is that this theory has to presuppose guiding fields but what the field is and how it guides remains unexplained.[89]

The second problem is the interpretation of the statistical frequencies of the individual quantum systems. The thesis that statistical frequencies are properties of the quantum systems themselves is a necessary implication of the assumption that quantum theory is complete.[90] Uncertainty is the principle of quantum systems, and indeterminacy relations are the ontological correlate of the uncertainty principle. The indeterminacy is an indeterminacy of position and momentum. Probability refers not to the course of events in time, but to the tendency of events. Position and momentum cannot be observed simultaneously, according to a proposal of Heisenberg, because they are disturbed by the interaction with the instrument that is used for simultaneously observing the position and momentum of the quantum system.[91]

The guiding thread for the ontological interpretations of quantum theory in the Copenhagen interpretation was to start with an explication of the categorial system of classical physics in order to show the limits of this system. The indeterminacy principle and the wave/particle dualism are the indicators of the shortcomings of this categorial system. The observer and the observed belong to one and the same context. The quantum system and the measurement instruments, including the observer, are not independent entities, subject and object are inseparable. It is necessary to recognize the limits of our knowledge, our representing the world as it is in itself. To understand the indeterminacy principle (as well as the complementarity principle) as a realistic ontological description of reality in itself is absurd. The indeterminacy principle and the complementary principle are indicators of the limits of our knowledge. The Copenhagen interpretation has been characterized in the literature as anti-realistic, as metaphysics, and it has even been said that it is a type of positivism because it rejects all attempts to introduce hidden entities behind the phenomena.[92]

It has been mentioned that the assumption of hidden variables can be saved for a non-relativistic space-time framework with additional assumptions. Schrödinger's non-relativistic equation permits a wave/particle interpretation. Bohm introduced a mathematical transformation that permits rewriting the equation as a modification of Newton's second law of motion, and this equation admits an interpretation in terms of particles and particle trajectories.[93] The probability density of particles in

[89]Cf. Gibbins 1987, 43f., on Schrödinger and 45f. on Born.

[90]Cf. Gibbins 1987, 52, on judgments about Heisenberg in the literature.

[91]Heisenberg's proposal is a quasi-pictorial interpretation based on a thought experiment. The interpretation, together with the Heisenberg's presupposed definition of the indeterminacy relation has been refuted in the last decade according to A. Steinberg and others, *Physical Review Letters*, 104, Nr. 100404.

[92]Cf. Gibbins 1987, ch. 4, esp. 48f., 53–56; cf. also Cushing 1994, 3.3.2.

[93]Cf. Cushing 1994, 42.

the Copenhagen interpretation is inherent to the structure of the quantum system. Given the Bohm interpretation, probability density occurs because we cannot *in practice* predict or control the location of a particle due to the unpredictable and uncontrollable disturbances induced by the measuring apparatus. But this does not imply that the particle does not have a precise location *in principle*. The use of a statistical ensemble is, as in classical mechanics, only a practical necessity, and does not represent the inherent state of the system. There is a statistical ensemble and with it a probability density, but this is only the consequence of our ignorance of the precise initial conditions of the particle.[94]

The Bohm interpretation preserves a non-relativistic Newtonian conception of space and time, the motion of actual particles on continuous trajectories, event-by-event causality, non-locality, and determinism.[95] Statistical frequencies are not inherent properties of quantum systems. Observation of phenomena in experimental situations is restricted to statistical frequencies because it is impossible to determine the initial conditions of the experimental situation. The initial conditions are not observable because the measuring apparatus itself induces disturbances in the motion of the particles.

Bohm's hidden variables ontology has been called underdetermined. "Underdetermined" can be interpreted in two ways. The Bohm interpretation is underdetermined because it presupposes that for the observers the states of the system lie behind a veil of practical ignorance. It is, however, also possible to understand "underdetermined" in a broader sense. Bohm's realistic interpretation and the anti-realistic Copenhagen interpretation presuppose the same mathematical formalism, the same experimental phenomena, and the same mathematical formalism for the explanations of the phenomena. Both interpretations are compatible with these presuppositions. Theories implying ontological interpretations are epistemologically underdetermined if the choice of this or that ontological interpretation is not fully determined by the underlying system of explanations.[96]

There are two basic questions for a phenomenological epistemology of post-classical physics. The first question is whether ontological interpretations of the mathematical theory and its application to the explanation of observable phenomena in experimental situations are immediate implications of the theory and its application, or whether such interpretations presuppose an added independent cognitive activity.[97] An answer to this questions presupposes the answer to the question whether or not the theory and the theoretical entities of the theory admit quasi-pictorial representations, a question mentioned in the beginning of the present section.

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[94]Cf. Cushing 1994, 44f.

[95]Cf. Cushing 1994, 46.

[96]Cf. Cushing 1994, 205ff.

[97]This question has been raised in the literature, e.g., in Cushing 1994, see table 2.1 and the comments on the table 12f. Cushing seems to prefer the second horn of the dilemma.

The second question is whether ontological interpretations are necessary for the epistemological analysis of the presuppositions for the success of the technological applications of physics and of the natural sciences in general. The answer will be negative. Instrumentalism connected with ontological quietism offers an alternative that has its foundations in elementary understanding and only in elementary understanding, without any admixture of higher understanding.

Answers to these questions once again require a brief recapitulation of some viewpoints that have already been considered. Natural sciences have their foundations in the experience of the lifeworld after the first abstraction in the spatial and temporal structure of intersensory intuition on the one hand and in the interests of elementary understanding on the other. The abstraction brackets the practical interests of elementary understanding. What is left in the residuum of the reduction is the interest in law-governed causal relations. The basic structures of elementary understanding appear on the level of higher understanding as the categories of the theoretical reflections on the ontology of nature in pre-scientific philosophical reflections, i.e., without including epistemological reflections on the natural sciences.

The immediate generative foundation for the emergence of physics is a sufficiently developed mathematical theory. The requirement for the ontological interpretation of classical physics was, in addition, that the mathematical theory is able to justify the claim that physics itself is a true philosophy of nature based on mathematical principles and written in mathematical symbols and, therefore, is able to replace the old pre-scientific philosophical ontology of nature. The negation implied in the replacement of the old philosophical ontology of nature as a partial rejection that also implies serious modifications of the set of pre-scientific categories that can still be applied in the new philosophy of nature.

The principles guiding the selections and modifications are the principles of the applied mathematical theory, including analytic geometry and its extension in the infinitesimal calculus. This mathematical theory presupposes as its foundation Euclidean geometry, algebra, and, ultimately, the foundations of geometry and algebra in the structure of the natural environment given in elementary understanding and intersensory intuition. As mathematical disciplines both disciplines require idealizing mathematical abstractions and, in algebra, some elements of formalizing abstractions. The mathematical theory remains, however, on the level of mathematical objects as objects of idealizing abstractions.

The ontological categories of classical physics are, hence, categories that must be definable in terms of this mathematical theory and only in terms of this theory. At the time of Newton and later this theory was *not* understood as a pure mathematical formalism. *Mathematics itself could be and was understood at this time as a natural science, and such an understanding is not compatible with an understanding of mathematics as a pure formalism presupposing formalizing abstraction*.

Thus the explanations of Newtonian physics regarding space and time are abstractions that have not yet completely lost their connections with the empirical basis of the natural sciences in the residuum of the first abstractive reduction. This was a “natural” bridge for the transition from mathematically guided explanations

to an ontological interpretation of the mathematical with ontological categories that determine the real nature of physical phenomena. The ontological interpretation of classical physics is, hence, not an added cognitive activity. It is immediately applied with an understanding of mathematics as natural science.

An immediate implication of what has just been said is that quasi-pictorial representations can be admitted in classical physics. They can be admitted because they are still applicable to classical analytic geometry. The mathematical theory of classical physics has been and can be understood as a theory of ideal objects given in idealizing mathematical abstraction, but it can also be understood with hindsight as a mathematical formalism given in formalizing abstraction. However, the possibility of understanding the mathematical theory as an idealized representation of the structure of intersensory experience is bracketed, excluded, for the ideal objects in the residuum of formalizing abstraction.

Three steps toward pure mathematical formalisms that have been applied in physics have been distinguished. The first step is the formal treatment of the axioms of Euclidean geometry. Abstracting from the possibility of an intuitive interpretation of the axioms, it is possible to introduce several types of changes in the system of the axioms. The second step is the development of the theory of functions and the infinitesimal calculus on the level of a mathematical formalism of higher algebra and arithmetic that is able to be applied to non-Euclidean geometries. The final step is the introduction of imaginary and complex numbers beyond real numbers in the context of the mathematical formalisms of higher algebra.

The mathematical formalism of special relativity presupposes a four-dimensional time-space continuum. The general theory adds the application of the principles of Riemann's non-Euclidean geometry. To call this continuum "space" is a metaphor. It presupposes a purely formalistic understanding of mathematics. Pictorial representations, even in the restricted sense of quasi-pictorial representations mentioned above, are impossible in this context. The understanding of reality with the aid of this formalism has lost its foothold in the idealized mathematical concepts of the categories of intersensory experience found in classical physics. It has, however, *not* lost its foothold in the reality of predictions of phenomena given in experimental situations and causal explanations. There is convincing experimental evidence that confirms the theory.

Serious objections have been raised against the use of pictorial representations in the interpretation of the formalisms and the explanations of post-classical physics.[98] However, such arguments also have serious implications for the idea of possible ontological interpretations of the formalisms and the explanations of post-classical physics. The presuppositions for the justification of the possibility of an immediate interpretation of classical physics (not one that is merely added on to it) are precisely the arguments that justify quasi-pictorial representations for the ideal objects of classical physics. Arguments against pictorial representations for post-classical physics are, hence, also arguments for the assumption that ontological

[98] Cf., e.g., Gibbins 1987, 57f.

interpretations of the mathematical formalisms and explanations in post-classical physics are not immediately implied in the theories. Such ontological interpretations require additional reflections that justify *added* ontological interpretations.

As already mentioned, the "world" and the "world points" of an Einstein/Minkowski world are ideal entities on the level of pure formalism; there is no ontological interpretation of "local" and "non-local" for "world points" in the Einstein/Minkowski "world" that can be traced back to the lived experience of reality in the lifeworld.[99] What can be said is that what "appears" as non-local for comparatively small distances in the world of classical physics and in the lifeworld is local in the "world" of relativity theory. The formalism represents, hence, a "mathema-physical" world, "physical" understood in the sense both of nature, as the *physis* of pre-scientific ontology and of nature in the world of classical physics. In other words, this world is a world of things that are considered as they are in their own right and appear first in the world of pre-scientific experience and then on the level of idealizing abstraction as objects of the experience of classical physics.

But contrary to this Kantian model, this mathema-physical world of relativity theory is immediately of significance for the recognition of causal relations and prediction of facts in the realm of phenomena given for the immediate experience of real things appearing in the lifeworld, and these facts can have tremendous impacts in and for a lifeworld with sciences.[100] The question is whether an ontological interpretation of mathematical formalism and the explanation of empirical evidences with the aid of that formalism can have an *added* ontological interpretation applying a selection of modified categories of classical physics. There is a phenomenological answer to the question what this "meta" meta-physics means in the case of relativity theory.

The assumption of a limited speed of light determined the transition from Newtonian space and time to Einstein's space-time and this assumption is not at odds with a descriptive account of the structure of intersensory experience. The simultaneity of events beyond the limits of a face-to-face intersubjectively given spatial environment is not observable. Seen from the viewpoint of the limited natural environment of subjective and intersubjective experience a "message" from outside refers to an author in a past Now that is outside the receiver's natural environment and thus given neither in the Now nor as a past Now in the past horizon of the receiver. The structure that determines these properties of messages is the structure of the natural environment, and there are other events in the natural environment that share these properties.

It is a simple observation of scientific intersensory experience that the speed of sound is limited and it is, therefore, also compatible with the structure of the natural environment given in the lifeworld to assume that the speed of light is limited.

[99]Cf. the question regarding what it really means if we read that the astronomer has observed *now* what has happened distant *past* in a distant space measured in light years.

[100]For instance: nuclear bombs and nuclear power plants. The problem of scientific technology will be considered separately in Sect. 9.2.

Thus it is also compatible with the structure of intersensory experience to assume that simultaneity of events is restricted to comparatively small distances. Relativity theory admits, even proves, the practical applicability of classical physics for natural environments that are small compared with astrophysical distances. The application is, however, only tolerable as an approximation referring only to the things as they appear to us and not as they are supposed to be in their own right according to the mathematical formalism of relativity theory. The upshot of this is that the mathematical formalism of relativity theory is not able to represent an ontology. There are, however, motives taken from puzzling aspects of the spatial-temporal structure of the lifeworld and from classical physics that justify quasi-pictorial representations *per analogiam* and that justify a *metaphorical* use of the these categories of classical physics in a *meta*-physical ontology of relativity theory. The analogy is in this case a strong analogy because only a few well-defined steps beyond the mathematical formalism of classical physics qua formalism are required for the development of the mathematical formalism of first the special and then the general theory of relativity.

The situation is different in quantum theory. The axiom systems of the non-Euclidean geometries and their treatment in Riemann's extensions of analytic theory can still be understood as modifications and extensions of a formalistic interpretation of the mathematical theory that has been applied in classical physics. The re-interpretation of the basic categories in the context of relativity theory can also still be understood as metaphorical re-formulations of these categories in the language of the mathematical formalism of relativity theory. However, such an attempt is hopeless with respect to Hilbert spaces with indefinitely many dimensions over a space of complex numbers; it needs, therefore, additional special mathematical transformations like the Hermetian operator mentioned above to reach mathematical expressions that can be applied to the measurements of contexts of phenomena given in experimental situations on the level of intersensory intuition. But precisely this need indicates that the formalism by itself offers no foothold for ontological interpretations.

The problems for added ontological interpretations of the explanations in quantum theory are, therefore, problems that already occur on the level of the empirical basis, more precisely, on the level of measuring the phenomena in experimental situations that are supposed to determine whether the underlying physical reality has the character of a wave or a particle and of speed and momentum. Seen from the viewpoint of classical physics the results of the measuring are ambiguous because they end in statistical probabilities, i.e., in uncertainty. It can be said that the choice of the mathematical formalism explaining this situation is justified precisely because it allows projections that admit such uncertainties.[101]

[101] See Gibbins 1987, 92f. This is not what Gibbins says explicitly in ch. 6 but what he says implies that the choice of the Hilbert formalism is the necessary condition for a possible explanation of the phenomena.

Given this situation, it is not a surprise that there are still competing ontological interpretations of quantum theory that are more or less in accordance with the same amount of experimental evidence and that there are two, the Copenhagen interpretation and the Bohm interpretation, that cover the ground of all experimental evidences for the mathematical formalism and its explanations. Seen from the viewpoint of a systematic classification of philosophical positions, it is, furthermore, impossible to understand these interpretations as ontological interpretations in direct intention.

The main problem of quantum theory is not an ontological but an epistemological problem. The added ontological interpretations presuppose epistemological viewpoints. The natural sciences themselves, and especially physics as the prototype of science, are in the center of the philosophical reflections since the seventeenth century. Epistemological reflections determine what can be said about ontological structures. However, the ontological interpretation of classical physics was understood and can still be understood, as a replacement for pre-scientific philosophical ontologies.

Presupposing what has been said above, it can be said that the Copenhagen interpretation[102] sticks to the phenomena and, therefore, can be characterized as a type of positivism. It has also been said that the Copenhagen interpretation is anti-realistic. It presupposes the inseparability of observer and observed and is, therefore, a type of positivism that denies the possibility of recognizing nature as it is in itself. However, it is also possible to add a meta-physical interpretation in the sense defined above implying causal indeterminacy not only of nature, but of the world in general and of the subject-object relation in the world.

The Copenhagen interpretation and the Bohm interpretation presuppose both the space and time structure of classical physics[103] in their interpretation of the relevant phenomena given in the experimental situations in quantum mechanics. *Prima facie,* the Bohm interpretation and the Copenhagen interpretation are diametrically opposed. Roughly speaking, the Bohm interpretation is realistic because it presupposes hidden particles behind the frequency phenomena and the complementary interpretation of these phenomena as waves and as particles. Quantum theory is, according to this interpretation incomplete. It is necessary to presuppose hidden variables and it is possible to reject indeterminacy and non-locality for such hidden particles. The Copenhagen interpretation rejects most of the basic assumptions of the ontology of classical physics.

The Bohm interpretation preserves the basic assumption of the ontology of classical physics. It is, however, not a straightforward realistic ontology of nature like classical physics. It is an *added interpretation* that implies epistemological assumptions. The phenomena given in experimental situations do not refer immediately to physical reality; they are appearances. The hypothetical assumption

[102]The Copenhagen interpretation is not a monolithic systematic position, but rather a web of partially different viewpoints in a discussion.

[103]This is not the case with Einstein's hidden variable interpretation.

of a reality in itself (and its ontological categories) behind the appearances is an ontological construction. Given the state of the art, there exists no positive justification in empirical experimental evidence for the assumption. What justifies the assumption is only that it is compatible with the formalism and the explanations of the empirically given phenomena of quantum theory.

The task for a phenomenological epistemology is not to look for viewpoints for the defense of one or the other of the interpretations. The basic problem is rather the fact that there exist *two* incompatible interpretations and that there is, *rebus sic stantibus*, no possibility to find any mathematical or empirical justification for one of them together with the rejection of the other. Of phenomenological interest is that both interpretations have one common denominator, namely, the suspicion that the measuring instruments used in the experiments themselves have an impact on the status of the object of measuring. One interpretation assumes mathema-physical hidden entities and classical physical properties of the entities behind the screen of this extraordinary experimental situation. The other interpretation additionally presupposes epistemological assumptions about the subject-object relation, assumptions that imply mathema-physical consequences for the ontological nature of object and subject.

Seen from the phenomenological point of view, natural science as an activity *in the lifeworld* is guided by the interest in discoveries of causal connections regardless of whether or not they are of practical interest for elementary understanding. The activity of scientists is, nevertheless, a practical activity, and the indicator for the generative foundations of empirical science in elementary understanding is that the natural sciences use *instruments*. These instruments are *tools* used for precise descriptions of phenomena that are, e.g., not visible for the naked eye, and they are also used in the preparation of controlled experimental situations. The first and the second abstraction brackets practical interests, but science nevertheless has one of its generative foundations in elementary understanding because it shares the foundation of elementary understanding in intersensory experience. It further shares and has its generative foundation in the ability of elementary understanding to invent and to use tools, instruments.

The guiding interest of the sciences in general in instruments is that instruments can be used not only for the purposes of observation, but also for the preparation of controlled experimental situations. The additional interest of the hard sciences after the second abstraction is that the instruments provide precise measuring of the quantity of the categories of the objects of physics: motion, acceleration, force, energy, position, momentum, etc. It is science itself that has control that the instruments (and to prove that they do what they are supposed to do) with the aid of already established scientific theories, and it is, last but not least, the task of scientific discoveries to develop new types of instruments that are able to do a better job than the old ones.

One aspect of this task of controlling the instruments used in scientific research with the aid of scientific theories was and is to ensure that the instrument, more precisely the energy used by the instrument, does not disturb and modify the observed object. This condition must be fulfilled for the justification that the

instrument permits an observation or representation of physical reality as it is in itself. It is possible that critical scientific reflection can show with the aid of scientific theories that a certain type of instrument is not able to fulfill these requirements. However, this was not a problem as long as there was an open possibility of repairing these shortcomings with different types of instruments that are able to fulfill the requirements, e.g., to the possibility of using electron microscopes instead of optical microscopes. Instead the problem of quantum mechanics is not only that the instruments used to determine position and momentum in quantum systems disturb the quantum systems, but that the assumption that they disturb the quantum systems is backed by quantum theory itself, i.e., according to the given state of the art, it is impossible in principle to invent instruments that can repair this shortcoming.

This is a new situation for the status of ontological interpretations of the theoretical entities of physics and the hard sciences in general. According to what has been said above, for contemporaries classical physics implied an ontology, a philosophy of nature written in mathematical symbols. Though the use of "ontology" is in this case a metaphor, the general theory of relativity implies the ontology of a four-dimensional space with curvatures of space and events that can be characterized as world points in the context of such a world. In both cases there is no reason to assume that the observations in experimental situations disturb the observed inertial systems, and it is also not possible to assume that there is more than one meaningful ontological interpretation of the mathematical formalism and the explanations of the phenomena with the aid of this formalism.

The phenomenological account of the problem of instruments used in quantum theory indicates first of all that the philosophical interpretation claiming the inseparability of observer and observed ought not to be misunderstood as the thesis of the inseparability of subject and object, e.g., in the sense of a Kantian version of a transcendental epistemology. The problem is not the cognitive status of observers qua epistemological subjects. According to another now quasi-pictorial proposal, the problem is the instrumental apparatus used for the observation of the object, and the epistemological subject is well aware in this case that it is the instrument and not the structure of its own cognitive apparatus that causes the problem.

The "crisis" of the understanding of the hard sciences is, hence, first of all a crisis of the problem of the ontological interpretation of the mathematical formalisms used in scientific explanations of measurable phenomena. The interest in ontological interpretations of the formalism is not a problem for the application of the formalism in successful scientific explanations. The latter interest has its generative foundation in elementary understanding, and science has a high value from this point of view because it is useful for technological applications of scientific research on the level of elementary understanding in a cultural lifeworld with sciences. Natural science has, hence, a value because for elementary understanding it is a tool, an instrument for the realization of practical purposes and goals.

The interest in the ontological interpretation of the mathematical formalisms that can be used in explanations of the things in the world as the real world, of nature as it is in itself and not as it appears to us, has its generative foundation in higher understanding, and there first of all in a pre-scientific theoretical philosophy

of *natura*, i.e., of *physis*. The abstraction from practical interests in the lifeworld in the broadest sense is constitutive for natural science as a theoretical cognitive attitude belonging to higher understanding. This attitude, the interest in knowing how things really are, was the dominating factor in the development of the natural sciences, and it is still a dominating factor for the self-understanding of science. However, it is also possible to adopt an attitude of being interested in science only because the output of insights in causal relations can be applied for the practical purposes of elementary understanding on the level of a scientific technology. Instrumentalism as an epistemological position justifies science as a procedure for finding methodologically reliable predictions for technological purposes.

Successful technological applications are nothing other than a series of further confirmations for scientific theories. The original question whether or not science tells us how things really are is an idle question of scientific "theories." Seen from the viewpoint of a phenomenological epistemology, this thesis implies that scientific theories are not of significance for higher understanding.[104] Quite apart from the fact that this understanding of the natural sciences is what guides the evaluation of scientific activities for the vast majority of laymen including those in business, politics, and in the meantime unfortunately even education, this understanding has also become a motive for the practical self-understanding of scientists who are disinterested in ontological interpretations. This disinterest has also been characterized as ontological quietism.[105]

It is an essential consequence of instrumentalism as a consistent epistemology of science that mathematical formalisms are of interest for research in the hard sciences only because they can be applied as instruments producing reliable predictions and explanations of the phenomena. It is not necessary to assume mathematical objects that can be given in idealizing and formalizing abstractions. The nominalistic interpretation of mathematical objects as signs or symbols with syntactical rules determining well-formed formulas that admit transformations only in operations that are guided by strictly defined systems of rules is sufficient for an instrumentalistic epistemology of the natural sciences. Mathematical formalisms "work" for predictions that are required in technological applications. It is natural for the instrumentalist to assume that computers "think" and are as such ideal *instruments* for doing mathematics, since the value of mathematics is a value only because mathematics can be used as an instrument.

Instrumentalism can, of course, be criticized as a crude type of philosophical utilitarianism,[106] but seen from the viewpoint of a phenomenological epistemological

[104]Instrumentalism is an understanding of science that is welcome in all types of religious fundamentalisms.

[105]Cf. Gibbins 1987, 75, 160.

[106]To call it pragmatism would be an offense to the pragmatism of Charles Sanders Peirce and partially also that of William James.

analysis this criticism does not touch the real problem. The introduction of transcendent, imaginary, complex numbers and finally transfinite numbers in the nineteenth century has caused discomforts for some mathematicians and epistemological reflections on mathematics, last but not least for the intuitionists. For a phenomenological epistemology of mathematics, the reason for this discomfort is the transition from a mathematical formalism that still has quasi-pictorial referential objects given in mathematical idealizations to a pure algebraic formalism. The referents of the symbols and operations of this extended algebraic formalism are pure formal ontological essences given in formalizing abstraction, and this also implies an abstraction from all mathematical idealizations that admit quasi-pictorial representations.

The transition from classical to post-classical physics has caused much less discomfort among physicists. The basic question for physics is whether a mathematical formalism is able to derive hypotheses about causal relations, to admit deductive systems of confirmed hypotheses, and to derive new hypotheses from such systems. The further problem of the immediate applicability of the well-formed formulas of the purely algebraic formalism that can be applied to the description of phenomena in experimental situations not only lurks in the background, but surfaces in the need for special "translation operators" that mediate between the language of the descriptions and the language of the theory.[107]

Of course this problem in the background is not a problem for instrumentalism and ontological quietism. It is, however, a problem for ontological interpretations and in general for the question concerning what it means to say that the natural sciences are able to reveal what nature really is. What is required is the ability to apply mathematical formalism in a physics that does not admit straightforward ontological interpretations of objects of experience as in classical physics, but only quasi-metaphysical ontological interpretations. "Quasi-metaphysical" is a metaphor. Metaphors that are not merely puns presuppose analogical similarity. An analogy can have real heuristic value if it is possible to determine borderlines between the structural similarities and structural dissimilarities implied in the analogy.

The application of ontological categories (i.e., of beings given in the experience of objects in the created world) in onto-theological speculations about the essence of God caused serious difficulties for the pre-scientific scholastic ontology of the Middle Ages. The answer was that the onto-theological application is an application *per analogiam*. It was, however, also a problem for ontologies that presupposed epistemological reflections in general, and especially on the natural sciences. A prototype is the Kantian ontology of principles of pure experience. This ontology has empirical reality for objects of experience. However, it is not applicable for the metaphysical realm of things considered in themselves. An attempt to apply them

[107] Cf., e.g., what has been said above about the Hermetian operator in quantum mechanics.

in metaphysics ends in contradiction. Only an analogical application, a symbolic understanding that uses analogies, is possible.[108]

A comparatively naïve understanding of mathematically idealized categories such as cause, mass, and energy as ontological categories was possible for the ideal objects of classical physics. But it is impossible for the ideal objects of post-classical formalisms and their relation to observable objects. The ideal objects of the *mathesis universalis* on the level of formalizing abstraction do not admit quasi-pictorial representations. There is no intuitive bridge connecting the ideal objects with the observable objects given in experimental situations. They are *prima facie* something like the Kantian things in themselves.

The essential structural difference is that the relations and the whole system of these *quasi*-metaphysical "things in themselves" are not only explicable in terms of the *mathesis universalis* on the level of formal ontology, but are also of significance for predictions, hypotheses, and the discovery of laws for causal relations between the observable objects, the phenomena given in experimental situation. They are in this respect still connected with the objects of experience and of significance for the objects of experience given in the lifeworld. However, nothing beyond that can be said about the ideal objects that are given in formalizing abstraction. They are only accessible for ontological interpretations that connect them with the lived experience in the lifeworld *per anlogiam,* and in this sense mathema-physical.

It is possible to give an explication of the meaning of "mathema-physical" in terms of an extension of Kant's critical reflections on the "presuppositions of the possibility" of classical physics. Kant's principles of pure understanding can be recognized as a satisfactory account of the categories of a general ontology of physics as well as of the possibility of interpreting these categories for first-order understanding in terms of classical Newtonian mathematics and physics. The objects of physics given for the principles of pure understanding can be given in quasi-pictorial representations presupposing only the pure forms of the intuition a priori. However, the theoretical entities of post-classical physics cannot be given in the forms of intuition in any sense.

They are objects of formalizing abstractions beyond the realm of intuition, objects of the "pure reason" not of Kant, but of a Leibnizean *characteristica universalis*. They are in this sense the mathema-physical things in themselves. The crucial difference between these things in themselves m and Kantian things in themselves is that they are still objects of physics as an empirical science because the theories about this type of things in themselves have to be and are testable in experiments that refer to phenomena given in intersensory observation. It is the methodology of the experiments that connects the level of the sensible world of intersensory observation with the "supersensible" world of relativity theory and quantum theory.

[108]Cf., e.g., Kant KGS V, *Critique of Judgment* §90, section 2.

8.5 The Empirical Basis and Theories in the Life Sciences

Hard or exact sciences require the second methodological abstraction that is, in addition, a reductive abstraction. The first methodological abstraction determines the empirical basis of the soft sciences. The empirical basis under the first abstraction admits phenomena that are not explicable with the mathematically idealized system of categories of the hard sciences under the second abstraction. In other words, the descriptions of observables in the soft sciences include references to the so-called secondary qualities. The soft sciences admit, furthermore, the application of ontological categories that cannot be defined in terms of the mathematical formalisms, but they also admit categories that are defined in terms of a mathematical formalism in the hard sciences without referring to such definitions. According to the analyses of Sect. 8.1, the definition of, e.g., efficient causality in the context of Mill's analysis of experimental situations is sufficient for the soft sciences. The soft sciences are nevertheless able to apply measurements to measurable aspects of their observables. Counting and measuring are techniques that have already been used on the level of pre-scientific elementary understanding for practical purposes and the bracketing of the practical purposes, after the first abstraction does not imply the bracketing of these techniques. A further question is whether and how the soft sciences can be reduced to the hard sciences.

Chemistry is an example of a science that was "soft" in the beginning and could eventually be reduced to physics without causing ontological problems. Chemistry has its pre-scientific foundation in the elementary understanding of the application of mixtures of materials for practical purposes, e.g., the mixture of copper and other metals in different kinds of bronze. The history of the development of such techniques and their social impact in pre-scientific cultural lifeworlds is of outstanding significance for the history of elementary understanding as well as for history in general, and especially for the pre-history of chemistry as a science. The period of chemistry as a soft science came to its end with Lavoisier's table of the elements at the end of the eighteenth century. The new theory of elements, atoms, and molecules was the presupposition for the reduction of chemistry to classical physics on the level of submolecular particles and then to the physics of subatomic particles in post-classical physics, especially in quantum theory.

The situation is different in the life sciences. The life sciences can be called *soft* sciences not only because they admit references to secondary qualities in the description of observables, but also because they presuppose ontological categories cannot be defined in terms of the mathematically idealized categories of the hard sciences and are, therefore, excluded from the residuum of the second abstraction. A rough survey of the historical development of ontological reflections on the life sciences can serve as a preparation for the phenomenological analysis of these categories.

The distinction between living beings as "animated" entities that are subject to generation and corruption and depend in their existence on more or less favorable circumstances in their environment, on the one hand, and materials that can be used

in the techniques of craftsmanship, on the other hand, is already an essential aspect of the pre-scientific systems of elementary understanding. It was also an essential aspect of healing wounds and illness not only of humans, but also of animals in the pre-scientific medical arts. The outstanding significance of living beings in the natural environment for the systems of elementary understanding dominates early types of religions: animism, shamanism, and polytheistic religions on the level of higher understanding.

The categories of form and matter, material, formal, and final causes, potentiality and actuality, generation and corruption, and the ontological application of the logical categories genus, species, and specific difference for the classification of animals and plants are essential for the pre-scientific Aristotelian ontology of nature. The necessary condition for the existence of organic life, the material cause, is inorganic matter. Essential for the emergence of organic life and organisms are the formal causes determining the specific forms of organisms. Formal causes are the forces behind the potential generation of the realized actuality of organic life in matter, and the decreasing power of formal causes initiates corruption of organisms.

The naturalistic interpretation of Aristotle reduced final causality to formal causality. Final causality is also excluded by the first abstraction. Formal causality had to be excluded or reduced to an efficient causality because only efficient causality admits a definition in terms of mathematical idealizations in classical physics. The ontological interpretation of classical physics by the Cartesians already implied the reduction of formal causality to efficient causality. The consequence is that animals and later even humans have to be understood as machines. Formal causes are admitted as teleological causes in the life sciences only as heuristic guidelines that have to prepare the path toward the final explanation of organic life with the aid of the general principles of the hard sciences.[109]

Quite apart from the circumstances at that time (and ultimately even for the present state of the art) convincing experimental evidence was still missing, a theory of the emergence of organic life out of inorganic matter has in addition serious ontological implications. Organic life has categorial structures that are not immediately explicable in terms of the categorial structures of inorganic matter, i.e., in terms of ontological interpretations of theories in the hard sciences. Matter would be more than that which can be described and defined in terms of these interpretations. It would have in addition some creative potential because it creates entities with complex ontological structures that must be added to the set of categorial structures of the objects of classical physics. Ontological considerations of this problem can turn the tables. Vitalism and in general ontological theories of nature emphasizing the creative power of nature tacitly reintroduce nature itself as the source not only of efficient causes but also formal causes.

[109]Kant's application of "purpose," a category of practical philosophy, in his *Critique of Judgment* as a heuristic principle for the life sciences can serve as an outstanding example (KGS V, §§63–65, 78, 80–82). It will be shown that this is not acceptable for a phenomenological epistemological analysis of the methodology of the life sciences.

It is the task of empirical research to find out whether and how organic wholes can emerge out of inorganic matter, and whether and how the life sciences can be reduced to the hard sciences. The task of a phenomenological epistemology is restricted to the analysis of the cognitive attitude of the life sciences and their intentional correlate, the ontological region of organic entities. It includes in addition the analysis of the relations between the categories of the ontological region of organic life and the categories of the ontological region of inorganic matter. Such analyses are, however, able to decide the question whether the reduction of the life sciences to the hard sciences is an ideal formal ontological possibility and then a material ontological possibility. This will be the case if it can be shown that the ontological region of inorganic matter is the static and genetic foundation of the ontological region of organisms. Three basic problems for a phenomenological epistemology of the life sciences can be distinguished

(1) The first problem is the analysis of the formal categorial structures of the formal ontological theory of the whole and the parts, on the one hand, and the formal ontological theory of unit and manifold, on the other hand.
(2) The second problem is the constitution of the cognitive attitude governing the methods of the life sciences and their intentional correlate, the material ontological region of organisms, on the one hand, and the cognitive attitude governing the methods of hard sciences and their correlate, the ontological region of inorganic matter, on the other. The problem of the difference between these cognitive attitudes is in (2) the determination of the scope and the limits of the application of efficient causal relations in the life sciences.
(3) The analyses that are relevant for the first and the second problem are problems for static phenomenological considerations. The third problem requires in addition analyses that belong to *genetic* phenomenology. Two levels of this problem can be distinguished. The first (3.a) is the problem of the ontological interpretation and explication of the guiding force of the formal causality of pre-scientific ontology in the life sciences. The second problem (3.b) is the question of the guiding force and its essential structures governing the process of the evolution of organisms.

(1) An analysis of the ontological structures of organic entities for the purposes of phenomenological epistemology has to start on the level of the formal ontological theory of the whole and the parts. A recapitulation of essential aspects of what has been said in Sect. 1.2 is sufficient. Organic wholes have the structure of second-order wholes. The parts of wholes of second order are one-sidedly founded in the whole and are held together by *relations* between *independent* parts, not by immediate *foundations* between *dependent* parts as in first-order wholes. An organic whole is a whole of the lowest level of second-order wholes. It is a structural whole of relations between independent parts of a concrete whole that are wholes of the first order and not of second order, i.e., they are not themselves organic wholes. They are, hence, not able to exist as independent wholes of the second order in more than one whole of higher order like the parts of wholes of a higher order. Only concrete organic

> wholes, and beyond them wholes of a higher levels of the second order can be independent parts of wholes of the next higher levels of wholes of second-order, e.g., as members of communities with different degrees of complexity (presupposing in some cases different structures in the organic wholes that are their independent parts). Such communities of organic wholes are of course also intentional objects for the cognitive attitude of the life sciences.[110]

The key for an answer to the question of the formal ontological ideal possibility of a reduction of the life sciences to the hard sciences is the answer to the further question of the formal ontological relation between the theory of the whole and the parts on the one hand and the formal ontological theory of the basic categories of the *mathesis* unit and manifolds on the other. *Either* they are two independent formal ontological theories on the same level of universality *or* one of them belongs to a higher logical level of universality. The formal ontological structures of the theory of a higher level of universality abstract from the "specific differences" of structures of theories on the lower level of universality, but they are applicable in principle to all entities that are determined in addition by the formal categories of the formal ontological theory of a lower order. This implies, however, that the formal ontological structures of higher logical order are formal ontological foundations for the formal ontological structures of a lower order. It is obvious that the reduction of organic life to inorganic matter is a priori a formal ontological impossibility if the answer is "yes" to the first horn of the dilemma and "no" to the second. The reduction is, however, an ideal possibility if the answer is "no" to the first and "yes" to the second horn of the dilemma.

A brief recapitulation of some relevant viewpoints already discussed in Sects. 1.2 and 7.2 is sufficient for the justification of a "yes" to the second horn. The categorial system of the objects of the hard sciences is explicable in the language of mathematical formalisms. The two basic categories of the formal ontological structure of a *mathesis*, unit and manifolds or collections of units, determine the formal structure of the system of natural numbers. Seen from the viewpoint of formal ontology, natural numbers are collections of individual units without an intrinsic formal structure, units that are related to each other in a well-ordered, dense, and indefinitely extended open sequence. All other numbers, including imaginary and complex numbers, are products of more or less sophisticated mathematical operations.

The analysis of the application of counting on the level of elementary understanding has shown that counting can be applied not only to all objects that are concrete wholes, but also to the abstract properties, i.e., dependent parts of concrete wholes. Measuring as counting of units and numbers as units in measuring can be applied to all dependent parts that belong to the genus extension. But this means that all entities under the formal ontological categories of the whole and the parts can be considered

[110]Humans live in communities, and animals do too. Family communities of both require different organic structures of their members, first of all of the sexes and some communities of insects require more complex systems of such differences.

as units and collections of units if the formal ontological differences pertaining to the categories of the theory of the whole and the parts are excluded with the aid of a generalizing abstraction determining a realm in which all of them, including the wholes themselves, are mathematical units in collections that can be themselves be considered as units, etc. The answer to the above-mentioned dilemma is, therefore, "no" to the first and "yes" to the second horn of the dilemma.

The formal ontological theory of unit and manifolds is, hence, one-sidedly founding for the formal ontological theory of the whole and the parts. Manifolds of concrete wholes as well as independent parts can be counted. A reduction of the material ontological structures of organic entities is, hence, an ideal possibility. It is *only* an ideal possibility because a genetic foundation of B in A requires, beyond A, the additional structures and properties C for B. What has to be added to this will be considered in (2) and (3).

(2) After the second abstraction, the description of the phenomena of physics is reduced to the properties and relations that are of relevance for the mathematically idealized categorial system of physical objects. The material given for the descriptions and preliminary classifications of phenomena of the life sciences is of a higher degree of complexity. The task of the precise description and classification of organisms and parts of organisms in the life sciences without any admixtures of causal explanations is a basic part of zoological and botanical research. A verbal representation of the objects of the life sciences needs terms for colors, sounds, even smells, in short, for everything that is still given in the empirical basis after the first abstraction but will be excluded by the second abstraction. The descriptions of phenomena that are characteristic for organic life and the huge manifold of different types of organisms in their outer and inner structure, as well as in the relations to their environments admit and even require pictorial representations that are able to support verbal descriptions.

The difficulties of providing adequate descriptive accounts of the relevant phenomena have consequences for the structure of empirical research in the life sciences. The first consequence is that observation, the description of phenomena, and discoveries of new opportunities for observations are of much greater significance in the life sciences than in the hard sciences. Even descriptions of a new organic species or of essential parts of an organic entity without any references to causal relations count as "discoveries" in the life sciences.

The second consequence is that a precise determination of initial conditions in experimental situations is difficult, and in many cases even practically impossible. Organisms belonging to the same species react in more or less different ways to the added factors in experimental situations that are supposed to cause this or that effect. Experimental research is, therefore, explicable in terms of refined versions of Mill's methods, and is in many cases restricted to the discovery of statistic causalities.

The first task of a phenomenological epistemology is, hence, to analyze the structure of the empirical basis of the life sciences or, in the terminology of *Ideas*

II and *III,*[111] to carry out the analysis of the structures of the material regional ontology of the life sciences. The second task is the analysis of the cogitative types of the methodology of experiments, of the predictions, and the explanations in the life sciences.

Two levels of universality and three dimensions on both levels can be distinguished in the descriptions of the phenomena of the empirical basis, the material ontological region of the life sciences. The first dimension of the first level is the description of the phenomena in which the lowest species of living organism are given as concrete *wholes* for intersensory intuition. The second dimension of the first level is the description of the independent parts of organisms as concrete wholes and the third dimension is the dimension of the specific environment of species of organic beings. The second level of descriptions presupposes generalizing abstractions for the constructions of taxonomies for species of organisms. The generalizing abstractions presuppose as their empirical basis the descriptions of the first level in all three dimensions.

Descriptions of lowest species of organic wholes presuppose variations in imagination of the material contents of wholes that are constitutive for the schemata underlying the empirical concepts of species of organic wholes. The rules guiding the variations are determined by the formal ontological structures of organic wholes. According to what has been said in Sect. 2.1, the ideal case beyond that would be variations that are sufficient for the constitution of the morphological essence of, e.g., the *eidos* "lion," or probably better, the empirical type "lion."

The second dimension of the description of phenomena that are necessary for the explication of the material categories of organic life and organisms has to determine the material characteristics of the parts of organic wholes. The independent parts of organic wholes cannot be simultaneously parts of other organic wholes, and they cannot exist independently outside the system of their functions of the organic whole. They will decay if they are separated from the whole without providing an artificial environment that can substitute for the whole or stop the process of decay. The description of the inner independent parts of an organic whole requires anatomical research. Anatomy in the broadest sense requires instruments, including instruments today presupposing technologies that have been developed with the aid of the hard sciences, e.g., x-rays.

The description of the environment of a species and the ecological relation of the species to the environment is not of immediate significance for the simple recognition of the species of an individual organic being or for the development of taxonomies for organic species. It is, however, of significance for experimental research and for the discovery of causal relations between organisms as concrete wholes (or their parts) and certain properties or aspects of their environments.

The basic scheme for the development of taxonomies is the formal ontological and apophantic logical structure of genus, species, and specific differences for

[111] See Hua IV, the title of Hua V, and the original project of the second volume of the *Ideas* sketched out in the introduction of Hua III/1; cf. also Hua III/1 §60; and Seebohm 2013

substances, i.e., concrete wholes. The constitution of taxonomies is the correlate on the second level of descriptions, and presupposes imaginative variations that are guided by differences in chosen characteristics of partial aspects of the lowest species of concrete wholes.[112] This basic scheme dominates the structure of linguistic communication in elementary understanding and has been recognized as a basic ontological and logical structure in pre-scientific philosophy. From the very beginning, the ideal and perfect realms of entities that can be thought within the framework of this conceptual scheme have been the realms of organic beings. Taxonomic systems of the life sciences are, however, of a higher degree of complexity because they have to refer to all three dimensions of the descriptions of the phenomena that are constitutive for the ontological region of organic entities.

Descriptions of phenomena given in the residuum of the first abstraction, i.e., in the soft natural sciences in general and, therefore, in the life sciences as well, admit pictorial representations. Pictorial representations of an individual belonging to a species of organisms, e.g., a photograph, are insufficient. The descriptions of the lowest species admit pictorial representations that can serve as symbols for the material morphological essence of the species only if they highlight specific features, the specific differences of the species indicating the rules of a schematic representation, e.g., the schema of a dog in Kant's example. Pictorial representations of schemata of species of higher orders of universality can also be used for the illustration of taxonomies. The ability to use pictorial representations, and not only quasi-pictorial representations and quasi-pictorial representations *per analogiam*, indicates both the borderline between the soft and the hard sciences and the foundation of this borderline in the distinction between the first and the second abstraction in the natural sciences.

The relations between independent parts of an organic whole are of significance for the existence of the organic whole because they have functions that connect them with other parts of the organic whole and finally with the organic whole itself. The environment is of significance for an organic whole and its parts only if it has parts and aspects that have a function for the existence of the organic whole. Both types of functions are understood on the level of elementary understanding as purposeful for the organic whole, and on the level of higher understanding in pre-scientific philosophical ontologies, such purposes are understood as final causes. Purposes (and with them, final causes) are excluded by the first abstraction.

The scientific explication of the relation between the parts and between the whole and the parts in the whole of an organism in the life sciences after the first reduction is *prima facie* an explication of one-sided or reciprocal efficient causal relations. Such causal relations between the parts of an organic whole, or between the parts and the organic whole itself can be discovered in empirical experimental research. The phenomena given in such experimental situations are given in the residuum of

[112] E.g., the organs serving the purpose of reproduction in the case of plants.

the first abstraction. The cognitive attitude of experimental research under the first reduction is, as mentioned above, explicable in terms of Mill's descriptive analysis of the methodology of experiments.

There are two types of hypotheses about efficient causal relations that can be tested in experiments in the life sciences. The first type of hypotheses about causal relations between parts of the organic whole and its environment can refer to observable phenomena given in the empirical basis of intersensory experience after the first abstraction. The purpose of the experiments is, on the one hand, to check whether such causal relations explain how the functioning or malfunctioning of parts of the organism affect other organs and the organism as a whole and on the other hand to discover the significance of certain aspects of the environment of organic wholes for certain species of organisms. The disadvantage of experiments in the life sciences is that the amount and the structure of interdependencies of initial conditions in an individual organism and in its environment is so large and complex that many of the causal laws that can be discovered in such experimental situations are statistical causal laws.

The only way to reach beyond the realm of statistical causalities is the application of strict causal explanations and predictions of the second type. The second type of predictions and causal explanations in the life sciences are applications of causal laws that can be confirmed in the hard sciences. Some of them, first of all the laws of classical push-pull mechanics, presuppose only descriptions of phenomena that are available under the first reduction and were already accessible on the level of pre-scientific elementary understanding. Others are available if causal laws referring to physiological phenomena can be reduced to laws of organic chemistry. Since chemistry can be reduced to physics, it can be said that the *soft* methodology of experimental research in the life sciences should be reduced and backed by the standards of the *hard* methodology of the hard sciences wherever this is possible because only the methodology of experimental research in the hard sciences is able to confirm strict causal laws. This reduction is a reduction of methodologies that are interested in the confirmation of the laws of efficient causality, and as such is not immediately relevant for the ontological question of the reducibility of the categorial system of the soft sciences to the categorial system of the hard sciences.

The advantage of a phenomenological epistemology in this respect is that there is no need to preserve concepts like "purpose," "final cause," or "teleology" as necessary ontological categories or heuristic principles. The reduction of the methodology of empirical experimental research in the life sciences to methodological principles of the hard sciences is a progress toward the realization of a methodological ideal that can be justified not only in the context of a phenomenological formal ontology as shown in (1) in the present section, but also by a phenomenological analysis of the material ontological region determining the empirical basis of the soft and the hard sciences, and finally by the phenomenology of the cognitive attitude of the soft natural sciences after the first abstraction and the cognitive attitude of the hard natural sciences after the second abstraction.

There is the ideal *possibility* of reducing the vague category of efficient causal relations on the level of the material ontology of organic entities to the strict causal

relations of the hard sciences. Efficient causal relations between the independent parts of an organic whole, and between aspects in the environment of the organic whole and the organic whole, can refer to descriptions of phenomena that belong to the so-called secondary qualities. Efficient causal relations referring to secondary qualities can be explicated in terms of primary qualities, i.e., the efficient causal relations between measurable aspects of qualities.[113] How far this reduction is possible is a question of empirical research.

(3) Explanations presupposing confirmed laws of efficient causal relations are obviously able to explain changes in pre-given organisms caused by functions and malfunctions of the parts, the inner organs of the organism, and/or by factors in the environment of the organism. It is not obvious how they are able to provide an answer to the questions of the laws that determine the structure of the genesis of organisms and the ability of organisms to inherit these laws from their predecessors. In terms of pre-scientific ontology, it is not obvious how explanations that are restricted to efficient causes are able to replace the assumption of formal causes. And beyond this it is also not obvious how such efficient causal laws are able to explain the history of the evolution of organic species.

Observations and descriptions of phenomena with the aid of sophisticated instruments provided by technologies that presuppose the hard sciences, e.g., microscopes, are able to discover that cells are the last independent organic parts of parts of more complex organisms. Like all other parts of organisms that have been separated from them, these smallest independent parts will decay if no artificial environment can be provided for them or if they are not embedded as a part or parts in another organism. However, observations with such instruments are also able to discover that independent organic wholes of the lowest degree of complexity are single-celled microorganisms. They also have parts, but the smallest independent parts of microorganisms are molecular compounds, proteins, below them amino acids, and finally carboxyl groups that are of interest for organic chemistry. Organic chemistry can be reduced to inorganic chemistry. The material ontological categories of organic wholes are, hence, in the last instance one-sidedly founded in the categorial system of the ontological region of the hard sciences.

The existence of organic wholes in general depends, furthermore, first of all on their metabolism and on the existence of favorable circumstances in their environment. Other organisms are of significance in this respect, but the just mentioned chemical building blocks of organic life are of ultimate significance. Seen from the viewpoint of material ontology, this material categorial aspect of the dependency of organisms once again has the character of a *one-sided foundation* but precisely that does not mean that organic life can be *reduced* to the system of the

[113] *Nota bene*: this reduction is an explicative reduction of the efficient causes, not of dependent parts in a concrete whole. Blue is a dependent part of a whole of the first order of the genus quality that cannot be reduced to a dependent part of the genus extension of the same concrete whole.

categories of the hard sciences. What is again in question is the factor C that must be added to the founding material ontological region A for the emergence of entities belonging to the material ontological region B.[114]

This categorial irreducibility does not imply that it is impossible for empirical research to discover opportunities for descriptions of the circumstances that accompany, as initial conditions, the emergence of living organisms out of inorganic matter. Given this, the next problem is to reconstruct such circumstances in experiments, and even to develop a technology to produce primitive organisms. Apart from the difficulty of an unambiguous interpretation of the ontological categories of quantum theory, such a reconstruction implies changes in the ontological interpretation of the categorial framework of the hard sciences, changes that will be considered below. Two problems must be distinguished. The first (3.a) is the problem of the force behind the generation and corruption of living organisms. The second (3.b) is the process of the evolution of the species.

(3.a) was already a problem for pre-scientific higher understanding. The answer of monotheistic religions was that God created living organisms and determined the laws for the generation and corruption of animals and plants. The answer of pre-scientific ontologies of nature was either the assumption of a formal cause or the assumption of a kind of matter or atoms that have the creative power to develop such forms. On this level and in general later before the nineteenth century, it was beyond question that the different types of organisms have existed since the beginning of the world and that they will exist as long as the world exists.

The answer of pre-scientific ontology to the first problem, the question of the force or power behind the generation of organic life, was the assumption of a specific type of cause, the formal cause. Corruption starts if the force of the formal cause is exhausted. The scientific explication of the pre-scientific ontological category "formal cause" in the life sciences is the theory of the genetic code. Since its initial appearance early in the twentieth century, genetics has been until the decoding of DNA-sequences in the second half of the Twentieth century the most rapidly developing theoretical discipline of the life sciences. The methodology of the theory is experimental research, i.e., the testing, confirming, and refuting of hypotheses referring to descriptions and classifications of phenomena. However, the presupposed description requires more than the description of phenomena in an experimental situation. What is required is the description of the genesis of species of organisms, and even perhaps of individual organisms belonging to a species. It is not the description of a present experimental situation. The description has the structure of a narration about a development, a series of changes in a temporal sequence.

This straightforward solution for the first problem seems to be clear enough, but it entails ontological problems. The explication of causal relations in the

[114]Cf. Part I, Sect. 2.2.

methodological framework of Mill's theory of experimental research in the life sciences refers to *effective causes*. Effective causes are factors that immediately trigger either an immediate change or a series of further changes in structure of organic wholes in the future, e.g., the development of a disease. The effect of an efficient cause is in both cases a disturbance in the material structure of an organic whole. A *formal cause* "causes" the genesis of an organic being step by step and so do the genetic codes if they are understood as the scientific explication of formal causes.

The ontological difficulty for this solution of problem (3.a) is the meaning of the metaphor "code." Decoding in the sciences of interpretation is the decoding of a written language. Decoding as deciphering is the first step toward an understanding of the *meaning* of the code. As such, the immediate reference of the term "code" and "decoding" or "deciphering" is a method that belongs to the human sciences as sciences of interpretation. The deciphering of a genetic code as a natural cause has to be something else. Another model would be a graphic representation of a building or a machine together with instructions for how to produce these artifacts step by step. This metaphor refers to techniques and technologies that require practical activities. But this reference implies an application of the pre-scientific category, *final cause*.

Final causes, however, are excluded from the residuum of the first abstraction. What comes closest is to use the metaphor "computer program." Given a program, a computer if it is started by a certain input produces an output step by step in a temporal sequence. The program is a code, and after a genetic code is initiated in a similar way it produces the living organism as an organic whole. Decoding the genetic code is the reconstruction of the program in experimental research, beginning with a description of the output and finding out which part of the program will cause certain changes step by step at certain temporal phases of the development that are of significance for the genesis of the organic whole.

Even this metaphor has a weak spot. A computer program needs a programmer and the computing machine requires complex electrical engineering. What lurks in the background of the metaphor is again the tacit assumption of a final cause, but final causes are excluded by the first abstraction. The consequence is that the genetic code has to be understood as an explication of the category "formal cause" without implying aspects of an explication of the category "final cause." The deciphering of the genetic cause is a task for the natural sciences, and as such, the deciphering in experimental research, step by step of which part of the code will be the efficient cause of a certain change in a certain phase of the genesis of the organic whole.

This explication of the formal cause implies, hence, a blind creative power of organic nature, where "blind" means in the life sciences as natural sciences under the first abstraction, that nothing can be said and ought to be said about a designer and/or a purpose behind this creative power. A further problem is whether and how this creativity can be reduced to the causal laws determining inorganic nature. What can be said about this problem has to include a solution for the second problem, the methodological problems implied in Darwin's "theory" of the evolution of organic species.

The second problem (3.b) is the question of the possibility and the force behind the development of species of organisms of different degrees of complexity out of other more or less complex species of organisms. The idea that the specific forms of the presently given different types of living beings is itself the product of a development of life forms was beyond the horizon of religion and philosophy, and even, except for some speculative attempts,[115] beyond the horizon of the worldview of the sciences before the second half of the nineteenth century. Darwin's "theory" is, in this respect, of at least the same significance for the development of the self-understanding of humanity as the Copernican turn. More about this will be said in Sect. 9.1. Darwin's theory is a reconstruction of the history of organic life with the aid of theories that have been provided by experimental research in the hard and the soft sciences.

The "theory" would be a theory on the level of the life sciences—set aside the requirements for theories in the hard sciences—if it were capable of discovering the causes for the generation of different species of living organisms out of pre-existing living organisms in experimental research. The first methodological question is, hence, in what sense Darwin's discoveries are confirmations of hypotheses. Already famous scientists among the contemporaries, e.g., Virchow, had doubts whether Darwin's theory is really a theory in this sense or only a "hypothesis" because there is no experimental evidence for the theory. Only experimental tests are able to discover and confirm the causes behind the development of the different types of living organisms,[116] especially with respect to the development leading from primates to humans. However, it is also not obvious in what sense Darwin's "theory" can be called a hypothesis. A hypothesis is an assumption about a causal relation but Darwin's "hypothesis" is, closely considered, neither a theory nor a hypothesis in the sense in which these terms are used in the methodology of the hard sciences.

Hypotheses in the hard sciences are assumptions of strict causal laws written in the language of a mathematical formalism, derivable from mathematical principles and testable in experimental situations. There are also theories and hypotheses in the soft sciences, e.g., a theory of certain types of diseases that are caused by certain types of bacteria. A refined version of Mill's methodology of the methods of induction is, as mentioned, sufficient for the epistemological analysis of experimental research in the life sciences. A theory is in this case a collection of causal laws that can be derived from general causal laws "written" in a natural language that is enriched with a more or less complicated system of technical terms. Both types of

[115] E.g., Schelling's philosophy of nature.

[116] Rudolf Virchow, professor for pathological anatomy and founder of the anatomy and pathology of cells, was a member and leader of the Party for Progress (*Fortschrittspartei*) in the Prussian Parliament and an opponent of Bismarck, but nevertheless also a defender of the sciences against the teachings of the Christian churches in the so-called *Kulturkampf,* cf. Morkramer 2010, 124 quoting passages from Virchow's speech in the Prussian parliament 1879. The struggle about Darwin's "theory" in Germany is a good example of the interplay of contingent and necessary conditions in the history of science with some parallels in the present cultural disputes about teaching in Darwinism in high schools in the United States.

theories are theories about causal laws, and the main task of research is the discovery of causal laws by testing hypotheses about causal relations in experimental research.

The upshot is that, seen from the viewpoint of a phenomenological epistemology, Darwin's, "theory" is neither theory nor a hypothesis, but the reconstruction of the *natural history* of the evolution of the species of organic life. A history is more than a narration about sequences of events that can be observed in the present mentioned in (3.a). As history, it presupposes, first, the description and classification of a huge amount of phenomena that can be discovered in the life sciences, including fossils as the presently given facts *for* historical research.

A history requires as a second step the determination of the age of the facts, i.e., the period in the temporal sequence of past periods. The presupposition for the determining the age of the facts for historical research presupposes the application of theories about causal relations that must be borrowed from the hard sciences. What was available at the time of Darwin in this respect was geology. In the meantime more sophisticated techniques that can be used for determining of periods of the past in the temporal sequence of the past have been developed.

The third step is the *reconstruction of a past reality* using the facts as *traces* of events and states of affairs belonging to the past reality of a past period, e.g., the past reality of the age of the dinosaurs. Such a reconstruction again presupposes the application of theories borrowed for this purpose from the life sciences, but also again ultimately from the hard sciences. A reconstruction of a past development of events always has gaps that have to be closed with the aid of the discovery of further facts able to fill the gaps. If and as long as such material is a "missing link," the gaps can be filled by assumptions about material that might be able to fill the gaps. Such assumptions can be called hypotheses, but such hypotheses are *historical hypotheses*. Such historical hypotheses refer to facts *for* historical research that might be able to close the gaps in the history of evolution. Historical hypotheses are confirmed if it is possible to discover facts that can close the gap, the "missing link" in the reconstruction of a past development in the history of nature.

There is finally the task of the *historical causal explanation* of the more or less significant reconstructed changes in the structures of organisms as concrete wholes in the development of the history of organic life. Causal explanations require in turn the application of more or less strict causal laws that are already established and recognized. The basic paradigm of a "theory" for such explanations was at Darwin's time the "survival of the fittest" as a principle of natural selection together with the somewhat cryptic assumption that the final purpose of "nature" was to create something like that. The problem of this explanation is that "fittest" is not a precisely defined term and admits several interpretations. Setting aside the obviously absurd interpretation of "the fittest" as the "strongest," especially in the Fascist version of Social Darwinism, "fit" means to fit into the conditions of the natural environment that is essential for the survival and procreation of organisms.

This explication of the meaning of "fittest" as a principle of natural selection still has shortcomings. The first is that the explanation cannot be immediately derived from a well-defined causal law that has been tested in experiments. Since it refers to the relation of the organism to its environment, it is a mass term for a whole set of

possible causal relations. In addition, the explanation is circular. The "fittest" is the one who survives, and vice versa. What is left as a background for an explication of the meaning of "fittest" is the everyday experience in the lifeworld that clever people know how to adapt to circumstances and survive better that those who stick to their old habits. Precisely this is the reason for the plausibility of the transition from Darwinism as a theory of the life sciences to Social Darwinism.

The second and really serious shortcoming is that the principle of natural selection is able to give dubious types of explanation for why certain forms of living organisms perished in a changing environment and others survived, but it is not able to explain why organic life is able to develop an increasing variety with an increasing degree of complexity in the structure of organisms. In other words, the principle of natural selection is not able to discover the moving force behind the development of new forms of living organisms out of others.

Seen from the viewpoint of a phenomenological epistemology, Darwin's discovery, as already mentioned, is neither a theory nor a hypothesis. It is rather the discovery that there is a *natural history* of the development of living organisms beginning with microorganisms and ending with organisms, concrete wholes of an incredible degree of structural complexity. Hypotheses in this context are historical hypotheses that can be confirmed or disconfirmed with the discovery of additional facts for the historian. Darwin's "theory" is, furthermore, a history that is not able to provide satisfying historical explanations for the historical changes that took place in the course of the history of the evolution of organic species.

In the meantime the theory the genes and the genetic code has provided a way to deliver the experimental evidence for the causal relations that can be applied in the explanations of changes in the history of the evolution of organic species. The causes behind such changes are changes in the genetic code, and these changes can be explained by presupposing causal relations that have been confirmed in the hard sciences. Thus, e.g., radiation is able to cause mutations in the genetic code. It is an open question whether and how the genetic code can also be modified by properties and abilities that have been acquired by individuals in their struggles with a changing environment and natural selection.

The question whether or not the life sciences have to presuppose a creative force behind the generation and corruption of organisms has been left open in the analyses of the material ontological region of the life sciences and of the epistemological structure of the methodology of the life sciences in (3.a). It has been left open because it could be expected that the problem of the genesis of organic life forms in a history of the evolution of the species of organisms in (3.b) would imply further essential aspects of this question.

The first new aspect that surfaced in (3.b) was the problem of the creative force behind the evolution of the species of organisms in the history of evolution. The second aspect is the problem of the creative force behind the development, the natural "history," of the genesis of primitive microorganisms out of inorganic matter beyond the history of the evolution of the species in the life sciences in a general history of nature in general and its significance for the natural sciences in general. More about that will be said in the next section.

A reminder has to be added. It is possible though by no means necessary to assume some intelligent design behind this development, but this assumption is not possible as a scientific thesis. Such an assumption is *metaphysical* because it presupposes an entity that additionally determines a formal cause interpreted as a final cause that cannot be given within the limits of the empirical basis of the sciences. The reminder implies, however, that it is dangerous if seemingly innocent metaphors that entail tacit references to final causality are used in the life sciences. What is possible is the assumption that nature has the potential power to develop organic life, given inorganic matter as a material ontological foundation along with favorable circumstances, i.e., the power to develop entities with categorical forms that are not reducible to inorganic matter. In other words, nature has creative power, but this power is "blind." What "blind" means in this case is that nature understood as the intentional correlate of the cognitive attitude of the natural sciences excludes purposes and conscious intentions; in short, nature is "blind" because final causes are already excluded under the first abstraction that is constitutive for the cognitive attitude of the natural sciences.

Part IV
The Natural Sciences, the Historical Human Sciences, and the Systematic Human Sciences

Chapter 9
History and the Natural Sciences

9.1 The History of Nature and History as a Human Science

According to Neo-Kantian epistemology, ideographic description and understanding is the medium of the human sciences in general, and especially of the historical human sciences; in contrast the natural sciences are nomothetic, interested in the discovery of universal causal laws and in the causal explanation of what happens and has happened. Regarding the special case of history, this strict dichotomy between the human and the natural sciences causes some problems. The first problem is that it seems to be a flat misnomer and even absurd to talk about a "history of nature." The second problem is that this approach is not able to give an epistemological justification for the significance of causal explanations, including the application of causal laws borrowed from the natural sciences for historical research. A third problem is that the dichotomy is not able to give a satisfactory account of the interplay of methods taken from history as a human science and from the history of nature in pre-historic research. Similar problems surface in the epistemological analysis of the differences and affinities of the methods and the empirical basis of the systematic human sciences on the one hand and the natural sciences on the other, especially the life sciences. They will be considered below Sects. 10.1 and 10.2.[1]

Fixed life expressions given in the present are the facts for research in history as a human science. Fixed life expressions are tools and artifacts in the broadest sense on the level of lower understanding, while monuments including art works and texts are fixed life expressions on the level of higher understanding. Historical research as a reconstruction of a past reality presupposes progress in the interpretation of fixed

[1]The theses of this section will be not only incompatible with the Neo-Kantian but also with the Diltheyan strict methodological and epistemological separation of the natural and the human and here especially with the historical human sciences. What will be said is, however, compatible with Husserl's reflections on the historicity of the primordial pre-givenness of the world. Cf. Hua XXXIX, text 7, 540.

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life expressions, but the interpretation of the life expressions also presupposes *vice versa* the progress of the reconstruction of the past real lifeworld of the authors of the fixed life expressions.

The reconstructions of historical developments presuppose a common temporal framework. This framework is calendar time determined by the movements of celestial bodies in a Galilean framework. This temporal framework is the presupposition of the possible causal explanation of historical facts and events in the past in general.[2] Three "periods" can be distinguished in the history of nature: the history of the universe, including the history of the formation of our solar system; the geological history of our planet Earth; and the history of the evolution of organic life on our planet. The history of the universe is the history of inorganic matter. It is meaningless to apply the Galilean framework of calendar time in this part of the history of nature. In this period of natural history the methodological order of the reconstructions of the past and causal explanations of the past is reversed.

The Kant-Laplace theory of the origin and development of our solar system is already a theoretical reconstruction presupposing the theoretical framework of classical physics. It is, as such, a historical hypothesis that has to be confirmed by subsequently discovered indirect evidence given in astronomical alongside with astrophysical observations and possible confirmation in experimental research. The theories of post-classical physics presupposed in a "history" of the universe "starting" with the "big bang" indicate a much more complex framework. It is questionable in what sense the emergence of the atoms of the elements can be called a "history" that "happened" in Minkowski's world points of the space-time continuum of relativity theory.

The situation is different for the natural geological history of our planet and the history of the evolution of organic life as a part of the history of our planet. The Galilean framework can be used for determining temporal sequences and periods of geological history and the history of organic life. The historical past is given for historical research in the present, first in traces of past geological events and then in the traces of organic life, i.e., fossils. The reconstruction of the geological past of inorganic matter presupposes a description of minerals, ores, different types of rocks and sediments, etc., but the reconstruction immediately implies causal explanations based on causal laws that have been confirmed in the natural sciences.

The history of organic life on our planet is the reconstruction of the history of the evolution of organic life, of the generation and corruption of different types of organisms. The presupposition for the reconstruction is the understanding of fossils as traces of past organic life and its past environments. This understanding is a *first-order understanding* and *not* the *second-order understanding*, an interpretation of the life expressions of Others in the present and in the past indicating their first-order understanding of states of affairs, in the broadest sense, in their time. The first-order

[2]The difference between historical narrations and myths is that the reports in historical narrations refer to a certain time in the temporal sequence of a historical time that is filled with other determinable events. This assumption is irrelevant for myths and mythological thinking.

understanding of traces presupposes the first-order understanding of organic life, i.e., all that is presently known about organic life forms in the life sciences. These distinctions require further explications.

The organic life forms of the past are given in the present for research interested in the history of nature because they left presently given traces of their existence: the fossils. Presupposed for the understanding of the traces in paleontological research are (1) the classification of the presently given different types of organic life forms, their similarities and their affinities; (2) descriptions of presently given organisms and their anatomy; (3) the understanding of the functions of the parts, the organs of the organisms, for other organs of the organisms and for the organism as a whole, i.e., the understanding of the functions as a complex web of reciprocal causal conditions; and (4) the understanding of the reciprocal causal relations between the living organisms and their environments.

Traces are understood as traces of organisms living in the past if it is possible to reconstruct, given general knowledge of (1)–(4), to reconstruct the past organisms and their environment. The general context for possible determinations of the time in which the organisms existed is the Galilean framework of measuring time sequences of the natural history of the planet. Geology provides the empirical material and the causal explanations that are required for the reconstruction of the development of the sequence of periods in this history. At the time of Darwin geological periods were and still are the first indicator of the age of the traces, the fossils of organisms, of their emergence and their extinction, and they still play this role. Meanwhile modern physics and chemistry have provided other and more sophisticated means for measuring the age of geological periods and the traces of organic life in such periods.

The reconstruction of the development and the periods in the natural history of organic life has, hence, a complex methodological structure. The life sciences provide the knowledge about the general inner anatomical and physiological structures of organic life forms, as well as classifications of organisms indicating a system of kinships and different degrees of complexity. This knowledge has to be applied to the reconstruction of the forms of organic life that left the presently given traces of their existence. Geology, and with it, causal explanations taken from the hard sciences provide the means for the reconstruction of the age of the traces and the historical development of the different life forms. Geological knowledge applied in the reconstruction of the history of the planet is in addition essential for the reconstruction of the environment of the past lifeworld and the environmental conditions of the emergence, flourishing, decay, and final extinction of the life forms.

The methodologies of history as a human science and of natural history are different, but they nevertheless share partial aspects of their structures. (1) They share as their main task the reconstruction of what was the case in the past, the historical facts, with the aid of presently available material, the facts for historical research. (2) This reconstruction presupposes a temporal framework, time given in a Galilean framework. History as a human science and the natural history of the evolution of organic life forms share the general Galilean framework for the determination of the temporal phases of events, states of affairs, and developments

in the historical past. (3) The reconstructions of events and developments in the past that happened in geological history and the history of organic life require causal explanations that have to be justified in the experimental research of the natural sciences. History as a human science must at least admit such explanations in its reconstructions of the development of past real lifeworlds.

There are, beyond these shared methodological structures, significant differences. Both the empirical basis of what is given in the present and can serve as the material of the reconstruction of the past on the one hand and the methods of the reconstruction on the other are different. The differences are, hence, differences both of types of traces and of the intentional acts of understanding the traces. Traces of the history of nature are (1) geological traces and (2) fossils. The traces of history as a human science are (3) fixed life expressions. The understanding of (1) and (2) is, as mentioned, first-order understanding. The understanding of (3) is second-order understanding, i.e., interpretations of the meaning of the fixed life expressions of the author, i.e., her/his first-order understanding.

It is necessary for an analysis of the relation of the methodologies of the history of nature and history as a human science to say more about (2). The facts for the natural history of the evolution of organic life are *traces*, i.e., the fossils as traces of more or less complete material imprints of parts of organisms in inorganic matter and traces of the activities of organisms, e.g., footprints. The understanding of the traces as indicators of specific kinds of organisms is the task of paleontology. Paleontology presupposes the reconstruction of the organisms, and in the beginning this reconstruction presupposes in turn the descriptive knowledge and classification of presently existing life forms and of the internal anatomical and physiological structures of such life forms. This knowledge implies the knowledge of the functions of parts of the organisms for other parts and for the organisms as independent wholes. Knowledge of the functions implies an explication of the partially reciprocal causal relations that determine the functions. The laws guiding these causal relations have to be confirmed according to the methodological rules of experimental research in the life sciences. It has also been shown above that the methods used to determine the age and the temporal periods in which certain organic life forms existed presuppose causal explanations applying causal laws that have been confirmed in the hard sciences.

The understanding of traces, and in general the understanding of organisms in the life sciences, is a first-order understanding. The understanding of life expressions in general is second-order understanding, i.e., the interpretation of the meaning of what is or was understood in immediate or fixed life expressions. The materials offered by the empirical basis, i.e., the facts for the philological-historical human sciences, are fixed life expressions. The sign *matter* of fixed life expressions are *traces* of a past human activity but to recognize such *traces* as a *sign matter* requires the possibility of giving an *interpretation* of the meaning of the *signs*. Fixed life expressions including texts and monuments of art and architecture indicating the contents of higher understanding, but also tools and artifacts as indicators of elementary understanding, need the interpretation of what is meant in them, the foreign first-order understanding that is encoded in them.

To reconstruct this first-order understanding is the task of philological and archaeological interpretation. Philological interpretations (and to a lesser degree, the archaeological interpretation of tools, artifacts, and monuments supported by philological interpretations) are able to reconstruct a quasi-temporal order of texts and monuments. This quasi-temporal order is not sufficient by itself for the historical reconstruction of a past reality. Beyond the interpretation of fixed life expressions, history also requires the reconstruction of a past temporal development of a past real lifeworld, including the events of the creation of the fixed life expressions by their authors. This reconstruction presupposes calendar time in a Galilean framework. This framework also includes, however, a past beyond the past that can be reconstructed with the aid of philological-historical interpretations of fixed life expressions, i.e., the past reality of natural history.

The presupposition of a Galilean framework for historical reconstructions of past developments has significant consequences for the methodology of history as a science. Fixed life expressions presuppose a sign matter and the sign matter by itself is a trace. This means, however, that its age and place can be determined with methods that are also used to determine the place and the age of traces in natural history. What is required for such determinations are analyses of the material structure of the sign matter with the aid of confirmed hypotheses of the natural sciences. Paleography is able to use such methods for determining the age and the place of the origin of the sign matter of texts. The same methods can be used for the determination of the age and the place of the origin of the material that has been used for works of art, architecture, tools, and other artifacts. This research work is, of course, not of immediate significance for the interpretation of fixed life expressions. It is, however, a legitimate part of the methodology of historical research because the determination of the age and the place of origin in the past of calendar time in the Galilean framework is a necessary presupposition for further historical research. The determination of the time and the place of the origin of fixed life expressions can then in turn be of significance for philological-historical interpretations of these life expressions.

Even on the level of elementary understanding, the recognition of causal relations and their application in explanations of what has happened already presupposes the distinction between the past and future horizon of events in the present and of events in a past present.[3] The first task of history is the reconstruction of events and changes in a past temporal sequence, but history is also interested in causal explanations of what has happened in the past. Such causal explanations can be genuine causal historical explanations if the causal laws are determined by the system of norms and habits governing social life in a past reality. They are genuine historical explanations because the knowledge of these laws presupposes the interpretation of the fixed life expressions that have been created in the past reality.[4]

[3] Cf. Sect. 3.5.

[4] Cf. Sect. 6.2.

Pre-scientific historical narratives have always applied both recognized causal relations determining events in the natural environment and trivial secondary understanding of the motives of actors in a pre-scientific lifeworld.[5] The application of such causal explanations is suspicious because both are determined by the context of higher understanding belonging to the time of the historians who have written such historical narratives. The causes of (a) relevant events in the natural environment reported, e.g., in historical narratives written in pre-scientific contexts of higher understanding, are the will and power of spirits, demons, the gods, or God, and the effects are understood as punishments or rewards or miracles. Such explanations are of interest for the historical reconstruction of the authors who have written such histories, but not for the time in which the events happened. So-called everyday psychology and understanding of motives of other persons is also determined by the context of higher understanding of the historian, and it is always a question for further scientific historical research whether the application of such explanations has to be rejected as an anachronism.

History as a science in a lifeworld with sciences is able to replace the trivial "psychological" explanations just mentioned with explanations taken from psychology as a social human science. The problems of this application will be considered in Sect. 10.1. History as a science in a lifeworld with sciences is also able to apply explanations presupposing causal relations that have been discovered and confirmed in the natural sciences. Causal explanations borrowed from the natural sciences are necessary for the explanation of changes in the natural environment of a past cultural lifeworld including changes that have been caused by human activities. The methodological structure of such explanations presupposes their confirmation in experimental research and has, hence, precisely the methodological structure of causal explanations in the history of nature. Such explanations can be applied in history as a science for the explanations of events in the natural environment (including the human body) that in turn caused changes in the development of a society. They can also be applied in explanations of systems of techniques and technologies used in coping with the natural environment in a past real lifeworld.

For a phenomenological epistemology, the justification for borrowing such explanations from the natural sciences is in the last instance the generative foundation of the natural sciences in elementary understanding. The ontological region of the empirical basis of history as a science is the structure of lifeworlds in general, and elementary understanding of practical life is an essential part of the ontological region of a lifeworld in general. History as a human science is a science of interpretation. Interpretations in the historical human sciences presuppose a methodological abstraction. This abstraction is implied in the first canon of hermeneutics and its application in historical research. In contrast, the first abstraction of the natural sciences abstracts from all human activities and their goals and values and, hence, also abstracts from all interpretations in secondary

[5] Cf. Sect. 6.4.

understanding of this dimension of a concrete lifeworld in general. What is left is the interest in causal relations within the natural environment in itself, i.e., nature in itself, and the structures of experimental research.

History as a science and philological-historical interpretation are interested in the authors of fixed life expressions in a foreign past lifeworld and its natural environment. Thus they are also interested in the events in the natural environment of past foreign lifeworlds and in possible explanations of these events taken from the natural sciences. Such explanations are historical because they have the methodological structure of explanations in natural history. Thus here the justification additionally presupposes that a reconstruction of past real lifeworlds in history as a human science cannot be completely separated from the history of nature. History as a science is, seen from this point of view, a mediator between the cognitive attitude of the scientific research presupposing interpretations and the cognitive attitude of experimental research in the natural sciences. This thesis needs further explication. A first step in this direction can be taken with a brief analysis of the specific situation of historical research in pre-history.

The term "pre-history" can be misleading. Pre-history is not a history of the early periods in the development of humankind in general, and it is also not a history of early periods in the development of different cultural lifeworlds. Pre-historical cultures are cultures without a written tradition. No texts are available for historical research and the reconstruction of the past reality of such cultures. Available are only traces of tools, artifacts, and monuments. The empirical basis of historical research is restricted to archaeological interpretations.[6]

A further distinction is necessary. There are cultures without a written tradition that have been or still are in cultural contact with cultures with a written tradition. Such cultures are pre-historical cultures in the broader sense. More or less objective descriptions of such pre-historical cultures are available in the literature of cultures with a written tradition. Ethnological research as a discipline belonging to the social sciences was and is able to produce reliable descriptions and reports about such archaic cultures, but this window has almost completely closed in the last century.

Pre-history in the narrower sense is the history of cultures that lack a literary tradition and leave no traces in texts of cultures that have a literary tradition. The distinction between pre-historical cultures in the broader and in the narrower sense is not of significance for the cultural structure of pre-historical societies without a literary tradition. The distinction is only of significance for the structure of the available empirical basis and the methods of historical research. Only the fixed life expressions that are of interest for archaeology (monuments, tools, and artifacts) are available in these cases. It has been shown in Part II, Sect. 5.3; that archaeological interpretations of the higher understanding indicated in monuments is limited if no texts are available. What can be interpreted are implicit references to structures of elementary understanding in monuments, e.g., indicators of techniques

[6]Cf. for what follows Sects. 3.4 and 5.1 above on pre-history and Seebohm 2004, §§16, 18.

to determine the periods of the seasons with the aid of celestial phenomena that can be reconstructed with the presently available astronomical scientific knowledge.

The methods that are available for the interpretation of tools must use pre-scientific and scientific knowledge of the human body, of the material used for manufacturing tools and artifacts, and of the natural environment of the pre-historical culture for and in which the tools and artifacts have been used. Beyond that, interpretation is restricted to comparative methods and the classification of equal features found in the fixed life expressions of different pre-historical lifeworlds, but also in ethnological information about cultures without literary traditions.

The first task of history and pre-history is to determine the temporal distance of a reconstructed lifeworld and of the fixed life expressions that must be interpreted before they can be used for the purposes of the reconstruction. As mentioned above, the determination of the age of fixed life expressions presupposes in general a calendar time in a Galilean framework and is, in addition, able to use methods "borrowed" from the natural sciences. The only hints given in fixed life expressions for determining the temporal distance between a pre-historical past and present historical research are artifacts and monuments that can be interpreted as representations or instruments for measuring temporal distances with the aid of the movement and the constellation of celestial bodies.

However, the unearthing of the fixed life expressions is also accompanied by the unearthing of traces of the human and even humanoid organisms of the authors of the fixed life expressions. Archaeology together with and also paleontology as a discipline of the life sciences are both presupposed for the reconstruction of pre-historical cultural lifeworlds. Like the history of nature in general the methods of paleontology presuppose causal relations that have been confirmed in experimental research. Pre-historical research in the early phases of historical developments is, hence, in a grey zone between history as a human science presupposing interpretations of fixed life expressions and natural history presupposing applications of confirmed causal relations. The significance of causal explanations belonging to natural history increases with the age of the pre-historical culture. The question whether or not individuals belonging to a certain species of humanoid primates or of the *homo habilis* or of the *homo erectus* are already humans is irrelevant for epistemology. What is relevant is the decrease of the possibility of applying archaeological interpretations and the increase of causal explanations belonging to natural history in the reconstruction of past pre-historical lifeworlds.

The analysis of the determination of the age of fixed life expressions using methods that are "borrowed" from the natural sciences indicates that historical research presupposes in general and not only in pre-history the application as of causal laws and, therefore ultimately of experimental research. Historical causal explanations of events in the natural environment of past cultural lifeworlds also presuppose in general the application of such causal connections. This is the case for explanations of inventions of the new technologies, e.g., windmills that have been of significance for the development of cultures with a written tradition as well. Of significance for historical causal explanations are, furthermore, traces of human

bodies of individuals and of social groups indicating, e.g., diseases or malnutrition analyzed with the aid of material taken from the life sciences. The material for the history of the lower (and usually illiterate) social classes of the society, a history that is of basic significance for the historical development of a cultural lifeworld as a whole, is usually also neglected in the literature of the educated classes. Thus in such cases historical explanations presuppose precisely the methods of pre-historical research.

The thesis that the methodology of historical research, historics, presupposes and implies not only the methodology of the interpretation of fixed life expressions, but also the methods of natural history, and with them the application of causal connections that can be confirmed in the natural sciences, has two consequences. The first is that a strict separation of explanation and understanding or of ideographic descriptions and nomothetic theories does not hold water. History as a science is interested in explanations, and there are explanations that presuppose, like natural history, the application of natural laws offered by the natural sciences. What is worse, the determination of the place of events (including the creation of fixed life expressions in the temporal sequence of the historical development in the past) requires once again the application of precisely the methods of such determinations in natural history and their justification with the aid of experimental research in the natural sciences.

The second consequence is a paradox. It can be said that there is a priority of history, and that the historical spiritual world[7] has priority over the world as it is given in and for the natural sciences. It has this priority because epistemological reflections presuppose reflections on what scientists do and have done. In short, it presupposes the history of science. We ultimately know what natural science is from the history of science. Conversely, however, we know what really happened in historical time and why it happened only in a context that stretches into natural history beyond the scope of human history, and the methodology of natural history presupposes the experimental research of the natural sciences telling us how things really are and not how they appear to us in this or that period of historical time.[8]

9.2 Technology in a Cultural Lifeworld with Sciences and Instrumentalism

Quite apart from all differences in the evaluation of this situation, it is generally recognized that the correlation between the natural sciences and technology as a structural subsystem in the structure of a social lifeworld with natural sciences is of essential significance for this lifeworld. It is also of significance for the special status

[7] CF. Hua IV, section III, ch. 3 and elsewhere.

[8] What lurks in the background is the paradox of subjectivity, cf. Chap. 10 below, esp. Sects. 10.2 and 10.3.

of the natural sciences in the system of the sciences in a lifeworld with sciences. The generative foundation of this socio-cultural situation is immediately implied in the generative foundation of the natural sciences in elementary understanding. It has been mentioned several times in Part III[9] that the natural sciences use instruments. They design instruments for their own theoretical purposes and are in addition able to design instruments for practical purposes; this is the reason why the natural sciences themselves can be understood as instruments, as technology.

This understanding of science under the perspective of utilitarian pragmatism and instrumentalism has its ultimate justification in the foundation of the natural sciences in elementary understanding. Elementary understanding is first of all an understanding of instruments, tools, and systems of tools, as well as of the techniques of the application of tools. A first step for a critical evaluation of this justification presupposes a summary of the main arguments for the thesis that the natural sciences are able to replace the idle speculations of the philosophical ontologies found in the tradition.

According to the analyses of Part III the necessary conditions for the emergence of science are as follows:

1. A developed pre-scientific philosophical ontology of nature either as an independent theory or in connection with onto-theological theories;
2. Mathematical theories; and
3. Sufficiently developed knowledge of the ways to cause desired changes in the natural environment, including the application of basic arithmetical and geometrical techniques on the level of elementary understanding.

The attitude of the natural sciences toward its foundation in (1) is ambiguous. The cognitive attitude of the natural sciences implies the rejection of the pre-scientific philosophical theory of nature as false. This rejection also implies, however, that science claims to be a theoretical discipline like philosophical ontology and presupposes, hence, a distinction between the theoretical and the practical attitude that is *prima facie* similar to the distinction between the theoretical attitude of a philosophical ontology and the practical attitude of elementary understanding. The natural sciences also apply a selection of modifications of philosophical ontological categories: time, space, mass, movement, acceleration, and force, and with them the category of efficient causality defined in terms of the other categories. The principle of the modifications is that these categories must be explicable in "mathematical letters."

Three arguments have been used in epistemological and ontological philosophical reflections after the emergence of the natural sciences in order to support the claim of the natural sciences to offer the "true philosophy of nature." The first argument is that the application of mathematical deductions in the true ontology of nature – and even in onto-theological metaphysical philosophical reflections *more geometrico* – is able to replace the endless disputes about the conceptual categorial

[9]Cf. the remarks about technology in Sects. 8.1 and 8.3.

distinctions and opposed theses in pre-scientific philosophy. The second argument is that the methodology of the new scientific ontology is based on sensory intuition as the source of the experience of reality and is, therefore, able to decide the disputes between competing hypotheses with the aid of experiments and observations. Natural science is, hence, able to promise progress in the ability of the sciences to predict future events in nature and to give theoretically consistent explanations of past events.

The third argument is that science is useful, i.e., science is able to produce as a side effect *scientific technologies* that can be applied in practical life serving the needs and desires of individuals, groups, and the social community as a whole. The ability of the sciences to cope with the brute realties of the natural environment was and is the most convincing argument for the acceptance of the natural sciences in the economic, political, and last but not least military contexts of elementary understanding in a cultural lifeworld with natural sciences.

The first two arguments defend the theoretical supremacy of the natural sciences over philosophical theories of nature as meta-genres of higher understanding, but there have also been epistemological difficulties. There was first the dispute between empiricism and rationalism. Empiricists had difficulties giving satisfying explanations of the application of mathematics in the natural sciences, while rationalists usually had to rely on metaphysical idealistic assumptions.

The analysis of the methodology of experimental research and the application of mathematical theories has solved some of the old problems, but it also created new problems. Given the state of the art, the mathematical formalisms of relativity theory and quantum mechanics are different. No universal mathematical formalism is in sight from which the two partial formalisms can be deduced. It is, furthermore impossible to decide with the aid of experiments which of the competing ontological interpretations of quantum theory represents the "true" ontology of the wave/particles given as observable phenomena in experiments.[10] What is left is that the mathematical formalisms of the theories "work," i.e., experimental tests of predictions based on hypotheses confirming or falsifying hypotheses are possible.

A phenomenological analysis of (3) and the third argument is able to shed some light on the difficulties of (1) and (2) and the first and the second argument. The difficulty is the difference between the meaning of "theory" in ontological but also in mathematical theories and the meaning of "theory" in the natural sciences. The analysis has to begin with an extension and a final corroboration of what has been said in Part III about the two abstractions that are constitutive for the cognitive attitude of the natural sciences.[11]

[10]Cf. above, Part III, Sect. 8.3. The difficulties of ontological interpretations of quantum mechanics highlight the significance of instruments for the methodology of the natural sciences. No objective and intersubjectively acceptable knowledge is possible if it cannot be proven that the instrument warrants the objective validity of the information that can be gained with the instrument.

[11]Cf. Sects. 8.1 and 8.2.

The source of the natural sciences' immediate contact with reality is, even for analytic epistemological reflections, not individual but intersubjective sense experience, in short, intersensory experience. Observations and descriptions of relevant phenomena given in experiments and experimental situations must be intersubjectively accessible. This requirement implies that experiments (and even opportunities for favorable experimental situations) ought to be repeatable. A tacit presupposition of these requirements is that the preparation of experiments requires active manipulations determining a set of factors and adding a factor to the set of defined factors, the initial conditions. Such interactions include the application of *instruments* used not only for the preparation of experimental situations, but also for purposes of the observation of phenomena given in experiments and experimental situations. Scientific research presupposes, hence, not only *intersensory* experience, but also repeatable *interactions using instruments*. Scientific research has, therefore, its ultimate foundation on the level of the elementary understanding of practical actions and interactions and tools. It shares essential structures with the search for and the application of means that can be applied in elementary understanding for the realization of certain purposes guiding the actions and interactions of practical life.

The interest in realizing one's own purposes, i.e., the fulfillment of needs and desires in coping with the brute realities of the natural environment, determines the cognitive attitude of elementary understanding.[12] This interest is manifest as the motive, the desire to realize a specific artifact in the broadest sense.[13] Moreover, for its purposes elementary understanding is (1) interested in the pre-given material in the natural environment and the means that can be applied to produce the desired artifact using the pre-given material. Elementary understanding provides, hence, the knowledge of the materials and the means that are able to support goal-directed practical social activities. Such means are bodily actions and interactions in connection with such actions, often with the use of tools.

Elementary understanding includes, furthermore, (2) the experience and understanding of regular sequences of events, of causal relations in the natural environment that determine the favorable or unfavorable circumstances for the actions and interactions of practical life. Such sequences are given in (2.a) the experience of regular sequences in repeated circles, first of all the movements of celestial bodies and the seasons; (2.b) the experience that an occurrence of events of the type x is usually followed by events of type y, and (2.c) the experience of the sequence of the emergence, genesis, decay, and corruption of forms of organic life including the living bodies of consociates and one's own body. It is known in elementary understanding that all actions and interactions of practical life presuppose and are dependent on the context of the regularities of the natural environment. This

[12] Cf. Sect. 3.2.

[13] For instance, the interest in the breeding of cattle.

knowledge is, however, only of interest as the "handmaiden" of the interests of the motives, desires, and needs of practical life together with the representation of desired objects.

Elementary understanding is not interested in theoretical knowledge of nature for its own sake. It is also not interested in theoretical knowledge about the significance of practical actions and interactions in the context of the society in and for a cultural lifeworld. Theoretical understanding of the norms for practical actions and interactions in a cultural lifeworld and their justification, or even the notion of nature as an independent whole behind the immediately given natural environment of a cultural lifeworld, is higher understanding. Meta-genres of higher understanding are religion, myths, poetry, theoretical philosophical reflections in ethics and politics, and philosophical ontology. The ontology of nature is only a part of general philosophical ontology.

The theories of the natural sciences have been understood from the beginning as offering the true philosophy, the true ontology of nature that has to replace the pre-scientific ontologies of nature. This claim can be misunderstood. What is misunderstood is the difference between the cognitive attitudes of pre-philosophical ontologies and the theoretical attitude of the ontology or later ontologies that can be understood as interpretations of theories of the natural sciences. The difference is a difference between two different meanings of "theory." An analysis of the differences in the two abstractions that separate the theoretical attitude from the practical attitude of elementary understanding in the lifeworld is able to determine the differences.

A philosophical ontology of nature abstracts from the experience of the practical encounter with the natural environment in elementary understanding. The cognitive attitude of elementary understanding implies generalizing and even idealizing abstractions. The cognitive attitude of philosophical ontology has nature and being in general as its intentional objects. The objects of generalizing abstractions are of interest only if they are in addition objects of categorial intuition[14] and explicable in terms of categorial systems. It is this abstraction that separates elementary understanding and the understanding at work in the ontological systems of theoretical philosophy as a meta-genre of higher understanding.[15]

The cognitive attitude of pre-scientific theoretical philosophical ontologies presupposes, hence, an abstraction that not only excludes the practical activities in social encounters that are of interest for practical philosophy; it also excludes all

[14]Terms like "concept," "categorial intuition," "category," "material essences," "formal essences" have to be understood in this investigation in the sense and only in the sense determined in Part I, Sect. 2.3.

[15]Practical philosophy is a theoretical reflection on practical social life in its own right and as a normative system for actions and attitudes that are of significance for social relations, it is implied in elementary understanding. However, it is not relevant for the elementary understanding of the natural environment and the elementary understanding of actions and interactions in the encounter and the struggle of practical life with the pre-given natural environment, and is therefore not in the residuum of the first abstraction that is constitutive for the natural sciences in general.

practical activities in the encounters of practical life with the natural environment, along with the elementary understanding of the techniques of practical life used in its struggle with the natural environment. This exclusion implies that philosophical ontologies of nature are not applicable for the development of technologies that can be useful for the elementary understanding of the natural environment.

As mentioned, the distinction between the first and the second abstraction is not a historical but a systematic distinction of phenomenological epistemology. Soft sciences presuppose only the first methodological abstraction. Hard sciences presuppose in addition the second abstraction which is an abstractive reduction. The first abstraction excludes the practical interest and values guiding elementary understanding. As mentioned in Part III what is left after the abstraction in the residuum of the natural sciences is (1) first of all the immediate contact with the brute reality of the natural environment in elementary understanding in *intersensory* experience. The experience of elementary understanding is intersubjective because it has its generative foundation in intersensory experience. The structure of the first-order understanding of the objects in the medium of intersensory experience determines and is manifest in the structure of the conceptual generalizing abstractions and the system of categorial structures of the ordinary language of a cultural lifeworld.

Left are (2) partial aspects of the interest of elementary understanding in the discovery of causal relations that can be applied in the techniques of practical life. This search is on the level of elementary understanding, the haphazard game of trial and error guided by "instinct," i.e., associations, and by luck. Seen under the abstraction of the cognitive attitude of a philosophical ontology of nature, such causal relations are first of all efficient causal relations and, where organic beings (animals and plants) are concerned, formal causes. The interest of elementary understanding in formal causes is again guided by the desires and needs of practical life. The search for such causal relations governed by the theoretical cognitive attitude of the natural sciences further inherits from elementary understanding the criteria for the decision whether or not an assumed causal relation or an assumed quality of a certain type of matter is reliable. Such assumptions are reliable if it has been shown that predictions of what will happen in the future have always been confirmed in the past and can be confirmed again in the present.

The partial foundation of the natural sciences in elementary understanding has further implications. Elementary understanding is in immediate contact with, and has to struggle with, the brute reality of the natural environment. The main weapons in this struggle are the means to modify the materials given in the natural environment according to the needs, desires, and purposes of the social community and these means are tools. Tools are themselves artifacts produced with other tools and are parts of a system that includes tools, materials offered by the natural environment, and the desired artifacts produced for consumption. A tool is a tool that deserves its name only if it is a part of such a system in elementary understanding. "Tools" used by animals usually do not fulfill these requirements.

An independent part of the whole system of practical activities in elementary understanding in a pre-scientific lifeworld can be called a technique or an art, in Greek *technē* or Latin *ars*. Tools in the sense defined can also be called *instruments*.

A technique using instruments applied in practical life and given in elementary understanding is recognized as a successful technique only because "it works." The theoretical question why it works is not of interest for elementary understanding. The content of elementary understanding in a pre-scientific cultural lifeworld is knowledge about techniques and about the significance of the techniques for a pre-scientific cultural lifeworld, first of all their significance for economic relations.

The methodology of scientific research inherits from elementary understanding the use of instruments for observations and for designing experiments. The use of instruments is in this case guided by the theoretical interest in the discovery of causal relations and explanations of natural phenomena but the requirement of the methodology of scientific research is in addition the scientific justification for the ability of instruments to provide objectively valid observations. On the level of elementary understanding the use of instruments already implies intersubjective validation, the intersensory evidence that the instrument works. What the scientific explanation adds is the causal explanation of why the instrument works for theoretical and perhaps practical purposes. However, the discovery of such explanatory laws require in turn the intersensory experience of the intersubjective community of researchers, and this community has its foundation in elementary understanding.

Modern natural science has been understood from the very beginning as a new and true philosophy of nature because the theories of the natural sciences are based on mathematical principles. The natural sciences replace the unending disputes between rival philosophical ontologies, e.g., in the Aristotelian, Platonic, or Epicurean traditions, with the method *more geometrico,* i.e., the method of deductive mathematical systems. A scientific theory is scientific only to the degree to which mathematics is applicable in this theory. A perfect scientific theory is a theory that is completely explicable in the language of a mathematical theory, and this mathematical theory was initially analytic geometry and its extensions in the infinitesimal calculus. This self-understanding was predominant in rationalism, the second branch of early post-scientific philosophical epistemological reflections.

The second abstraction implies that the observables in experiments and experimental situations that are accessible under this abstractive reduction must be measurable. This requirement is fulfilled in the residuum of the first methodological reduction only for mechanics. The second abstraction implies, hence, that all theorems of scientific research on the level of the first abstraction must be reduced to explications in terms of mechanics, be it Cartesian, Newtonian, or quantum theoretical mechanics. Relevant in the residuum of the second abstraction are, therefore, only efficient causal relations as forces that are explicable in terms of measured space, time, mass, movement, and acceleration. Qualities of intersensory experience given under the first abstraction must be reduced to explanations in terms of observables that are still accessible under the second abstraction.

Both form *per se* and with it formal causes of organic entities have to be reduced to a more or less closed system of partially reciprocal efficient causal relations. That colors or sounds are effects caused by mathematically explicable efficient causes can be, and has been, confirmed in experimental research and experimental tests is, according to the first abstraction, the justification for the theories of the natural

sciences and their claim to tell us the truth about the real things in themselves. That the application of the category of causality to reductions of this type is not without difficulties has already been mentioned, and it will be re-considered again.

The cognitive attitude under the first abstraction still admits the application of pre-scientific philosophical ontological categories, first of all of the categories of form or gestalt and of formal causality in the observations of the life sciences.[16] They can be admitted because the intersensory empirical basis of this attitude is still identical with the intersensory experience of elementary understanding. This implies that pictorial representations are admitted in explanations of states of affairs in the life sciences. Pictorial representations are admitted under the restrictions of the first reduction. They are not admitted only under the restrictions in the residuum of the second reduction. Theories under the second reduction must be explicable in the language of mathematical theories. Added ontological interpretations are possible but not necessary for the confirmation or rejection of hypotheses in experimental tests. The only ontological categories that are admitted in the residuum are mathematically defined counterparts of the original philosophical ontological categories. Ontological categories are excluded from the residuum of the second reduction if they do not admit explications in mathematical theories. The cognitive attitude under the second reduction implies, hence, a wholesale rejection of the categorial systems of philosophical ontologies based on categorial intuition.

The use of a system of instruments together with the theoretical explanation of why the system's instruments are able to achieve what they are supposed to achieve is more than a technique of elementary understanding. It is a techno*logy*. The progress of the natural sciences is, hence, immediately dependent on the development of scientific technologies for the purposes of the progress of scientific research. Beyond that, natural science is also able to explain why instruments that have been used for the practical purposes of elementary understanding actually work and to offer systems of knowledge about practically applicable efficient causal relations. Natural science is able to develop systems of instrumentation that can be used for the practical purposes.

Elementary understanding is, on the one hand, one of the factors in the generative foundation of the natural sciences, but, on the other hand, after the emergence of the natural sciences elementary understanding is in large parts no longer elementary. It not restricted to the simple understanding of "how to" use techniques. It presupposes techno*logical* understanding of the instrumentation used for practical purposes in the context of a lifeworld with sciences, i.e., one that is no longer restricted to the haphazard search for causal relations. The search can be guided by technology, and technology is in this case an application of the natural sciences for the purposes of practical life. Conversely, in this context natural science is not merely theoretical; it also practical because it is possible to construct systems of practically applicable instrumentation.

[16] Cf. Sect. 8.5.

The theories of both pre-scientific philosophical ontologies of nature and of philosophical ontologies after the emergence of science are contemplative, i.e., pure theories. Their cognitive attitude requires the abstractive exclusion of *all* practical activities. In brackets are also practical activities that are guided by the interest in discovering causal relations and properties of materials that are relevant as causal conditions without having practical purposes in mind. This has consequences.

According to Aristotle the contemplative cognitive attitude of philosophical ontologies of nature on the level of higher understanding is able to know the universal, but it is not able to know the individual and individual events. In contrast, the theories of the natural sciences know the universal, but they are also able to predict individual events and to explain individual events that have happened with the aid of experimental research. They are, hence, in this sense *not only nomothetic*, they are *also ideographic*. Philosophical ontological theories know the universal category of efficient causality, and they know in general that individual events are determined in combinations of specific different efficient causal connections. Theories of the natural sciences "know the universal" because they discover and know universal systems of *specific* efficient causal relations.

Philosophical ontologies of nature are, therefore, neither interested in nor able to develop techniques or technologies with the aid of instruments. Natural science is able to discover technologies and to develop the instruments that are necessary for technologies. The warrant of the objectivity of the discoveries and the knowledge in the natural sciences is experimental research, and experimental research requires the application of instruments and technologies. Natural science is able to produce this type of knowing of the universal because it brackets only those purposes of practical activities (and the values implied in these purposes) that are relevant for elementary understanding. What is not in brackets is the interest of elementary understanding in the discovery of causal relations.

Natural science has its foundation in part in elementary understanding, but also in part in higher understanding. This creates tensions not only in understanding of what natural science really is and what its value for laymen is, but also for the self-understanding of scientists in a cultural lifeworld with sciences. A consequence of this situation is the epistemological dispute between instrumentalists and the defenders of the ontological relevance of the natural sciences as a true "philosophy of nature." Instrumentalism has its roots not only in the difficulties of providing ontological interpretations of scientific theories in the hard sciences, but also in the situation of the natural sciences and their significance for the development of technologies in the context of cultural lifeworlds with sciences. A descriptive account of this situation is of significance for a phenomenological analysis of cultural lifeworlds with sciences in general, but it is also of interest for a critical phenomenological account of the dispute between instrumentalism as an epistemological position and the defenders of the claim that natural science as an ontology *sui generis* is a theory that tells us what nature really is.

Technology is double faced. Technology is a useful collateral benefit provided by the natural sciences for society, but technology is also a necessary implement of the methodology of the natural science. The common root of both aspects is

that elementary understanding is one of the essential factors in the generative foundation for the emergence of the natural sciences, and this foundation is of essential significance for the epistemological status of the *theories* of the natural sciences. This has consequences not only for the evaluation of the significance of natural science in a lifeworld with sciences, but also for the epistemological reflections of the instrumentalists.

Common sense is a cognitive attitude that in its judgments about meta-genres of higher understanding is primarily guided by elementary understanding. The touchstone of the value of meta-genres of higher understanding is whether they are able to cope with the reality of the natural environment and/or to satisfy human needs and desires. This implies that their value depends last but not least on their ability to provide tools, i.e., instruments that can be used to introduce changes in the course of events for such purposes. Natural science as a meta-genre of higher understanding was and is in high esteem for common sense (at least as long as no harmful side effects were in sight) because progress in the natural sciences promises significant extensions of the practical ability to produce the desired effects with the aid of technology.

Seen from this viewpoint, natural science is of crucial significance for the development of the structures of social relations in a lifeworld with sciences: for the economy, the distribution of political power, and the development systems of law. The self-understanding of those who administer economic and political power is on the surface determined by pre-given systems of normative ideas taken from the tradition of religions, customs, and philosophical reflections on customs, ethics, and politics, i.e., by "ideologies" belonging to different meta-genres of higher understanding. In a lifeworld with sciences, however, groups administering economic and political power are, however also well aware that progress in technologies is a dominating factor for the progress of wealth, the distribution of wealth in the economy, and the consequences of such changes for the distribution of political and military power. They are interested in the progress of technology and science for their own purposes.

This interest has consequences for the status of the natural sciences in the context of the social world. The relation between the correlations of science/technology and economy/politics is itself a correlation of a higher order in the social structure of a lifeworld with sciences. The methodology of the sciences presupposes the application of technology, and the progress of the natural sciences presupposes the progress of the technology applied in the instrumental apparatus that is required for experimental research. The degree of economic expense for the introduction of new technologies that must be applied in the instrumental apparatus increases with the degree of sophistication of the instrumental apparatus.

Thus on higher levels of its development, scientific research needs financial support from the society and finally the state. The economic expenses can be justified if it is reasonable to expect advantages for the economic and military power of the state. Neither common sense, nor the economy, nor political leadership

share the theoretical interests of the sciences in the progress of a truly scientific "philosophy of nature" for its own sake without economically and politically useful side effects. Scientists and the organized societies of natural scientists know this and try to prove or pretend that their research will be useful for the well-being of humankind, for common sense, and for the interest in an increase of the internal and external political power of the state. They will be "quiet" about their own satisfaction in discovering theories about the laws of nature as it is in itself.

The pragmatic attitude toward the natural sciences can be called pragmatic instrumentalism and quietism. However, instrumentalism as an epistemological position requires more. According to Galileo and Newton pre-scientific philosophical ontologies have to be replaced by natural science as the true philosophy of nature. The first step of epistemological instrumentalism is that the cognitive attitude of the natural sciences implies a wholesale rejection of the ontology of scientific theories. Only mathematical principles are of interest for the natural sciences and the progress of the natural sciences. The analyses of Part III, Sects. 8.3 and 8.4, have shown that there is no immediate need for added ontological interpretations of the mathematical formalisms applied in the theories of the hard natural sciences. Experimental research is able to prove that the theory "works," and this is enough.

This first step, the elimination of ontological interpretations, is followed by the next step. Mathematics was already understood in the techniques of elementary understanding as a tool, an instrument used for practical purposes, and not as a theory of a realm of ideal objects. Modern mathematical formalisms *can* be understood as operations with symbols. Such free activities creating consistent (and if possible, complete) systems have, however, significance and meaning for empirical sciences only if they can be used for precise definitions of hypotheses that can be confirmed or disconfirmed in experiments. A confirmed hypothesis can be used in predictions and explanations, and the ability to predict and explain is nothing more and nothing less than the ability to be applied in technologies.

The critique of instrumentalism against the claim of Platonism and intuitionism that mathematics is able to achieve objectively valid knowledge of an ontological region beyond the regions of empirically accessible objects must be distinguished from the instrumentalist critique of ontological interpretations of the application of mathematical formalisms in the hard sciences. The answer of a phenomenological epistemology to the instrumentalist interpretation of mathematics has already been given. Furthermore, it has been shown that mathematical theories of classical physics immediately imply an ontological interpretation because the mathematical formalism applied in classical physics refers to mathematical idealizations, and mathematical idealizations admit quasi-pictorial representations.

The situation is different in post-classical physics. Post-classical physics presupposes mathematical formalisms that belong to extended algebra, and such formalisms do not admit of quasi-pictorial representations. Ontological interpretations of the theories of post-classical physics are possible only *per analogiam*. The additional difficulty of quantum mechanics is that at least two competing ontological

interpretations are possible. According to the analyses of phenomenological epistemology, the root of the difficulty is that the theory itself denies the possibility that the instruments that have to be used in experimental research are indeed able to warrant objectively valid descriptions, because the instrument is itself a part of and a causal factor in the observed quantum system. Mathematical formalism as a part of the *mathesis universalis*[17] has to be understood as a meta-physical interpretation on the level not of a material, but of a formal ontology.

[17]Cf. Sect. 8.3.

Chapter 10
History and the Systematic Human Sciences

10.1 Between Interpretation and Observation: General Methodological Problems of the Systematic Human Sciences

The center of the research interest within the systematic human sciences is the *present* system of social structures, first of all in economy, law, and politics, along with the interpretation of the first-order understanding of social interactions and of the self-understanding of the participants in these interactions in different systems of social structure. Social structures in the immediate past horizon of the present social world and at a larger historical distance are of interest for the systematic human sciences only to the extent in which they are of significance for the interpretations and explanations of events and developments in the *present* social world.

Some remarks about terminological questions are necessary before turning to the general epistemological controversies concerning the systematic human sciences. Psychology was a discipline of *theoretical* philosophy before the advent of empirical psychology in the second half of the nineteenth century. Empirical psychology was widely understood as *experimental psychology* and as a branch of the natural sciences in the nineteenth century. Dilthey introduced *understanding psychology* as a branch of the systematic human sciences. For Stumpf and later Husserl psychology was as *phenomenological psychology* a descriptive discipline.[1] The question is whether a phenomenological psychology is able to include both experimental psychology and understanding psychology and to bridge the gap between them or whether it is just another term for understanding psychology.[2] Economics,

[1] Cf. Sect. 4.2.

[2] Cf. Sect. 10.3.

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law, and politics have been philosophical disciplines that belong to pre-scientific *practical* philosophy, i.e., philosophical reflections on purposes, values, and norms for actions. It will turn out in the following sections on the social sciences that this system of first-order higher understanding in pre-scientific philosophy is still compatible with the phenomenological analyses of the division of the disciplines of the systematic human sciences.

Dilthey distinguished between the systematic human sciences and the historical human sciences. Schutz's term for the systematic human sciences is social sciences. Psychology is the basic discipline of both the historical *and* the systematic human sciences in Dilthey's system of the human sciences. For him understanding and descriptive psychology is first of all *individual* psychology. However, for Schutz's "understanding sociology" psychology is first of all relevant as social psychology.[3] Of interest is how the systems of social interactions determine the activities and the first-order understanding of the interactions of the participating individual persons.[4]

Dilthey's term "systematic human sciences" will be used as a general term for psychology *and* the social sciences in the following investigations. It will turn out in the following sections that Dilthey's and Schutz's *prima facie* different positions regarding the status of psychology in and for the social and the human sciences in general are compatible within the framework of the phenomenological analyses of the formal and material ontological structures of the region of the systematic human sciences.

Epistemological reflections on the systematic human sciences have to begin with an analysis of a basic methodological controversy about the epistemological status of the systematic human sciences at the beginning of the last century. The *empirical* systematic human sciences emerged as late bloomers in a cultural lifeworld with sciences. Thus from the outset, the present in which the systematic human sciences are interested is the present of a cultural lifeworld with sciences. Scientific research interested in pre-scientific cultural lifeworlds is restricted to the methodology of empirical historical research, and within certain limits to ethnological research. The immediate epistemological consequence is that the systematic human sciences can be recognized as sciences only to the degree to which they are able to apply the methods of the already established natural sciences *or* the philological-historical sciences. One of the main tasks of the following investigations is to show that this consequence was and is misunderstood if the "or" here is understood as an exclusive "or."

The answer of the positivistic and analytic epistemologies was that systematic human sciences can be recognized as sciences only to the extent to which they are able to apply experimental methods and, if possible, mathematical refinements of these methods. The empirical basis of psychology and sociology are observations of *present* phenomena. Such observations have an open future horizon and admit,

[3] On Schutz's "social psychology" and its relation to the social sciences, see Embree 2003, 2008a.

[4] The significance of social psychology for the social sciences and vice versa will be considered in detail in Sects. 10.3 and 10.4.

therefore, predictions. The possibility of predictions implies the assumption of possible applications of analogues of the methods of the natural sciences, first of all the methods of experimental research, and then the application of mathematical models in predictions and hypotheses that have to be tested in experiments. This answer has serious shortcomings but it is, nevertheless, partially correct.

The answer of the defenders of the independence of the human sciences was that the systematic human sciences are independent because empirical research in these sciences presupposes communications between the researchers and the "objects" of research, other persons belonging to an intersubjective community that includes the researcher. Research in the systematic human sciences presupposes secondary understanding of life expressions of other persons and has to apply a methodology of interpretation, not the methodology of experiments and explanation governing the natural sciences. Psychology is understanding psychology, sociology is understanding sociology, etc. This answer is again partially correct, but also has serious shortcomings.

Considering the first horn of this dilemma it is obvious that a descriptive analysis of basic epistemological structures of the *empirical systematic human sciences* already indicates that observations in these sciences refer to events and states of affairs that are given in the actual present and its future horizon. It is, therefore, plausible to expect that the empirical systematic human sciences are able to use at least analogues of the methods of experimental research that have been developed in the natural sciences. However, this expectation has to cope with some methodological difficulties.

It is essential for the general significance of the controversy that traces of its impact surface even in the background of disputes in the phenomenological literature. According to Felix Kaufmann, differences in the methodologies of the social sciences and the natural sciences are only differences (1) in the *degree* of the precision of predictions and the reliability of empirical methods for the confirmation or disconfirmation of theorems, and (2) in the spatial and temporal realm of the universality of the theorems. Kaufmann rejected the thesis that these and/or other differences can be derived from differences in the ontological structures of the world of the natural sciences and the social world. In the context of Kaufmann's investigations, this rejection has to be understood as a rejection of Dilthey's and Rickert's strict separation of the human sciences as sciences of understanding and the natural sciences as sciences of explanation. The problem that Kaufmann's position is also incompatible with the position of Husserl and Schutz will be considered below.[5]

A brief summary of what Kaufmann had to say about the differences of the degree of precision and the restricted reliability of predictions is necessary because his results will be presupposed in the following sections.

[5] See Kaufmann 1944, 174, 180ff; and Reeder 1991; 42f, 46, on Kaufmann.

(1) Given the degree of complexity of organic wholes and their relations to their environment, even in the life sciences it is already difficult and sometimes almost impossible to determine all or at least most of the initial conditions in experimental situations. The consequence is that most of the causal laws that can be discovered in the life sciences are statistical causal laws. The methodological problems of experimental research in the life sciences are, hence, a fortiori also problems for the systematic human sciences because systems of social interactions and of the first-order understanding of social interactions are structures of second-order wholes of even higher levels of complexity. Their smallest independent parts are individual members of the society, and as such are already organic wholes in the formal sense. The structure of social communities is the structure of a hierarchy of levels of wholes of the second-order beginning with small groups of different types, e.g., families and clans, and ending on the top with structures of different types of states and relations between states. The degree of complexity for experimental situations increases with the degree of complexity of the formal structures of social wholes. The consequence is that the statistical causal laws and predictions in the systematic human sciences will be increasingly weaker with the increase of the complexity of the type of social communities and the relations between different social communities of the same or different type.
(2) The structure of the system of possible causal interdependencies that is relevant for predictions in the hard sciences has not changed in the period of natural history that can be measured within a Galilean framework. But changes, even sudden revolutions caused by external factors in the natural environment, have happened frequently in the evolution of organic life. And the known "evolution" of systems of social interaction in the last 10,000 years is a period of increasingly rapid changes. Even well-confirmed estimates about the relevance of certain factors for causal relations in social interactions in the system of the social structures of a society 500 years ago[6] are not applicable in the present, and those that are applicable in the present may will be misleading in the near future. It is always possible that predictions will be overthrown by the sudden emergence of new factors in systems of social interactions that have not previously been taken into account, e.g., unexpected events in the natural environment, the invention of new technologies, new intercultural contacts, etc.

Turning to the second horn of the dilemma of phenomenological reflections, what has been said in this respect about Rickert and first of all about Dilthey in Sect. 4.2 must be kept in mind. Of significance for the methodical approach of this investigation is first of all that the epistemological reflections on the methodology of the humans sciences in general carried out by Husserl and Schutz, on the one hand, and by Kaufmann, on the other hand, are *prima facie* incompatible. Kaufman denied, as mentioned above, that there are any ontological differences

[6] And at a geographical distance in other continents, e.g., in China.

behind the differences in the methodologies of the natural and the human sciences. Husserl as well as Schutz maintained that there are essential differences in the cognitive attitudes of the natural sciences and the human sciences, including the systematic human sciences. Social relations are social interactions. Human actions and interactions are guided by in-order-to-motives, i.e., in Husserl's terminology, by purposes and values. It is precisely purposes and values, i.e., the lived experiences in which objects on states of affairs are given as desired and valuable as well as the immediate givenness of other persons along with the understanding of their lived experience of other persons, that are all in brackets after the first methodological abstraction.[7]

Kaufmann admits that the methodology of the social sciences presupposes the "schemes of interpretation" of Max Weber and that these schemes imply in-order-to-motives, but he says nothing about the methodological problems of such interpretations. The region of research of the systematic human sciences is for him the *psychophysical* region. This psychophysical region can be understood with a grain of salt as a counterpart of the lifeworld in Husserl and Schutz. The difference between Kaufmann and Husserl/Schutz is that nothing on the abstractive reduction that is required for the step in question (i.e., the step leading from the attitude in which the concrete lifeworld is given to the attitude in which a world is given as the correlate of the natural sciences) can be found in Kaufmann's reflections on the psychophysical region. Given such reflections, some ontological categories that are of essential significance in the lifeworld would be in brackets after the abstractions that are constitutive for the cognitive attitude of the natural sciences.[8]

Except for occasional references to schemes of interpretation and in-order-to-motives, nothing about a methodology of interpretation in the social sciences can be found in Kaufmann. But in spite of the differences just considered between the approaches of Kaufmann and Husserl, nothing about the methodology of interpretations in the historical and the systematic human sciences can be found in Husserl. Schutz offered a detailed methodological analysis of schemes of interpretation, called by him *ideal types* and later *constructs*. His methodological analyses admit an explication and justification of the specific nature of predictions and explanations based on causal relations among the social relations interpreted in the systematic human sciences and will be considered in detail below in Sect. 10.4. Nothing is said, however, about how criteria of objective validity of interpretations based on

[7] On Husserl's theory of the abstractive reductions determining the ontological region of the natural sciences and the concrete lifeworld, see Sect. 8.1 above and Hua IV; §18d and g; Hua VI, §§2, 8–10, 66. On understanding and empathy see e.g., Hua IV 93ff; cf. Seebohm 2013.

[8] Kaufmann admits that the social sciences need Weber's schemes of interpretation, i.e., ideal types, and that they imply understanding of in-order-to-motives, but insists that social facts have to be constructed out of psychophysical facts in the way characterized above, cf. Reeder 1991, 43f., referring to Kaufmann 1944, 177–179. The main point is predictability, and with it degrees of empirical falsification.

pre-scientific secondary understanding and first-order elementary understanding are possible in the systematic human sciences.[9]

According to Husserl's investigations a phenomenological analysis of the understanding of other persons in the lifeworld causes no further epistemological problems because this understanding has the character of an intuitive empathy.[10] This assumption is misleading. The process of mutual understanding in the present lifeworld requires *successful* communication. Communication can be disturbed by not-understanding and misunderstanding. The real problem is, hence, the problem of the pre-scientific methods (and, beyond that, perhaps a scientific methodology) for the elimination of not-understanding and misunderstanding.

It will turn out to be useful to have a look back (1) on the significance of causal explanations in history[11] and (2) on the methodological problems of interpretation and reconstruction in the historical human sciences before the next section embarks on a systematic phenomenological analysis of the epistemological problems mentioned above.

(1) A brief comparison of the relation between the "systematic" experimental natural sciences and the history of nature on the one hand and of the relation between the systematic and the historical human sciences on the other can shed some additional light on the problems of prediction and explanation in the human sciences. The reconstruction of past developments of nature in geological history and the history of the evolution of organisms along with the determination of the past time in which this or that happened and why it happened at this time, presupposes the application of causal explanations. These causal explanations presuppose generalized conditionals referring to causal relations that have been discovered and confirmed in experimental research in a present after the explained past event. The sum total of such confirmed generalized conditionals is methodologically presupposed in the reconstructions of a history of nature.

In contrast, the methodology of history as a human science, i.e., the philological-historical method, by no means presupposes results of research in the systematic human sciences. However, historical research is able to apply confirmed causal conditionals borrowed from the natural sciences for the determination of the past temporal phase and the geographical place of

[9] Schutz is first of all interested in the objective meaning contexts of ideal types. The problem of the secondary understanding and then interpretation of subjective meaning contexts remains in the margins, see Embree 2015, chapter 11 on meaning and there especially the references to PSW (Schutz 1967) 247; CP I, 6, 58; CP IV 206. Schutz mentions in passing the correlation of interpretation and application in jurisprudence Schutz 1967, 138 in the context of a quote from Kelsen, cf. also Sect. 10.6 below. The problem behind the problems of pre-scientific secondary understanding and interpretations of foreign life expressions lurks in the background of disinterested observations, cf. below Sect. 10.2.

[10] On understanding and empathy see, e.g., Hua IV 95ff; cf. Seebohm 2013.

[11] Cf. Sect. 6.3–6.5.

fixed life expressions and their authors, and history is also able to use causal laws borrowed from the natural sciences in causal explanations of historical events. The separation between the cultural horizon of the interpreter of the fixed life expressions of authors in a distant past and these authors' cultural horizon, a separation required by the first canon, does imply on the one hand restrictions on attempts to apply confirmed hypotheses about human social behavior in the present in historical explanations. There are, in the contrary, no theories in the social sciences referring to society as a whole on the level of economics, politics, and law that do not presuppose references to results of historical research. The immediate object of the systematic human sciences is the present social world and the present implies immediately in its past horizon includes not only contemporary history but also history and historical research in general. Theories in the social sciences can be criticized, even refuted, if they presuppose mistakes in the reconstructions of what happened in a past social reality.

(2) A short reminder about what has been said in Part II, Sects. 5.3, 5.4 and 5.5 about the presuppositions of objectively valid *interpretations* in the historical human sciences can be helpful for focusing the special problems of a methodology of interpretations in the systematic human sciences. Fixed life expressions and traces are the empirical bases for the *reconstruction* of what happened. No aspect of what really happened in the past is given in the actual present of intersubjective temporality.[12] What happens in the actual present or in the immediate past horizon of the actual present is given for some members of a society in immediate observation. What has been observed by somebody in the past horizon of the actual present can be reported in the actual present, and there might be traces in the actual present of what has happened in the past horizon of the actual present.

It is possible to investigate what is/was the case without being restricted solely to fixed life expressions and traces. History is able to find causal explanations for what happened but except for genuine historical causal explanations,[13] history is not able to discover causal relations that can be applied in historical explanations. Such discoveries require confirmations in experimental tests that apply the causal relations in predictions. The present of what has happened is a past present. It is meaningless to predict events that have in fact already happened in the past future of a past present as effects of events of their causes given in this past present.[14]

[12]Cf. ch. II, esp. §§7 and 9.

[13]Cf. Sect. 6.4.

[14]It is meaningful to predict, given certain reconstructed events in a past present, that certain other events can be reconstructed in the future horizon of this past present. But this prediction is not the prediction of an event. It predicts that new material can be available that admits the reconstruction of the event.

History is, hence, only able to borrow the confirmed causal relations in its causal explanations from the natural sciences.

Considerations about the epistemological problems of interpretation in the systematic human sciences have been postponed at the end Sect. 6.5, because research in these sciences requires research about contemporary social developments and share, therefore, the epistemological problems of *contemporary history*. Contemporary history presupposes interpretations of fixed life expressions, but also of immediate life expressions in the present and its immediate past horizon. An epistemological analysis of contemporary history must, hence, face a problem that is not relevant for the methodology of the historical reconstructions of a distant past reality. This distance admits the separation of the present horizons of the reconstruction and the past present horizons of the reconstructed historical reality.

In Sect. 5.5 the issue was whether the methodological abstraction implied in the first canon of interpretation can serve as a criterion for the objective validity of interpretations in contemporary history was negative. The answer was, that interpretations of fixed life expressions of authors of a foreign past are reproductive. Interpretations of life expressions as the process of eliminating not-understanding and misunderstanding in communications in the present are productive. In the latter case of the elimination of misunderstanding and not-understanding in communication is an open-ended process in the future horizon of present communication.[15]

It is, hence, impossible for contemporary history as well as for the systematic human sciences to apply the abstractive reduction that is constitutive for the historical human sciences to the epistemological problem of objectively valid interpretations in present communications. The disadvantage of the systematic human sciences is that for them there are no methodological criteria that can serve as warrants of objective validity of interpretations of present life expressions and as warrants for the possibility of interpretations of human scientists as interpretations of "disinterested observers." The advantage is that they have immediate access to the observation of life expressions of consociates in their social and natural environment in the present, its past, *and* its future horizon.

10.2 Interpretation and Prediction

The empirical basis of the systematic human sciences is not a specific region of objects given in the concrete lifeworld that can be determined by an isolating abstraction. Their ontological region includes the structure of the concrete lifeworld as a whole. The disciplines of these social sciences are different because they are interested in different aspects and not in separable regions of the lifeworld. A phenomenological epistemology must, therefore, start with an analysis of possibly different aspects in the formal and then the universal material ontological structure

[15]Cf. Sects. 3.2 and 3.5.

of the lifeworld in general,[16] aspects that are of methodological significance for both the historical *and* the systematic human sciences.

Presupposed for such analyses are the formal ontological distinctions between the system of relations between the independent parts of higher-level wholes of the second order; between the internal systems of relations of the independent parts of this whole; and finally between the independent parts on the lowest level. Wholes on the lowest level are organic wholes, "organic" understood in the formal ontological sense that has been explained in Part I, Sect. 2.2. The two main perspectives for further analyses in this context are, on the one hand, the perspective focusing on the system of relations connecting the parts, and ultimately the parts of the lowest order in wholes of a higher order; on the other hand, there is the perspective that considers how these relations are one-sidedly founded in certain properties of the parts and add vice versa certain properties to the ensemble of properties of the parts, especially to the independent parts of the lowest level.

Relations between the independent parts of a lifeworld as a concrete whole are social interactions and systems of social interaction, which implies on the lowest level interactions between individual persons (and groups of individual persons) with the natural and social environment in their concrete lifeworld. The perspective focusing on these systems of relations is the perspective of the *social* sciences. Social sciences are interested in the structures of systems of social interactions, i.e., social institutions. Of essential significance for the structure of concrete lifeworlds is that these systems of social interactions and their foundations in practical social interactions with the natural environment are given for the individual persons in first-order elementary and higher understanding. The perspective focusing on the *subjective* aspect of first-order and second-order *understanding* of social interactions and the natural environment is the perspective of *psychology*.

What is understood in secondary understanding in general and then in the interpretations of psychology is on the lowest level the lived experience of Others given as animate *bodies*. The object of the second-order understanding of understanding psychology is the first-order understanding of individual persons and groups of their natural environment, including their own bodies and their social environments. Social psychology as a branch of understanding psychology is the interpretation of the first-order understanding of the system of social interactions of the individual persons and groups of individual persons who participate in the social interactions as the intentional *objects* of this first-order understanding.

The social sciences are interested in focusing on the *objective* aspect, i.e., not on the intentional acts, but on the types of intentional objects in this structure. Research interested in a theory of the types of first-order understanding of social interactions and of the natural environment of the participants in interactions presupposes research interested in theories of the structures of these interactions and vice versa. What has been said is the answer that can be given on the level of a formal ontological and then material ontological analysis of the whole-part structures of

[16] What follows is a summary of the main viewpoints that have been considered in Sect. 2.2.

the lifeworld in general to the remarks of Schutz and others about the problem of the relation between social psychology and sociology.[17]

Epistemological investigations interested in descriptions of what scientists really do[18] have to admit that research in the systematic human sciences presupposes as its empirical basis life expressions, i.e., actions and interactions realizing certain purposes and/or verbal communications. Life expressions can be understood or misunderstood or not-understood. The systematic human sciences must, therefore, apply methods for the interpretation of life expressions. However, this material basis is given in *present* observations of life expressions, interactions, and the encounter with the natural environment in elementary understanding, and in the experience of the blind power of the reality of the natural environment in systems of higher understanding, first of all in religions. The present always implies a future horizon, and with it, possible expectations and predictions.

The systematic human sciences are, hence, also interested in predictions. Beyond that they are even able to apply at least analogues of the methods of experimental research because the first-order understanding of actions and social interactions of the participants in interactions already implies a first-order understanding of causal relations on the level of pre-scientific understanding of a concrete lifeworld.[19] Of significance in this respect is that the lived experience of Others as other living bodies is the foundation for all higher levels of second-order understanding and that it is originally given in an associative transfer as the lived experience of other animate *bodies*. Under the first abstraction of the natural sciences animate bodies considered as organisms admit the application of experimental methods in the life sciences.[20]

This will have consequences for the methodology of experimental psychology. Of significance is, furthermore, that the systematic human sciences are sciences of the present, and for the human scientists this present is the present of a lifeworld with sciences though this is not true for their objects in all cases, e.g., in ethnology. The natural environment in such a lifeworld is given as an environment for *technologically* guided practical social interactions, and this implies that it is not given only as a natural environment, but also as the independent nature in its own right as the universal correlate of objects for the natural sciences.[21]

Closer considerations will reveal further epistemological difficulties. What has been said is, however already sufficient for the suspicion that *the classical distinction between the human sciences as sciences of understanding and the natural sciences as sciences of causal explanations and predictions does not hold water* for *present* interpretations of the *present* first-order understanding of *present* social

[17]Cf. Embree 2008a; and Schutz 1967, 248, 199.

[18]This is in contrast to an interest in the normative question, what they ought to do according to epistemological theories a priori; cf. Sect. 7.2!

[19]Cf. Sect. 3.5.

[20]Cf. Sects. 8.5 and 10.3 below.

[21]Cf. Sect. 10.1.

interactions by the participants in interactions. This suspicion has implications for the systematic human sciences in general that need further clarification before considering their weight and significance in the different branches of empirical research in the systematic human sciences.

There is a general agreement that the conceptual constructions used in the methodologies of the social sciences have to be developed out of the structures of social interactions that are given in lived experiences in the lifeworld.[22] In terms of the typology of understanding this means that they have to be developed out of the pre-scientific secondary understanding of the first-order elementary understanding of social interactions by the participants in these interactions. The analysis of the empirical basis of the methodical constructions must, hence, begin with an analysis of the structures of first-order elementary understanding of social interactions in the pre-scientific lifeworld. The epistemological justification for the thesis that interpretations in the systematic human sciences require conceptual constructions or ideal types presupposes an analysis of the empirical basis of such conceptualizations in pre-scientific first-order *and* second-order understanding of social interactions.

The process of mutual understanding in social interactions in the present lifeworld requires successful communication. The misunderstanding and not-understanding of life expressions can be discovered and eliminated in the *future horizon* of the process of communications The elimination of not-understandings and misunderstandings is, hence, a process not of *reproductive* but of *productive* first-order elementary and then of secondary understanding.[23] A brief recapitulation of the basic structures that have been considered in Part I, Sect. 3.5, Part II, Sect. 6.4, and Part III, Sects. 8.1 and 8.5, is necessary for the analysis of the possible discovery and elimination of misunderstanding and not-understanding and of their foundations in expectations about events that can be confirmed or disconfirmed in the future horizon of the temporal structure of first-order and second-order understanding of social interactions.

[22]Schutz and others often use "natural attitude" as the correlative to "lifeworld," but "natural attitude" is used in Husserl as the counterpart to the transcendental-phenomenological attitude (*Einstellung*) presupposing the transcendental phenomenological reduction. Simply to follow Schutz in this respect causes some problems. What does it mean to say that the mathematical entities of higher algebra, including imaginary and complex numbers or functions determining world points in four dimensional spaces with curvatures and their application to phenomena as objective correlates of mathematical methods in the hard sciences given in the natural attitude, are given in the lifeworld? There are according to the results of Sects. 8.2 and 8.4 neither in Husserl's nor in Schutz's nor in Gurwitsch's publications satisfying analyses of the specific epistemological problems of post-classical mathematics and post-classical physics. What can be said is that the intentional objects of higher algebra are given in types of lifeworlds with natural sciences and formalized *mathesis universalis*. However, such objects are not given in pre-scientific lifeworlds and, hence, not in *the* lifeworld in general. An analysis of structures of *the* lifeworld requires analyses of the generation of these structures.

[23]Cf. Sect. 2.4. It is of significance for the following analyses that first-order understanding of interactions implies in addition possible partial or complete agreement and disagreement, and as a consequence the partial or complete disruption of interactions.

Predictions of events presuppose causal connections between events such as explanations of events in the past horizon. The temporal structure of the primordial sphere and then of intersubjective lived experience is already determined on the level of elementary understanding by causal relations in expectation and disappointment. The basic ontological category of the regional ontology that determines what can count as an object for the hard natural sciences in the residuum of the first and the second abstraction is a pre-formation and generative foundation of *efficient causality* in pre-scientific philosophical ontologies. The cognitive attitude of the life sciences presupposes only the first abstractive reduction and can, therefore, admit in addition analogues of the *formal causality* of pre-scientific ontology.

Essential for the systematic but also for the historical human sciences are in-order-to-motives, purposes guiding the direction of actions and interactions toward the realization of their objects, and values as properties of the objects or states of affairs that are pre-given as purposes. Bracketing other implications of the meaning of the ontological term "final cause" in pre-scientific philosophy, the term can be used for substructures of goal-directed social interactions and their objective correlates, which can be understood as one-sided foundations of the dependent parts just mentioned: motive, purpose, and value.

(1) Final causes are given for the participants in the interactions on the level of first-order elementary understanding in practical social interactions and can be communicated in an elementary secondary understanding of the participants that is itself a dependent part of the interaction. Since final causes are understood as the guiding principles of a sequence of present interactions, final causes are also understood as the reason behind the *expectations* of the participants that the interaction will be able to realize the final cause. If such predictions fail, the first reaction of the participants will be the assumption that there have been errors in (2.a) the selection of the actions in the sequence of the interaction realizing the final cause, because it is the final cause that determines this sequence, or (2.b) the trust in the willingness or ability of the participants to act as required in the sequence of actions in the interaction.[24] The actions themselves are already understood as efficient causes on the pre-scientific level of lived experience in the encounter with the natural environment.[25] The justification for such expectations of elementary understanding is that actions that have always been efficient for the realization of a final cause will be efficient once again in future work toward the same or similar final causes.

Two levels of the lowest level of secondary understanding can be distinguished. (1) Already the cooperation of the participants in simple social interactions requires occasionally secondary understanding in communications between the participants of social interactions. (2) The whole context of social interactions is given from the inside for the participants in elementary understanding, but it is also given from the outside for contemporary observers that are not immediately involved in the

[24]For reasons that will become clear in the following sections. (2.a) can be called the economic and (2.b) the civil or political and legal aspect of social interactions.

[25]Cf. Sect. 9.2.

interaction. The phenomenological analysis of (2) is of essential epistemological significance for phenomenological analyses of the methodology of the systematic human sciences.

Contemporary observers are interested in the secondary understanding of "what is going on" in the interaction. They want to understand *what* is understood in the first-order understanding of the participants, but they can also be interested in the subjective *how* of the understanding the lived experience of the participants. The empirical basis for their understanding of the observed sequence of actions is the sequence of life expressions of the participants in the interaction. The process of secondary understanding of contemporary observers is, like secondary understanding in general, always accompanied by possible not-understanding and misunderstanding. In cases of not-understanding it is natural for *pre-scientific* secondary understanding based on observations to ask the participants in the interaction, why they are doing what they are doing. An answer about the "what" will usually indicate information about the "why" and with it the in-order-to-motive (the purpose as the final cause of the interaction), and in addition information about the interactions providing means, i.e., the effective causes for realizing the purpose, (the because-motive).

To refer to the distinction between the subjective meaning of an action and its social context on the one hand and their objective meaning for an observer on the other is misleading. An onlooker can be, and usually is, involved in the context of acts in interactions. The "objectivity" is restricted by concrete practical and social interests.[26] It is not very helpful to add that the onlooker or observer ought to be disinterested in the social actions of the actor. Without further specifications such an onlooker would be either guided by idle curiosity or restricted to an empty stare. Scientific observations are interested. Their interest in the human sciences is precisely the objective validity of the interpretation of the action or life expression. But this explication of the meaning of "disinterested onlooker or observer" is obviously circular.

The questioning of participants in social interactions causes, however, serious difficulties for observers who want to be *disinterested* contemporary observers in every respect. It was and is a generally accepted methodological principle of the systematic human sciences that observations of social interactions and the secondary understanding of social interactions ought not to be involved or interested in the social interactions. The difficulty given with this methodological requirement is that research in the social sciences and in social psychology needs communication between the researcher and the objects of research.

Schutz's postulate of adequacy requires that the terms and the constructs or ideal types used in the social sciences for analyses of social actions ought to be reasonable and understandable for the actors and their contemporaries.[27] An attempt to find

[26]This distinction of Max Weber was rejected by Schutz; cf. Embree 2000a, 84ff. Schutz CP II, 275; cf. 227. On Weber, see also Grünewald 2009, 108 and 135.

[27]See Embree 2015, ch. 10, and there especially the references to CP II, 85 and V, 36.

out whether the construct is understood requires participating in communications via diagnostic questionnaires or in interviews about the "why" and "how" of their interactions, and such ventures are always in danger of ending in a *dialogue* about the further question why it is good, pleasant, reasonable, etc., to realize such purposes and such values in social interactions. The observer who participates in such dialogues has become an interested observer.

The methodological problem for the disinterested observer in the context of the systematic human *sciences* is, hence, first of all to avoid an engaged dialogue with the actors who are the objects of the research. What can be said after the preceding epistemological reflection is that the disinterested observer is only able to save this status if the questioning of participants is restricted to inquisitive and diagnostic questions first about their in-order-to-motives and then about their because-motives, i.e., their applied knowledge about the means for realizing their purposes guiding their in-order-to-motives. This difficulty will be considered below.

Attempts to determine the limits of the secondary understanding of disinterested observers presuppose the analysis of further essential aspects of the process of the secondary understanding of social interactions. The discovery of misunderstandings of social interactions is the correlate of disappointed expectations about the course of events on the level of pre-scientific secondary understanding. Several cases of such situations can be distinguished.

Hypotheses about the outcome, the final cause of a course of events in a social interaction, can be confirmed or disconfirmed in the course of events regardless of whether the hypothesis has a background in the observer's previous experiences in the lifeworld or whether it has been tentatively introduced in an attempt to eliminate not-understanding. The disconfirmation or confirmation of the hypothesis about the events is in this case not separable from the confirmation or disconfirmation of the assumed secondary understanding of the *purpose* of the observed social interaction. Except for a special case that will be considered below, it is essential for the second-order understanding of observers of social interactions that misunderstandings are discovered if expectations and predictions about the outcome of the finished observed social interactions is disconfirmed, and with it the observer's secondary understanding of the purpose of the social interaction. The immediate result of the disconfirmation of second-order understanding is a not-understanding, and the next task is to propose a new hypothesis that can be used in future observations of certain social interactions.

It is, of course, possible that answers of participants in social interactions are hiding the real in-order-to-motives of their interactions. Such complications can include special problems for psychology, but they can be neglected in a preliminary outline of the methodological problems of understanding in the systematic human sciences in general. Relevant are cases in which there is complete agreement between the observer and the participants in understanding the purpose of the interaction, but in which expectations about the outcome of the social interaction are disconfirmed for both because in the process of the realization of the final cause, the purpose of the interaction has been interrupted.

For the *first-order* elementary understanding of the participants the disconfirmation implies the assumption that something went wrong. Possible referents of the "something" are factors that have been assumed to be efficient for the realization of the final cause. Two different species of such factors can be distinguished: natural factors, i.e., efficient causes connected with unexpected changes in the natural environment or malfunctioning tools and techniques, and social factors, i.e., efficient causes connected with unexpected changes in the action and behavior patterns of participants in interactions.

In such situations the task of secondary understanding is to understand the attempts of first-order understanding to find and eliminate "what went wrong." Secondary understanding is able to follow observations of the life expressions of the participants, including their answers to diagnostic questions, without further difficulties in the case of natural factors (including malfunctioning of the bodily actions of the participants) if observer and observed share the same empirical basis of intersensory experience on the level of *practical* social interactions.

Finding and eliminating social factors lies at a higher degree of complexity. In this case elimination means "correcting" the patterns of actions of the participating individuals, and on the level of first-order understanding the standards for such corrections has already the tendency to end up in disputes, in dialogues about what is right and what is wrong, what can be admitted and what has to be prohibited. A restriction to the inquisitive questioning of participants without being drawn into the context of such dialogues is difficult. The secondary understanding of observers will end up in difficulties if the participant's answers refer to contexts of higher understanding, to more or less trivial "myths," or to religious or philosophical contexts that are used to explain the failure, but also the success, of efficient factors in social interactions. Communications between observer and participants in social interactions as consociates in such cases will again end up in a dialogue.

The only way out is a protocol documenting what the participants said; then the observer must try, if possible with the aid of other fixed life expressions, first of all texts,[28] to apply the philological-historical method under the first canon of hermeneutics. This is, however, a transition that leads beyond the temporal structures of observations of contemporary social events in the strict sense.[29]

Only certain characteristics of essential structural aspects on the highest level of universality of the ideal type "social interaction" have been considered in

[28]On other fixed life expressions cf. the beginnings of Sects. 3.2 and 3.4. It is and always has been a question of the available technologies for the kinds of fixed life expressions that can be produced in a cultural situation, and every new invention in this field will require the development of new methods for adequate interpretations of such new types of fixed life expressions.

[29]In the last two centuries technology has offered ways of producing new types of fixed life expressions beginning with photographs and records to videotapes; such inventions cause additional methodological difficulties for the systematic human sciences and for contemporary history. It is easy to manipulate such "sources" for attempts to reconstruct "what is or was really the case." Required are new methods of "critique" for these new types of "historical" sources and these methods will have to use results of the *natural* sciences.

the preceding analyses. Methodological analyses of the different branches of the systematic human sciences will have to deal with specifications and modifications of this universal structure. The main task was to indicate that the discovery of misunderstanding in the second-order understanding of contemporary observations of social interactions is a correlate of the disconfirmation of predictions about events.

Secondary understanding and interpretation of first-order understanding of events on the one hand, and prediction of future events on the other and therefore also explanations of past events are inseparable in the process of first-order and second-order understanding of social interactions in the present. This result of the preceding analyses can count as an explication and justification of Felix Kaufmann's position: the phenomenology of meaning is not an autonomous sphere of knowledge, because interpretation is a synthesis of *internal* and *external* experience. Social facts must be constructed as psychophysical facts.[30]

It has already been mentioned that Kaufmann's position is *prima facie* not only diametrically opposed to Rickert's and Dilthey's separation of explanation and understanding, but also to Husserl's phenomenological analysis of the difference between the natural and the human sciences after *Ideas II*, and this means after the analyses of the methodological abstractions that are constitutive for the natural sciences. It is also obvious that Husserl and other phenomenologists after him accepted Dilthey's dichotomy of the natural and the human sciences, and beyond that, even a priority of the human sciences over the natural sciences.

It is, however, questionable whether either this self-interpretation of transcendental phenomenology or the significance of the theory of the methodological abstractions for a phenomenological epistemology of the natural and the human sciences is compatible with the thesis that the structures of the lifeworld are the foundation for all possible cogitative types of a higher order. Schutz presupposed the priority of the lifeworld in his investigation of the social world. Accepting this thesis together with what has been said about the basic structures of the lifeworld in Part I, Sect. 3.5, of this investigation it must also be presupposed.

Even on the lowest levels of the generative foundations of first-order elementary understanding the structures of lifeworld imply already the elementary understanding of efficient causal relations and also final causes. Causal explanations in a concrete pre-scientific lifeworld refer first to in-order-to-motives of purposes and values as properties of objects before turning to questions about the understanding of effective causes, i.e., because motives. The question "why are they doing that" has priority over the question "how are they doing that." Final causes in this sense are the principles of the selection and the temporal order of the application of efficient causal relations in the realization of purposes following in-order-to-motives.

It is, hence, possible to defend Kaufmann and to insist that the ontological region that is pre-given for research in the systematic human sciences is psychophysical and that the psychic cannot be given by itself without the physical. Using Kaufmann's

[30]Cf. Reeder 1991, 44f. on Kaufmann.

terms, it is not the task of Husserl's second methodological abstraction to separate the psychic from the physical. The task is, on the contrary, an abstraction that brackets the psychic including purposes, etc., in order to thematize the physical, i.e., nature as correlate of the cognitive attitude of the natural sciences, in the residuum of the abstraction. However, the abstraction itself has its generative foundation in the givenness of nature as the natural environment, i.e., as a dependent part in the psychophysical unity of the lifeworld.

For the theory of the abstractive reduction what is called "psychic" in Kaufmann is the structure of a final causality and its parts and relations: purposes, in-order-to-motives, values, and with them other persons that manifest these motives in their actions as their life expressions. Bracketing the psychic in the abstractive reduction implies, hence, bracketing final causality. What is left in the residuum of the ontological region of the natural sciences is efficient causality, and in the life sciences formal causality remains as well.

Presupposing that hypothetical interpretations can be tested and disconfirmed as correlates of predictions about causal connections in the lifeworld, it is now possible to return to the postponed problems connected with the cognitive attitude of "disinterested observers" in the systematic human sciences. Much has been said in defense of the possibility of such observers and about the requirements they have to fulfill. The shortcoming of the defenses is that they are restricted to considerations about the requirements for the *subjective* attitude of individual researchers that must be fulfilled for the possibility of "disinterested observation," and even what is said about this aspect is rather dubious.

The main question is whether the relation between research and practical application of the results of this research can be the same in the systematic human sciences, in the natural sciences, and in history as a science. The structures of the cogitative types of observations that are relevant for the systematic human sciences are (1) the specific temporal structures of the givenness of the empirical basis of the observations and (2) the specific structures of the intentional "objects" of the observations. These objects are (2.a) given for research as contemporaries, and this givenness happens in direct or indirect communications between the observers and their observed "objects." However, (2.b) the "objects" as well as other contemporaries are not only able to react to questions of the researchers in unexpected ways, but are in addition able to react to "published" results of empirical research in the systematic human sciences. Such reactions are, therefore, immediately added conditions to the set of initial conditions that have to be determined for methodologically viable predictions and explanations in the empirical sciences. Some further reflections are necessary to clear this ground.[31]

It is beyond question that here "disinterested" can only mean "disinterested in *practical* participation in social interactions." Research in the empirical systematic

[31]The prediction of economists that a certain set of transactions in the market will lead to falling profits for the participants in the interactions will change the behavior of the participants at the very moment at which they receive the information about the prediction.

human sciences does indeed require a theoretical interest in actions and interactions. It is, however, also necessary to keep in mind, that the distinction between the theoretical and the practical is already relevant for the *theoretical* reflections of *practical* philosophy. Such reflections are interested in the ethical *values* of actions of individuals and of economic and political social interactions. They are not interested in generalized conditionals that admit predictions of the effects of certain actions and social interactions.

Observations in the empirical natural sciences can be recognized as "disinterested observations" precisely because the natural sciences are theoretical *empirical* sciences. They are *disinterested theoretical observations* only because the residuum of the *abstractive reduction* brackets precisely the categorial structures that are characteristic for practical interests in general and therefore also for interested observations. It is, furthermore, meaningless for the ontological region of the natural sciences to assume that natural scientists can be tempted to ask their objects (e.g., planets, minerals, plants, magnetic waves, etc.) whether they agree or disagree with the scientists' understanding of their interactions, e.g., in the solar system.

Left for the search for an answer to the question of what it might mean that research in the *systematic human* sciences requires disinterested observations is, hence, to ask what it might mean that research in the *historical human* sciences is "disinterested" in the outcome of its reconstructions and *interpretations* of a past reality. A reference to the application of the first canon of hermeneutics as a methodological principle for the reconstruction of historical events at a historical distance is sufficient for the justification of the claim that historians can be "disinterested" interpreters of a reconstructed past reality. The canon implies that the historical distance separates the horizon of the interpreter and the horizon of the authors of the interpreted life expressions.

The epistemological analysis of the methodology of historical research can justify the claim that historical researchers ought to be disinterested "observers" and "interpreters" in their interpretations of fixed life expressions and their reconstructions of the lifeworld of predecessors in a distant historical past. The first canon implies a methodological abstraction that is, like the methodological abstraction of the natural science, constitutive for the distance between researcher and research object. For precisely the same reason the historians also not able to conduct inquisitive interrogations and ask the predecessors about their first-order understanding of their social interactions and their purposes.

Prima facie, it seems to be an advantage of the systematic human science over the historical human sciences that for the systematic human sciences, immediate communication with the "objects" of research in the present is possible. Misunderstandings in the process of secondary understanding of participants in social interaction can be at least partially discovered with the aid of disconfirmed predictions that are implied in the misunderstandings. The disadvantage is that it is impossible for interpretations of life expressions with authors in the present to separate interpretation and application. The horizon of the interpreter will always be of immediate significance in such communications. The "objects" of observation and/or understanding are "subjects," contemporaries, and even consociates

belonging to the social horizon of the "disinterested" observer; they share the present of the researcher and in general of a research project of a science that is theoretically interested in them as subjects and in their social interactions.

In the systematic social sciences there is only one requirement for "disinterested interpretations" that has the character of a straightforward methodical rule and does not depend on the training of psychic ability to eliminate prejudices and ideologies. Though the observer (i.e., in this case the interpreter), cannot avoid communication, she/he has to avoid all temptations to get involved in a dialogue with the objects of research going beyond the limits of inquisitive and diagnostic questioning. But the real difficulties for the requirement that observers and/or interpreters must remain "disinterested" or "not involved" are implied in the formal ontological and material ontological structures considered in the beginning of this section. They are relevant for (1) the research activities of systematic human sciences and (2) the significance of the theories of the systematic human sciences for the future development of the social and cultural community in the lifeworld.

(1) It is sufficient to consider the partial structure "observation of an object," including communication in diagnostic questioning of the "object" in the present of the second-order whole of social relations in a concrete social lifeworld. The meaning of "disinterested" cannot imply that the observer has a standpoint outside this structural whole like the standpoint of historians in the reconstruction of a past social lifeworld. Since the conceptual framework of research in the systematic human sciences presupposes the structures of pre-scientific social life, all observations and interpretations in the systematic social sciences will be determined by this context and the context of the presently dominating theories in the systematic human sciences. The inquisitive dialogue with the "objects" will, therefore, necessarily include "suggestive" questions.

    It is *possible* to reduce this impact of the horizon of interpreting research in the systematic human sciences if the structure of the social interaction under investigation is comparatively small and admits distance between the context of the social interaction and the context of the interpreter. It is *impossible,* i.e., determined by the ontological structures of temporality and of the givenness of others in the lifeworld as a second-order whole, if the context of the system of social relations under investigation includes the whole of the social lifeworld or large parts of it. Even approximations to an analogue of a separation between interpretation and application in historical research are impossible in such cases.

(2) There is, finally, the problem that the results of social research can be efficient factors causing changes in the structure of social interactions and social institutions. The problem of research in the systematic human sciences is that the scientists are not only involved as researchers in a specific type of communication in the present with participants in social interactions, but are also involved in communications about their interpretations and theories, with their contemporaries as "objects" of their theories and not only with other scientists in the field.

This has immediate consequences for the status of the interpretations and the theories of specific types of social interactions in the systematic human sciences in the context of the present lifeworld. The interpretations of the systematic human sciences have an immediate impact on the "objects" of the theories if they are "published," i.e., known by contemporaries who share the present social context with the researchers and the objects of their research. The interpretations are, hence, able to cause changes in the social behavior of individuals, and therefore also in the structure of parts of the present system of social interactions. Since the theories of the systematic human sciences are theories about contemporary social interactions and their significance for their development in the future, they are necessarily of vital interest for the objects of the theories, the participants in the social interactions.

This recognition presupposes communication between the theoreticians and their objects, and begins with the publication of theories that imply predictions of future socially relevant developments. Such predictions usually immediately imply recommendations[32] for social actions guided by the purpose of avoiding unpleasant consequences and promoting pleasant consequences in the future horizon of the social interactions that have been analyzed in the sociological or psychological theories. The consequence is that the "published" theories themselves appear as factors that are able to introduce changes in the system of social interactions. Thus the epistemological requirement of "disinterested observation and interpretation" is not only impossible because a separation of interpretation and application is impossible. It is also impossible because theories in the social sciences cannot have the character of pure theories unaccompanied by any practical interests.

10.3 Psychology

As already mentioned in the formal ontological reflections of the preceding section, psychology is the perspective that is interested in the first-order and second-order *understanding* of social relations and of the natural environment of social relations. This perspective includes in addition the lived experience of Others as animate living *bodies*. A phenomenological epistemology of empirical psychological research must, therefore, presuppose the general structure of a phenomenological psychology, i.e., precisely not an empirical psychology,[33] as well as the phenomenological analysis of the correlation of primordial subjectivity and intersubjectivity that was considered in Part I, Sects. 3.1, 3.2, 3.3, 3.4 and 3.5.

[32]The recommendations are implied in statements like: "If x is done, then y will be the case"; "If x is not done, then y will not be the case."

[33]Cf. the discussion of the problems of the relation between phenomenological and empirical psychology and phenomenological psychology and transcendental phenomenology in Ströker 1997, ch. V and VI. A phenomenological investigation that is primarily interested in psychology as a science is Drüe 1963.

For phenomenology, the immediate object of an epistemological analysis of empirical psychology is the general structure "individual person" given in eidetic intuition. The primordial subject is given in this analysis as an abstraction that brackets all contents of the lived experience of individual persons that presuppose the givenness of other persons in a common natural and social environment of an intersubjectve community. The passive primordial subject is affected and determined by its hyletic field as the field of a blind reality that is not yet understood as a world of intentional objects given in intentional acts. The formal structure of this field is determined by two systems of dimensions. The first system of dimensions is inner temporality, with its center in the primordial actual Now and its dimensions in the horizons of retentions and protentions. The second system of dimensions is the system of inner spatiality and its separation of the inner Here of the primordial living animate body and the manifold Theres outside the body including the living body itself as given not only from the inside but also partially from the outside.

On the level of animalic understanding, the givenness of the own body is already the passive foundation for the givenness of other living bodies including other persons and intersubjectivity. Intersubjectivity is in turn the foundation for the self-givenness of the primordial subject as an individual person, i.e., as a member of a social community. As a member of the community the individual subject is able to distinguish between pre-given contents as intentional objects that are independent real or ideal objects as intersubjectively given objects, on the one hand, and its private representations including illusions, on the other.

The past is present in memory. A personal "history" presupposes reproductions. Reproduction presupposes memories as its material content. The emergence of memories of contents that are stored in the continuum of retentions is determined by passive associative syntheses. The givenness of contents that are identifiable intentional objects and states of affairs that can be serially ordered reproductions of a personal "history" presupposes the intersubjectivity of the givenness of such objects and a serially ordered, intersubjective temporality. The consequence is that the "history" is a history of the past experience of an individual person as given in her/his memories. Such experiences are the presupposed foundations of possible explicit reproductions. The "historical" reports of such reproductions are intersubjectively accessible.

These structures are pre-given a priori for a phenomenological epistemological analysis of the methods of *empirical* psychological research. The steps of such an analysis are (1) the analysis of the foundations of the cognitive attitude of psychological research in the a priori structures of the pre-scientific givenness and self-givenness of individual subjects; (2) the analysis of the empirical basis of the different dimensions of psychological research; (3) the analysis of the general structures of methods and theories applied in psychology; and (4) the analysis of the different aspects of the applications, the "technology" of psychological research in a cultural lifeworld with sciences.

(1) A person is given for another person as having a body and the body appears as the body of a person because it is the "sign matter" of the immediate

present life expressions including verbal life expressions. On the level of elementary understanding, life expressions can be understood or misunderstood or not-understood in associative transfer. Understanding, the repair of not-understanding, and discovery and repair of misunderstanding require productive interpretations in communications. The psychologist is another such person, but the psychological interpretation of the life expressions of other living persons is an understanding within the theoretical cognitive attitude. It is not determined by an interest in practical interactions with the intention of realizing certain goals, or simply of enjoying communication as a pleasant entertainment. Psychology is interested in theories of the general structures of the lived experience of other persons only to the extent to which the observation and understanding of other persons can be used as a source for descriptions that are relevant for answers to theoretical questions.

Seen from the viewpoint of this interest, it is *prima facie* plausible to assume that psychologists are "disinterested observers" because their objects are individual persons, groups of individual persons, or even "masses" of individual persons whose lived experiences are different, and can be separated from, the lived experience of the psychologist. This assumption presupposes that the communication, the dialogue of the researcher and the objects of research, can be restricted to diagnostic questioning. Pure diagnostic communication is fragile because it can always be disturbed and even disrupted by misunderstandings and not-understandings of the "objects" by the psychologist or vice versa. The interrupted diagnostic communication will end in a dispute about what has been said or heard, understood or misunderstood.[34] Though such methodological complications are of different weight in different psychological disciplines, they occur on all levels of psychological research. It is, hence, always questionable to what extent a psychologist can be a "disinterested" observer and interpreter.

(2) Three levels can be distinguished in the empirical basis of psychological research: (2.a) the level of observations of the relation between individual persons and their natural environment including their own living bodies in a cultural lifeworld; (2.b) the level of the encounter of individuals with their social environment; and (2.c) the level of the individual history of a person. Phenomena that are relevant for (2.c) include phenomena belonging to (2.b) and (2.b) presuppose the observations of (2.a).

(2.a) The individual person as a living body is given to her/himself on the level of first-order animalic understanding in its sensory experience of objects outside in the natural environment and inside in bodily feelings like pleasure or pain and strength or weakness, etc. Differences in the constitution of the living bodies of the individuals, e.g., male or

[34]There are not only interesting slips of the tongue of the clients. There are also interesting slips of hearing and understanding by psychoanalysts, slips that are last but not least pre-determined by their theories.

female, child or adult, strong and healthy or weak and ill, etc., are relevant factors for their reactions to stimuli of the natural environment. The empirical materials for pure *experimental* psychology are in this respect the immediate bodily life expressions, including verbal utterances answering spoken or written questions by the psychologist. On this level psychological research already presupposes communication; and with it the need to avoid misunderstanding, but the need for communication is in the case of (2.a) restricted to life expressions that are immediate reactions to stimuli of the natural environment as effective causes. Final causes, i.e., purposes and guiding values of practical actions and interactions, are not of interest and *can be bracketed* on this level of empirical psychological research. All that is of significance for psychological research is that the relevant empirical material, except for the verbal utterances of the "objects" and their interpretation, are also relevant for observations and descriptions of the reaction of organisms to outside stimuli for the life sciences in the cognitive attitude of the natural sciences under the first abstraction. This has consequences that will be considered in (3.a) below.

(2.b) Individual persons are given for empirical *social* psychology in their encounters with their social context. What is of interest is the second-order understanding of the first-order self-understanding of other persons in their practical actions and interactions in their social environment. The empirical basis includes, hence, in addition to the material basis of (2.a), the understanding of purposes and basic systems of values determining the purposes; and beyond that, of systems of higher understanding that legitimate the applied system of values in practical actions and interactions in a cultural lifeworld. This means that (2.b) considers life expressions as material for interpretations and not as descriptions of observations. It includes psychological contents and structures that are in brackets on level (2.a). Of basic significance for the system of the systematic human sciences is that the empirical basis of (2.b) includes the subjective cognitive correlates of *cogitata* that belong to the empirical basis of the research in the social sciences, namely, systems of institutionalized social interactions. The results of research in the social sciences are, hence, the correlate of, and as such a presupposition for, the empirical basis of research in social psychology and vice versa. More about this point will be said under (3.b).

(2.c) The individual person is individual because she/he has its unique personal "history." This "history" is not yet present as given in reproductive intentional activity. It is present only in memory,[35] first of all as a history of the past social relations of the person, but also the history of the individual experience of one's own body in its relations to the natural environment. The reconstruction and analysis of this history and

[35]Cf. Sect. 3.4.

its influence on the present potential and actual mental and physical actions of individual persons is the task of an understanding psychology of the *individual*. Of specific significance for this understanding is the interpretation of traumatic experiences that are present in the realm of the pre-conscious continuum of retentions. The partially conscious and partially only associative repressions of such contents, along with their potential to be contents of present memories constitutes the realm of subconscious contents in the sphere of primordial retentions that can, nevertheless, be a determining factor for present representations and actions. Psychoanalysis is the dimension of individual psychology that is especially interested in this aspect of lived individual experience.

(3) Like all theories, theoretical psychology presupposes generalizing abstractions. Two dimensions of generalising abstractions are relevant for psychology: the generalizing abstraction in which types of events in the experiencing life of other persons as animated bodies are given, and the generalizing abstractions in which types of individual persons are given. There is a psychology of perception, of recognizing gestalt qualities,[36] of memory (3.a), but also of different attitudes toward the social environment (3.b), and in addition there are theories of different types of individual persons and the individual "histories" of such persons (3.c).

(3.a) The theories of experimental psychology refer to data belonging to the empirical basis (2.a), i.e., to the types of reactions to external stimuli, with or without internal inclinations and drives given on the level of first-order animalic and elementary understanding. The theories refer to a system of causal relations that can be tested in *experiments*. Experimental psychology on this level is able to determine most of the initial conditions and to control and if possible to measure the impact of added causal factors. Such experiments belong to understanding psychology only to the extent to which empathic secondary understanding not only of verbal life expressions but also of immediate bodily life expressions of animated living bodies, higher animals included, are relevant for observations.

The already mentioned (2.a) epistemological problem of experimental psychology is the problem of possible tests using cases with similar experimental arrangements to study the physiological reactions to external stimuli of living bodies considered as organisms, i.e., as objects of the life sciences. A possible conclusion is that the causal connections discovered in the life sciences can be considered as the better "explanations" for the corresponding psychological causal connections. The consequence of this naturalism is that this might be possible also for psychological phenomena and explanations belonging to (3.b) and (3.c).

[36] Gurwitsch 1929, introduced this viewpoint. The hyletic field is already structured in its own right and is not a collection of atomistic hyletic data.

The problem of this consequence is that it is by no means clear either what "explanation" means in this case or whether what is explained is the process of interpretation in the psyche of the interpreting psychologist or the first-order understanding of the "objects," (i.e., the clients of psychological research) or both. These and connected problems will be considered in the conclusions in Part V.

A preliminary answer to this problem in the narrower context of a phenomenological epistemology of an empirical understanding psychology is an analogue of the answer about the problem of causal explanations in the philological-historical sciences. Human sciences, including psychology, *in a lifeworld with natural sciences* are able to use confirmed hypotheses about causal relations *borrowed* from the natural sciences in their causal explanations. They are able to do so because the natural environment that is given for them as a dependent part of the concrete lifeworld is given under the first abstraction as nature for the natural sciences. In a lifeworld with natural sciences, technology reveals the partial identity of the natural environment and nature.

(3.b) According to a widespread positivistic epistemological thesis social psychology is a science because it is able to apply methods that are similar to the methods of empirical research in experimental psychology and research in the life sciences. Social psychology is, hence, able to predict social behavior and to develop technologies that are applicable in "social engineering," e.g., in marketing. Closer considerations reveal that such empirical investigations have a certain similarity with experimental research, but this similarity is in most cases restricted to collections of empirical data representing a comparatively small subset of the relevant set of causal conditions that would justify reliable experimental tests of hypotheses about future actions and interactions of the "objects" in their social environment, i.e., the relevant initial conditions.

Prima facie, the structure of the communication required for gathering the necessary data for the predictions is simple. It starts with a list of questions prepared by the psychologist; in continues by obtaining a list of the answers of a representative sample of a type of contemporaries, i.e., the "objects" of the investigation, and it ends with the interpretation of the answers, an interpretation that is interested in deriving predictions of the future behavior of these "objects." The application of statistical methods in the selection of the sample and in the evaluation of the interpreted answers is usually considered to be a justification for the claim of social psychology to be a respectable empirical science.

The problem of this account is that the presupposed empirical data are not intersensory observations. The data are *interpretations* of life expressions of contemporaries given in the process of a complex diagnostic communication. This communication is diagnostic because what is of interest is not a common subject matter. What is in question is the first-order understanding of partners communicating about their social

environment. This communication is complex because it implies several dimensions of first-order understanding and interpretations of systems of first-order understanding. Behind the list of questions prepared by the psychologists is the dimension of the psychologists own understanding of the social world and the structures of social institutions.[37] The presupposed interpretation of the social world of the psychologists also determines their hypothetical guesses about the first-order elementary and higher understanding of the social environment of their "objects," that determines both their list of questions and the formulation of these questions. The immediate consequence of possible second-order misunderstandings on the part of the psychologists of the first-order understanding of their "objects" in their formulation of the list of questions will in turn be misunderstandings of the questions on the side of the objects.[38]

The first methodological presupposition of the objective validity of the results of empirical research in social psychology is the objective validity of the presupposed theory of the structure of the social environment of their "objects." A "perfect" social psychology is possible only as a correlate of "perfect theories" of the structure of the present social world. Epistemological solutions for the basic methodological problems of social psychology presuppose, hence, the context of an epistemological analysis of the methodology of the social sciences. Further complications lurk in the background.[39] The general problem of psychological diagnostic communications is that misunderstanding and not-understanding can be discovered and repaired only in communications on the level of a mutual recognition of the partners in communications as partners of equal rank. Precisely this is not the case for diagnostic questioning.

(3.c) Individual psychology is interested in types of individuals insofar as these types are determined by similar individual histories. Results of research in social psychology (3.b) are of basic methodological significance for the method of the interpretation of events in the history of individual persons. The "universal concepts" of individual psychology are morphological types determined by general "symptoms" that have been discovered in empirical research and free variations of certain characteristics within the

[37] E.g. family and clan structures, economic structures, structures of the distribution of power.

[38] It is possible, for instance, that certain groups of participants in social interactions are guided by expectations embedded in intentions and purposes that have not been considered to be relevant for the outcome of the interactions by other participants in the interactions. These problems will be considered in the next section.

[39] There is, furthermore, the interpretation of the psychologists of the answers of their "objects" to their questions and inquiries, and there is then finally the task of the interpretation of the whole context of all of the dimensions of such investigations in a final evaluation of their results.

limits of pre-given material contexts.[40] The task of theoretical *empirical* individual psychology is, therefore, to distinguish between different types of individual histories determining different types of behavior characterizing different types of individual persons. The collections of material for the generalizing abstractions, and then for recognizing this or that person as belonging to this or that type (e.g., as an autistic, neurotic, schizoid, introvert, or extrovert person), presupposes intense communications between the psychologists and the "objects" of their theories.

Two layers of individual psychology can be distinguished. The first is the biographical level of interpreting and explaining the present or past behavior and the self-understanding of individual persons with the aid of their biographies. The material basis for such interpretations and explanations is accessible for the investigating psychologist in reports by the "objects" about their memories and reproductions of the temporal sequences of events.[41]

The second layer includes the traces of those events in an individual history that are not accessible in conscious reproductions. Psychoanalytic research has to provoke utterances by the "objects" about their memories, preferably memories that are immediately determined by associations and not by conscious reconstructions in reproductions. The access to the specific empirical basis of psychoanalysis presupposes specific methods for the interpretation of the life expressions of the "objects." Analytical psychology is a branch of the interpreting sciences,[42] but it requires in addition a "technology," a method of indirect inquisitive and diagnostic communicating, that is able to discover the traces of a past individual history that are covered and suppressed by a system of unconscious and subconscious associations.

Psychoanalytic interpretations and reconstructions of a past individual history and its significance for the present situation of the individual person as an object of psychoanalysis presuppose assumptions about systems of social interactions, e.g., theories about archaic cultural patterns of social behavior that are accessible in mythological stereotypes. The "experimental" test for such interpretations is whether an interpretation accepted by the "objects" communicating with the psychologist is then

[40] Cf. Sect. 2.3. A systematic account of the meaning of types, morphological ideal types, ideal types and rational ideal types in the social sciences will be given in the next section.

[41] For Dilthey, this level of individual psychology was also of interest for the historical human sciences, and there especially for interpretations of works of art.

[42] According to Ricoeur 1970 Freud's psychoanalysis is an art of interpretation. Psychoanalysis in the strict sense on the level of its application to patients does not use drugs, but only the diagnostic dialogue with patients. Today psychiatrists trying to understand the patient using communications with the patients can also use drugs if they have the licence to do so in the treatment of their patients.

able to change their self–understanding and their social behavior. The epistemological problem of such tests is that the "objects" as subjects in their communications with the psychologist have to accept the presuppositions of the psychoanalytic theory that has been applied in these interpretations.

The epistemological problem of theories considered in their own right for themselves is that like the theories on level (3.b), they presuppose further assumptions and interpretations not only about interpretations of present social structures, but also (like e.g., Freud) about archaic social structures that are only accessible in mythological narratives. Such assumptions are possible objects of historical research and can be applied in explanations in historical research. Quite apart from the circumstance that historical research can falsify such explanations simply by proving that the assumption that the explained x was a historical fact can be falsified,[43] it is questionable whether such assumptions can be applied in all other present and past cultural and social contexts.[44]

(4) As a systematic human science individual psychology is interested in the present, but its main interest (except for the prediction about future behavior of the "patients") lies in the clinical application in psychiatry and in psychotherapies, i.e., in interpreting the past horizon of the present. It is, therefore, also of significance for historical interpretations and explanations.[45] Psychology as a scientific discipline can be applied, and in such application, usually called psychotherapy, it is used as a technology. The "objects" of theoretical psychology, regardless of whether it is experimental or interpretive or understanding psychology (*verstehende Psychologie*), are given in the application in psychotherapy not as "objects," but as consociates. The relation between the psychologist and the patient or client is a social relation. The close kinship between experimental psychology and experimental physiology has its counterpart in the kinship between individual psychology and practical medicine.

The application of technologies that have their presuppositions in theoretical research in the life sciences to the patients of physicians is not equal to, but is very similar to, the application of theoretical individual psychology and psychiatry to clients or patients. The object of theoretical anatomy, physiology, etc., is the

[43] Cf. Sect. 6.4.

[44] The assumption that Freud was not able to analyze workers in Vienna because they were too stupid speaks against Freud's theory and not against the Vienna workers. Seen from the viewpoint of historical research, it is also an absurd anachronism to explain, for instance, the behavior of the pharaoh Akhnaton with elements taken from the myth of Oedipus. The family structures especially the family tradition of the Egyptian pharaohs and their mythological background cannot be explained and interpreted with myths taken from the archaic Greek tradition.

[45] Biography is in the center of Dilthey's reflections on historical interpretations; cf. Sect. 4.2.

living body, including bodies of humans considered as organisms. These bodies are, however, also given for physicians as other living bodies first of all the bodies of other human persons, i.e., as consociates. The social relationship of the practicing physician with the patient is indirect because the direct object of the physician is the body of the patient considered as organism. The social relation of practicing clinical psychologists to the patient or client is direct because it implies interpretations of life expressions of the lived experience of other persons, but applied psychology is also linked with the medical arts and vice versa. The link is psychiatry to the extent to which psychiatry applies medications that affect the physiology of the human body and are able to cause changes in the behavior and the mental constitution of patients.

Even on the level (3.b) the psychological theories of social psychology already imply references to norms, purposes, and values, and research in individual psychology implies in addition the interpretations of memories required for the reconstruction of an individual history. Their "technological" application is also guided by an interest in the question whether a certain irregular behavior of other persons is harmful for such persons and/or other persons, and this interest is guided in turn by evaluations and normative considerations. Interactions of the practicing psychologists with their clients in the *actual lifeworld* are, therefore, also subject to moral and juridical evaluations and judgments of contemporaries.

Solutions for the general methodological problems of the systematic human sciences mentioned in Sects. 10.1 and 10.2 are necessary presuppositions for answers to the epistemological question whether and how observations in the systematic human sciences can be observations of *disinterested observers* and *interpreters* in the different disciplines of psychology and the social sciences.

Experimental psychology presupposes only communications about reactions of the "objects" to stimuli. The reactions can include not only immediate bodily life expressions, but also verbal reports of the "objects" about the lived experience of their reactions to the stimuli.[46] Left after this abstraction from all secondary understanding of purposes and values is not nature as an in-itself closed universe, but the presently common natural environment of the researcher and the "objects." The observer and experimenter can be in this sense a "disinterested observer."

The observer can apply experimental methods in *social psychology* if her/his observations of social interactions and life expressions, including information about the purposes of the interactions in communications, remains without any admixture of the researcher's judgments about the values guiding such interactions. Since the second-order understanding of the social interactions of the interpreting psychologists and the first-order understanding of the social interactions of their "objects" now belong to separate streams of lived experience, it is tempting to assume that the

[46]Experimental psychology and only experimental psychology can be reduced with behaviorism to a natural science as long as only intersensory observations without any admixture of empathic understanding or interpretations of verbal and/or fixed life expressions are admitted in the description of the reactions to the stimuli.

distance between both can serve as a warrant of "disinterested interpretations" on the side of social psychology. However, social psychology always presupposes and implies a theory of a system of social interactions guiding its empirical research and its theories, whether on the theoretical level or implicitly simply as a collection of religious, political, or other "prejudices" of the psychologists.

This presupposition implies further complications. The main problem is whether and how far the interests of theoretical social research analyzing such systems can be disinterested in the purposes and values that determine the in-order-to-motives in interactions that are relevant for the system. This problem is a central problem of the social sciences; it is not important for the application of experimental methods in social psychology, but it is nevertheless of significance for social psychology because research in social psychology is implied in the research of the social sciences as its correlate.

Prima facie, it could be assumed that observations that are of interest for research in *individual* psychology can be called disinterested observations because this research is interested in the individual history of *other* persons and not in the individual history of the observer and interpreter. It can be assumed that the observer can and must bracket her/his own personal history. The problem is that the material basis for such observations is not restricted to the intersubjectively accessible biographies of other persons. The materials of psychoanalysis are first of all verbal life expressions of other persons in the present about their memories guided by associations. The interpretation of this material presupposes psychoanalytic theories, and such theories imply assumptions belonging to social psychology and even social history. Thus individual psychology implies once again assumptions that can only be justified in the social sciences and social history.

10.4 The Social Sciences

Two preparatory remarks about terminological distinctions are necessary before beginning with epistemological reflections on the basic methodological problems of the social sciences.

(1) According to Dilthey's system three independent social sciences presupposing partially different methodological principles can be distinguished: economics, the science of the law, and political science. This system was accepted by Schutz, Kaufmann, and other phenomenologists. The terminological problem is that other social scientists before and after Dilthey preferred to speak of sociology rather than of social sciences. For them sociology is a term for social sciences in general with methodological principles that can be applied to all kinds of social interactions. Presupposing this terminological decision it is possible to distinguish between different fields of research as "sociologies of ... " Economics, the science of the law, and political science are then such sociologies of ... together with other sociologies of ... that are interested

in other regions of social interactions, e.g., the sociology of science or the sociology of music. All "sociologies of . . . " have to apply the same methods, i.e., methods that belong to sociology, to the social sciences in general.

The problem is that the three Diltheyan social sciences require further guidelines for the methodically guided application of principles that are not required in the methodology that governs research in sociology or social sciences in general. Even a superficial epistemological reflection already indicates that the science of the law, economics, and even political science themselves have social functions that are missing in other sociologies of . . . . Their main purpose as disciplines in universities is to educate professionals and this implies that they are in this respect first of all interested in methods for the application of the results of scientific research. In contrast, the task of the sociology of religion or the sociology of science is not to serve the professional education of priests or scientists.

The history of the three "Diltheyan" social sciences indicates, furthermore, that these social sciences refer to and presuppose the interpretation of systems of interactions in certain professions. The historical development of these professions required an increase of systems of knowledge that had to be applied in professional interactions. The first task of epistemological reflections on these three sciences was and is, therefore, the interpretation of the systems of the theoretical knowledge that has to be applied in the social interactions in involved in market economies, in jurisprudence in the courts of law, and in political interactions. It is, furthermore, of significance that all three disciplines are not only relevant as sociologies of certain partial systems of interactions within a society, but are immediately of significance for the society as a whole.

All three sciences presuppose the results of empirical sciences; however, it is according to what has been said in the introduction, an open epistemological question whether they can be recognized as empirical sciences in the narrower sense. These special questions will be considered in the next three sections. The task of the present section is the epistemological analysis of the epistemological problems of the social sciences in general, and such an analysis has to start with a critical review of Alfred Schutz's phenomenology of the social world.

(2) Schutz characterized his investigations of 1932 as a phenomenological analysis of the social structure of the lifeworld. Schutz also called his investigations a "*Wissenschaftslehre,*" a term that had already been used by Husserl as an abbreviation for the explication of the task of the *Logical Investigations,* i.e., the task of developing a phenomenological "general theory of knowledge (*Erkenntnis*)."[47] This task was, as mentioned in Sect. 2.2 of the introduction and then in Sect. 4.5, the task of offering a phenomenological "general theory of knowledge (*Erkenntnis*)." The first to use the term *Wissenschaftslehre* in the German tradition was Fichte. The preferred translation of his term in

[47]Cf. Sect. 4.5 and the interpretation and discussion of the difficulties of the term *Wissenschaftslehre* in the introduction to Embree n.d.

English is now "doctrine of science." The term was used later by Bolzano for a quite different type of *Wissenschaftslehre*. A *Wissenschaftslehre* in general, i.e., covering the common features of Fichte's, Bolzano's, and Husserl's use of the term, is a theory of the structure of the system of basic categories of the different ontological regions that can serve as foundations of the positive sciences, and such a *Wissenschaftslehre* is in this respect of significance for, but by no means identical with, the epistemologies of positive sciences.

The difficulty for Schutz in the cultural context of the United States, which was governed at this time by analytic positivism, was in effect to explain the difference between a *Wissenschaftslehre* and a *Wissenschaftstheorie*, i.e., a theory of science. A theory of science is an *epistemology* of positive sciences in general. It is not necessary to give a detailed interpretation of Schutz's attempt to cope with the difficulty of explaining the difference between his approach and the approach of the theory of science in the analytic tradition, given in the present task of conducting a systematic explication of investigations about a phenomenological epistemology of the empirical sciences.[48] It is sufficient for this purpose to refer to the distinction between phenomenology as a general theory of the categorial structures of ontological regions that can serve as the foundations of the different sciences, on the one hand, and on the other hand a phenomenological epistemology reflecting the different methodologies of the formal and the empirical sciences as characterized in Sect. 4.5.

Theories in the social sciences are theories of structures of social institutions as parts of the structure of the social world. The social world is a system of social relations between institutionalized groups and between individual persons and groups. Social relations between individual persons and groups of individual persons are "relations in interactions" between participants in systems of social interactions. A preliminary epistemological reflection already discovers that the objects and the region of the objects of the theories of the social sciences are not individual events and states of affairs given in immediate experience. Descriptions in the social sciences *start*, like all other descriptive sciences, with descriptions of types given in generalizing abstraction that have their empirical basis in observations.

Following Alfred Schutz, it was a generally accepted methodological principle that the empirical basis for phenomenological descriptions in the social sciences is the lifeworld.[49] The term for such descriptions of material ontological structures a priori in the social lifeworld is "ideal type."[50] Like Kaufmann's term "scheme of

[48]Cf. Embree 1980 and the critical discussion in Nasu 2010; Schutz's, "Positivistic Philosophy and the Actual Approach of Interpretative Social Science" of 1953 was first published in Schutz 1997. An earlier shorter version entitled "Concept and Theory Formation in the Social Sciences" was published in the *Journal of Philosophy* in 1954 and is now available in Schutz CP I, 48–66.

[49]Cf. on lifeworld in Schutz also: Schutz and Luckman 1973.

[50]Schutz 1967, xxxi, 6, 196f; 227; cf. Embree 2015, ch. 10 with the references to Schutz CP I, 40–42, CP II, 81. A terminological synonym for "ideal type" used by Schutz after the fifties of the

interpretation," the term "ideal type" was adopted by Schutz from Max Weber.[51] Schutz's term "ideal type" and related terms like "typification" will be used in the present investigation, but some remarks about modifications in the explication of the meaning of these terms will be necessary. The modifications are consequences of the theory of eidetic intuition in Sect. 2.3; of the typology of understanding and the explication of the general structures of the lifeworld in Sect. 3.2; and finally, of the epistemological reflections on hermeneutics and histories in Part II.

According to Schutz[52] Weber himself rejected a Neo-Kantian interpretation of his understanding of "*ideal* type." For Schutz, a priori forms have to be understood in phenomenological contexts not as subjective, but as objective formal or material, exact or morphological essences in the sense worked out in *Ideas I* and the *Logical Investigations*. Beyond that, Schutz understands the terms "type" and "typification" in the sense of Husserl's explication of the meaning of "empirical types" in *Experience and Judgment*.[53] "Types" are already present in the typifications of everyday life, as standardized but still ambiguous conceptualizations of common-sense thinking.[54] Apart from some extensions, e.g., the reference to Kant's theory of the schematism of the imagination underlying empirical concepts, there is no difference between the understanding of "type" and "typification" in Schutz and the explication of these terms in this investigation.

The problem left is, however, that the examples of material exact and morphological essences mentioned by Husserl are in most cases essences of abstract dependent parts of concrete wholes, and nothing is said about the constitution of ideal types as essences of concrete wholes of the first order but also of higher orders. Solutions for this problem can be found neither in Schutz nor in the literature about Schutz.[55] Presupposing the formal ontological analyses of Sect. 2.2 and their application in Sect. 2.3, it is, however, possible to offer a solution that is at least compatible with Husserl's basic intentions. The term "ideal type" is in *this* investigation understood in the sense that has been determined in Sect. 2.3 as a result of a partial analysis of the material, i.e., morphological ontological structures of concrete wholes of a higher order given in eidetic intuition.

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last century was "construct." He also used for ideal types of acting persons the metaphors "puppet" and "*homunculus.*"

[51]Cf. Reeder 1991, 44, on Kaufmann 1944.

[52]See Schutz CP IV 126 on the influence of the South-Western German Neo-Kantian school for the interpretation of "ideal" in "ideal type" in Weber in the first section of "Positivistic Philosophy and the Actual Approach in the Interpretative Social Sciences" in Schutz CP V. Schutz following in this respect Kelson, emphasized, however, also in the beginning of "Husserl and His Influence on Me," CP V, that the Neo-Kantians nowhere provided a solution for the problem of the understanding of the subjective meaning of a social action of the actor.

[53]Husserl 1972, §83.

[54]Cf. Embree 2015, ch. 11 and the references there to Schutz CP I, 323, 348; cf. CP II 233.

[55]The constitution of constructs requires, according to "Positivistic Philosophy," §2, in Schutz CP V; a "set of abstractions, generalizations, formalizations, and idealizations." Seen from a formal-ontological point of view the same can be said about the constitution of numbers and sets.

This explication presupposed the formal ontological structure of the whole and its parts and the theory of static, genetic and generative foundations discussed in Sect. 2.2. The specific problems of the application of such ideal types in the systematic human sciences in general were considered at the beginning of Sect. 10.3. A systematic exposition of a system of different "types" of ideal types and their methodological functions in the social sciences will be given after some preliminary epistemological analyses of basic aspects of the methodology of research in the social sciences. The analyses presuppose in addition what has been said in Sect. 10.3 about the temporal structures and the correlations between observation, interpretation, prediction, and explanation in the systematic human sciences in general. Of interest is first of all the problem of the mutual interdependency of (1) the structures of interpretations of presently observed social relations and (2) of the structures of the predictions and the confirmation or disconfirmation of predictions in the future horizon of present observations of social situations.

(1) All social interactions require verbal and/or non-verbal communication, and according to Sects. 4.3 and 4.5, communications require in turn the reciprocal second-order understanding of the first-order elementary and higher understanding of Others. The first-order understanding of the social interactions of the participants in the interactions can be understood in the second-order understanding by consociates and contemporaries. The whole context of first-order and second-order understanding is the empirical basis for the interpretations of social interactions and individual actions in social psychology and the empirical social sciences. First-order elementary understanding is, with a grain of salt, roughly equivalent to Weber's and Schutz's subjective or insider understanding of the meaning of an action or an interaction. Second-order elementary understanding is Weber's and Schutz's "objective" or outsider meaning. "Objective" is a misnomer in this case because elementary and even higher secondary understanding of the meaning of actions and of life expressions of Others in general is by itself not an immediate warrant of its intersubjective, i.e., objective validity, because it is always accompanied by possible misunderstanding and not-understanding. Secondary understanding as interpretation in the theoretical cognitive attitude needs, hence, a methodology or at least a doctrine of methods.[56]

Two temporal dimensions of secondary understanding can be distinguished: the secondary understanding of predecessors, and the secondary understanding of contemporaries and consociates. Predecessors and their actions and interactions are given for secondary understanding only via reports in fixed life expressions, *historical* narrations. Consociates and contemporaries and their actions and interactions are given in actual or at least possible observations as immediate life expressions.

[56]On subjective and objective meaning and Schutz's critique of "objective" meaning in Weber's terminology see Schutz CP II, 257 quoted in Embree 2015, ch. 11.

Theories in the empirical social sciences presuppose the results of research in social history. The foci of the research interest of the social sciences are the structures of social interactions in the present, but this research presupposes historical material for the idealizing abstractions in which the ideal types that are applied in this research are given. Schutz mentions the significance of history several times,[57] but neglects, like Husserl,[58] the difference between historiography and historical research in history as a science. Research in the social sciences presupposes and is one-sidedly founded in reports about the results of methodologically guided research in history in general, and especially in contemporary history.

The central focus of empirical research in the social sciences is the interpretation of the structures of social interactions in the present. The temporal structure of this empirical basis of the empirical social sciences is the structure of the actual present together with its immediate past and future horizons. The immediate objects of observations in the empirical social sciences are the life expressions of participants in social interactions in a present that they share with the observing social scientist. It has been shown in Sect. 10.3 that it is impossible to apply the methodological criteria for valid interpretations in history in general and social history in particular. It is, therefore, necessary to look for other criteria that can serve as warrants for the objective validity of interpretations in the "interpretative (*verstehende*) social sciences"[59] and of the implicit first-order understanding of causal relations that is understood in the interpretations. The difference in the meaning of "understanding" in "understanding sociology" and "understanding social psychology" is in this respect of crucial epistemological significance.

Seen from the viewpoint of the phenomenological theory of understanding, interpretative psychology presupposes a reflection on certain types of *intentional acts* that are correlates of certain types of *intentional objects*. In social psychology such reflections are one-sidedly founded in the pre-scientific secondary understanding of a first-order understanding of some state of affairs of other persons. The "object" of the interpretations of social psychology is, hence, the givenness of the social environment in the first-order understanding of the present *lived experience* of Others. What is of interest for social psychology in this respect is the structure of the *experience* of social structures in general, and not the social structures for their own sake.

Theories in the social sciences are interested in the structures of social institutions. Social institutions are systems of social relations, and social relations are relations between individuals or groups of individuals in social interactions. The epistemologically best world is a world in which the social structures that are given for the social psychologist are identical with the social structures that are

[57]E.g., Schutz 1967, 210.

[58]Cf. Seebohm 2013.

[59]Setting aside the difficulty that "interpretative" would be an inadequate translation because "interpretation" means more than just "*Verstehen*.," The terminology used in this investigation follows the explication of the terms in the analyses of the typology of understanding in Sect. 3.2.

given for the social scientists. However, a theoretical claim of this sort always requires always critical reflections on observations that are able to confirm such assumptions.[60] Within the social sciences the first-order understanding of social interactions by participants in these social interactions presupposes and begins with the understanding of their purpose determining their in-order-to-motive, i.e., the practical intention of their activities.

All social interactions are guided by purposes, values, and norms given in the immediate experience of elementary understanding and beyond that in systems of higher understanding, and these systems of understanding include the elementary and higher understanding of the natural and/or social situations of the interactions. Purposes, values and norms are correlates in the context of understanding actions and interactions. The realization of a purpose is the realization of an observable object that has a certain value, and it is the value that is constitutive for norms for governing actions and interactions: if x has the value y, then x should be, or, in case of a moral value, ought to be realized.[61]

The first and second-order understanding of the purposes determines the understanding of efficient means for realizing the purpose in the process of the social interaction, i.e., in Schutz's terminology the "in-order-to-motives" determine the "because-motives."[62] The terminology of Schutz covers the aspect of the motivational relevance of the subjective lived experience of the participants in social interactions, i.e., the aspect that is of interest for interpretative social psychology and by implication according to Sect. 10.3, for individual psychology as well. However, the guiding purpose can be and was understood in pre-scientific philosophical ontology as a final cause that determines the selection and the order of the *objective* sequence of efficient causes for the process of the realization of the purpose. It is, therefore, in many cases possible that the first-order and then also a second-order understanding of social interactions imply an understanding of a context of causations. This first-order understanding implies the *expectation* and with it the *prediction* that the action or interaction will be able to realize the purpose with the aid of efficient means, including tools and techniques, if there are no unforeseen disturbances caused by external efficient causal conditions.[63]

(2) Interpretations in the social sciences have to be the result of a methodologically guided secondary understanding of the object, the *cogitatum* of the first-order understanding of the social interactions by the participants in the social interactions. The knowledge and understanding of causal relations in the present presupposed for the interpretation of social interactions in the present implies

[60]This is, for instance, at least questionable for psychoanalytic interpretations and ideology critique.

[61]This formula is a slightly extended version of the formulas that have been discussed in Sect. 4.5 on normative sciences in the *LI*. See also Embree 2006 and 2010b.

[62]Schutz 1967, 188–190; Schutz CP II 81, CP V "Reflections on the Problem of Relevance," §§2 and 3, cf. Embree 2015, ch. 10.

[63]Cf. Schutz and Luckman 1973, 3, C, 4 on typicality and prediction 238f.

both predictions of the future course of events and explanations of sequences of past events, all considered in terms of the future and past horizon of the present. Predictions can be confirmed or disconfirmed. It is, hence, *prima facie* reasonable to expect that it might be possible to test interpretations of social interactions in the social sciences by testing the predictions that are implied in the interpretation, because these interactions are themselves guided by a more or less explicit first-order understanding of their purposes as final causes and the efficient means required as efficient causes for the realization of the purposes.

As sciences of the present social world, the empirical social sciences emerged, as already mentioned, in a cultural lifeworld with natural sciences and a steady progress in the application of technologies in practical social interactions. Presupposing this cultural context, it was natural to assume that there are cases in which the participants in practical interactions are able to foresee and predict the consequences of their actions. The presupposition of this cultural context in empirical social research in a present with developed natural sciences implies the partially misleading expectation of possible applications of the methods of the natural sciences, first of all the methods of experimental research, and beyond that, even the application of mathematical models in the social sciences.[64]

Such expectations ought to keep in mind that, seen from the viewpoint of a phenomenological epistemology, the region of communications, purposes, actions, and interactions, values, and norms are bracketed after the first abstraction that is constitutive for the natural sciences. In contrast, what is in brackets for the cognitive attitude of the natural sciences is, on the one hand, of essential significance for causal explanations and predictions in the systematic human sciences in general, and especially in the social sciences. It is, on the other hand, also of significance that the first-order elementary understanding of practical social interactions in encounters with the natural environment, is according to the analyses of Sects. 7.2 and 9.2, one of the generative foundation of the first-order higher understanding of effective causal relations in the natural sciences.[65]

A solution for the problem of the relation between predictions based on causal relations and interpretations in the social sciences requires a phenomenological analysis of the structure of *rational* behavior, i.e., a behavior that is guided by a first-order elementary and higher understanding of causal relations in social interactions. The first-order understanding of the participants in social interactions already includes the understanding of the *prediction* that the purpose, the goal of an interaction, will be realized if the materials, the tools, and the techniques required for this success are available and no external factors interfere in the process of realizing the purpose.

[64]This is the assumption of the positivistic and analytic tradition in the epistemology of the systematic and even the historical human sciences. Cf. also the Introduction of Embree 2015.

[65]Cf. Sect. 8.1 on the generative foundations of the natural sciences.

Efficient causes that are determined by purposes in systems of rational social interactions can be called the internal conditions of the interactions. External causal conditions are the ideally *possible* causal relations between social interactions and those events in their natural or social environment that are of significance for the success or failure of the realization of the purpose of the interaction. These implicit understanding of causal relations that already occurs in first-order elementary understanding (and, therefore, also underlies the methodological structure of predictions) is of a higher degree of complexity in the social sciences than in the natural sciences.

A summary of what has been said until now is sufficient for the justification of the application of the general thesis of Sect. 10.3, i.e., the thesis about the possibility of the synthesis of causal explanations and interpretations in the systematic human sciences to the social sciences. Social interactions imply the dimension of *final causes* as purposes and *efficient causal relations* as means. This context is already given for the participants in social interactions in first-order *elementary understanding*, and then in higher understanding as well. This first-order elementary or higher understanding of the participants in social interactions can be understood in pre-scientific *secondary understanding* of their contemporaries, and finally also in the methodologically guided *interpretations* of the social sciences.

The consequence of this summary is that *the classical distinction between human sciences as sciences of understanding and the natural sciences as sciences of causal explanations and predictions does not hold water* for *present* interpretations of *present* first-order understanding of *present* social interactions of the participants in interactions. However, this is only a negative answer to the epistemological question about criteria for objectively valid interpretations and/or predictions in the social sciences. A positive answer requires further analyses of the specific intrinsic structure of the ideal types that can be applied in the social sciences. The ideal types that are applicable in the life sciences are, according to the examples given in Sect. 2.2 and then Sect. 2.3, first of all ideal types of the wholes of first order, i.e., organic wholes. Ideal types that are applicable in the social sciences to different types of social interactions are again according to the examples given in Sects. 2.2 and 2.3, wholes of a higher order.

What has been said about final causes is of significance for a positive answer to the basic epistemological question is just mentioned. Final causes, purposes determined by systems of values and determining the subjective in-order-to motives of social interactions, are of basic significance for the structure of ideal types of social interactions. Since final causes determine the selection of actions that serve as efficient causes for the realization of the purpose of the social interactions, ideal types are of basic significance for the interplay of between confirmed or disconfirmed expectations and predictions, on the one hand, and first-order elementary understanding and pre-scientific second-order understanding, not-understanding, and misunderstanding, on the other hand.

The first task is to analyze the specifications of such morphological ideal types and the special relevance of rational ideal types for research in the social sciences. The explication given of the meaning of "ideal type" additionally requires, according to Schutz, the explication of the meaning of "construct" not only as

a synonym of "ideal type," but also as a term that can be used as a methodical guideline for applications of different subtypes of ideal types in empirical social research. According to Schutz, a "construct" implies a methodological rule for the application of the construct and its substructures to the objects of empirical social research. The constitution of constructs requires the application of abstract ideal types to empirical material that belongs to not yet structurally articulated empirical types of social communities and institutions.[66] The next problem is the problem of the criteria of objective validity. Answers to this question have to begin with a critical evaluation of the list of Schutzean postulates like relevance, consistency, and adequacy that can be applied as guidelines for empirical research in the social sciences.[67]

According to Schutz, it is possible to use the term "ideal type" for certain essential dependent or independent partial structures of "course of action types." Schutz distinguishes (1) course of action types; (2) personal ideal types guided by typical in-order-to-motives; (3) cultural products or artifacts (including tools).[68] For Schutz type (2) can be derived from type (1) and vice versa. Type (3) can be understood as the realized product of (1) as guided by in-order-to-motives. The personal ideal types (2) are the ideal types or constructs that can be understood as puppets or *homunculi* in the classification of Schutz.

A precise understanding of this classification has to cope with difficulties. The main difficulty is that there seems to be a one-to-one correlation between a course of action type and a personal type. It follows that it will be difficult for Schutz to distinguish clearly between a phenomenological epistemology (*Wissenschaftslehre*) for the *social* sciences and a phenomenological psychology serving as a phenomenological epistemology for social psychology as an empirical science. It cannot be the task of a systematic investigation to decide problems of the interpretation of Schutz's theory of ideal types and constructs and his division of different types and constructs. What had to be emphasized is only that his theory is, though partially modified and extended here, the presupposition of a formal and material analysis of a system of different subtypes of the general type of ideal types that can be applied in the social sciences.

The comprehensive (1) ideal types that can be applied in the social sciences are not "course of action types" for individuals. They are course of social *inter*action types. The ideal type "social interaction" is a basic category of the ontology of the lifeworld in general, and as such a structural whole of the highest degree of

[66] Embree 2009c.

[67] Cf. in Schutz 1967, 237. The explications of the concepts "ideal type," "construct," and "postulate" ought not be understood as an *interpretation* of Schutz's theory of ideal types, constructs, and postulates. Instead, it prepares the explication of the application of these terms in the context of the *present* systematic investigation.

[68] Following Embree n.d. ch. 10 see for (1) Schutz 1967, 197, CP I 17, 40; for (2) Schutz 1967, 187–90, CP I 19, CP IV 101; and for (3) Schutz 1967, 187; CP II 81, and for the following see also Schutz 1967, 187, 196f., 227, 242.

abstract universality in the region of social phenomena in the lifeworld. Essentially *dependent* parts of social interactions as structural wholes are (2) the ideal types of purposes, their relation to value systems, and their realizations as artifacts with the aid of efficient causal means. Essentially independent parts, i.e., parts that can be parts of more than one structural whole are (3) the dimensions in the environment of the social interaction in the lifeworld in which the purpose can be realized, and finally, (4) the personal ideal types of the different course of action types, i.e., the different roles or functions of individual participants in course of social *inter*action types. The latter ideal types (4) imply the methodological significance of *social* psychology for the social sciences. Of interest for *individual* psychology is in addition the ability of individual persons to belong to more than one and to different types of social interactions.

A classification of different ideal types that are subtypes, partial aspects of ideal types (1) of social interactions, has to start with (2). It is usually presupposed tacitly, and has been implicitly presupposed in the preceding reflections, that the realized purpose in social interactions has the character of an artifact in the broadest sense and that the means to produce such artifacts have the character of effective causes in the *natural environment*. Such social interactions will be called *practical social interactions* guided by *in-order-to-motives* that determine subordinated actions guided by *because-motives*. However, there are also social interactions with the in-order-to-motive of introducing corrections or changes not in the natural, but in the *social environment*. Such social interactions, e.g., the election of leaders, interaction in a court of law, etc., can be called *civil social interactions*.

The social environment to which such civil social interactions are applied is the social environment of practical social interactions. Because the system of practical social interaction is supposed to be the object governed by civil social interactions, it is the static and generative foundation of these interactions. The limiting case between ideal types of practical social interactions and of civil social interaction is the use of instruments, e.g., weapons as efficient means in brute violence as a means of political power to end social conflicts. All ideal types of social interactions beyond this level are the rational (or better reasonable) ideal types of civil social interactions that have the general purpose of peacekeeping in systems of customs and the law.

The analysis of the system of further subtypes of social interactions has to start with practical social interactions because the social environment along with civil social interactions in a social lifeworld presuppose a system of practical social interactions as their foundation. Different types of purposes and the mode of their realization in practical social interactions determine two different ideal types of such interactions: (1) the ideal type of *bricolage* interactions and (2) the rational types of social interactions. An answer to the question why investigations concerning (2) have usually been preferred by social scientists while (1) has been often neglected will be given below. The structures of social interactions of type (1) are, however, the generative foundation of interactions of type (2) in a pre-scientific lifeworld, and still determine most of the everyday social interactions in a lifeworld with sciences.

(1) No explicit knowledge of the efficient causality guiding the search for means to realize the purpose is required in cases of *bricolage* ideal types. The technical term *bricolage* is borrowed from ethnological research in cultural anthropology, and means that the finding of means and the recognition of actions as means is the outcome of haphazard searches; it is also possible that the finding of certain means can change the original projection of the purpose. Two examples of subtypes of *bricolage* ideal types can be mentioned. (1.a) Some practical social interactions take place on the level of animalic understanding without any explicit first-order understanding of the purposes and means guiding the fulfillment of in-order-to-motives that are satisfied by the participation in the interaction. (1.b) Though there are interactions that do have an explicit first-order understanding of the purpose and are likewise satisfied by the participation in the interaction (e.g., dance, playing games, and singing together) most examples of this subtype of practical social interactions are interested in the realization of *freely* chosen purposes as "artifacts," e.g., the creation and enjoyment of works of the fine arts or poetry. Techniques based on conscious application of knowledge about efficient causal relations are of minor significance in such interactions. Required are the "free" associative intuitions of the genius.[69]

(2) Ideal types of *rational* practical social interactions requiring rational behavior from all participants, e.g., participants that represent the ideal type *homo oeconomicus*, must have purposes that are able to function as final causes determining a "rational" selection of efficient means and shaping the rational determination of the temporal sequence of the application of such means. The selection can be called *rational* because it implies the understanding of causal relations of ground and consequence. The understanding of the interactions by the participants has the general form: if the realization of a purpose P with the value V is desired, then x, y, and z have to be done in this order. Rational ideal types of social interactions presuppose a first-order understanding of efficient causality that is already more or less determined by the first understanding of efficient causality in the context of the natural sciences.

A *caveat* must be added. To call purposes of practical social interaction rational in the sense characterized above does not imply that the *choice* of such purposes as a guide for interactions is rational in the sense of being *reasonable*. There may also be some good reasons to prefer purposes for practical social interactions that are incompatible with rational practical behavior. It is by no means *reasonable* for Buddhist or Christian monks to choose purposes that are characteristic for certain types of rational behavior, governed by the leading purposes of participants in a market economy.

[69]Participation in and interpretation of such interactions requires the "re-living" in Dilthey's sense of the work of the "genius"; cf. Seebohm 2004, 60f., 160f.

A rational ideal type is "ideal" in a double sense. It is ideal as a ideal type of a social interaction, and it is ideal because the in-order-to motives obey the commands of the understanding of causal relations. The understanding of such types is already pre-given in the general structures of animalic and then in elementary understanding. What is understood on these levels is the function of efficient means in the realization of purposes and the fulfillment or disappointment of expectations.

The participants in rational practical interactions following the general patterns of rational behavior are able to predict the outcome of their actions in the course of their present experience and to observe whether the prediction will be confirmed or disconfirmed. Their first-order understanding of practical interactions having the general structure of such types can be understood by consociates and contemporaries in secondary understanding. An outside observer of a practical interaction who understands the system of causal connections that is determined by a certain ideal type of rational behavior is in turn able to predict the actions of the participants in the presently observed practical interaction. It is, furthermore, possible that the observer has a better understanding of the rational ideal type of behavior than the participants in the observed interactions do. The observers are in this case able to predict that the expectations of the observed participants in the interaction will fail, and such observers will accordingly be able to give some good advice for doing a better job.

Schutz characterized his investigations of 1932 as "*sinnhafter Aufbau der sozialen Welt.*"[70] Given the context of these investigations in the development of the phenomenological movement, "social world" has to be understood as "social structure of the lifeworld," i.e., structures as given in first and second-order understanding in the lifeworld. Thus Schutz's *Wissenschaftslehre* can be understood according to the original meaning of the German term as a phenomenological theory of the material categorial structures of the region of the social world as a part of the categorial structures of the lifeworld. However, there are other passages in Schutz's writings that indicate that this *Wissenschaftslehre* is also relevant for the sciences in general and for the epistemology of the *empirical* social sciences.[71] Of interest for a phenomenological epistemology reflecting on the methods of the social sciences is, first of all, Schutz's system of the postulates that can serve as warrants for the objective validity of ideal types in a phenomenological epistemology of the social sciences.

The first two postulates, (1) the *postulate of logical consistency* and (2) the – originally Cartesian – *postulate of clarity and distinctness*, are obviously postulates

[70]Cf. for what follows the discussion of the difficulties of this term (with numerous references to the writings of Schutz) the Introduction to Embree 2015.

[71]Cf. fn. 148: *Wissenschaftslehre* in Fichte is the deduction of the basic categories of theoretical and practical philosophy as an explication of the positing absolute acts, *Tathandlungen*, of the absolute I. *Wissenschaftslehre* in Bolzano is the explication of the categories of an ontological logic. However, in the development of the positivism of the nineteenth century in Germany in the wake of J. S. Mill, the term already covered epistemological reflections on the methodology of the empirical sciences as well.

for the applicability of theories in the empirical sciences in general. However, (3) the *postulate of relevance*, more precisely the postulate of *interpretative* relevance, is of significance not only for the methodology of the construction of ideal types, but also for the methods of verifying and falsifying of propositions that have been derived from ideal types in the social sciences. This postulate requires the determination of a scheme of reference, i.e., of the scope and the limits within which the relevant ideal types can be applied.[72] It can be understood as a specifying reformulation of a general methodological principle for categorial schemes that determine the application of basic categories in empirical sciences in general for the special purposes of the social sciences. What this third postulate really means in the social sciences can only be determined with the aid of the fourth and the fifth postulates, i.e., (4) the *postulate of subjective interpretation* and (5) *the postulate of adequacy*.[73]

(4) the postulate of subjective interpretation has a number of presuppositions. It presupposes that (4.a) the actors know where their action starts and where it ends, and what their "in-order-to-motives" and their "because-motives" are. In terms of the typology of understanding laid out in Sect. 3.2 of this investigation, actors have a first-order understanding of the purposes and the efficient means used for the realization of the purposes in their actions. (4.b) In social life, the individual actor's knowledge of the action also implies that this action is given as an aspect of an interaction in a shared intersubjective world, i.e., in a structural reciprocity of perspectives. (4.c) This subjective meaning can be understood by the partners of the actors who are also involved with the actors in the interaction because they share a set of purposes with these actors. Moreover it is understood, and this means it can be understood in *secondary understanding* according to Sect. 3.2 of this investigation, by consociates and contemporaries who are not immediately involved in the interaction. Interpretations of the subjective meaning of social interactions for the participants, the actors in such interactions, require in addition a secondary understanding that is not only not involved in, but also disinterested in the interaction. The difficulties connected with this requirement have already been considered in Sect. 10.2 and will be considered again in the end of this section.

(5) The *postulate of adequacy* in Schutz's system of postulates can be understood as a special version of the requirement of the testability, of the openness for confirmation and disconfirmation of hypotheses and theories in the empirical sciences in general, for the specific situation of the social sciences. Except for certain aspects of the postulate of relevance mentioned above, the first four postulates can be considered as methodological rules for the construction of theories in the social sciences, i.e., for the construction of ideal types of social actions and

[72] See "Reflections on the Problems of Relevance 3" and "The Interdependency of the Systems of Relevance" in Schutz CP V.

[73] About the system of postulates in Schutz's see Embree 2015 at the end of chapter 10 and the references there to Schutz 1967, 144, 241; CP I 24, 35; CP II, 18f, 85; CP IV, 22; and CP V "Positivistic Philosophy," etc., §3.

> interactions. The postulate of adequacy is the basic postulate for a methodology of confirming or disconfirming such constructs, i.e., it warrants the consistency of the constructs with their empirical basis. This means for the social sciences that the construct is consistent with common-sense representations of the social reality, i.e., the construct has to be understandable for the actors and their fellow humans in terms of their common-sense interpretation of the social interaction. Whether this is the case or not can be verified by empirical findings.[74]

Critical evaluations of difficulties connected with the postulates of subjective interpretation and adequacy have to start with a reminder. What was said about subjective meaning in postulate (4) and about adequacy in postulate (5) might be applicable in the social sciences, but it is not applicable for the problems of a methodology for interpretations in the historical human sciences. Interpretations in the historical human sciences are interpretations of fixed life expressions, first of all texts of authors who created them in a *distant past*. Given the a priori structures of intersubjective temporality in the lifeworld, it is impossible to ask in *present* communications with the actors/authors whether an interpretation of the subjective meaning of their actions or interactions is acceptable for them as an interpretation of their own first-order understanding of their actions or interactions. According to Sects. 5.3 and 5.4, it is not possible to consider the "original intention," i.e., precisely the subjective motives, of an author of a text as a warrant for the confirmation or disconfirmation of hypothetical interpretations of a text. The warrants of valid interpretations of fixed life expressions, first of all texts, are the methodological rules of text hermeneutics, and these rules refer to the context of texts of a text and not to its author. The original intentions of authors and actors can be given in the historical human sciences only in the reconstruction of a past reality in historical research in the narrower sense.

The basic deficiency that lurks behind this and other difficulties in Schutzean social science is that the methodology of philological-historical research that was developed since Schleiermacher and Boeckh in the nineteenth century was neglected in the epistemological reflections of both Husserl and Schutz.[75] Presupposing what was said in Sects. 10.2 and 10.3, it is impossible to apply these methods in the interpretation of *presently* observable social actions and interactions. Thus Schutz's postulate of adequacy is not applicable for the interpretations of the human sciences in general because it is not applicable in the historical human sciences. It is beyond that also not applicable if fixed life expressions, texts, are of central significance in branches of the social sciences, first of all the science of the law. This is, however, only an indicator of the real problem.

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[74] CP II 85 and CP V l.c. – The postulates of relevance and of adequacy can be understood as necessary implications of applications of an occasionally mentioned postulate of testability or verification for the empirical sciences in general of the positivistic tradition to the social sciences in Schutz epistemology of the social sciences.

[75] Cf. Sect. 4.3 above.

The basic problem behind these difficulties is that the interest in presently given social interactions presupposes a cognitive attitude that is restricted to one abstract dimension, an abstract moment of the concrete experience of social reality. The present in the lifeworld in general is always given as a dependent correlate of its past horizon and social research interpreted in presently given social interactions always presupposes and implies research in social history. Social history is, like history in general, only present in fixed life expressions.

Disregarding this dimension of problems there are two other difficulties for applications of the criteria mentioned in the postulate of adequacy. The first is an ambiguity. In Schutz's formulations the postulate refers to course of action types of *individual* actors. However, the subjective, *social psychological* aspect is dominating in the analysis of subjective meaning even for the requirement that an interpretation has to presuppose that the actors understand the action as an action in the intersubjective world, i.e., in a structural reciprocity of perspectives. Description of the structures of systems of institutional interaction by no means presuppose a positivistic behaviorism if they replace the metaphors "puppets" and "*homunculi*" by n-placed relations between nodes of functions, i.e., description of social roles. For a cognitive attitude that is interested in the description of such structures in a certain type of feudal society "king" is a function that can be satisfied by "variable" persons who function only as substitution instances. The "puppets" or "*homunculi*" as abstract schemes of concrete individuals occur only for social psychologists who are interested in the representations in which a king is given to members of the feudal nobility and the members of the feudal nobility are given for the king.

According to Schutz it is possible to test predictions about the future behavior of participants in systems of interactions or the future development of such systems in experiments.[76] Though it is only an occasional remark and not a postulate, this possibility is of basic significance for a critical phenomenological analysis of the postulate of adequacy. It is of significance because the epistemological structure of the experimental testing of predictions is an essential *partial* aspect of the application of the postulate. Other aspects will be considered below. The hypotheses derived from a pre-given ideal type in such applications are assumptions about the subjective meaning of an action in the first-order understanding of the action of participants in interactions. The quasi-experimental test is to ask the participants in the interactions whether they agree or disagree with the hypothetical interpretation of their first-order understanding. The hypothetical interpretation implied in the ideal type is confirmed if they agree. It is disconfirmed if they disagree.

There is, however, the possibility that a confirmation of a hypothetical interpretation will be followed by the disconfirmation of a hypothesis about future events in the development of a system of social interactions or in partial aspects of the system. This disconfirmation of a prediction implied in a quasi-experimental test is in such cases the correlate of a disappointment of the expectations of first-order understanding of the interaction of participants in the interaction. The confirmed

[76]CP I, 165; CP V, "Positivistic Philosophy."

interpretation and the disconfirmed prediction are compatible in such cases. Several types of *external* factors can be responsible for such situations, and there are also several types of *internal* factors that can cause similar problems.

(1) *External* factors in the strict sense are changes in the natural environment that cause destructions of the causal conditions of techniques or technologies used in practical interactions in the encounter with the natural environment. As in history, explanations of such changes are possible with the aid of causal laws borrowed from the natural sciences, but predictions of future events in the present presupposing such causal laws are also possible. Predictions of their consequences for social structures share the difficulties that will be mentioned in (2).
(2) Social history teaches that technical or technological innovations can change the structure of practical social interactions, and even the structure of whole systems of social interactions. Given a certain level of the development of technologies in a lifeworld with sciences, it is once again possible to predict the potential of developing new technologies again with the aid of theories borrowed from the natural sciences, but a prediction of the social effects of such *hitherto unknown* causal factors emerging *in the present* together with the innovations is *impossible*. The social effects of innovations can only be recognized by looking back at what has happened in the past after the emergence of the technical or technological innovations in social history.
(3) Conditions in the natural environment that can disturb practical social interactions and systems of practical social interactions can themselves be side effects of techniques and technologies that have been applied in the interactions and caused changes in the natural environment.
(4) Practical or civil social interactions in the social environment of a practical social interaction can be factors that disturb or even interrupt the realization of the purpose of practical social interactions. Closer considerations of the impact of these factors presuppose the phenomenological analyses of the basic structures of civil social interactions in the final two sections of this investigation.

External factors are first of all of significance for cases of the ideal type "rational practical social interaction," but predictions presupposing ideal types of this kind can also be partially or completely disconfirmed by *internal factors*, i.e., competing values and purposes determining the interactions of a system of social interactions. Such factors occur if not all groups of participants in the same systems of social interactions are guided by the same purposes, e.g., workers and trade unions versus management and shareholders. They occur, furthermore, if there are conflicts in cases in which an individual or groups of individuals participate in different systems of interactions with different purposes, values, and duties, e.g., duties as family members or members of religious communities and membership in the higher ranks of economic or political systems. It is possible in such cases that choices of efficient means for the realization of goals in one system are prohibited by the other system, e.g., the charging of interest for a banker who is a faithful Muslim.

There are also no problems with predictions about the outcome of practical social interactions that belong to the level of animalic understanding. First-order animalic understanding by itself is originally given in communications via immediate bodily life expressions. Communications referring to contents of animalic understanding on the level of linguistic expressions are determined by systems of higher understanding. Predictions that can be confirmed or disconfirmed in experimental tests can be *borrowed* from the life sciences and/or from experimental psychology.

Difficulties occur for ideal types of "free" interactions because justifications of actions referring to efficient causality are not needed, and are even suspicious in the context of such interactions. Such free interactions can be characterized as *bricolage* because they are not determined by references to causal efficiency. The general difficulty for applications of the postulate of adequacy in such cases is that it is meaningless to ask for because-motives referring to efficient causal connections.

Of interest in this respect are interactions of artists creating works of art as their "artifacts" and their "audience" of more or less active participants that have the "taste" to appreciate such works of art. Of basic significance for the development of social structures are, however, first of all the "works" of shamans, of prophets and enlightened spiritual leaders, of philosophers, and of scientists as creators of a "scientific worldview." Of significance is, hence, what belongs in general to the literary tradition of genres of *higher understanding* or, in other words, all cultural interactions and their products along with the social structures of the consumption of such products that are usually considered as belonging to the *higher education* of a cultural tradition.

It is impossible to confirm or disconfirm interpretations of practical social interactions of this type with the aid of confirmations or disconfirmations of predictions because no significant references to causal relations are implied in first-order understanding of the authors and the "consumers" of the artifacts of such practical social interactions. The "works" produced by such social interactions are supposed to be at least in part created "under the influence" of "*original* inspirations" and to be "works of *genius*" in the case of works of art, philosophy, or basic new ideas in the sciences,[77] but also in the case of prophets of divine revelations. These original inspirations usually determine both the purpose of the interactions *and* the means that are able to realize the purpose all together in one step.

This list of internal factors is not complete but it is sufficient to shed doubts on the assumption that interpretations of social interactions of this type can be confirmed or disconfirmed if the participants in the interactions admit in interviews that they agree or disagree with the interpretation. A "testing" of an interpretation of, e.g., a religious ceremony, requires more than asking some deliberately chosen participant about what the ceremony means in her/his everyday understanding of the ceremony. It requires, hence, more than the version of a postulate of adequacy that might be sufficient for testing interpretations derived from rational ideal types, e.g., in economics.

[77] See Sect. 4.1 on Boeckh and the work of the genius.

The above-mentioned internal factors belong to the subtype of abstract ideal types that determine the subjective attitude and the in-order-to-motives of participants or groups of participants in an interaction. Social and individual psychology are able to use diagnostic interviews in order to discover causes of abnormal behavior and attitudes in the "everyday" understanding of the social environment of certain individuals participating in social interactions that require rational behavior. Such discoveries presuppose the objective validity of a pre-given interpretation of the intersubjectively recognized purposes, guiding values, and effective means of social interactions. It is, however, also a basic methodological assumption of the postulate of adequacy that hypothetical interpretations of social interactions can be confirmed or disconfirmed in diagnostic interviews of participants in the social interactions. There have been at least *prima facie* no problems for this implicit methodological assumption in the postulate of adequacy in cases of ideal types of interactions that require rational behavior.

Difficulties surface for cases of ideal types of the above-mentioned "free" interactions. It is tempting in such cases to propose a return to the methods that can be applied in the history of ideas. The problem is that the empirical basis for this type of research is restricted to fixed life expressions of predecessors in the past. Only the methods of philological-historical research are left for the evaluation of the objective validity of hypothetical interpretations. These methods require the strict separation of the interpretation of fixed life expressions, texts from the application of the truth claims of the text tradition in the present, but the re-enacting of the objective meaning connected with the immediate recognition of their truth claims is precisely what happens in such social interactions.[78]

Of interest in this respect are also the so-called "interpretations" of fixed life expressions that happen in present social interactions, e.g., the "interpretations" of a symphony or a tragedy, but also of religious ceremonies and cults. These interpretations have the character of "re-living" a work of art or, in the case of religious traditions, of acts of "practicing" a religion. The ideal type of such re-enactments presupposing the unity of interpretation and application includes and presupposes knowledge borrowed from the storehouse of results of philological and historical research. However, in acts of re-living, such knowledge only has the function of a handmaiden of the creative re-enacting of the work of the genius or the revelations of the prophets. This type of "interpretation" cannot be considered as the outcome of the application of the methodology of an empirical science interested in a theoretical confirming or disconfirming of hypothetical interpretations. They are themselves an object, but not an outcome, of research in the social sciences as empirical sciences.

According to Schutz, interpretations of systems of social interactions are adequate according to the postulate of adequacy if they can be "verified by empirical findings." This verifying has to be the result of the answers of participants in a

[78]Cf. Sects. 5.3 and 10.2.

social interaction to questions about their first-order understanding of the meaning of the actions and interaction. What has been neglected in the epistemological analyses up until now was that the testing of the predictions in applications of the postulate presupposes the context of communications between the researchers and the "objects" of their research, i.e., the participants in an interaction. There is, hence, the possibility that the foundations for the above-mentioned difficulties can be found in a phenomenological analysis of this aspect of the postulate, as well as the further possibility and that this analysis will be of significance for phenomenological reflections on epistemological difficulties in the application of the postulate to interpretations of all social interactions.

Two steps in the methodological procedure required by the postulate of adequacy must be distinguished. The first step is the construction of the ideal type that implies the interpretation. The material basis of this "construction" is the pre-scientific second-order (and perhaps also first-order) understanding of social scientists. The methods for constructing first empirical and then ideal types have been considered at the beginning of this section. The second step is essential for the epistemological problem of a possible confirmation or disconfirmation of the interpretation in the social sciences as *empirical* sciences. The difficulty is that such "interviews" have a structure that must be distinguished from the structure of diagnostic dialogues, i.e., dialogues that can be applied in psychological research interested in the reactions of the participants to their social environment, because such dialogues presuppose already established interpretation schemes for social interactions, e.g., schemes determining psychoanalytic approaches in the diagnosis.

In contrast, the dialogue of the social scientists with the participants in a system of social interactions has to be a productive and not a re-productive dialogue, and first of all not a diagnostic dialogue. The goal of the dialogue is the discovery and possible elimination of misunderstanding and not-understanding. In such interviews social scientists have to explain their theories in "simple" terms before asking whether their clients agree or disagree. Since the explanation is already a part of a process of productive interpretations in dialogues, it is possible that the participants in the interaction will agree simply because the explanation has explained to them what they are really doing and consider their own former self-understanding as false. But they may also agree or disagree because they misunderstood the explanation. Finally, the outcome will be a more or less radical mutual not understanding if the religious, ideological, or even scientific categorial systems of the construction of the ideal type and the self-understanding of the participants and/or of different participants in the same system of interactions are incompatible.

The process of the communication between researchers in the social sciences and their objects has not reached its end after a confirmation or disconfirmation of the proposed interpretation of the participant's first-order understanding of the social interactions. Critical reflections have to keep in mind what has been said in Sects. 10.2 and 10.3 about the results of research in the systematic human sciences, and especially in the social sciences, as factors in the set of initial conditions of events in future social interactions. A theory in the social sciences based on

empirical social research is itself a factor in the development of practical social interactions in the future. It is a factor because it is able to predict the effects of the introduction of adding or removing efficient causal factors that can cause improvements or avoid damages. The factor in question is external for the rational practical social interaction as an object of the observations of social research. However, it is an internal factor in possible communications between participants of the observed interactions and the social scientists as observers. Presupposing this along with what has already been said, it is possible to summarize the viewpoints that are necessary for a more detailed explication of the requirements for being a "disinterested observer" in the empirical sciences.

Research in the empirical *sciences* presupposes a *theoretical* interest in methods that are able to confirm or disconfirm theorems that are derivable from theories. The applications of such methods require practical actions and/or interactions of researchers, e.g., the interactions of experimental research. The applications of the methods and the practical interactions connected with them must be separable from all further interests in applications of confirmed theories for inventions of technological means that can be used in practical interactions, i.e., interactions that are guided by an interest in the realization of objects that serve certain practical purposes. The theoretical interest requiring "disinterested" observers is disinterested in technological application of the theories.

Disinterested research is only possible in a discipline in which theories and the practical application of the theories in technologies are separable. Such separations are possible in a science if the methodological abstraction that includes the region of the objects of the science in its residuum excludes practical interests in realizations of objects that presuppose technological applications of the theories. Such methodological abstractions are possible if they determine a distance between the subject, i.e., the concrete person of the researcher as the actor behind the cognitive and practical activities of theoretical research, and the ontological realm of the objects of research.

The presuppositions for the constitution of such a distance are conditions that are pre-given in specific temporal structures of the relation between the cogitative types and the objects given in these cogitative types. Research in the natural sciences is separated from the realm of its objects because what the methodological abstraction that is constitutive for the natural sciences includes in its residuum is nature given as a universe existing in the medium of an objective mathematically explicable time/space continuum given for the researchers in the natural sciences. As a transcendent object, this time/space continuum transcends the continuum of the intersubjective temporality of researchers and with it all practical interests in realizing objects of possible in-order-to motives.

The first canon of the philological-historical method separating interpretation and application separates the social context of the historians and the context of the objects of historical research. The separation is a methodological abstraction that has its one-sided foundation in the passively pre-constituted temporal distance

between the experience of past and present reality in intersubjective temporality. The temporal structures that determine research activities in the social sciences imply two temporal perspectives. The social sciences can be considered as an annex of social history, i.e., as the attempt to develop a classificatory system of different empirical and then also of ideal types of systems of social interaction based on historical experience. For this perspective, as in history, the present only occurs as a limit of the empirical basis of research. The situation is different for the temporal perspective of empirical social research that is first of all interested in the *present* as the center of its research. The historical past is only of interest insofar as it is relevant as the past horizon of the present.

The universe of the objects of social research, the social interactions with participants interested in the goals and means of the interactions as the objects of social research, and social research itself coexist together in the same present. The question is whether or not and how a methodological abstraction that can be constitutive for a strict separation between the social researchers, on the one hand, and the objects of research, on the other hand, is possible for this perspective of the empirical social sciences. This question is not a question for a "phenomenology of the social world." It is a question for a phenomenological epistemology of the empirical social sciences. Relevant for an answer to this question is the following summary of the descriptive analyses of basic structural aspects of empirical research in the social sciences.

(1) According to the principle that only everyday experience can serve as the foundation of conceptualizations and theory-building in the social sciences only the *present* situation of social research can serve as the empirical basis for the abstracting and constructing of ideal types or constructions in the social sciences. According to the outcome of the preceding analyses of the pre-scientific first-order and second-order understanding of social interactions, this means that social researchers are in themselves participants in these interactions in the beginning. However, the attitude of a social scientist who wants to be a disinterested observer presupposes a methodological abstraction. This abstraction has to bracket all interests implied in the first-order and second-order understanding of interactions from the cognitive attitude.
(2) As objects of eidetic abstractions and constructions "ideal types" are a-temporal. The cognitive attitude in which ideal types are given requires a methodological abstraction that includes in its residuum only material and formal essences. The methodological abstraction excludes objects given in materially empirical *reality*. Excluded are, hence, all practical interactions that are interested not only in the *realization* of objects and states of affairs, but also in discovering *real* objects that might serve as efficient means in a process of the *realization*. The phenomenologist who has a theoretical interest in a "phenomenology of the social world" is, therefore, in this sense a disinterested "observer" of ideal objects. It is of epistemological significance,

that (2) admits a meaningful explication of the postulate of adequacy. A description of ideal objects in general, and especially ideal types, can be called adequate if contemporaries starting with a similar material basis for variations in imagination, the same cogitative types, and the same thematic attitude accept the assertion that a given description of an ideal structure is intuitively evident.

(3) Research in the *empirical* social sciences is, however, first of all interested in testing whether the interpretations that can be derived from the empirical or ideal types can be confirmed or disconfirmed in *present* observation of *real* social interactions. These observations require active communications and interactions with participants who are involved in the systems of practical interactions under investigation and these communications are themselves a part of the system of communications in a society with empirical social sciences.

It is *prima facie* tempting to call any propositions used in predictions based on previous experiences or derived from interpretations of social interactions "adequate" if they are confirmed. "Adequate" in the sense of (2), however, is an epistemological term for degrees of evidence in intuitions of a-temporal ideal objects. A proposed empirical thesis or theorem that is *now* accepted as a confirmed proposition can be disconfirmed in the future. The meaning of "adequate" in the sense of "confirmed" in the context of (3) must be distinguished from the meaning of "adequate" in the context of (2). It is, therefore, inadvisable to use the term "adequate" in epistemological and methodological contexts in which "to confirm" refers to *real* events that have been expected in the future of a past now and can be observed in an actual now.

(4) It has been mentioned above that a present publication of results of research referring to presently given events in the systematic human sciences will itself be one of the initial conditions in causal connections that can be of significance for further predictions of future events. In other words, it is possible with a publication of results of social research that the objects of research, i.e., participants in social interactions, recognize what is published as a correct analysis of their own situation. Since they are interested in correct predictions of all events that are relevant for the realization of their purposes, they will modify their interactions according to the predictions of the theory. The practical or civil system of interactions that is guided by the interest in the realization of a purpose is in such cases itself an experimental test of a prediction that has been derived from a theory published by the scientists and accepted by the "objects" of the theory. The consequences can only be spelled out in detail after an analysis of the epistemological problems of economics, the law, and political science. They are of basic practical significance for the whole society; they refer to rational ideal types, i.e., theories of rational behavior governed by the application of causal relations; and especially in economics they admit the application of mathematics.

10.5 Economy as the Region of Practical Social Interactions in the Lifeworld

Economics, originally a discipline of practical philosophy,[79] emerged as an empirical science in a cultural lifeworld in which technologies that were developed with the aid of the natural sciences had already replaced many of the pre-scientific techniques used in practical social interactions. Of interest for economics as an empirical science are practical social interactions considered as economic interactions guided by the purposes of the production and trading of goods and of materials for production. What has been said about technology and practical social interactions in the preceding sections will be presupposed for the following analyses. Trading goods, etc., in the cultural context of lifeworlds with natural sciences and technologies presupposes a market economy with a developed monetary system. Since the sixteenth century economic systems of this type have been of vital significance for the increase of wealth, and with it the distribution of political and military power in and between states in the age of absolute monarchism.

Reflections of a phenomenological epistemology on the methods of *empirical* economical research must take into account that the *empirical base* of such research was and is restricted to this type of an economic system because only this type was and is given for empirical economical research *in the present* for societies with natural science. Economic research interested in the phases of the generation of the economic systems before the advent of a fully developed market economy has to presuppose the methods and results of historical and ethnological research.

Epistemological reflections on the methodology of empirical economic research require an analysis of the static structures and the generative levels of the development of a market economy with a monetary system. The first task is an analysis of the necessary dependent parts in the whole of the static structure of the ontological region of the empirical basis of this research. The initial step of such an analysis is to determine the static and generative structural aspects of the ideal type "*market economy*" that justify the interest in *predictions* of economic developments, and beyond that the *application of mathematics* in the definition of the basic ontological categories of this ontological region.

According to a widely accepted though rather inadequate slogan, a discipline is an empirical science only to the extent to which mathematics is applicable in the discipline. Mathematics had already been applied in *pre-scientific* techniques used in practical interactions on the level of elementary understanding, and this application was one of the generative foundations for the emergence of the hard natural sciences. The application of mathematics in the hard natural sciences requires that the basic categories of the science can be defined in terms of mathematics. The "conditions of

[79]The author of the first book on economics in the Aristotelian tradition was probably Theophrastus. Latin translations with some extensions existed since the first half of the thirteenth century.

the possibility" of this application of mathematics have been considered in Part III.[80] Economics is a systematic human science admitting an application of mathematics that is *prima facie* similar to the application of mathematics in the hard sciences.

The application of mathematics to objects of an ontological region presupposes definitions of the basic categories of the region in terms of mathematical equations and must be distinguished from the application of mathematical statistics in the probability calculus.[81] The application of mathematics to ontological regions refers to *objects* and relations between objects in the region. The application of mathematical statistics in the probability calculus refers to the probability of *predictions* and differences of the statistical weight of the efficiency of factors in the ensemble of antecedents of predictions. Statistics and the probability calculus are, therefore, also applicable in the "soft" life sciences, in the historical human sciences, e.g., philology,[82] and in the systematic human sciences, e.g., psychology.

The main epistemological task is, hence, a phenomenological analysis of the foundations, the "necessary presuppositions of the possibility" of the application of causal explanations and mathematics in the theories of economics as an empirical social science, and this task requires a precise explication of the generative and static structure of the ideal type "market economy." Seen from the viewpoint of economic research and economic theories, such an explication would merely be a trivial re-definition of basic economic concepts in the terms and context of the phenomenological analyses of practical and civil social interactions in the lifeworld. However, the purpose of these considerations is not to enhance economic research.

The first task is to determine the specific ideal types of practical social interactions that serve the production of artifacts as goods, the exchange of goods, and the application of technologies in the production of goods. The second task is to prepare the ground for a phenomenological solution of the epistemological problem of the necessary presupposition of the possibility, and the foundations of the applicability, of mathematics in economic theories, determining "its scope and its limits." This solution should be also able to determine the difference between the application of mathematics in the hard natural sciences and in economics as an empirical systematic human science.

A sketch of the basic structures of archaic economies and the generative foundations of economies applying technology in the practical and civil interactions of monetary market systems is necessary before turning to the phenomenological analyses of the epistemological problems of empirical economical research. Two types of social authorities can be distinguished in such systems of social interactions, the authorities determining the process of practical interactions serving the production of goods and the authorities determining the distribution of goods and

[80]Cf. for the following Sects. 8.2, 8.3, 9.1.

[81]Mathematical statistics can also be applied in the definitions of the categories of a region in the hard natural sciences, e.g., in the statistical theory of gases and then in quantum theory.

[82]Simple statistical investigations, e.g., for determining the frequencies of words used in a text, can be hints for the solution of the problem of identifying authors of texts.

sources for production within the community of participants in the interactions. The leaders of practical interactions in pre-scientific cultural contexts are the experts, the "masters of the craft," who know that and how the applied techniques work and how to use them. Their leadership is recognized as legitimate leadership because of their success in practical social interactions in the encounter with the natural environment in the broadest sense.[83]

The authority of experts in social contexts of practical interactions can be, but is not necessarily, identical with the authority for the distribution of the products, the goods. The distribution of goods in archaic communities in which the participants in practical social interactions are more or less identical with the community of consumers was the task of the "political" authority of the head of the family or the clan, and was guided by the rules of customs. The original owner of the products produced by the participants in practical interactions is the community of participants. There can be some kind of ownership of certain tools and weapons used by individuals on this first-order level of the development of practical interactions, but there is no private ownership of goods in such contexts. However, this does not mean that all participants have an equal access to the consumption of goods. Some have privileges that others do not have.

In more fully developed economic system, distribution of goods outside the clan, one's own archaic community, was in further developed economical systems possible in interactions of individuals exchanging goods, commodities. Such trade interactions are second-order practical interactions that are one-sidedly founded in the first-order practical social interactions of the production of goods. Barter in and between archaic social communities is the exchange of surplus products or goods of a community with surplus goods of another community.

Developed market economies presuppose techniques and then technologies that are able to promote the production of artifacts for trade. The systems of means of production that can be observed in *empirical* economical research have been and are one-sidedly founded in presently available techniques and technologies. Social history shows that early types of practical social interactions using only pre-scientific techniques in the production of artifacts are already perfect examples of ideal types of rational behavior in social interactions. The elementary understanding of such practical interactions implies the understanding of efficient and final causality, and it is able to apply arithmetical and geometrical techniques wherever the materials found *in the natural environment* admit measurement techniques.[84]

The experts in practical interactions using techniques in pre-scientific contexts are the above-mentioned "masters of the craft." The experts in practical interactions using technologies in cultural contexts with developed natural sciences are engineers. Like the masters, engineers know that a technology works and how to use it, but they also able to explain why and how the technology works. This ability presupposes expertise in the results of research in the natural sciences and this

[83]More will be said about practical social interactions, techniques, and technology below.

[84]The results of Sects. 8.3 and 10.2 are presupposed in the following analyses.

expertise permits the application of such results not only for the enhancement of already used techniques and technologies, but in and, beyond that, the systematic search for technological innovations.

The methods as well as the empirical basis of the observations of empirical economics presuppose a cultural lifeworld with natural sciences. Social structures determined by practical interactions applying only pre-scientific techniques are possible objects for social history, but they never have been and never will be possible objects for *empirical* economical research in the *present*. They might be objects for ethnological research, but like research in social history, this research will first of all be interested in the *interpretations* of the mythological contexts of higher understanding that "explain" the techniques given in first-order elementary understanding. This is one of the reasons why empirical economic research could only emerge in a period in which the means of production for products presupposed technologies. Technologies are only of immediate significance not only as effective causes determining the structures of the production of goods, but also as effective causes determining changes in the development of social structures in the system of means of production.

Natural science is able to predict how a given technology is able to realize this or that purpose. It is also able to predict to what extent the application of the technology will cause desirable or harmful changes in the natural environment. Economic research is first of all interested in the present social structures of the community of the participants in practical interactions that are determined by the application of certain technologies. Meaningful predictions referring to the course of events in economic structures that are determined by means of production are possible in periods without significant changes in the natural environment or changes caused by inventions of new technologies.

Given such situations, empirical observations that explain *partial* social structures of different systems of practical social interactions are possible for observers, who are not involved in the practical interaction itself. The application of experimental methods is possible because observations of the actions of participants in practical interactions admit the interpretation of such observations as observations in experimental situations.[85] The task of the following analysis is the explication of the generative and static structures that are implied in the ideal type "market economy." And, as indicated, the analysis of this ideal type is necessary to prepare the ground for an epistemological justification of the application of causal explanations and mathematics in economics.

Setting aside changes in the natural environment inventions of new techniques and technologies are able to change social structures of entire systems of the production of commodities in a market economy. Natural sciences are able to predict possible technological innovations and the consequences of the application of such inventions for the natural environment. However, they are not able to

[85] An observation of a technology that "works" in an interaction confirms a hypothetical prediction that it will also work in realizing a purpose in the future.

predict the economic and general social consequences of the application. Empirical economic research is neither able to predict future innovations nor able to offer theoretically justifiable hypothetical predictions about the economic success or failure of innovations and of the social changes that will be the effects of the introduction of a technological innovation.

It is indeed possible to give a more detailed account of circumstantial conditions in the past horizon of the actual present, and thus after an innovation happens economics is able to offer *with hindsight* plausible *explanations* how and why such economic and social changes happened after the application of technological innovations. But no reliable theoretical analysis of the initial conditions of the situation in which a new technology is applied is possible. Predictions are possible in case of small enhancements that trigger small changes in the circumstantial factors of the situation. Real innovations like the invention of the steam engine cause "industrial revolutions."

The first step in the development of trade systems beyond archaic economical structures is the production of goods not for consumption in one's own community, but only for exchanging them for goods (not yet for money on this level) produced elsewhere. Trade in general is the *second-order* civil interaction of the transaction of goods that are products of *first-order* practical interactions. Trade as barter then comprises the second-order civil interactions of professional traders who exchange products or goods for products or goods. A series of such transactions starts with acquiring products from producers of commodities and ends with exchanging the commodity with a consumer for some other products. Trade implies the separation of production and consumption. Trade is, hence, a second-order *mediating* civil social interaction that is one-sidedly founded in first-order practical interactions, the production and the consumption of goods. Mediating practical interactions are, like other practical interactions, originally understood in first-order elementary understanding.

Products acquired from the producers in exchange for other products produced by other producers are the property of the trader until they are traded in for other products. This intermediate property of traders is now *abstract individual private property* and this type of property consisting of things neither used nor consumed by the owner is only given as a dependent part in the system of a market economy.[86]

The immediate purpose of trade interactions for the merchants as participants in the interaction is to provide support for their needs and desires in trading some of the goods in their possession for goods that can be used for their own consumption. This type of civil interaction implies the possibility of increasing the wealth of the traders, i.e., the amount of goods in their private possession that can be used, but

[86] An economic *liberalism* presupposing the quasi-metaphysical principles of isolated "free" individuals as original economic actors and private labor as justification of ownership is, seen from the viewpoint of social and economic history, a myth. Individual ownership makes sense only on the level of the trade of products in a market economy. A *feudum* in feudalistic societies was not understood as private property in this sense.

are not yet used, in exchange for goods for consumption. Trade in general offers additional[87] and effective possibilities of raising taxes for the support of the political power of governments. Rather complex systems of this kind existed long before the emergence of economics as an empirical science. The significance of a developed market economy not only as a system of the distribution of goods and wealth but also for the distribution of power and for legitimate lawgiving will be considered in the next section.

The last step in the generation of the foundations of a market economy is the development of a monetary system for purposes of the mediating practical interactions of trade, including the trading of money for money, of lending and borrowing. The participants in the mediating practical interactions of early market economies used measurable units of rare materials, e.g., gold, as standards for measuring the *price* of the *value* of goods. Paper money is a last step leading to a fully developed market economy, a step that reveals, quite apart from its practical advantages, the abstract mathematical character of the category "market value" as a measuring rod for the value of commodities at different times and places. The participation in market interactions required, hence, skills in arithmetic as well as algebraic techniques and techniques of measuring all factors in other interactions that can be of significance for the calculation of the price of commodities. In other words, all categories that can be of significance in the context of a market economy must have definitions in terms of mathematical formulas.

These techniques of reckoning and measuring are given for the participants in market interactions in first-order elementary understanding and then partially in higher understanding. The progress of mathematics on the level and in the medium of the elementary understanding that had to be applied by the merchants had been taught by the "masters of reckoning." For them mathematics was not yet an abstract academic discipline requiring the theoretical cognitive attitude of a science. However, the development of mathematical skills in the context of early market economies was one of the foundations for the emergence of modern mathematics as a science and its application in the methodology of the modern empirical sciences.[88]

This short "history" of the generative foundations of the region of objects for economical research already indicates the difference between the application of measuring and arithmetic to objects given in the natural environment of first-order practical interactions and to objects that are given as merchandise in trade systems. Objects given in practical social interactions in the encounter with the natural environment are objects used as tools or produced in first-order practical interactions, either for consumption or as tools in other practical interactions. Such objects have as purposes or realized purposes *values* with different *material*

[87]The simple form of raising taxes used by administrators of political power is the immediate confiscation of goods from the producer of goods and "delivers" in turn the promise to defend the producers – and later in addition the merchants – against "illegal" violence from outside and inside the community.

[88]Cf. Sect. 8.3.

qualities. The material quality of value pertaining to a desired object is an *intrinsic* abstract property as a dependent part of the object as a whole. Purposes that can be realized in first-order practical interactions and the finished products of such interactions are valuable objects because they are the objective correlates of desires. Some desires and their correlates are needs. What needs and their correlates are is given in animalic understanding. Other desired values are the values of tools and materials needed in first-order practical interactions. They are given in the intentional acts of elementary understanding. Some values belong to objects of higher understanding, e.g., aesthetic values of a poem or the religious value of a cult.

The first step toward an application of mathematics in practical economic social interactions in the market, and then in economics as an empirical *human* or cultural and *not natural* science, is barter. An object O is a concrete first-order whole given in elementary understanding as an intersubjectively given object in practical social interactions.[89] Objects are, as such, physical things. A person P is also given as an object that represents the Other, and the Other is originally given as a living animate body.[90] Objects (including other persons) that are given in cogitative types implying practical interactions are given as measurable and countable objects (n)O, (m)O, where n, m, ... are numbers. The ability to count collection of objects or to measure the weight or the size of objects has its original foundation in techniques used in practical interactions. Techniques of counting and measuring objects were essential tools for determining the quantities of exchanged objects in trade relations.[91] Objects of this kind are originally given as purposes of practical interactions. Realized purposes are desired objects, and objects are desired because they have an *intrinsic value*, iv. Objects can have iv as Oiv only as materials for or as products of *first-order practical interactions*. Objects can have in addition a value in *second-order practical interactions* in which objects obtain a *trade value* tv. An object has tv as Otv only at the time at which it is traded for Oiv in a transaction. An analysis of the structure of secondary practical interactions, i.e., of *trade* interactions, must start with the simplest structure. The simplest type of trade interactions is barter.

Barter is a reciprocal relation of a higher order between two three-placed relations, the asymmetrical relation between two persons P1 and P2 and an object O. P1 is in one direction or perspective of the reciprocal relation of a higher order the buyer of an object O2, and P2 is the vendor of O2. P2 is in the reciprocal opposite direction the buyer of O1, and P1 is the vendor of O1 in the other perspective.

[89]The formal-ontological terminology used in the following analyses is the terminology of the phenomenological theory of the whole and the parts introduced in Sect. 2.2.

[90]What has been said in Sects. 3.1 and 3.2 is presupposed for the understanding of "object," "Other," "intersubjectivity," and related terms.

[91]What will be said in the following passages of this section about quantification, counting, and measuring of objects that are given as first-order wholes in elementary understanding presupposes the analyses in Sects. 8.3 and 10.1.

P1 desires the object O2 with the intrinsic value Oiv2 for consumption. In its relation to O2, P1 is a consumer. P1 is furthermore the producer of O1. P1 offers his O1 for the desired Oiv2. P1 is willing to give O1 because P1 does not desire O1. O1 has, hence, for P1 only the value of "can be given for something else," but this implies that in the perspective of P1, O1 has only a trade value tv and is, in short, an Otv. Given the reciprocal character of the barter relation, it follows that O2 has the trade value tv and O1 the material intrinsic value iv for P2. Seen from the perspective of P2, O2 is an Otv. In barter trade, the trade value Otv is always the trade value of different objects for different persons.

The first presupposition for trading in market interaction in general is the *invention* of objects Otv that have the function of representing the trade value for all other objects that have an intrinsic value iv for all persons that are interested in trading objects. Such intersubjectively given objects admitting the objective identification of tv presuppose the trade transactions in the market as a system of interactions between participants exchanging objects in transactions mediated by identifiable and quantifiable physical objects Otv. The invention and introduction of independent objects Otv is the static and generative foundation for the development of market economies. The smallest *partial* model of such a system is a trade interaction with three participants,[92] two persons P1 and P2 and in addition as a mediating third person the merchant Pm. P1 desires O2, but P1 now not only represents the production of a valuable object O1. He is in addition also the owner of an Otv. Pm owns O2 and is willing to give it to P1 for an Otv that is in this context a physical and identifiable bearer of the trade value of O2 for Pm, but also for P1 in Pm's secondary understanding of P1. Pm and P2 are able to get involved in a trade interaction with the reverse order of O1 and O2 mediated by a third object Otv.

It is, furthermore, essential for the difference between barter interactions and transactions on the one hand and trade interactions and transactions on the other that barter requires an immediate interaction of P1 and P2 at the same time in the same place. Even the smallest partial model of the ideal type "market interaction" already admits that there is no immediate interaction between P1 and P2. There are only immediate interactions between P1 and Pm and between P2 and Pm, and each of them can take place at different times and places.

Market interactions in general, including the smallest partial model of trade interactions in a market, do not only require that Otv is given as an identifiable physical object. It is also required that Otv can be used as a measuring rod of tv for all possible objects with an intrinsic value iv, i.e., the value of a commodity for consumption, offered for transactions in the market. The countable or measurable quantity of objects O1 and O2 in their function as Otv in barter trading is incommensurable because O1 representing Otv for P1 is different from O2 representing Otv for P2. If a *quantifiable* Otv is pre-given, however, all quantities

[92]The simplified general model is not a theoretical construction. Merchants selling and buying merchandise at the door to interested persons and trading in the general store in a small village are concrete instances of the formal structure of this model.

of objects with an intrinsic value for possible consumption will have a quantifiable counterpart Otv and vice versa. The quantity m or n of Otv for which an Oiv can be bought as a *commodity* is the *cost* for the buyer. The quantity of Otv for which an object with iv is offered to be sold by the vendor is the *price* of the commodity.

Note that Pm was the owner of O1 and O2 before the two transactions of O2 and O1 to P1 and P2 took place, and after the two transactions Pm is the owner of n + m Ovt. Pm is, hence, able to buy O1′ and O2′ not only from other P1 and/or P2, but also other producers, or even other merchants beyond the structure of the smallest partial model. The trading interactions between Pm, P1, and P2 can begin again, but such continuation implies the possibility of a transition to the market economy in which objects are given as products and commodities for participants that interact as buyers, vendors, producers, consumers, and merchants. The chain of trade interactions and transactions of objects, of commodities, starts with a producer who offers a product for a chain of merchants as a commodity for possible consumers. The chain ends with the last buyer, i.e., the consumer or user of the commodity.

Quantities of units of Otv are "running around" between the participants of this extended model of the ideal type "trade in a market economy," and these quantities can be called quantities of a currency. Currencies must admit intersubjective measuring and counting in equal units. Quantities of units of Otv are quantities of the *money* used as *currency* in a market system. These units are units in which the trade values of quantities of objects with intrinsic values, the commodities or goods, can be measured. Objects without an intrinsic value or quantities of such objects have no trade value at all. The trade value of a trade object Otv, i.e., money for its owner is, hence, only that the owner is able to exchange it for all kinds of goods. In addition, units of Otv can have an intrinsic value in their own right as the correlate of the desire of some individuals, such as people like the value of a gold coin for a goldsmith, but this intrinsic value is not a part of their function, the measuring of the trade value of objects with an intrinsic value vi. There are objects such as paper money that serve as Otv, yet have almost no intrinsic value at all.

What production and consumption and hence what producers and consumers are can be already understood in the first and second-order elementary understanding of the participants in an archaic economy, and it is also understood on this level that producers are in need of consumption and consumers have to produce in order to be able to consume something. It is understood on the same level of understanding by participants in a market economy that the "production" of merchants is not a production, but the transaction of goods. It is also understood that merchants, like all other participants in the system of economic transactions are also consumers who need resources for buying the commodities they need.

Merchants must, last but not least, take into account that their interactions and transactions in a market presuppose the transportation and storage of the merchandise. Transportation and storage of goods are specific types of practical interactions that have their costs like all other first-order practical interactions. There are, furthermore, the time, the efforts, and the skills of merchants organizing the transactions of the commodities. Merchants have to add all these costs to the costs

of buying products from the producer or commodities from other merchants in the calculation of the lowest price for which they can sell the merchandise to potential producers without losses, and hopefully with profits.

This is only one set of factors in the calculations of the price for potential buyers by merchants. There are other factors that are of significance for the price that potential buyers are willing to pay for commodities that are offered on the market. The price of commodities that is acceptable for buyers can change, and such changes are *caused* by different *effective* conditions in different situations. The effectiveness of the factors in a certain situation can be measured in the increase or decrease of the turnover of the commodity that is offered at a certain price. Such factors are first of all the relation between *quantities* of potential buyers and the *quantities* of the desired commodities that are offered for trade at a certain time in a certain place.

Of significance is, secondly, the quality of different commodities. For some types of commodities the quality is immediately measurable in units of Otv. A commodity that can be used by the consumer for some purposes, including the purposes of practical interactions in the production of goods over a longer period of time than another commodity that is designed for the same purpose is of a higher quality because it will be able to save costs for the consumer of the commodity. Two other types of factors that are able to determine the quantity of consumers interested in buying certain commodities cannot be calculated in advance because they are not, taken by themselves, measurable. There are first psychological factors such as taste that determine the quality of satisfaction in the process of the consumption of a commodity. There are secondly, the factors connected with the distribution of political power, factors that will be considered in the next section.

Throughout the history of market economies it was the goal of merchants to increase their wealth, the amount of available money, and objects that have only a trade value. The source of the increase of their wealth always was and is the ability to avoid losses and to be able to sell their merchandise with a profit, i.e., for a price in units of Otv that is larger than the sum of the costs of the merchandise for the merchant in units of Otv. The rational behavior that is required for reaching this goal includes first of all the skill of experienced merchants, supported by the masters of reckoning, to measure and to calculate quantifiable factors and to estimate the impact of the unquantifiable factors on the quantifiable factor price in transactions.

The structures that have been considered above are structures of the ideal type of a market economy as an extension of "archaic" economies, e.g., the economy of medieval feudal society. Two additional structural extensions are necessary for a fully developed modern market economy and must be taken into account before turning to the epistemological problem of the justification of the application of mathematics in economics as an empirical science. The first is the analysis of the definition of practical interactions in the production of commodities in terms of the categories of a market economy. The second is the transaction of money for money.

(1) Production of artifacts, goods in a fully developed market economy, presupposes the technological application of theories about efficient causal relations borrowed from the natural sciences and restricted to the production of commodities for the market. Presupposing this context, all factors that are

necessary dependent parts in the process of the production of goods can be re-defined in terms of the categories of market interactions and transactions. Factors that have to be re-defined are the causal factors in the process of practical interactions that have been mentioned at the beginning of this section: (1.a) the material found in nature or already prepared in earlier practical interactions for being used in further practical interactions are the material causes; (1.b) the tools, i.e., the machines provided by the technological skills of engineers; and (c) the labor, i.e., the time participants use to contribute their efforts in the process of the practical interaction and the skills of the participants in using the technologies.

These factors can be treated as marketable objects, i.e., as objects that have an intrinsic value only in the process of practical interactions, but can also be offered for a certain price on the market. For the producer of the product, this price is as a part of the cost of the production. The sum of all of these costs for the process of production, plus the costs of the transaction itself, is the cost of the product. All aspects and factors of the practical interaction that are guided by the purpose of the production of products with a certain intrinsic value are reduced to the basic categories of the economical system of the monetary market economy.

(2) Productions of marketable products and the transactions of products have their costs according to (1). Producers and also merchants in a fully developed market economy who do not have a sufficient amount of the money required for their productions or transactions are able to buy money and to promise the vendor, who is in this case a banker, to pay back the price for the money they bought plus interest later. Interest is a share of the profits they are supposed to make with the business that has been subsidized by the banker.[93] The extension (2) of a market economy with a developed monetary system is the financial market, a market without objects with an intrinsic value. Only money is traded for money. Objects with an intrinsic value appear only in the fringes of a financial market, but they are, nevertheless, the essential foundations of a fully developed market economy as commodities for consumers and as production means for the producers. No such objects occur in the financial market. Here there are only units of Otv exchanged for units of Otv and there are no limits for ingenious arithmetical and algebraic constructions, the so-called financial "products," of the participants in this market.

The preceding descriptions have been restricted to the analysis of the structures and generative foundations of the economic interactions that are already given for the ideal type of a *first-order elementary understanding* of the participants in these interactions. The task of these descriptions was to prepare the ground for the explication of the epistemological justification for the application of mathematics in economic theories.

[93]Charging interest is shunned in certain religious contexts, but a Muslim banker has to make profit somehow, regardless of how this will be done and explained in Muslim theology.

Like all other systematic human sciences, economic research presupposes methods of secondary understanding, of *interpretation*. What is understood in the interpretations of economics is the first-order elementary understanding of practical interactions of the participants in the interactions. Phenomenological reflections on the epistemological problem of the justification of the application of mathematics in empirical sciences have to presuppose the results of the phenomenological analyses of the generative foundations of mathematics as a formal science, namely, the pre-scientific basic arithmetical and geometrical skills in practical interactions and trade interactions (Sect. 8.3).

The epistemological reflections have to begin with reconsiderations of the transaction of units of Otv for units of Otv in *financial markets*. The use of units Otv in market structures in which Otv is applied as a means to enhance transactions of objects O with an intrinsic value iv is in brackets on the level of the financial market. Left in the residuum of this abstraction are only units of Otv that represent numbers and operations with numbers. This abstraction is pre-given for economic theories as an essential aspect of the participants' first-order understanding of their interactions and transactions in a market in which money is traded for money. The first task of economic research as social research is the interpretation of both the practical social interactions of the participants in a monetary market economy and their first-order understanding of their interactions. The condition of the possibility of the application of mathematics in economics as an empirical science is, hence, that the pre-scientific first-order understanding that participants have of their interaction already implies the first-order givens of enumerable units of Otv and arithmetical operations applied to units Otv.

The ability to apply mathematics not only in all practical interactions and transactions of objects in the market, but also in all practical interactions producing objects as commodities for the market implies the possibility of abstracting from all Oiv and of defining them solely in terms of prices and costs as units of Otv. A quantity of units Otv, i.e., an amount of *capital*, measures the trade value of a quantity of objects with an intrinsic value only at the time and the place of the transaction. This aspect is of basic significance for economics as a science, but economics also includes an interest in material factors of the empirical basis of the abstraction. Objects with intrinsic values are in most cases products of practical interactions that realize a certain purpose in the encounter with the natural environment with the aid of efficient means for realizations. Though it is possible to define the whole process of first-order practical interactions in terms of transactions in a market system of trade interactions, such definitions imply in the *definiendum* values, purposes, and the first-order elementary and higher understanding and second-order understanding of the participants in the practical interactions of productions and interactions in the market. An epistemological justification of the application of mathematics in economics as a systematic human science requires an explicit analysis of this foundation of Otv in Oiv.

The next questions that have to be considered after the question of the justification of the application of mathematics in economics are questions about the possibility of testable predictions, perhaps even "experiments" in empirical

economic research. The general key for the solutions of the epistemological problem of the possibility of predictions in the social sciences is the construction of ideal types. The abstract ideal type "rational social behavior" has been characterized in the previous section as behavior that is guided by choices of effective means for the realization of a pre-given purpose regardless of whether or not the choice of the purpose is itself rational in some other sense. Practical interactions of this type imply predictions, and predictions imply knowledge about causal relations.[94] The causal relations presupposed in predictions can in addition be defined in terms of mathematical equations if the underlying data referring to observables are measurable.

Engineers applying technologies for the realization of their purposes presuppose theories of the hard natural sciences about causal relations that can be defined in terms of mathematical equations. The rational social behavior of participants in the practical interactions of a market economy can be interpreted as a mathematically guided *rational economic behavior*. The purpose of economic interactions is determined by the value of "calculable increase of wealth" or "maximizing profits" of a pre-given amount of Otv, of capital. It is possible to assume in addition that it is natural for certain systems of purposes and values, certain worldviews, to assume that there have to be (at least in the last instance) private individual owners of capital or shares of capital. This and other assumptions about ownership imply, however, assumptions about laws and lawgiving that are not of significance for the problem of possible economic predictions with and without the application of mathematical methods.

There might be, furthermore, good reasons guided by ethical or other viewpoints for judging that to choose this purpose as the leading maxim for all actions is not quite reasonable for individuals or groups of individuals. Essential for the viewpoint of epistemology is, first of all, that the value determining the purpose of the interaction admits increase and decrease in degrees of measurable quantity. Behavior is rational if it serves this purpose and it serves it if it is guided by mathematical calculations of the price of the traded objects and the costs of the material, the tools, and the labor of the participants in the process of the production of the goods.

This explication of "rational" is an interpretation of an ideal type of the elementary understanding and self-understanding of the participants in market interactions in economics as an empirical science. It is an interpretation, but the thesis that an epistemology of economics can be reduced to a hermeneutics, a methodology of understanding the social world, is misleading. Of additional significance this case are specific structures of social interactions in a market economy.[95] The

[94] Cf. Sect. 10.5.

[95] Cf. Gary Brent Madison 1997 about such attempts in the literature. See now also Staudigl 2010. Economics is not of interest for the authors of the essays in this volume. Of interest is for such a reduction of understanding sociology is only what can be said about music, literature, interpretation of social activities in everyday life, etc.

methodology of interpretations of systems of economic interactions presupposes an *ideal type* of a first-order understanding that is interested in discovering *efficient causes* and reliable predictions as well as applications of *mathematical calculations* that can be used not only for testing predictions, but also for explanations of developments in the past. This interest is already an essential partial structure of the first-order understanding that merchants and bankers have of their practical interactions, and not a methodological invention of economics as an empirical science. Economics is able to apply mathematics because the objects of economics apply mathematics in their practical interactions, and this is the "hermeneutical" epistemological justification for the application of mathematics in economics.

It is true that purposes and the relevance of causal relations for the realization of purposes are in brackets under the abstractive reduction of the natural sciences. "Increase of wealth" is, however, though quantifiable, a *value* that determines the *purpose* of trading goods in a market economy. The causal relations that realize the increase of wealth as a purpose can be calculated if quantified data about the supply of and the demand for commodities are available. In the process of trading commodities, demand is ultimately determined by the material values determining the purposes and the needs of those who are able to acquire goods for consumption. The quantifiable factor of supply is in the last instance determined by the sum of the costs of the materials, the tools, and the labor in the process of the production of goods.

Two types of factors in this structure are of significance for the difficulty of deriving reliable predictions in empirical economic research regardless of whether mathematical models can be applied in the description of relevant factors or not: (1) changes in the objective conditions of the production of goods and the cost of the production of goods and (2) problems in the definition of "increase of wealth" in its quantitative representation and in its relation to other values and purposes in a lifeworld. The problems (1) have already been mentioned at the beginning of this section in the analyses of the significance of techniques and technologies for first-order practical interactions. They are also relevant for answering questions regarding the difference in the justification of the applicability of mathematics in the hard natural sciences and in economics. What is of interest for (2) will be relevant for the transition of the analysis from the distribution of wealth to the analysis of distribution of power.[96]

(1) Practical interactions in a market economy presuppose the production of goods and are, hence, one-sidedly founded in practical interactions that produce marketable products. Changes in the structure of the foundations change the initial conditions for the mathematical models that determine economic predictions, but they cannot be predicted in the mathematical models of economic research. The changes in the initial conditions are of significance for changes in the costs

[96]Reflections about such distributions are, however, already reflections on civil social interactions.

of the materials, the tools, and the labor of the production of goods.[97] Such changes are (1.a) changes in the conditions of the applicability of technologies, and (1.b) changes in the conditions and quantifiable aspects of the production of goods for a market economy caused by technological innovations, including technological innovations in the techniques of the transportation of goods. In both cases (1.b) as well as (1.a), changes in the economic structures are caused by efficient factors that can be explained in the natural sciences, but neither (1.a) nor (1.b) is relevant for predictions of economic and social consequences and the cost/price relations of the economic application of mathematics.

Some concluding reflections on the meaning and significance of the application of mathematics in the natural sciences and in economics are, hence, necessary. The pre-scientific epistemologically relevant foundations of the development of basic arithmetic in elementary understanding for purposes of trading products are not different from the pre-scientific epistemologically relevant foundations presupposed in the development of advanced techniques in practical interactions.[98] What is measured and what is a possible object of economics as a systematic human science is, however, not a possible object for the natural sciences even including the life sciences. What prices and costs are cannot be understood without referring to purposes, values, efforts, elementary understanding, and secondary understanding of the lived experience of other persons. All of this is, however, already in brackets already the *first abstraction* of the natural sciences. What is measured and counted in the hard sciences under the second abstractive reduction and in economic interactions and economy as a science is, hence, *toto genere* different because the regional categories are *toto genere* different.

Mathematics in the *hard natural sciences* is, furthermore, not applied to the categories of an ontological region of objects that are given for a primary *pre-scientific* first and second order understanding and then for systematic interpretations of this first-order and second-order understanding. In the case of the hard sciences, the application determines categories of a *first-order higher understanding* of the categories belonging to the ontological region of nature under the first *and* the second abstraction.[99] Nature as an object of *scientific* higher understanding is only given, after the abstraction, as the region of everything that happens regardless of whether it is desired or not. It is that which is present in elementary understanding only as brute and not-yet-understood reality.

The "objects" of economics and in general in the systematic human sciences, are interactions of "subjects" who have already understood what they are doing on the level of elementary understanding. The claim of the systematic human sciences, and especially of economics as a science is that they better understand what their

[97] What follows is an application of what has been said about the relevance of external factors for practical social interactions to economic interactions.

[98] Cf. Sect. 8.3.

[99] Cf. Sects. 3.4, 8.3, and 8.4.

"objects" are doing in their interactions. That "better understand" means first of all that they are able to predict and explain states of affairs that are not yet understood in their "objects" elementary first order and second order elementary understanding of their interactions.

There are, furthermore, essential differences in the epistemological structure of the predictions of future events based on mathematical calculations in the natural sciences and in economics as a systematic human science. The predictions of the natural sciences are not immediately of technological interest, and it makes no sense to assume that they are of interest for the self-understanding of the objects of the natural sciences. The predictions of economics are, on the contrary, of immediate interest for the "objects" of economics, the participants in the market economy, and they are, therefore, also immediately of "technological" significance. In the case of the natural sciences it is possible to distinguish between "pure" science and scientifically guided technology. However, results of economic research are immediately applicable in the practical interactions of the participants in the market. Economists are, therefore, immediately consultants of business leaders and of politicians who are interested in raising taxes and the gross national income as an essential tool for the administration and distribution of power. As a social science, economics is a theory that as a theory of practical interactions is immediately itself of practical significance for practical interactions precisely because it can be understood by participants in practical interaction as a theory of their practical interaction.

A final remark about the ideal type of the system of social interactions in a market economy and the *homo oeconomicus* as the ideal type of "perfect" participants in this social system is necessary. According to the explication and partial critique of the theory of ideal types of Schutz, the *homo oeconomicus* is the ideal type of participant in the market economy. Understood in this sense, it would not be nice to refer to the *homo oeconomicus* using Schutz's term *homunculus* and to understand this term in its original pejorative Latin meaning. The *homo oeconomicus* is rather the ideal type of a *perfect* professional ideal of a *perfect* merchant, banker, or businessperson in general, regardless of whether they learned the art and necessary knowledge of their profession from masters, including the masters of reckoning in the sixteenth century, or acquired their knowledge studying business administration in a university. There is, however, also another "participant" interested in the increase of wealth in a market economy: the state. Economics considered from this point of view is political economy. Except for the remarks below in (2), a thorough epistemological account of political economy presupposes viewpoints taken from epistemological reflections on the science of the law and political science, and these will be considered in the following sections.

(2) Two types of problems in the first-order understanding of the highest purpose "increase of wealth," *vulgo* profits, and its interpretation in economical research can be distinguished. (2.a) Some parameters for increases and decreases of wealth that are relevant for the determination of the universal purpose guiding economic interactions are not mentioned in the usual definitions

of "increase of wealth." Given a certain quantity of increase or decrease of wealth, nothing is said about the parameters of the increase or decrease. Some people prefer to earn high profits in a short time, others prefer lower profits earned over a long period of time. Some persons are inclined to take high risks of possible losses for chances of gaining large profits. Others prefer to avoid risks and to be satisfied with small but secure profits. Some are inclined to change their strategies if others are changing theirs. Others stick more or less stubbornly to their strategies. An accumulation of such types of behavior in a critical phase of the development of the market economy triggered by the inclination to imitate what most of the others do can be a significant factor in the development of a financial crisis. Social psychology is able to discover the motives and inclinations behind such types of partially "irrational" behavior of participants in economic interactions.

(2.b) The rationality of rational economic behavior as an ideal type is rational because it requires criteria for the selection of means that can be understood as efficient causes for the realization of the "increase of wealth" as the highest purpose of economic interactions. It is, however, questionable whether the choice of this purpose is a rational choice for purposes of the "pursuit of happiness" for individuals or for other values guiding social interactions interested in promoting the commonweal, such as justice, fairness, and respect and sympathy for the needs and desires of other persons.

The highest purpose of social interaction following the principle of rational economic behavior is not violated if it can be realized for some subgroups of participants in social interactions at the cost of a minimum increase or even a loss of wealth for other groups. The immediate psychological reactions in such situation can be envy and anger, and it is again social psychology that has the methods to measure such reactions and to try to predict the consequences for individuals and society. There is, however, more involved in this case than just blind subjective feelings and inclinations governing reactions to critical situations.

The fact that an increase of wealth for individuals and/or small groups beyond a certain limit always has consequences for the distribution of power in a society will be considered in the next section. Of immediate significance for economics is that the reaction to the feeling of being a victim of gross *injustice* in the *distribution of wealth* is aggression; such aggression can cause social disturbances, and these disturbances can be of *immediate* consequences for the *distribution of power* and as a consequence the *distribution of wealth*. The secondary understanding presupposed in such cases in psychological investigations has to include the understanding of purposes guiding social interactions beyond the sphere of economic social interactions. It has to start with interpretations of the first-order understanding of purposes and values guiding social interactions in the realm of the distribution of power, e.g., justice and fairness. Social interactions belonging to this realm can be called *civil social interactions*.

Economics by itself is not able to answer the question whether the highest value guiding rational economic behavior is itself able to be the warrant of the

*common*weal and of distributive justice and fairness as values that are able to determine the purposes of civil social interactions. Some but not all groups in the society experience the "freedom of the market" as a blessing. Seen from an epistemological point of view, the thesis that only interactions guided by the purpose of realizing the value of "increased wealth" are able to warrant the balance, or at least to correct imbalances, of wealth in the society is neither a truth a priori nor has it a high a posteriori probability. The assumptions that the striving of all members of the community to realize the highest value of the market implies the realization of distributive justice and that it is "natural" that all members of the society are able to follow the inclination to be a rational egoist without being plagued by other inclinations presuppose the metaphysical assumption that nature is kind enough to be the best of all possible natures.

10.6 From Jurisprudence and the Science of the Law to Politics and Political Science

The science of the law (sometimes followed by political science) is usually mentioned at the end of the list of the systematic or social human sciences ever since Dilthey. This ranking is *prima facie* acceptable in the context of the analyses of the last section because legal and political *civil* interactions refer to and have, hence, their foundations in economic social interactions. However, there are also difficulties. It is questionable why and how the law can be understood as an empirical science together with psychology and economics because even superficial reflections already reveal differences in the generic structure of the history of economics and the history of the law.

Only scattered treatises on economics can be found in the pre-scientific philosophical tradition of Classical Antiquity. Economics did not belong to the "higher faculties" and was only of marginal significance as an academic discipline in the *artes liberales* in the Middle Ages. It emerged as a science in the eighteenth century and was from its very beginnings understood as an empirical science like physics, chemistry, and the life sciences. There are, on the contrary, many systematic treatises on the law, lawgiving, and politics in the philosophical tradition of classical philosophy. Jurisprudence as a profession was of outstanding political significance in late Classical Antiquity in Rome. The faculty of the law was one of the higher faculties in the medieval universities and remained in high esteem as an academic discipline before and after the recognition of empirical psychology and economics as empirical sciences in the modern academic world. It was, furthermore, never a disputed question whether and how jurisprudence ought to or can adopt methods borrowed from the empirical natural sciences, or whether it somehow admits the application of mathematics or at least statistics, in order to be recognized as a respectable academic discipline.

Facing these problems, it can be useful to have a look at Kant's description of the situation of the academic disciplines at the end of the eighteenth and the beginning of the nineteenth century. He distinguished in the doctrine of the law, between *jus*, i.e., the doctrine of the *positive* law, and the *science* of the law, the *scientia juris*. The jurist as a *jurisconsultus* has to know the pre-given and presently enforced system of positive law. The *jurisconsultus* can be in addition a *jurisperitus* who is experienced in the application of the law to concrete cases. The ability to apply the law presupposes *prudence* in the application of the law, *juris prudentia*. Jurisprudence is, hence, prudence and *not* a science. The science of the law (*scientia juris*) excludes all the aspects of *jus* just mentioned and is restricted to the analysis of the principles of natural law, *jus naturalis*.[100] Traces of this Kantian division and its consequences can be found in the Neo-Kantian tradition. It was and is possible in this tradition to deny that jurisprudence and the science of the law can be recognized as empirical human sciences.[101]

However, contrary to the original meaning in Latin and in Kant, in most dictionaries "jurisprudence" is understood as term for the science of the law.[102] It is recognized that the application of the law requires more than just knowledge of the law, but jurisprudence as the science of the law is understood as the science of the system of positive law and this science presupposes juridical hermeneutics, and includes the history of the law as a science of understanding, not as a science of causal explanations.[103] It covers, hence, the doctrine of the law, i.e., the doctrine of the *jurisconsultus*, but not the *scientia juris* in the Kantian division of the doctrine of the law.

Defenders of this understanding of jurisprudence can be found in the tradition starting with Dilthey, but also in the phenomenological tradition in the investigations of Adolf Reinach, Alfred Schutz, and Felix Kaufmann. According to this tradition jurisprudence is not a science of explanations interested in causal connections, but a science of understanding. The *history* of the law and juridical *hermeneutics* are, hence, the necessary methodical tools for the interpretation of the law. Since the interpretation of the law is the task of jurisprudence *in the present*, it is a systematic or social human science.

The opposition between the human sciences as sciences of understanding and the natural sciences as sciences of causal explanations (an opposition that is presupposed in reflections on the methodology of jurisprudence in the wake of

[100] Kant KGS VI, *Metaphysik der Sitten* Einleitung in die Rechtslehre §A. As metaphysical principles of the doctrine the principles of the "natural law" are, of course, in need of a transcendental deduction from the principles of practical reason in the specific context of Kant's transcendental philosophy.

[101] See, for instance, Grünewald 2009, 31f., 46.f., who excludes jurisprudence and the science of the law together with theology and philosophy from the list of the human sciences.

[102] See Schutz 1967, 138, 242, 246.

[103] Cf. Schutz 1967; 247f., on Kelson and quoting Kelsen. The problem of modern law positivism and different philosophical theories of natural law will be considered below.

Dilthey) has already been rejected in the preceding sections. There are, however, additional difficulties for jurisprudence. First of all, it is necessary to emphasize the differences between the methodology and the objects of interpretation in economics and in jurisprudence. The objects of interpretations in economics are rational practical social interactions. The secondary understanding of fixed life expressions are only occasionally of significance for such interpretations. However, the law is pre-given for the interpretations of jurisprudence as a fixed life expression. The immediate object of the interpretation is a text, and this interpretation presupposes knowledge of the history of the development of law texts.

Following Kant and others, jurisprudence is furthermore not restricted to the methodologically guided interpretation of law texts as fixed life expressions. It also includes the task of the *application* of the interpreted texts to presently given cases and is in this respect prudence. Persons are called prudent in their actions in social interactions if they consider all relevant real factors and possible evaluations of the presuppositions and the consequences that are relevant for the action before acting. Seen from an epistemological point of view, the *prudence* in juris*prudence* that is required for the application of the law presupposes the intention to consider all results of empirical research and the interpretations of the testimony of witnesses, etc., that determine "what was/is the case," to apply interpretation of the text of the law that has to be applied to the case (an interpretation that is correct in every respect), and to prepare the application of the law with the aid of correct interpretations of all relevant precedent cases of the application of the law to similar cases. Seen from this point of view, juris*prudence* is not a science but it presupposes the results of other sciences, first of all juridical hermeneutics but also other empirical sciences in the investigations that have to determine "what was/is the case."

This account of the scope and limits of jurisprudence as a *science* has been challenged. The difficulties started with the deconstruction of Dilthey's claim that traditional hermeneutics can serve as a methodology and thus as a warrant of the intersubjective validity of research in the human *sciences*. This deconstruction presupposed the thesis of the inseparability of interpretation and application. The thesis and its consequences need further analyses because the implied deconstruction of validity in interpretations also has uncomfortable consequences for the interpretation and application of the law in jurisprudence.

Facing these problems, a phenomenological epistemology must start from scratch with the analysis of the abstract morphological ideal type "civil social interaction" as a basic categorial structure of the ontological region of a social lifeworld in general. The ideal type of a social lifeworld along with its political structures (structures that are partially determined by written laws) can then be analyzed as a special case of the abstract morphological ideal type of systems of civil social interactions in general, i.e., including social lifeworlds without a literary tradition. The question whether and how this ideal type of a pre-scientific first- and second-order understanding can be understood as a *rational* ideal type determining rational choices is of central significance for epistemological reflections on the interpretation of the law in jurisprudence and of systems of legitimate lawgiving in political science.

Systems of civil social interactions presuppose systems of practical social interactions as their foundation because they have to be applied to practical social interactions and animalic social interactions. The general principle guiding purposes of civil social interactions is to avoid conflicts between participants in the same or in different systems of practical social interactions belonging to the level of first-order animalic understanding, elementary first-order understanding, and even higher understanding. To avoid conflicts, this highest level of universality includes the possibility of a violent elimination or suppression of the defenders of certain positions in such conflicts.

Commands are civil social interactions forbidding or requiring the participation of at least one individual person in certain practical or civil social interactions in the present. Rules as civil social interactions are *generalized* commands that refer to classes of actions. The purpose and in-order-to-motive of a rule for civil social interaction is, hence, the prohibiting, requiring, or permitting[104] of certain practical or other civil social interactions, including, of course, the purposes of these interactions.

The realization of the purposes of rules presupposes the announcement, the "publication" of such purposes in a social community. Such an announcement is a rule or a command. The question of the rationality or reasonability of a system of such rules is, therefore, a question of the principles of systems of the second-order purposes of civil social interactions that are announced in rules. Rules referring to purposes of civil social interactions are verbal public announcements prohibiting or requiring certain practical social interactions or the use of certain means used in social interactions that cause conflicts in systems of practical interactions. But the realization of the purpose of the rules also requires its own means.

The means to *realize* the purpose implied in the rule is the *promise* of sanctions, i.e., punishments for performing prohibited interactions or disregarding required practical interactions in the *future* as a necessary dependent part of a rule as rule. The warrant for keeping the promise that is given in the *present* is the power of those who represent the rule as actors to enforce the rule in the *future*. The power to give rules and to enforce given rules requires resources that can only be produced in practical social interactions. Apart from brute animalic violence, the *political* power behind rule-giving and the administration of rules is one-sidedly founded in resources provided by available techniques and technologies and economic practical interactions. The rule-giving and enforcing for civil social interactions also has, hence, a *material* foundation in systems of practical social interactions because the resources of the power necessary for enforcing the rules can once again only be found in systems of practical social interactions.

[104]Permitted are in general all social interactions that are not required or forbidden by the law. The definition is negative but precise under the additional formal assumption that a *system* of laws has to cover the ground of all social interactions.

The abstract structure just considered of the ideal type of a civil social interaction in general[105] pre-determines the special ideal types of different empirical types of pre-historical, i.e., pre-literate systems of *customary laws*. The ideal type of a civil society with a developed system of written laws and its political structures is another special case of the abstract structure of systems of civil social interactions in general. The additional generative foundation of the emergence of systems of civil social interaction based on *law systems* in the usual sense is the development of a *written* tradition.[106] Myths were the source of the justification of rules and the authorization of rulers for the system of customs in cultures without a written tradition. The written law emerges, therefore, in cultures with a written tradition in the early phases of the development of law systems in the context of religious literature that then additionally provide the *authorization* for the power of lawgiving and enforcing the law.[107]

A system of civil social interactions based on a system of *written* laws requires the interpretation of the text of the laws as a presupposition for the application of such laws. Epistemological reflections on jurisprudence must, therefore, start with analyses of the epistemological problems of juridical hermeneutics of present law texts and the history of the law requiring the interpretations of law texts of the past. Civil social interactions in societies under a system of customs are social interactions guided by rules, and the principle of the rules is to eliminate conflicts. Laws are written rules, but they offer as such the possibility of systematic distinctions between different *genres* of the law. It is possible to distinguish between actions and interactions that violate given laws prohibiting, requiring, or permitting certain interactions, on the one hand, and conflicts between participants in the same or different systems of social interactions, on the other hand, i.e., between the penal and civil law. It is, furthermore, necessary to distinguish between systems of private social practical interactions and large-scale systems of social practical interactions run by the government.

Essential in this respect are first of all the laws that determine the system of revenues of the states and their internal and external power, last but not least the power to enforce the decisions of the courts of law. All of this is, of course, of significance for empirical research in *political science* as viewpoints for distinguishing different empirical types and ideal types of states and law systems. It is also of basic significance for the system of genres of the law in different types of law systems. But the distinction between different types of systems of law and different genres of the law in a pre-given system is, following the principles of

[105] Systems of civil social interactions that are not determined by written laws still occur in societies with an otherwise developed system of written laws, e.g., in educational contexts, but also in the social relation of a coach and the members of the soccer team, etc.

[106] Cf. Sect. 3.4.

[107] God is in the last instance the lawgiver in monotheistic religions. The emperor has this function as the son of heaven in the tradition of the Chinese legalists. The Greeks and others opted, however, for a human lawgiver, e.g., Solon, with partial support of the gods.

hermeneutics as a methodology of interpretation, of central significance for juridical hermeneutics and the history of the law. The knowledge of the *jurisconsultus* who is able to interpret the meaning of the positive law is, hence, a necessary epistemological presupposition for the prudent application of the positive law to particular cases in jurisprudence. Thus it is necessary to distinguish between two different meanings of the *science of the law*. There is first of all the Kantian meaning of a *science of the law a priori* as the law of nature or the law of pure practical reason, i.e., of a specific type of the philosophy of the law, but there is also the science of the law understood as an *empirical science of the interpretation* of law texts.

A final remark about problems that are not of immediate significance for jurisprudence, but of central significance for the transition from jurisprudence and the science of the law to politics and political science must be added before returning to the central methodological and epistemological problems of jurisprudence and the science of the law. The field of possible applications of a developed law system is the region of civil social interactions. Here practical social interactions are only of interest in their connections with civil interactions. The system of civil social interactions connected with practicing the law has two inseparable and correlated subsystems: (1) the subsystem of civil interactions connected with the application, i.e., the administration and enforcement of the law, and (2) the subsystem of civil interactions connected with lawgiving. The whole system is self-referential because the civil social interactions in the subsystems have to obey the laws that have been designed for the elimination of conflicts in these subsystems.

Two sub-subsystems can be distinguished in the first subsystem: (1.a) the administration of the law in the application of the law passing sentences for pre-given concrete cases in courts of law and (1.b) the administration of enforcing the sentences. Setting aside the task of determining "what is the case," the first of the two sub-subsystems of the first subsystem is the domain of jurisprudence in the narrower sense as the interpretation and the application of the law. Since laws have been designed for and have to be applied to conflicts in subsystems (1.a) and (1.b), the subsystem (2) is relevant for both and is self-referential for its own administrative procedures.[108]

This self-referential system (2) always additionally implies elements of systems of higher understanding because the power behind the enforcement of the law as well as lawgiving is in need of legitimating justifications that have to be recognized by all, by the judges, by the administrators of the law, by the lawgivers themselves, and by all "law-abiding" citizens. Since the scope of higher understanding includes systems of religious dogmas, systems of philosophical theories, and even more or less scientific theories about human nature, such implements of the higher understanding of legal social interactions can be of central significance in disputes about lawgiving on the level of higher understanding.

[108]The sovereign is in such systems also "under" the law.

Such disputes belong to the *science of the law* in the above-mentioned Kantian sense and not to jurisprudence in the narrower sense. They will be considered in the next section. The domain of law, and this is the upshot of the preceding considerations, is coextensive with the domain of civil social interactions and their foundation in practical economic interactions in the social lifeworld, and therefore with the domain of politics as an object of political science. Contrary to political science, however, the task of the law is first of all *not* a *contemplative* theoretical account of political structures; instead, it serves as a system of *norms*, a guideline for civil inter*actions* separating what is required, what is prohibited, and what is permitted.

Applications of the law belong to the juridical civil social interactions in the court of law, i.e., to the sub-subsystem (1.b). Lawgiving (2) is not, apart from an exception that will be considered below, a business of the court of law and jurisprudence. What has to be applied and interpreted is positive law, i.e., the system of law texts that are presently relevant for the application of the law to cases in courts of justice.[109]

The methodical tool for the interpretation of positive law is juridical hermeneutics supported by the history of the law and the history of the law presupposes the interpretation of law texts that have been applied in the past and also juridical hermeneutics. It is of epistemological significance that the history of the law, including interpretations of laws that have been but are no longer applied can serve as a prototype of the *separation* of interpretation and application for philological-historical research. The history of law systems offers additional viewpoints for the interpretation in the present, but this is not a surprise. All systematic human sciences as sciences of the present have to apply the results of the corresponding branches of research in the historical human sciences not only for the interpretation of the understanding of the past generative horizon of the present situation, but also as a material basis for the variations in imagination that are required for the constitution of ideal types.

The methods of juridical hermeneutics for interpretations of present and past positive laws are the *methods* of general text hermeneutics, the knowledge of the grammatical rules, the terminology, the stylistic idiosyncrasies of the language of the law, but first of all the interpretation of the genres of the law. Of interest are the specific structures of the genre "law text" along with its species in penal law, civil law, etc., and the consequences of the structure of this genre for the hermeneutics of style and terminological systems on the level of lower hermeneutics.

A text belongs to the genre "law text in general" if it fulfills the following requirements. The first requirement is that a text is a law text only if it determines norms for what ought not to be done, what ought to be done, and what may or may not be done in social interactions. The second requirement is that a text is a law text only if it determines a sanction for violating the norms in the case of the penal law or a decision about what ought to be done in cases of the civil law. The

[109]The term "positive law" is relevant for practicing jurisprudence. Law positivism is a position of philosophical reflections on the *science* of the law in Kant's sense.

third requirement demands that the sanction or decision ought to be a consequence if the result of the first requirement can be applied to a case, i.e., if the case can be subsumed under the universal norm of the law.

The main *methodological* problem of juridical hermeneutics is that the methodological criterion of objective validity for philological-historical interpretations, the first canon of hermeneutics, cannot be used in juridical hermeneutics. The application of the canon is impossible because its application presupposes a temporal historical distance between the context of the interpreter and the context of the text, but jurisprudence and the science of the law, have like the other systematic human sciences, the center of their interest in present phenomena. There are, however, other criteria that can be added to juridical hermeneutics as a doctrine of methods, and these criteria are constitutive for the *jurisperitus*, the one who knows, who is experienced in the law. This experience includes the systematic investigation of the applications of the positive law to cases in the *past* horizon of the present as well as their significance for the objective meaning of a law, and beyond that, for the law system to which this law belongs.

The definition of juris*prudence* as science of the law is, hence, defensible even in the context of Kant's definition, because the jurist practicing juris*prudence* in applying the law to a case in the present ought to be a *jurisperitus*, the one who knows the law, including the range of the possible consistent applications of the law. What must be added to the interpretation of the text of positive laws in jurisprudence in this sense are interpretations of civil social interactions that have been the consequence of the application of the law in the immediate past horizon of the present. Jurisprudence was, therefore, understood, and can be understood, as a systematic social science and not a historical human science because the center of its task is the interpretation of the present positive system of the law.

Everything that has been said about juridical hermeneutics and the interpretation and application of the law up until now was never challenged in principle until the second half of the last century. The new and now widely accepted thesis of Gadamer was that the inseparability of interpretation and application in juridical hermeneutics can be used as a prototype for a hermeneutics in general as a hermeneutics of truth, and this thesis has already been discussed in the context of the epistemological problems of the historical human sciences in part II. The thesis implies that the methodological search for criteria of objective validity in interpretations is futile. An immediate consequence is that validity in historical research is suspicious for fundamental ontological reflections on the method of the human sciences as a method for the dis-covery, the *Ent-deckung* of Truth. The answer given in Part II was that the first canon of hermeneutics, and with it the separation of interpretation and application, can serve as a warrant of possible objective validity in philological hermeneutics and philological-historical research, including reconstructions of a past reality.

Here what has to be admitted is that a separation of interpretation and application was indeed impossible in literary traditions without a developed methodologically guided hermeneutics, in short, in pre-scientific literary traditions. What has to be admitted is, furthermore, that the methodologically guided approach always has its

generative foundation in pre-scientific literary traditions, and the warrant of truth and falsity in such traditions is the tradition itself. Finally, it has to be admitted that the required separation of interpretation and application, of the horizon of the author and the interpreter, is indeed impossible for interpretations of present life expressions of authors in the present and for contemporary history in general. The basic epistemological problem for interpretations in the systematic human sciences is that they are not able to apply the first canon and have to look for other criteria that might be able to serve as criteria for the confirmation or disconfirmation of interpretations.

The thesis that the alleged unity of interpretation and application in juridical hermeneutics can serve as the prototype for text hermeneutics in general causes difficulties for the methodology of philological-historical research. Ironically, it also has uncomfortable consequences for juridical hermeneutics, jurisprudence, and the belief that it is at least possible for a court of law to reach intersubjectively acceptable and in this sense objectively valid decisions. A solution for this epistemological problem requires a phenomenological analysis both of the structure of the application of a law to a case in a court of law as a specific *ideal type* of civil social interactions and of its specific methodological significance for possible predictions of future events and explanations of past events.

The first aspect of this structure is that the judge has to start with an interpretation of the law as a universal norm, but this interpretation implies the application of the law *to* a concrete case. Application is an inseparable part of the interpretation of law texts because the *meaning* of law texts *implies* that law texts have to be applied *to* cases given in *present* experience. Interpretation and application are, however, inseparable only in this sense in juridical hermeneutics and jurisprudence. The consequence is that a decision of a court of law that can be recognized as approximately "objectively valid" requires, in juridical hermeneutics, the systematic investigation of interpretations and applications of the *positive* law to cases in the *presently given past horizon* of this decision. The inseparability of interpretation and application in jurisprudence implies, furthermore, that a decision of a court of law about a case determines, according to the law, certain civil social inter*actions* in the future horizon of the decision. This "prediction" of future interactions is not based on effective factors produced by the case, i.e., the social interaction to which the law is applied. The prediction in the present "announces" the realization of a *promise* that will be executed by a *political* power that has the *efficient* means for the enforcement of the promised sanctions or other decisions of a court of law prescribed by the law.

The unity of interpretation and application is, hence, according to the preceding analyses, more than an armchair reflection of a scholar and interpreter as defender of a tradition about the application of the interpreted truth of a text in the present situation. The *ideal type* of the application of the law in the decision of a court of law is a civil social inter*action* and is followed by a sequence of further civil social inter*actions* that have been pre-determined in the decision. The interpretation of the law in jurisprudence is not an interpretation in the theoretical attitude of philological and historical research satisfying the methodological criteria of objective validity.

Instead, the interpretation of the law requires *prudence* in the application of laws as universal guidelines for civil social inter*actions* in a *practical* cognitive attitude. There are two epistemic requirements for *prudent* interpretation/application of the positive law to specific cases.

(1) The first requirement is that the application of the law in a court of law is restricted to whatever is *assumed* to be true in court about what was the case. What is assumed to be the case is the assembly of "facts," the state of affairs of the case, to which the law is applied. The case to which the law is applied is the *fact for* the court of law. But the fact for the court of law that determines the decision of the court is not necessarily identical with the facts that "were really the case." The *fact for* the court is, hence, an interpretation, a *historical narrative* based on research about what has happened. Seen from an epistemological point of view, it is of central significance that history as the reconstruction of a past reality is a science because a historical reconstruction can be falsified.

The question "what was really the case" is the root question of all investigations that are historical in a broad sense. It has been shown in Sects. 5.5 and 6.5 that the methodological criteria for decisions of questions of the type "what was really the case" in historical research include and presuppose methodologically correct interpretations of fixed life expressions. It has also been shown that in a lifeworld with sciences, they include the technological application of the results of the natural sciences that are necessary for determining evidences for "what was really the case." Finally, it is of significance for the prudence of jurisprudence that all statements about "what was really the case" in history are, according to the methodology of historical research, always open for "revisions."

The discovery of new facts or falsifications of parts of the assumed "history" of what was the case that are relevant for the application of the law require revisions in earlier decisions of a court of law in the past. It is, hence, the legal duty of those who represent juris*prudence* in a court of law to apply all findings of investigations about the "contemporary history" of the case including the evidences provided by the natural sciences concerning the case in question. An interpretation/application of a law to a "case" that can be recognized later as a state of affairs that "was not the case" has to be rejected as "false." This has consequences for the temporal dimensions in the epistemological meaning and significance of "fact" for history and jurisprudence on the one hand and for the empirical sciences on the other hand. The main task of the methodology of the *empirical* sciences is to guide a type of empirical research that is interested in the discovery and confirmation of predictions. History is not interested in predictions because to predict what has already happened is "countersensical," does not make sense. The interpretation/application of the law in *jurisprudence* is interested in cases that have happened in the immediate past horizon of a present. Of interest is only what has happened, and not what will happen in the future if a similar case happens again.

(2) The second requirement has already been mentioned in the outline of the basic principles of juridical hermeneutics offered before turning to the general problem of the unity of interpretation and application for hermeneutics in general, and especially for jurisprudence and juridical hermeneutics. Juridical hermeneutics is able to apply the methodical rules of lower hermeneutics and genre hermeneutics for philological interpretations to the interpretations of law texts, but it is not able to apply the first canon of hermeneutics as a criterion of objective validity in interpretations. Individual interpretations of the original intention of the authors or texts[110] need the support of reconstructions and interpretations of the cultural environment of the author and presuppose, hence, the first canon of the philological-historical method that separates the horizon of the author and/or text in the past and the present of the interpreter. Such individual interpretations are not relevant for the interpretation/application of positive laws because the application of a law text refers to cases that are given for a court of law in the present, and not to cases that might have been relevant for the lawgiver as the author of the law in a more or less distant past. The methodical rule of the first canon of hermeneutics that is especially of significance for philological interpretations on the level of individual hermeneutics is not applicable, and has to be replaced in juridical hermeneutics by the formal assumption or "fiction" that the intention of a law as a law, and hence also of the lawgiver, *ought* to be the commonweal.

Laws of nature are empirical laws that have to prove their objective validity in their application to *cases* in *empirical reality*. Such *laws* are rejected if *cases* can be found in empirical reality that are counter examples contradicting the claim of universal validity. The *laws of jurisprudence* determine, on the contrary, not what *is the case* but what *ought to be the case* and *sanctions* for cases that *ought not to be the case*. There are, however, situations in which the interpretation/application of the law reveals essential aspects of the general problem of the encounter of *jurisprudence* with *empirical reality*. Two ideal types of such cases can be distinguished, and both admit a critical evaluation of the validity of the interpretation/application of a law, and of the law itself, in decisions in a court of law. The epistemologically relevant result of a phenomenological analysis of these ideal types will be that interpretation and application can be separated and must be separable in jurisprudence, i.e., the prudence required for the application of the law.

It is a general principle and a requirement for the applications of law systems that they ought to be logically consistent. There is then in addition the requirement that the applications of a positive law to a present case *ought* to be consistent with its application to approximately equal precedent cases in the past horizon of the present case. The requirement is immediately derivable from the requirement of logical consistency between universal statements and their singular instantiations. Singular cases can be cases of the law as a universal statement only if they have all

[110] Cf. Sect. 4.1, 5.3–5.5.

the properties determined in the universal statement in addition to the properties that are constitutive for their singularity.

The justification of a *prudent* interpretation/application of a positive law to a presently given case requires a sufficiently complete survey of precedent cases in the past horizon of the presently given case. A possible positive result of such a search that has its empirical basis in a segment of the contemporary history of jurisprudence is the discovery of precedent cases that are similar to the present case and justify, therefore, the interpretation/application of the positive law to the present case. However, it is also possible that the result of the search is negative. The interpretations/applications of the law in all precedent cases are not able to justify the interpretation/application of the law to the present case because the present case is characterized by a set of unique properties that are not consistent with properties of the precedent cases. All instances of interpretations/applications of the law to precedent cases are, therefore, not sufficient to "do justice" to the present case in a court of law. The juris*prudence* of the court must in this case find an interpretation/application of the text of the law that is consistent with the *interpretation* of the text of the law and its place in the context of the law system, and must explain the reasons that justify the deviation of the interpretation/application of the positive law in the present case from all available precedent cases.

Serious difficulties for the understanding of the difference between the positive law and the problem of just laws in jurisprudence in law positivism occur if courts of law have to face situations in which a positive law is obviously "unjust" because it is incompatible with the dominating consciousness of what is right and what is wrong, what is recognized as belonging to basic human rights or is immediately derivable from basic human rights.[111] More complex are cases in which not only are precedent cases missing, but no correct philological interpretation of the text of a positive law is available that admits an interpretation/application of the law to a whole class of cases of a hitherto unknown type. The serious difficulties emerge if the application of a philologically correct interpretation of the text of the law to such cases is obviously "unjust." It is an old principle that a law is a just law only if it is a *useful* law for the *commonweal* as a remedy for certain needs of the society or groups within the society.[112] The application of the law in the abovementioned situations is unjust precisely because just laws are laws that have been given to serve the commonweal.

The law is *obsolete* if it is no longer useful for the commonweal. The philological- historical interpretation of the law reveals that the law is *not* applicable because the application presupposes a social context in the past in which the law was given, but a careful investigation of the presently given cases and their social

[111]The confrontation of courts of law in Germany after 1945 with the "positive" laws (and their principles) that were introduced in the Third Reich is a striking example of such situations.

[112]This principle is one of the requirements in the definition of a just law of the Roman jurists. Cf. Thomas of Aquinas 1882, I. II. qu. 95r, art. 3, objection I on Isidore of Sevilla's list of such requirements.

context shows that this context has changed and that the law is no longer applicable under the new circumstances.[113] Two answers can be given in such situations. The first is that a court of law has the right to declare that a law is obsolete and then to modify the meaning of the law and its *application*. The second answer requires in such cases that only the sovereign has the right to change the laws and that members of the court should, as citizens ask the sovereign to do that.

The problems connected with the discovery of unjust and obsolete laws are, as mentioned, immediately relevant for the general question whether a law is a *just* law. They are, therefore, also relevant for lawgiving as a political interaction. Several types of standards a law has to fulfill in order to be a just law can be distinguished. Following the levels of generative foundations in the development of the law, there is (1) the legitimating of customary rules and laws in the non-literary traditions of mythological narrations. There are (2.a.) the (in many respects incompatible) standards of literary traditions in the wake of different monotheistic prophetic revelations and the dogmatic interpretation of these revelations in the Jewish Talmudic tradition, in the Christian patristic and medieval tradition, and in the tradition of the Shariah in Islam, interpretations that have been more or less influenced by (2.b.) the pre-scientific theories of the practical philosophy of Classical Antiquity. There are finally (3) modern Kantian philosophical reflections on the problem of an a priori of the practical question of what "ought to be" versus the theoretical question of "what there is."

But in addition, there are the above-mentioned pragmatic standards of the Roman jurists, e.g., the principles that laws are just if they are in accordance with the customs of the tradition; they have to be useful, properly promulgated, able to be enforced, etc.[114] There are, finally, formal standards, and among them first of all the requirement that a just law must have been given by a legitimate lawgiver. Legitimate lawgiving requires in turn constitutional laws for legitimate lawgiving. Whether a law is a just law in this sense can be decided in a court of constitutional law, but this implies that it is still the task of jurisprudence and its methods to decide whether a law is a legitimate law.

Lawgiving is, according to formal standards, the privilege of the sovereign, but it is not possible to decide from this point of view whether the sovereign can be/ought to be one person, a group of persons, or all members of the political community, or what kinds of checks and balances are required for acceptable forms of the distribution of power of lawgiving, of enforcing the law, of giving commands and ordinances, etc. Answers to the question of the "best" constitution have been given in the "science of the law" in the Kantian sense since Plato, together with answers to the political question of the perfect distribution of political power.

[113]It was, for instance, in the United States at the time of the New Deal for the American realists among the jurists whether a certain law designed for a certain economic situation in the nineteenth century is still applicable after changes in the economic and social system in the twentieth century.

[114]Thomas of Aquinas, 1882, I.II. qu. 95, art.3, objection 1.

It is a basic problem for the methodology and the epistemology of the social sciences in general whether or not political theories on the level of philosophical reflections a priori can be and should be replaced by political science as an empirical human science. The paradigm of such a replacement is the replacement of pre-scientific philosophies of nature implying principles a priori by the natural sciences. To choose the first horn of the dilemma implies *prima facie* the philosophical position of law positivism. Some remarks about law positivism as the antipode of the metaphysical treatment of the science of the law will be a useful preparation for attempts to find an answer for this general epistemological question.

It is tempting to understand law positivism as a branch of modern epistemological positivism, as a position in the theory of the *empirical* sciences in general, because law positivism shares the rejection of metaphysical assumptions a priori in epistemological theories of the sciences. However, a critical review of this thesis has to start with the historical observation that the concept of "positive law" is much older than the use of the term "positivism" for an epistemological theory of the empirical natural science that was developed in the nineteenth century.[115] The distinction between positive law as the presently applied and recognized system of law versus natural law was known in the Middle Ages.[116] The practicing jurist of the eighteenth century, i.e., Kant's *jurisperitus*, is only interested in the knowledge of the *positive law* of the *jurisconsultus* and not in the metaphysical reflections of a *scientia juris* in the old sense.[117] Law positivism in this sense is a term that characterizes the cognitive attitude of the practicing jurist. The problems of a science of the law with or without principles a priori is of only marginal significance for this attitude.

Modern law positivism as an epistemological theory adds the thesis that it is sufficient for determining the meaning of "just law" and "legitimate lawgiving" that a law has been given according by the actually "recognized" political power following or *not* following but changing a certain recognized constitutional procedure. This principle is basically nothing other than an extension of the Roman pragmatic principle of lawgiving: the will of the sovereign has the power of the law.[118] Given this "way out," the problem of legitimate lawgiving is reduced to the question of the political structure of the distribution of power in a state in a certain historical period. The analysis of such structures is the task of political science. The empirical basis of the generalizations in political science presupposes historical facts, including the

[115] Cf. Sect. 7.2.

[116] Cf. e.g., Thomas of Aquinas 1882, I.II. qu. 95, art. 2, objection 2.

[117] Cf. Kant KGS VII, *Der Streit der Fakultäten,* 24f. on the *Eigenthümlichkeit der Juristenfakultät*.

[118] *Quod placuit principi legis habet vigorem*. A principle of the Roman jurist Ulpian quoted (and rejected), in Thomas of Aquinas 1882, I.II. qu. 90, art. 1, objection 3. The extension requires only replacing *princeps* with sovereign and to admit that, e.g., a parliament can be the sovereign. Well-known examples for such theories in the science of the law that by the same token are also certain political theories, e.g., the theories of Thomas Hobbes or, in the twentieth century, of Carl Schmitt.

facts of contemporary history. This implies that they presuppose the methods of historical research.

Law positivism is, hence, a branch of *historical positivism* and, therefore, not reducible to positivism in the epistemology of the natural sciences as *empirical* sciences. But this means that the first epistemological problems are problems of the methodology of interpretation of fixed life expressions of a past for the reconstruction of this past reality. What is of interest are fixed life expressions telling something about the law systems, about the theory and the practice of interpreting and applying the law, and about the procedures of lawgiving in a particular system for the distribution of political power. A law positivism that is not able to recognize the difference between the meaning of "empirical" in the natural sciences and in the social sciences insofar they are interested in predictions cannot have the last word in epistemological questions of jurisprudence and the science of law. The real epistemological problems connected with law positivism are the epistemological problems of the methodology of history, and behind that, the methodology of the hermeneutics of fixed life expressions, including then also the problems considered above of the unity of interpretation and application of texts representing positive law.

If law positivism is understood as a branch of historical positivism, it is still possible to recognize that there is a basic norm as a part of the constitutional laws that determine the objective meaning of legitimate and, in this sense, just laws as a thesis of legal positivism. To recognize that a law system needs basic norms that determine what can count as a legal norm in a law system presupposes only the distinction between the "is" and the "ought," but nothing about principles a priori of the "is" and the "ought." The difference of "is" and "ought" is known in everyday experience in elementary understanding of social interactions without determining a priori what ought to be. With respect to the history of the law, this means that there can be quite different law systems guided by different types of understanding of basic norms. The assumption of basic norms is, hence, compatible with law positivism.[119]

The acceptance of law positivism on the level of the science of law as a theory that is able to eliminate the problem of legitimate lawgiving and the question of the requirements of just laws has serious implications for political science. Law positivism as a theory of the science of law presupposes a political theory of lawgiving and sovereignty that implies a reduction of questions of justice to questions of political power. This justification can be immediately combined with political theories, e.g., with references to the political theory of Hobbes. It is, however, also possible to assume that the basic norms ought to be justified by an a priori law of practical reason, or even to assume an a priori access to action guiding moral, legal, and other objective values a priori. The question is then whether such an a priori is understood in the Neo-Kantian way as a subjective a priori, or assuming

[119]It is possible to characterize the position of Hans Kelsen as belonging to law positivism; see for instance Grünewald 2009, 32, n. 21, and 108, n. 160, on Schutz and Kelson.

the *Wesensschau* of the Göttingen "realistic" phenomenology, as an objective a priori. A different account can be found in the interpretation of Kelsen's basic principles by Felix Kaufmann and Alfred Schutz.[120]

10.7 From Political Science to the Science of Law

Political science is, as mentioned in the beginning of Sect. 10.4, more than a special discipline of the social sciences. It presupposes the general epistemological structures of the social sciences in general and, in addition categorial structures of the region of the objects of economics and jurisprudence and their interdependencies. Added is the material category "political power." The present section must, therefore, start with an analysis of the foundations of this category in the structures of the lifeworld in general. This analysis is an immediate extension of what has been said in Part I, Sects. 3.1, 3.2, 3.3 and 3.4.

The experience of power, i.e., the potential of using force, of being forced and resisting force, is an original experience on the level of animalic understanding. The victim of force or violence is, in the last instance, always the Other as a *living animate body* and the correlate of the threat of force on the side of the potential victim is fear. Power is, in addition, given in elementary understanding if the use of force is supported by weapons, i.e., "tools" that can serve as instruments of using force in social interactions.

Power as the power of giving and enforcing rules and commands for Others in connection with the expectation that Others will probably be obedient is *social power*. To have the power to enforce a command or a rule presupposes that the one(s) who threaten to use force also have the power to apply force. To give a rule or a command implies that rule-givers and/or those who want to enforce a pre-given rule *promise* to use their power to enforce the command or rule if other persons refuse to obey the rule. The giving of commands or rules and promising to enforce them, combined with the expectation that consociates are able and probably willing to obey or to refuse to do so, are civil interactions. The ability to promise the application of force is also a dominating factor in other "civil" social interactions, first of all in contracts (i.e., the reciprocal promising of other interactions) between individuals and groups of individuals. Contracts imply the will to enforce the promises on both sides, and only a fight can decide which one of the parties has the power to enforce its "understanding" of the promises in case of disagreements about a contract. Such conflicts can be eliminated if both sides recognize a superior authority, e.g., judges or chieftains who have the power to enforce their interpretation of the contracts and promises in the conflicts.

[120]Cf. Embree 2015, chapter 2 "Jurisprudence," the reference to Schutz 1967 p. 247 on Kelsen; see also Reeder 1991, xi, for Schutz on Kaufmann.

Giving and enforcing rules presupposes verbal communications. The ability to give promises and, hence, laws, already presupposes in these early phases the development of verbal communication systems in the medium of practical social interactions in archaic societies. Commands are given for one action in the future horizon of actual present. Rules are given for a class of present but also of future social interactions of the same type. Rules are able to survive as useful *customary* rules in non-literary traditions only if they are useful for the generation and survival of systems of customs that are consistent with and useful for the development of systems of practical economic social interactions. Systems of the rules of customs have their foundations in practical social interactions or are immediately connected with such interactions because they are systems of rules that are necessary for a successful performance of such interactions (Sect. 10.1 and 10.5).

A system of such customs requires as its correlate a system of civil social interactions of contemporaries who are entitled to enforce the customary rules, and their request to live according to the system of rules needs the cooperation of those who are supposed to live according to this system. The willingness to cooperate without being immediately threatened by the overwhelming physical power of Others, and without being immediately able to see that the rule is useful for the social community, requires legitimating. Rules determining the recognition of the legitimate use of force are necessary for the production of the artifacts, in the broadest sense, that are needed for the satisfaction of the needs of a family, a clan, or a tribe. The legitimation for such customary rules will be given in oral traditions of systems of higher understanding in myths and cults that "explain" the "world order" and the system of the rules of customs in this order.

In a non-literate archaic social lifeworld, a system of customs, including customs that determine the right of certain members of the society to enforce the rules of customs, is pre-given by the oral tradition of the society. According to the analyses in Sect. 3.2 it is impossible for an oral tradition to identify changes in the tradition and to distinguish differences in the customary rules of the present and the past. The judgment of a person who according to the rule of customs is entitled to pass the judgment that a social interaction violates the rule of custom needs no further justification in an oral tradition. Speaking through members of the community, an oral tradition itself passes judgments on improper behavior and demands the enforcement of the sanctions of the judgment for such behavior. Given is only the immediate application of the tradition; there is no need for jurisprudence or, beyond that, for a science of law and it is, hence, also meaningless to distinguish between a science of the law and political science. In archaic societies with non-literary traditions, it is also impossible to distinguish between economics, the law, and political science as disciplines that have to apply different methods and presuppose each other in various ways as well-defined regions of objects. The region of systems of civil interactions and of the distribution of social authority and power in non-literate archaic cultures with oral traditions is the region of ethno-sociology.

The generative development of the intersubjectively given regions of objects and of the categories of law and politics presupposes as its generative foundation the

"invention" of written communication bridging spatial and temporal distances. The tradition and its contents are given in the context of literate cultures in the present in fixed life expressions, i.e., texts that need interpretations before they can be *applied or rejected* in the present.

The pre-givenness of the tradition as a context of texts is first of all of significance for the development of lawgiving and the administration of the law in jurisprudence. Law systems first occur on the level of higher understanding in mythical or prophetic literature in religious contexts. Laws and regulations as objects of interpretations in higher understanding were then also given later by leaders of states representing political power for the lower level of practical interactions as regulation of market transactions, distribution of goods, compensations for damages, and last but not least, for the purposes of raising taxes and tributes necessary for the support of political power structures. It is the written law that confronts those who have to live under the law with the reality of social life on the level of higher understanding and as an object of higher understanding written law is also a possible object of methodically guided higher understanding.

This higher understanding occurs, on the one hand, as the requirement of the professional administration of the law in jurisprudence, but then also, on the other hand, in philosophical theories interested not only in the pre-given positive law, i.e., of the written tradition of the law, but also in just and perfect laws and in the best legal constitution of the state. Reflection on the law on the level of higher understanding of the science of law in the philosophical tradition immediately implies, hence, an interest in a theory of the state, the perfect constitution, and the problem of constitutions in general. *Political* power beyond *social* power and *animalic* power can only be given in literary cultural traditions with developed law systems. It is *political* power because its main function in the society to give and to enforce laws. The region of political science (but also already of political history) is the region of political power and of the social systems of the distribution of power.

The distribution of political power and the degree to which political power can be used inside political communities for purposes of lawgiving and law enforcement depends on the resources for power-building, and power-building depends on the development of the economy providing these resources in a social community. The development of the economy in a social community requires in turn the development of systems of civil social interactions and of the distribution of power of a higher degree of complexity, and this also means the development of systems for the distribution of power. Such systems determine who is entitled to rule and to use force and who has to obey the rules. The final court of appeal in such systems is the "ruler over rules," and this means the one or the ones who are *entitled* to give the rules and who is the one or are the ones who ultimately have the power to enforce the rules.

Since the whole system of practical social interactions and their natural environment, of civil social interactions and their relation to power as the potential to use force, transcends the limits of first-order and second-order elementary understanding, such legitimation can only be given in systems of *higher understanding*, "interpretations" of the lifeworld as a whole in myths, revealed religions, and

different systems of practical philosophy, including idealistic speculative systems as well as different types of naturalism, e.g., Social Darwinism.

What has been said up until now was only a sketch of the generation of the structures of the material categories of objects in the region that is of interest for political science and its relation to the other social sciences. Presupposed are the static and generative structures of a cultural lifeworld in general. The sketch is not an epistemological analysis of the problems of a methodology of political science as an empirical science, but it will be presupposed in the following phenomenological epistemological reflections on the methods of political science. Reflections on real conditions that are of significance for research in political science require reflections on the relations between the region of political and economic interactions and the legal regulations of social interactions. The next step preparing the epistemological reflections on methods that can be applied in political science must, therefore, provide a brief account of the foundations of the methods of political science and of political history in the methods of economics and the science of the law, on the one hand, and in the history of economics and the history of the law, on the other.

According to Sect. 10.4 the disciplines of the social sciences presuppose the results of historical research determining "what was really the case" in the history of the development of technological and economic structures, the history of the law, and political history. Of interest is not historical research, its methods, and the difficulties of the specific applications of these methods in contemporary history. Of interest are only the reconstructed historical facts as the material basis for the variations in imagination that are constitutive for the constitution of empirical and ideal types of static and generative structures that can be relevant for the derivation of predictions and explanations in political science.

Reconstructed historical facts are also of interest for epistemological reflections on the differences between historical causal explanations[121] borrowed from the natural sciences, historical psychological explanations, and genuine historical causal explanations. Of significance for political history is, for instance, if an *action* of a politically relevant person can be understood as caused by the in-order-to-motive of violating the system of the contemporary *laws* and *customs* with the intention of introducing changes in this political system.

The causal connections underlying such explanations can be "understood," and causal connections that can be understood in this sense are *genuine* historical explanations. To be "understood" means in the context of historical research to be the outcome of philological-historical interpretations of available fixed life expressions of a past foreign cultural lifeworld. Political history is interested in explanations of past events. The history of the structures of the economy, the history of the law, and political history presuppose each other in a system of structural interdependencies in cultural lifeworlds with developed economic and legal systems and systems of the distribution of power.

[121] What has been said about historical causal explanations and real conditions in Chap. 6 is presupposed for the following reflections.

Political science is interested in explanations of civil interactions in the immediate past horizon of the present, but also in possible predictions of events in the future horizon of the present. The *real* conditions that have to be analyzed in such explanations and predictions can be found in the region of systems of positive laws, in that of economic systems as foundations of the development of law systems, and finally in the natural environment. The historical development of the economy and economic structures is, therefore, a region that provides the real conditions for the historical development and efficiency of systems of political power. For political science, however, economic interactions are also vice versa the objects of the application of the law in jurisprudence, and beyond that also of the political interactions of law enforcement, lawgiving, ordinances, and other regulations.

Research in political science presupposes, therefore, research in economics and the science of the law, and it includes these disciplines under the perspective of the distribution of political power. Economic structures are relevant as foundations, as real conditions for developments of the distribution of political power. Seen from the viewpoint of political power structures, the task of the law is a system of regulations of economic structures. Both together are of significance for the resources and then the distribution of political power. Power is *political* power (beyond its significance on the level of animalic understanding as a potential of using violence against Others) only in this context, and it is of interest for political science only in this sense. Some further remarks about this system of reciprocal foundations are necessary before turning to the epistemological problems of the methodology of political science as an empirical science interested in explanations of past political developments and in predictions of future political developments.

It has been shown in the preceding sections that the empirical social sciences have to use the methods of understanding, of methodologically guided interpretations, but they also have to apply methods presupposing causal relations in their explanations and predictions. The methods of economic research interested in the civil interactions in a market economy presuppose interpretations of the first-order understanding of practical social interactions in the encounter with a natural environment. First-order understanding in practical interactions implies the understanding of explanations and predictions that in developed market economies are often borrowed from the explanations of the techniques and technologies, and the prediction of the consequences of their application, that are pre-given by the natural sciences.

As shown in Sect. 10.5 economic research is in addition able to apply mathematics in the analysis of the formal structures of social interactions and transactions of products of market economies. Of central epistemological significance is, however, how economic social interactions have to be understood; this understanding is first of all the understanding of the purposes of market interactions and of how all these purposes are species of the genus “maximizing the growth of wealth,” and this is the presupposition both of the possibility of the application of mathematics in economics and of the principle of selection of causal relations that can be used as effective means for realizing this purpose.

The epistemological problems of jurisprudence are first of all problems of the methodology of the interpretation and application of texts, i.e., hermeneutical problems. Law texts refer to social interactions, their purposes, and the values determining the purposes, but they imply predictions only as promises of possible sanctions or other consequences that ought to follow well-defined cases of social interaction. Predictions and explanations presupposing efficient causal relations are of interest for jurisprudence only in the context of the task of determining "what was really the case" before entering the problem of the interpretation and application of the law. The logical structure and the methodological significance of predictions in the basic structure of the ideal types of social interactions in economics and in jurisprudence are, hence, *toto genere* different.

Economics presupposes interpretations, but it is first of all interested in explanations and predictions. Jurisprudence is first of all interested in interpretations of law texts, but it is interested explanations only in the reconstruction of what was the case. Epistemological reflections on methods that can be applied in political science presuppose the recognition of the doctrines of methods of both of these disciplines and these doctrines have their roots, in different ways, in the allegedly opposed methodologies of explanation *and* understanding. No satisfactory account of a possible methodological approach in political science will be possible for epistemologies that start with the assumption of a strict opposition between explanation and understanding.

The central epistemological problem of the methods of empirical research in the systematic social sciences is the problem of the methods of causal explanations of political situations in the immediate past horizon and of *predictions* in the future horizon of the actual present. What has been said about explanations in political history can be used as a guideline for reflections on the problem of predictions in political science. This means, however, that the specific methodological problems of contemporary history already mentioned will be of significance for political science as well.

The first task of a phenomenological epistemology of contemporary social history and the empirical social sciences is the analysis of the ideal types (and their general categorial structures) that can be found in the material of social interaction for a social science. The ideal types of social interactions in the science of politics as well as in the science of the law are ideal types of *civil* social interactions. The main purpose guiding the civil interactions in a political community is the elimination of conflict, the unregulated use of force between members or groups of members in the community. The first step for the realization of this purpose is to determine the sovereign, i.e., the person or group of persons who are entitled to give and to enforce laws and ordinances.

Different "ideal types" of sovereignty, i.e., of constitutions, that determine the legitimating principles for the power of lawgiving were already discussed in Classical Antiquity. The Aristotelian list is not complete[122] and is at least

[122]The simplified version of the list is: monarchy, aristocracy, oligarchy, democracy, tyranny.

questionable; thus one task of political theory is to develop more comprehensive and systematic systems of such ideal types of constitutions in the present stage of the development of contemporary political history for the purposes of a political science. There are, for instance, first of all different types of oligarchies, such as the different types of the "dictatorship" of the Communist Party, of Fascism, of modern Islamic or other theocracies. There are, furthermore, different types of "republics" that are actually oligarchies of ethnic groups or clans that have occupied the sovereignty of lawgiving.

The task of distinguishing between different ideal and empirical types of constitutions and legitimate lawgiving in a political community must be distinguished from the task of distinguishing the potential of different groups of people in the political community to influence the sovereign in the process of lawgiving in the political community. Set this aside the different types of people, e.g., males or females, with different opportunities to gain access to political power in societies that are determined by archaic family and clan structures,[123] the membership in such groups can be determined (1) by specific functions in the process of economic interactions, e.g., today first of all farmers, workers, managers, shareholders, bankers, and special professions like medical doctors. The membership can be also determined (2) by functions in governmental institutions as public servants; such as the police, the military, the administration of justice, and other government agencies. Finally, the membership in such more or less well organized groups can be determined (3) by the belief in one of the systems of higher understanding of the social world and its natural environment mentioned above and by political parties representing these or other types of ideologies. The ways in which such organizations (1–3) can participate in lawgiving can be institutionalized and determined by laws. There is, however, also the possibility of the use of violence, i.e., of brute power, to introduce changes in systems of institutions and laws, including more or less radical changes in the structure of the distribution of power in a *coup d'état,* a rebellion, or a revolution.

The first preparatory task of a phenomenological epistemology of e*mpirical research* in the social sciences is the analysis of the process of intentional cognitive activities in which the empirical and ideal types of systems of social interactions, and of systems of such types, is originally given (Sects. 2.3 and 10.4). The next step is the critical analysis of the methods for the determining of relevant factors and initial conditions in predictions and explanations that are relevant for the empirical social sciences. Epistemological reflections on the methods that can be applied to political science on this level have to begin with the analysis of the relation between law and political power and go on from there to a critical analysis of the foundations of this relation in deeper layers of the whole context of political social interactions that are in the last instance one-sidedly founded in economic structures. The power to use force

[123]Such structures are, however, still of basic significance for the political development in many of the so-called "developing countries" of the twenty-first century.

and the distribution of this power are the basic categories of the region of political civil social interactions, i.e., the region of relevant observations of political science.

Laws have the abstract logical structure of generalized conditionals, but these conditionals do not refer to efficient or formal or final causes. In the case of laws as normative conditionals, the generalized conditionals have the specific material structure of generalized *promises* determining that all events or state of affairs of the type x mentioned in the antecedents *ought* to be followed by an event or state of affairs y in the consequent. This is the "empirical" dimension of *jurisprudence* considered in the preceding section. The methodological problems of jurisprudence are problems of a methodology of interpretation and application. A law, however, is a law according to the basic pragmatic principle of the science of the law only if it can be enforced, if it is possible to realize what is promised in the law. This principle of the science of the law determines the first dimension that is of immediate significance for political science as an *empirical* science because it adds the dimension of efficient causal relations, and this also means that it adds a dimension of possible empirical research.

The normative conditional "if there is an event of the type x, this x always *ought* to be followed by the event y" has the character of a viable promise if and only if there is a person or a group of persons who are able to realize y, to *cause* that events of the type x will indeed be followed by events y. The law is, therefore, of significance for predictions of the future course of events in civil social interactions only if the law can be enforced because to use force is to enact a *causal relation*, and with it, the logical possibility of predictions and explanations.

The second relation between law and political power is lawgiving. Developed law systems can have, beyond the penal and the civil law, systems of constitutional laws or state laws that determine the difference between legitimate and illegitimate procedures of lawgiving. Legitimate lawgiving is, however, meaningless without the power to enforce it. This formal principle together with the formal principle that the purpose the lawgiving is first of all to avoid violent conflicts among citizens or groups of citizens, implies a third formal principle. This principle requires that *only* the sovereign, i.e., the institution that has the legitimation to give laws, is also the institution in the state that has the legitimation to use power and ought to have this power for violent enforcements of laws and regulations.

Seen from the viewpoint of the science of the law, the power to give laws and to enforce given laws is the main problem for political science. The question is whether it is in all of its dimensions a problem for political sciences as an *empirical* science. The purpose of the ideal type "political social interaction" in general is, hence, seen from this viewpoint legitimate lawgiving. Apart from the formal presuppositions of legitimate lawgiving, the highest material purpose of legitimate lawgiving is to give just laws; just laws are laws given for the commonweal and not for private interests.

Empirical research in the systematic human sciences in general and, hence, in economics and political science as well is in the last instance interested in predictions and the discovery of "laws" of social life, i.e., generalized conditionals that can count as weak analogues of "laws of nature." They can only be weak

analogues because of the high degree of complexity of the social context and the restricted temporal framework in the development of societies in which such generalized conditionals can be relevant for predictions.[124]

What has to be kept is mind is that the rationality of ideal types of social interactions presupposes that the selection of means to realize the purposes is first of all interested in means that admit explications with the aid of efficient causal relations. The means are rational means only if they are causes that have useful effects for the realization of the purpose. The first step of empirical research interested in causal relations is the collection of all available empirical data that are necessary to determine the factors that are necessary for precise descriptions of the causal conditions and their conditioned effects. Different types of such data can be distinguished in different disciplines.

The social sciences in general have to cope with problems of determining *external factors* that are relevant for simple cause-effect relations; problems that arise because of the complexity of the ideal types of systems of interdependencies in social interactions. Political science has additional difficulties because it is confronted from the outset with the interdependency between the structures of practical and civil interactions of the economy on the one hand and the structures of the distribution of power behind lawgiving and the enforcement of the law on the other. There are, secondly, *internal factors*, first of all the reactions of participants in systems of social interactions to changes in the systems.

The region of external factors is, on the one hand, the region of pre-given present systems of laws and law enforcement and the recognized legitimate procedures of political acts of lawgiving. On the other hand, there is the region of practical economic interactions as the foundation for the production of the technological and financial resources of political power as a power to enforce the law within the political community, along with the military power used in conflicts with other political communities. Economic interactions are furthermore of significance as a system of real conditions both for the process of lawgiving and for the structure of law systems that determine lawgiving because more or less organized groups guided by different economic interests also have the power resources to influence the process of lawgiving in favor of their interests.

Systems of practical economic interactions also determine systems of higher understanding of the social and natural environment of a social lifeworld as a whole in myths and different types of religion, as well as of pre-scientific philosophical and scientific worldviews. Such systems of higher understanding have always determined the background of disputes about "just" laws and, hence, of the rationality of the choices of purposes in the process of lawgiving as a political activity. They can have a significant and sometimes violent impact on the political process of lawgiving and enforcing the law.[125]

[124]Cf. Sect. 10.2.

[125]The fight for or against laws permitting/prohibiting marriages of homosexuals is in the last instance a fight between worldviews: namely, between the system of higher understanding of the

The existence and further development of economic systems presuppose, vice versa, the coexistence and development of legal systems regulating first of all property systems, i.e., the distribution of wealth, and such legal systems must be enforced.[126] The possibility of the enforcement of the legal system presupposes that the system itself warrants that only the state has the legitimation to use power against all powers inside and outside the social community that threaten to violate the legal system. In a functioning economic system that produces revenue via taxation and other forms of "expropriation," such systems have in addition the necessary resources for the support of the enforcement of the legal system.

The immediate consequence is that the external factors that are able to introduce changes in the economic system also have the potential to cause changes in the political system. It is, therefore, difficult in political science to isolate cause-effect relations that admit predictions from a cause given in the present to an effect that will be given in the future. The presupposed cause-effect relations represent only one aspect of reciprocal causal relations between the power behind the enforcement of a legal system as a factor that causes changes in the economy, on the one hand, and on the other hand, changes in the economy that cause changes in the legal system and the distribution of power behind the lawgiving and the enforcement of the legal system.

Problems connected with interfering *internal factors* in economics and also in political science, and attempts to derive causal interdependencies between such factors and predictions of future events and developments, are problems for research in social psychology. Presupposed in such attempts are first of all statistical evaluations of the results of diagnostic questioning and of interviewing members of certain groups in the political community about their attitudes and their judgments about their social situations or about changes in these situations. Of interest are also more or less hidden psychic inclinations and drives that have an impact on in-order-to-motives of members of certain groups.

The main epistemological problem in such investigations is in general the objective validity of presupposed interpretations of systems of social interactions that determine the social environment of the "objects" of the diagnostic questioning.[127] The "objects" in diagnostic questioning are subjects, other persons who are able to respond to interpretations of the political situation implied in the questioning and to react to the results of the investigation.

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right of individuals of the Enlightenment and the system of higher understanding of the theocratic laws of the *Old Testament* that still dominate ethical and political doctrines in Muslim and Christian traditions.

[126]Economic liberalism defends the freedom of the market against legal regulation of the state but has no sympathy for other types of freedom, e.g., the freedom of the enemies of merchants and bankers, namely, robber barons, bank robbers, and communists. The state is required to suppress such freedoms with the force of the law.

[127]Cf. Sects. 10.4 and 10.6.

Closely connected with this problem are two other problems. It is of specific significance for political science as an empirical social science that no purposes, final causes that are able to determine rational selections of effective means are pregiven. Economics is able to presuppose such ideal types; however, political science (and especially political science as a science of rational lawgiving) is not able to restrict itself to rationality in the selection of means. What is of interest are first of all criteria not for rational choices of means, but for reasonable choices of purposes of social interactions and actions. It is impossible to bracket the problem of the higher-order "rationality" of the selection of purposes in political science because it cannot be bracketed in political theories of lawgiving. It is, hence, questionable whether the analysis of the contents and the structure of systems of purposes and the experience of values that are constitutive for in-order-to-motives behind the choice of certain purposes and their realization can be solved with the methods of an empirical social science.

There is, secondly, the problem that political science presupposes economics and the science of the law as its foundations. Results of these two sciences are presupposed in different degrees in all other sociologies of . . . , but political science includes from the outset the structure of the system of politically relevant social interactions *as a whole*, i.e., it is of interest in different perspectives, for all groups and members of the political community and for the purposes of their interactions. The question is, hence, whether and how it is possible to find criteria for the determination of the distance between researchers and the objects of research that is the presupposition of the possibility of "disinterested" observation.

The two problems just mentioned will be considered at the end of this section after an analysis of the scope and the limits of the empirical basis for testing predictions in the region of empirical research in political science. Political theory can be recognized as *empirical* social science only if it is able to fulfill the methodological requirements for empirical science. The first basic requirement is that political science must be able to discover generalized conditionals referring to causal connections that can be applied in explanations and predictions of events that change or save the structures of politically relevant social interactions.

The second basic requirement is that the predictions must be testable, and the touchstone of the tests must be empirical material that can be given for intersensory observations. Social sciences are sciences of interpretation, i.e., of methodologically guided secondary understanding of the first-order understanding that is implied in fixed and immediate life expressions. The empirical material that can be used for confirmations or disconfirmations of predictions in political science can only be *interpreted* life expressions, and thus these interpreted life expressions must be accessible for intersensory observations.

The empirical basis of research in political science is, hence, coextensive with the empirical basis of research in *contemporary* history. Of interest for descriptions of the initial circumstances are immediate life expressions, fixations of immediate life expressions, and fixed life expressions. The methods in political science on this descriptive level are the methods of historical research, i.e., the reconstruction of what was/is really the case with the aid of interpreted life expressions. Such

interpretations presuppose a methodology of interpretations, a methodologically guided hermeneutics. It is essential for the analysis of the methods of political science as an empirical science and of contemporary history to keep in mind both that the methodological abstraction of the philological-historical method is not applicable in contemporary history (Sects. 5.4, 5.5, 10.2 and 10.4) and that the applicable methods are the precisely the methods that can be applied in the investigations of "what was really the case" in jurisprudence (Sect. 10.6).

The observables of descriptions for social interactions in the present and its temporal horizons are life expressions. The predictions and explanations implied in observed social interactions already imply the secondary understanding of the purposes (and with them, of the in-order-to-motives of participants in social interactions). The general patterns pre-given for the search of explanations and predictions in the social sciences are the *ideal types* of practical social interactions and civil social interactions in general.

The region of practical economic interactions is, according to the above-mentioned and generally accepted thesis, the region of the real conditions for the region of civil social interactions. According to Sect. 10.5 and the preceding sections, ideal types of systems of economic practical interactions require in-order-to-motives implied in purposes that are interested in raw materials and techniques as means for the realization of the purpose, i.e., the production of marketable goods that can be explained in terms of efficient causality. Moreover, the choice of in-order-to motives is restricted on the level of a developed market economy to the purpose of the increase of wealth, *vulgo* maximizing profits. In this sense the discovery of efficient means admits in this case the application of mathematical calculations. Economics can, hence, be recognized as an empirical social science within the limits that have been mentioned in Sect. 10.5. The principle "increase of wealth" understood as "maximizing profits" is presupposed as *the* rationale or reasonable choice of the highest purpose for economic interactions.

The causal factors determining the structure (and the changes in the structure) of civil political interactions will in the most cases be changes in the structure of economic practical interactions and of other economic civil interactions that are immediately connected with practical interactions. The immediate real condition of the effects of political civil interactions is the force behind the commands and rules of a political authority that is required for the realization of the purposes of the rules or commands given by the political authority. A political authority is, therefore, interested in resources for the increase of its power. Of significance in this respect is the degree to which technological means are available for the production of sophisticated weapons, the "tools" for the use of force, but also the availability of technologies that can be applied for other purposes, e.g., for purposes of effective communication systems. Of central significance is that the possibility of raising taxes on the production of goods and on the profits gained in trading goods is a means of increasing the financial resources that can be used to develop and to apply such types of technologies in order to increase power as the ability to use force in social interactions.

Power is of significance as *political* power, beyond the ability to use brute bodily force, as a power to enforce rules and commands, first in archaic non-literate societies and then in literate cultural traditions that relate to the giving and enforcing of laws regulating civil and practical interactions. Of interest for a phenomenological epistemology of political science is, hence, not merely the question of the efficiency of economic conditions for the increase of the resources of political power. The epistemological reflection on methods used for description of relevant factors and their effects in the region of political interactions has to cope with the additional problems not only of conditions determined by economic structures for lawgiving and enforcing the law that are of interest for political science but also (and vice versa) of conditions determined by lawgiving and law enforcement for economic structures. The methods applied in economics are similar to the methods of the confirmation or disconfirmation of hypotheses referring to cause-effect relations in the natural sciences. But the methods applied in jurisprudence and in the science of the law are first of all methods of the human sciences, more precisely, of the sciences of interpretation.

The first task of the analysis of the region of the political interactions of lawgiving and law enforcement is the interpretation of texts representing the presently pre-given law system and its background in the history of the law. The problem of the application of the law, the main problem of jurisprudence, is not a problem for political science as a theoretical empirical science. Left are the problems of the philological-historical interpretation of law texts. The interpretation of laws implies, according to the analyses of Sect. 10.6, the interpretation of the context of a law in the system of positive laws. It presupposes, secondly, the interpretation of the presently still relevant historical background of the development of the law system and, finally, of the texts that are relevant for the systems of higher understanding that provide the legitimating for the lawgiving and law enforcement of the pre-given law system.

It is, hence, a special difficulty for research interested in causal conditions that can be used in predictions and explanations in political science that the methods used in descriptions of factors in the causal conditions on the one hand and factors in the effects of these conditions on the other are different. The causal conditions belong to the region of economic interactions and their descriptions imply descriptions of causal relations applied in the techniques and technologies of economic interactions, causal relations that on the level of the market economy admit even mathematical explications. In contrast, the principles of the methods of the description of the conditioned effects are the principles of the methodology of philological-historical interpretations. Interpretations of life expressions in the empirical basis of economics refer in the last instance to immediate life expressions connected with practical and civil economic interactions that can be given in secondary understanding in the present. But the interpretations of laws in jurisprudence are interpretations of fixed life expressions and have to apply the methods of philological text interpretations. Furthermore, according to Sect. 10.6 law systems include not only (1) laws for social interactions on the level of animalic,

practical, and civil social interactions, but also (2) systems of constitutional or state law regulating not only the enforcement of the law, but first of all the distribution of political power, i.e., the access to the process of lawgiving. On this level they also indirectly determine possible ways to gain political power by violating pre-given laws of the existing law system of level (2).[128]

The levels (1) and (2) together presuppose (3) the contemplative systems of higher understanding mentioned above that are able to provide the legitimation of political authorities to give and to enforce laws. As contemplative systems such systems transcend the regions of economic systems and systems of positive law, but they do imply and refer to such systems, last but not least as, e.g., theological and/or philosophical theories of the law and the state.

The systems of the legitimation of political power (3) of higher understanding mirror the system of the interests of groups and institutions in a society *as a whole*, and this system is ultimately also the region of real conditions for the contemplative systems of higher understanding that are constitutive for the legitimation of the lawgiving sovereign. Such systems can also be powerful factors for the realization of the interest of partial groups and institutions in the region of economic social interactions who use their influence to introduce changes in the system of lawgiving and the law. The in-order-to-motives of such "conservative" resistance are in most cases determined by the value systems of religious traditions, but also of other types of worldviews. Difficulties connected with (3) are, hence, immediately consequences of the above-mentioned problems that indicate the limits of possible applications of the methods of the *empirical* social sciences in political science.

Set aside that the degree of complexity and the speed of historical changes of factors that are relevant for predictions and explanations in the social sciences is much higher than in the life sciences the essential difference between both types of sciences is in the social sciences that empirical descriptions of such factors presuppose the interpretation of life expressions of contemporaries in the region of contemporary history. According to Sect. 10.4 the first epistemological problem for social sciences in general was, therefore, that the presupposition of the possibility of testing hypothetical interpretations in history, the strict separation of interpretation and application, is not applicable in contemporary history. The second epistemological problem was that hypothetical predictions about the behavior of the objects of the social sciences are themselves already able to function as factors determining the behavior of the objects. They are potential factors because they are not only objects, but at the same time subjects, contemporaries who can react to the publication of the results, and especially to the predictions of investigations of the social sciences.

The method used to overcome these difficulties in the social sciences is the construction of ideal types. Rational ideal types are in particular able to propose explanations and testable predictions presupposing effective causal relations in practical and even civil social interactions and to determine external and internal

[128]Cf. Sect. 6.2 esp. the example of Caesar's crossing the Rubicon.

factors that are able to explain disconfirmations of such predictions. Except for the applicability of the results of the natural sciences in the discovery of technological means in practical social interactions, economics is the social science that admits predictions with the highest degree of effective and even mathematically calculable causal relations (Sect. 10.5).

The region of objects of political science is a special case of this highest degree of complexity in the social sciences. It presupposes economics as the science of the practical and social interactions that provide the resources for power and for the division of power in political systems. It also includes, however, the ideal types of civil social interactions in the regions of the administration of the application of the law, of the enforcement of the law, and finally of lawgiving. The study of laws, law systems, and systems of law regulating the process of lawgiving presupposes the interpretation of law texts and the methodology of text interpretations in general. The methodology of philological-historical interpretations and reconstructions implies a methodological abstraction that requires the separation of interpretation and application. The possibility of separating interpretation and application already vanishes in contemporary history because in contemporary history the contextual horizons of the text and of the interpreter are not separable.

Both lawgiving and enforcing the given laws are political civil interactions that happen *in the present* including the immediate past, but also in the future horizon of the present and are of basic significance for political science as a social science. There are questions of giving laws that are only of immediate interest for partial groups and institutions. It is, of course, also possible in such cases to ask whether such laws are just or unjust laws, but in such cases it is still possible for political scientists who are only interested in *value free* judgments to consider the political process of lawgiving from the outside as disinterested observers.

The situation is different if the laws are of vital interest for the *whole* of the present life of a social community, i.e., for all members of the community and all social relations between the members in social interactions. No member of the society can be disinterested in such laws and the giving of such laws not only because of distinctions that belong to the realm of the "ought to be – ought not to be," but also because of their interest in the material conditions of their existence. The epistemological consequences for the question whether political theory can be reduced to political science as an empirical social science will be considered in the summary at the end of Part V.

Part V
Summary and Conclusions

Chapter 11
Summary and Conclusions

The following concluding remarks begin in Sect. 11.1 with a survey of the partially paradoxical controversies in discussions about the system of the empirical sciences in the last century and their foundations in the paradox of subjectivity. Section 11.2 is a summary of what has been said in the preceding investigations about the foundations of the empirical sciences in the structures of the lifeworld. Section 11.3 offers a summary of conclusions that are relevant for attempts to develop a system of empirical sciences and can be derived from phenomenologically guided reflections on the methods and methodologies of the empirical sciences, together with concluding remarks about the epistemic status of a phenomenological epistemology.

11.1 Naturalism, Historicism, Historism and the Paradox of Subjectivity

A summary of the positive results of the preceding investigations presupposes a critical review of the epistemological reflections on the system of the sciences and their development in the last century. This development started with Dilthey and Rickert (Sects. 4.2, 4.3 and 4.4). It ended with the contradictory theses of the priority of the cultural or spiritual world as correlate of the human sciences over the natural world as correlate of the natural sciences, or vice versa, in the tradition of analytic philosophy, the priority of the natural sciences and the natural world over the human sciences.

The main task of the summary of the results of the preceding investigation in this and the next sections to show how the paradoxical consequences of this controversy can be avoided with the aid of the distinction between the epistemic and the ontic interpretation of the controversy; a critical phenomenological analysis

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of the meaning of *understanding* and *explanation*; and a critical interpretation of the distinction between "methodological abstraction" and "abstractive *reduction."*

The final task of the present section is to unearth the foundations of the dilemma just mentioned in the paradox of subjectivity as the partial structure of reflective awareness in the lifeworld (Sect. 2.4).

According to the thesis of the priority of the natural sciences, it is possible to "explain" all phenomena or observables that are relevant for the human sciences in terms of categories of the natural sciences. The thesis of the priority of the human or "spiritual" sciences emphasizes, on the contrary, that the theories of the natural sciences are, as historical facts, historical phenomena that must be understood in their own historical context. The reconstruction of the historical past is able not only to reveal the fallibility of all scientific discoveries, but also to discover "revolutions," i.e., basic methodological paradigm shifts in the history of the natural sciences. What these revolutions really mean can only be understood in the context of the past historical period from which they emerged (Sects. 7.1 and 7.2).

One of the epistemic presuppositions of naturalism or naturalistic physicalism is the possibility of assuming that the second methodological abstraction that determines the region of objects of physics is in addition also an abstractive reduction. The immediate consequence is that the theories of the soft natural sciences (i.e., the life sciences) that have their region of objects in the residuum of the first methodological abstraction can be reduced to, i.e., explicated with the aid of the theories about, the objects in the region of the hard sciences (Sects. 7.2 and 8.5).

Epistemic naturalism adds the epistemic thesis that psychology can be reduced to the life sciences and then finally (together with the life sciences) to physics. Naturalism in the radical sense adds the ontological thesis that all the phenomena that belong to the region of the historical and the social human sciences can be reduced to psychology, and again with psychology to physics. It is *prima facie* plausible to assume such a possible methodological reduction for experimental research in psychology; and similar methods can be used in the social sciences. It is plausible because as sciences of presently given phenomena, both are able to use immediate intersensory observations of facts and quasi-experimental and experimental methods. The problem is, however, that the description of psychological facts also presupposes (Sect. 10.3), even in case of experimental psychology, also elements of secondary understanding referring, e.g., to in-order-to-motives and purposes of actions and social interactions.

The epistemic claim that *research* in the human sciences in general (and especially in the historical human sciences) can be reduced to psychological research and then to research in the natural sciences is absurd. It has been shown (Sect. 6.4) that historical research by itself can "falsify" psychological causal explanations of historical facts by simply using the methods of interpreting fixed life expressions and reconstructing a past reality, the assumption that the explained assumed historical fact was really the case. It is impossible in general to *replace* the methodology of philological-historical research with the methodology of research in the natural sciences. To claim, e.g., that brain physiology can help to translate

the *Iliad* or to reconstruct the relevant historical facts of the trial of Galileo without the aid of interpretations of the Latin documents in the archives of the Vatican is absurd. This does not imply that it is meaningless to try to find first psychological explanation and then perhaps the underlying physiological structures that support a psychological explanations for historical facts. But historical facts as such can be reconstructed and interpreted as historical facts only with the methods of historical research (Sects. 6.1, 6.2, 6.3, 6.4 and 9.1).

The modern *ontic* understanding of naturalism has its foundation in the modern *epistemic* understanding of naturalism. A phenomenological epistemology is able to offer solutions for the difficulties of the epistemic understanding and to recognize this naturalism as a respectable research program. An ontic understanding, however, will end in paradoxes, and these paradoxes have their foundations in the paradox of subjectivity that has been considered in Sect. 2.4. The first indicators for this transition from the epistemic to the ontic understanding are ambiguities in the meaning of "explanation."

It is essential for causal explanations in the natural sciences, e.g., in classical physics, that not only all factors belonging to the set of initial conditioning factors, but also the set of factors belonging to the state of affairs in the effect *must* admit explications and descriptions in terms of the basic categories: mass, force, energy, movement, etc., of classical physics. To reduce, e.g., the life sciences to physics according to an ontic understanding of naturalism means that all the basic categories of the life sciences can be represented in explications that use only the categories of physics. The consequence in the context of classical physics was that living organisms had to be understood as mechanical clockworks.

"Explanation" in terms of the *methodology* of the natural sciences can only mean that theoretical entities of physics are the efficient causes of all objects given in the lifeworld, including the objects given in my own inner experience and the lived experience of Others given in the understanding of the life expressions of Others. The *explananda* are in this case the objects in the lifeworld. The *explanans* is nature as the world of objects that are ultimately explicable in terms of the categories of physics. But this type of a causal connection cannot have the logical structure of causal connections in the world of the objects of the natural sciences. Instead, the causal relation is an analogue of an ontic relation between the thing in itself, representing the real reality that "causes" appearances given in the lived experience of conscious life and these experiential appearances themselves. Here cause and effect belong to strictly distinct regions in the lifeworld that are determined by different systems of categories.

The difficulties of a satisfying epistemological explication of the ontological meaning of "explaining" increase with the transition from classical to post-classical physics. The theoretical entities of classical physics are "written in mathematical letters," but these letters still refer to exact essences that presuppose variations in imagination admitting quasi-pictorial representations (Sect. 8.3). The additional difficulty for naturalism in the context of post-classical physics is that the theoretical entities of modern physics, i.e., of relativity theory and quantum theory, can only be represented in the language of post-classical mathematics and in this sense

are, therefore, mathema-physical entities that do not admit even quasi-pictorial representations (Sect. 8.4). They are this respect similar to Kantian things in themselves that cause the appearances in which the objects of our experience are given, now including even the objects of classical physics that admit pictorial representations. The Kantian things in themselves are objects of pure understanding. The theoretical objects of modern physics are objects of first-order understanding in terms of the language of the formalism of the *mathesis universalis*, and this means that they are objects of a *meta*-physics. What "cause," "matter," "force," "energy," etc., means can only be determined in terms of the *mathesis universalis*.

There are other puzzles and difficulties of ontological naturalism in the context of the lifeworld, e.g., for naturalistic explications of terms like "responsibility" or "freedom," that are not of immediate epistemological interest and can be neglected for the purposes of this investigation. Of central significance for epistemology is, however, an epistemic paradox that lurks behind the final reduction of all contents of lived experience in the lifeworld to the theoretical objects of physics.

The justification of the naturalistic reductions is, according to the most recent argument, that brain physiology is able to find explanations that reduce all contents of conscious life, and consciousness itself, to physiological processes in the brain. The first premise of this argument for naturalism is that all successful localizations of physiological processes that occur as correlates of the givenness of certain contents in conscious life can serve as causal explanations of the appearance of the contents. The argument is, however, invalid without a second premise asserting that the brain as a whole is not only able to "cause" changes in the subconscious and conscious contents of consciousness, but also that the whole of the physiological processes in the brain is also able to create conscious lived experience in all of its aspects. It is, hence, also the brain itself that distinguishes between itself as BRAIN and its objects, including the brain as an object of the brain physiologist. The BRAIN is the origin of the conscious distinction between subject and object. But this presupposes that the BRAIN, especially the BRAIN of the brain physiologists, posits itself qua physiological entity as a subject that can have as its object the brain as a physiological entity given in the context of other physiological and physical entities.[1] Entering ontological metaphysical speculations, it is possible to understand the positing BRAIN as a naturalistic analogue of the Fichtean ABSOLUTE EGO that posits itself as ego and the non-ego.

It is, however, also possible to understand this situation of naturalistic self-reflection as an instance of the paradox of subjectivity. Consciousness is given to itself as the correlate of the givenness of the world, and moreover as a correlate that accompanies the givenness of all objects given in the world, but the answer to the question concerning what consciousness is necessarily implies that it exists in the world. More about this reduction of the paradox of the BRAIN can be said below after considering the paradoxical problems of historicism.

[1]The explication given for the paradox of the BRAIN follows Emrich 1990, ch. IV.

Critical reflections on *historicism* in the context of a phenomenological epistemology have to start with Husserl's comments on historicism. Husserl rejected historicism in his "Philosophie als strenge Wissenschaft" of 1910/1911 because it implies historical relativism, relativism implies skepticism, and skepticism refutes itself. Historicism had to be refuted together with *naturalistic* psychologism because it denies the objective validity of ideal objects, first of all the objective validity of formal logic, along with formal ontology, including the *mathesis universalis*.

Seen from a systematic point of view, it is of significance for a possible extension of Husserl's critique of historicism that natural science is, seen from the viewpoint of historicism, a specific cogitative type of understanding that has the region of objects in the natural world as its correlate. As such it has a history, and this history is the object of research in the history of natural science. Historicism in the context of the epistemology of the formal and empirical sciences entered the scene in the second half of the twentieth century with the theses that epistemological reflections ought to consider not what scientists ought to do, but what they actually do or have done in the course of the history of science; historical research in the history of science then reveals that scientific methods and theories in past periods of the development of the natural sciences have been guided by paradigms.[2]

According to the radical version of this historicism, paradigm shifts in the history of science cannot be understood as indicators of progress in scientific rationality. They emerge like shifts in the paradigms of styles in art history. The authors of the thesis that it is possible to derive the principles of the epistemology of the empirical and then even of the formal sciences from the results of research in the history of sciences tried to deny that the consequence of their historicism is relativism. Such a denial is, however, impossible without introducing serious corrections of the thesis that the history of science is the touchstone for epistemological investigations. According to Husserl's analysis relativism implies skepticism and the self-refutation of skepticism. Self-refutation means in this case the self-refutation of the thesis that the history of science is able to provide principles that can be applied in the epistemological justification of the claim of the natural sciences to be able to reach the level of theories that can be recognized as representing objectively valid knowledge.

It is, furthermore, of significance for the problem of historicism in epistemological reflections on the natural sciences that historicism ultimately implies the self-refutation of the claim of historical research to deliver objectively valid reconstructions of past historical events in general, and especially in the history of science itself. It is not difficult to find different paradigms of interpretation and different ways in which "history" and "literary tradition" were understood in the historical literature of Classical Antiquity, of the Middle Ages, of the humanists

[2]Cf. Sect. 7.1 on relativism in Thomas Kuhn's conception of the history of science. It has been mentioned in Sects. 8.2, 8.3 and 8.4 that the transition from classical to post-classical physics, relativity theory, and quantum theory is not of basic significance in Husserl's later writings, but it was of crucial significance for the historicism of Kuhn and others in the history of science.

in the Renaissance, of the philological-historical sciences in the nineteenth century, etc. It is, hence, obvious that historical research too is guided by changing paradigms that also emerge as results of paradigm shifts. But if the claim of possible objective validity in historical research must be denied, then it is meaningless to offer an epistemology of the natural sciences that presupposes results of research in the history of the sciences.

The dominant problem in the early manuscripts of *Ideas II* after Husserl's correspondence with Dilthey was the problem not of historicism, but of *historism.* The term "historism" was not used by Husserl. It has been introduced in this investigation to distinguish between the epistemic and the ontic meaning of the set of problems that emerged in attempts to solve such problems with the support of historical research. A terminological distinction introduced by Popper[3] for partially different purposes has been used in this investigation for denoting the *phenomenological* distinction between the problems of *historicism* and the problems of *historism*. The problems of *historism* emerged in the dispute about the priority of the natural world of the natural sciences over the spiritual world of the human sciences or vice versa the priority of the spiritual world over the natural world in *Ideas II*.[4] The problems connected with this dilemma are the ontological problems connected with the ontic opposition of naturalism and historism. Dilthey's and Husserl's preference in this dilemma was historism.

It is, finally, necessary to mention a radicalized type of ontic historism, the historicity of Being, and its epistemological consequences because certain consequences of this position have been of significance for the discussion of the epistemological problems of philology and history as empirical sciences in the preceding investigations (Sects. 4.4, 5.4 and 6.5). According to Heidegger f*undamental ontology* requires the attitude of a contemplation of Being above and beyond the deficient modes of the experience of Being in the sciences and ontologies that presuppose the objective validity of the methodology of scientific research. Being and its Truth appear as a hermeneutics of Being in the horizons of the historicity of linguisticality. It is possible to establish *hermeneuticism* as a radicalized historism above and beyond any interest in the possibility of objective validity in philological and historical research and its methodological foundations in a possible separation of interpretation and application in philological-historical research. A phenomenological epistemology is able to respect the thesis that this fundamental ontological interpretation of hermeneutics is disinterested in questions

[3]Husserl used the term *Historizismus* in "Philosophie als strenge Wissenschaft" (Hua XXV, 3–62), but he never explicitely distinguished between *Historizismus* and *Historismus*. Popper used both terms in Popper 1957, but his "historism" is an analogue of Husserl's "historicism" and what he called "historicism" are theories about metaphysical theories of history as a whole like Hegelianism or Marxism.

[4]Cf. Seebohm 2013. It may be noted that, though it might sound awkward in English, the terminological equation "world of the human sciences" = "historical world" = "spiritual world," is natural for the German terminology: "Welt der Geisteswissenschaften" = "geistige Welt" due to Hegel's objective spirit.

of method and methodology and is therefore epistemologically irrelevant. However, a phenomenological epistemology is not able to tolerate attempts to use this analysis of the pre-scientific deep structures of understanding as an argument against the methodological significance of the separation of application and interpretation in philological research. Such attempts necessarily end in a regression back to the pre-scientific unity of interpretation and application in archaic literary traditions.

The preceding analyses indicated that the foundation of epistemological reflections that determine the formal structure of the paradoxes of naturalism and historicism is the paradox of subjectivity. According to Husserl's formula for the paradox of subjectivity (Sect. 2.4) consciousness is given for itself as *being* the subject of the sum total of all objects in the world in the reflective transcendental attitude, but it is also given to itself as *being* an object in the world in the natural attitude. The paradox of subjectivity appears for the ontic interpretation of its aspects in modern philosophy in disguise as unbridgeable as the antithetic opposition of philosophical materialism and idealism and in the discussion of epistemological problems as the opposition naturalism and historism. Husserl himself preferred in the *Crisis* a metaphysical interpretation of the phenomenological answer to the question of ultimate grounding and with it an ontic interpretation of the paradox. *Prima facie* these preferences cause problems for the necessary preference of the epistemic interpretation of the paradox in a phenomenological epistemology.

Dilthey's empirical morphological typology based on inner experience and the inner re-living of foreign mental life is not able to provide a precise analysis of interpersonal spiritual life; a recognition of the specific objectivity of the manifestations of spiritual life; a solution for the problems of historism; or a justification of the decision in favor for the thesis of the priority of the historical-spiritual over the natural world. Only transcendental phenomenology as the *absolute* science of the spirit, the *absolute Geisteswissenschaft*, together with the application of the method of eidetic intuition, is able to justify this decision.[5]

The need to offer a solution for the problems that surfaced with the recognition of Dilthey's ideal universal human science as a path to the transcendental-phenomenological reduction was one of the motives for the new metaphysical understanding of transcendental phenomenology in Husserl's last writings, first of all in the *Crisis*.[6] The problems of the antithetical opposition of the spiritual and the natural world and the need for a justification of the decision for the priority of the spiritual world over the natural world (and with it for the first horn of the dilemma of the paradox of subjectivity) required a new solution for the problem of *Letztbegründung*, ultimate grounding.

[5]Cf. Hua IX, §2 and Beilage II (1928).

[6]See Hua VI, §§54, 55, and 73. It is essential to keep in mind that the paradox of subjectivity appears in §§54 and 55 as the presupposition of Husserl's "discovery" of the primal ego, cf. the preliminary considerations in §4. A list of other manuscripts that are of significance for the interpretation of the primal ego as ultimate foundation of phenomenological research is now available in Geniusas 2012, ch. 9.

For the first steps of the analyses of transcendental phenomenology, the transcendental ego is given as a pole in the sequence of active intentional activities. This transcendental ego is, however, only the individual and therefore mundane ego of the phenomenologist. Phenomenological analyses and reflections on this level are, therefore, plagued by the problems of solipsism and the paradox of subjectivity. However, in the *Analyses of Passive Synthesis,*[7] the transcendental ego as an abstract pole in active syntheses is only an indicator of the transcendental ego understood as the self-manifesting activity of the *Ur-Ich*, the "primal" ego.[8] Passive synthesis as associative synthesis is determined by structures in the hyletic field as a necessary foundation of active synthesis and of the ego as pole of active syntheses. The primal ego can be understood as the "medium" in and "first mover" of the genesis of the unity and the process of subjective and intersubjective conscious life that is pre-given for the method of reflective analyses of transcendental-phenomenology after the first "naïve" transcendental phenomenological reduction. The analyses of passive synthesis are also presupposed in the analyses of the givenness of Others, i.e., the constitution of transcendental intersubjectivity and with it the cultural or spiritual world.[9]

Only the primal ego (and not the ego as the abstract pole of a manifold of cogitations) is, hence, able to satisfy the requirements of a justification for the thesis of the ontological priority of the spiritual world over the natural world and with it the decision for the first horn of the dilemma of the paradox of subjectivity. The activity of the transcendental ego in active syntheses is only an indicator of the self-manifesting *teleological* activity of the *Ur-Ich*, the primal ego as *ultimate grounding*. The primal ego, the *Ur Ich* as an "absolute" immortal transcendental ego, lies behind the intersubjectivity of mortal mundane "empirical" egos.[10]

The main question for a phenomenological epistemology is whether the ontological solution of the problems of the paradox of subjectivity in the *Crisis* can be of significance for the methods that are applicable in the reflective phenomenological analyses of epistemological problems and problems of a general theory of knowledge and knowing. The answer in the preliminary considerations of Sects. 2.4 and 3.1 was that the paradox of subjectivity is an unsolvable *ontological* paradox only for its *ontic* interpretation, but not for its *epistemic* interpretation. An epistemic interpretation is able to reduce the two horns of the alternative behind the paradox to the "what" of the givenness in direct and oblique intentions in the epistemic

[7] Hua XI, section. III, IV, ch. 1 and 2. Cf. also Hua I §§37–41.

[8] It is difficult to find a satisfying translation for the *Ur* in *Ur-Ich* in English. Nouns and adjectives using this prefix in German are translated in many different ways in English, e.g., great grandfather for *Urgroßvater*. Using the Greek *archē*, in German *Anfang* as *Ursprung* and known in English in nouns like archbishop; *Ur-Ich* could be translated as Arch-Ego. What comes closest in the history of philosophical terminologies is absolute ego, *absolutes Ich*, i.e., in the Kantian definition of "absolute," "independent and unconditioned in every respect."

[9] Cf Sect. 3.1 above.

[10] Cf. the report of Schutz on his last conversation with Husserl in "Husserl and his Influence on Me" in: CP V.

perspective. The subject is given to itself in *oblique* intention *as* the subject *of* the givenness of the world and is given to itself in *direct* intention *as* an animated living body in the world. This thesis does not imply that metaphysical interpretations are meaningless. The thesis claims only that such metaphysical interpretations are irrelevant for the methodological approach of the reflections and analyses of a phenomenological epistemology.

A short summary of some viewpoints that surfaced in metaphysical interpretations in the history of the phenomenological movement is necessary before turning to the final critical systematic evaluation of this claim. The problem of "phenomenology and/or metaphysics" dominated discussions of Husserl's phenomenology in the German literature after the Second World War. Several applications of phenomenology to metaphysical problems in the broadest sense, including references to Heidegger's fundamental ontology as well as to Hegel, can be found in this tradition. Critical viewpoints rejecting attempts to provide a speculative and metaphysical ultimate grounding in and for transcendental phenomenology as a *method* were discussed in the phenomenological circle at Mainz.[11]

These discussions after the war were been prepared in discussions connected with Husserl's efforts to finish final versions of the *Cartesian Meditations* and the *Crisis* in the Freiburg circle since 1928 and, after Husserl's death in 1938, continued in Louvain before the Second World War. The leading figure in these discussions of Husserl's research work was Eugen Fink who, influenced by Heidegger's ontological experience and his interpretation and critique of German idealism, prepared, last but not least, the final steps for a speculative metaphysical ultimate grounding of transcendental phenomenology.[12]

Husserl's and Fink's turn to a speculative metaphysical interpretation of the transcendental Ego together with the positive references to Heidegger and Hegel, was accepted by the French participants in these discussions and in general in the development of French phenomenology. The turn was known but not accepted in the phenomenological tradition of the *New School for Social Research* in New York. Schutz and Cairns participated in the discussions in the Freiburg circle. Fragments of later writings of Husserl were available before and after the war in the phenomenological circle at the New School. Schutz agreed with Fink's doubts concerning phenomenological justifications for the assumption of the possibility of a possible genetic constitution of a universe of monads in the individual transcendental subjectivity of a meditating philosopher, but he rejected Fink's speculative quasi-Fichtean solution. The question of the givenness of Others can be answered with phenomenological reflective analyses of the constitution of passive

[11] See Fink 1939, 1952, 1958 and Landgrebe 1948, 1963. A defence of phenomenology as a method can be found in the publications of Funke 1957, 1966; Müller 1956, Seebohm 1962. Detailed studies interested in this development can be found in Spiegelberg 1960, vol. II, 596 f. and Seebohm 1962, §29. A short study of the discussions in Germany in English is available in the first section of Geniusas 2013.

[12] On the discussions in the Freiburg phenomenological workshop, see Bruzina 2004, ch. 1.

syntheses.[13] Schutz's rejection of Husserl's and Fink's speculative ontological interpretation of the transcendental, the egological, and the primordial reduction was known in the phenomenological circle of the New School since 1937. His interpretation and critique was accepted by Dorion Cairns and there are no traces in the writings of Felix Kaufmann and Aron Gurwitsch of an influence of the Husserl/Fink speculative metaphysical interpretation of the ultimate grounding of transcendental phenomenology.[14] As mentioned above, the turn to metaphysics was also not acceptable for the defenders of "method" in the phenomenological circle in Mainz. Their position can be characterized as "Kantian," though by no means as Neo-Kantian, because they denied the intrinsic necessity to go beyond *transcendental* phenomenology as a philosophy of reflection in the direction of a speculative metaphysical ultimate grounding.

There is enough textual evidence for the thesis that Husserl (perhaps, as Schutz suggested, under the influence of Fink) shared the assumption that a quasi-Fichtean metaphysical idealism presupposing an ABSOLUTE EGO can serve as the ultimate absolute grounding of transcendental phenomenology. There are, however, also interpretations that are philologically correct in every respect and philosophically acceptable, of passages in Husserl's late publications and manuscripts in which the primal ego is mentioned without presupposing these assumptions.[15]

Presupposing the preliminary considerations of the first two chapters of part I, it can be said that the ontic attitude in phenomenology presupposes that phenomenology is not only a method for reflective analyses. It is in the last instance a method for the immediate speculative "ontological" experience or intuition of an ABSOLUTE EGO beyond the ego that is given in phenomenological reflective analyses as the abstract "pole" of a manifold of cogitations. Such an ABSOLUTE EGO is the ultimate ground, and as an absolute *entity*, it posits the emergence of an ego as a pole together with its correlate, the not yet understood brute reality of the hyletic field, and with it, the world in the actual standing Now of inner temporality.

According to Sects. 2.4 and 3.1, an epistemic understanding of phenomenological analyses is sufficient for the application of phenomenological descriptive analyses to problems of epistemological reflections on the sciences and the system of the sciences. An ontic interpretation is also sufficient, but this understanding

[13]Cf. §7 and Schutz's essay "The Problem of Transcendental Intersubjectivity in Husserl," together with Fink's comments with references to the *late* Fichte (and *not* to the early Fichte of the *Wissenschaftslehre*) and Schutz's response of 1957 in the English translation in CP III, 84.

[14]For recent comparative accounts see Embree 2009a, esp. section 5; Embree 2009b; Reeder 2009 all in Nasu et al. ed. 2009.

[15]For discussions of the interpretation of the transcendental ego as primal ego in the *Crisis*, the C-manuscripts, and in the writings of Fink, Cairns, and others, cf. now Bruzina 2004, 2013 and also Moran 2012, 145f. An interpretation without mentioning Fink's speculative metaphysical interpretation can be found in Geniusas 2012, ch. 9.

requires *in addition* that phenomenology ought to be a method of a speculative metaphysics, i.e., a method that admits an access to the *Letztbegründung* in the primal ego as the ABSOLUTE EGO.[16]

A solution for the paradox of subjectivity as it is given in the *epistemic* attitude presupposes as its foundation a phenomenological analysis of the temporal structure of the relation between intentional acts in direct and in oblique intention. The objects of intentional acts in oblique intention have their foundations in the last instance in acts in direct intention given in the immediate past horizon of the intentional act of oblique intentions. What is given in an intentional act in direct intention considered in its own right is an object in the world as "what it is," i.e., it is immediately given in its being given as a fact in the world. The subject of an act in oblique intention knows itself, in addition, in its identity with the subject of the intentional act in direct intention. It is also aware of its identity in sequences of iterated oblique intentions that ultimately have their foundation in acts of direct intention. Acts of oblique intention participate in the last instance in all sequences of intentional acts and require the priority of the actual Now as the foundation of sequences of retention, i.e., the past horizon of the actual Now. For the epistemic attitude being is only given a fact in the in the world as the totality of all beings given in direct intentions. Thus for the epistemic attitude the subject knows itself as a being, a fact, only in its being in the world and this means as inseparable from being incorporated "in" its living animate body living together with other animated and inanimate bodies.

The difference between the *ontic* and the *epistemic* attitude is, hence, a difference in the apprehension of inner time consciousness. As epistemic objects given in the oblique or reflective attitude temporal structures are abstract structures of concrete contexts of active and passive syntheses and their correlates. The correlates that are of interest for the epistemic attitude are the regions of intentional objects given in active and passive syntheses. For reflections in the epistemic attitude these contexts are pre-given in the past horizon of actual reflections. But the actual Now of such contexts is, seen from the perspective of the actual Now of reflections a past actual Now. In such iterations the actual Now of reflection is only given in the future horizon of a past actual Now as a not yet given *transfinite* Now, but not as the *absolute.* The actual Now of the ABSOLUTE EGO can, hence, be given only for an attitude that transcends the epistemic attitude.

Reflective phenomenological analyses are, hence, able to determine the general structure of the temporality of the primordial ego, the primordial hyletic field, and the primordial genetic constitution of intersubjectivity along with an inter-subjectively pre-given lifeworld without presupposing in addition an access to the ultimate ground of the activity of an ABSOLUTE EGO as an absolute being. A *reflective* phenomenological analysis is as such *not* able to analyze the "awareness" of its own actual Now as opening an access to the absolute transcendental ego. If there should be in addition a phenomenology of a higher order beyond "beginning

[16]Cf. the interpretations of Fink and Husserl in Bruzina 2013 and Bruzina 2004, 228, n 12, 263f., 282, 295f.

phenomenology," then it has to transcend the phenomenology of reflective analyses and precisely that is required if phenomenology can serve in addition as a method for speculative metaphysical contemplations of a phenomenological ABSOLUTE EGO. Whatever is given on this higher level is vice versa also *not* a necessary foundation for reflective phenomenological analyses. A phenomenological epistemology presupposes, as shown, the reflective analysis of all aspects of the genetic constitution of the lifeworld because the epistemic attitude is a special case of reflective phenomenological analyses. The experiences of a phenomenology of a higher order that is required for a speculative metaphysical experience is irrelevant for epistemological phenomenological reflections.

11.2 The Generative Foundations of the Empirical Sciences in the Lifeworld

The epistemological investigations in part II had to start with the considerations about the philological-historical method and the question whether it can be recognized as fulfilling all requirements for a methodology of history to be an empirical science. They had to start with these considerations because the epistemological reflections on the human sciences in the last century began with the strict separation between the natural sciences and the human sciences. They came to an end in the dispute between the defenders of the priority of the spiritual or historical[17] world and the defenders of the priority of the natural sciences and of naturalism.

Given this situation, it was first of all necessary to show that even the strict separation between the human sciences and the natural sciences does not hold water. It fails because the thesis of a strict opposition between the methodology of the natural sciences guided by the principle of explanation presupposing efficient causal relations and the methodology of the *historical* human sciences in general presupposing hermeneutical principles that were originally derived from the methodology of philological text *interpretations* does not hold water. It already fails for the methodology of history as a science because of shortcomings, hasty generalizations, and ambiguities in the presupposed descriptive analyses of the methods of historical *reconstructions* and *explanations* and their relations to the presupposed *interpretation* of the historically relevant sources (Sects. 6.1, 6.2, 6.3 and 6.4).

Additional problems surface in descriptive epistemological analyses of the methods of the systematic human sciences. "What sciences really do" in psychological research or research in economics implies methods of experimental research that have been developed in the life sciences for cases of highly complex structures of

[17]One could add to Husserl's terminology the Neo-Kantian "cultural sciences" (*Kulturwissenschaften*) that was used by Schutz and has emerged in the English literature in recent decades as a substitute for "human sciences."

ensembles of initial conditions and ensembles of conditioned effects. Even superficial reflections about methods in economics already show that a distinction between economics as a natural science and economics as a science of understanding is meaningless. Closer considerations have also shown that it is also meaningless to ask for a strict separation of methods of understanding and experimental methods in psychological research (Sects. 10.2, 10.3 and 10.5).

The initial steps of any attempts to develop a phenomenological epistemology of the empirical sciences already have to face a serious difficulty in Husserl's later published and unpublished writings. Husserl defended Dilthey's historism, praising his understanding of the historical world and his thesis of the priority of the historical over the natural world as a path to transcendental phenomenology in *Ideas II*, in appendices of *Phenomenological Psychology*, and other writings (Sect. 4.3). Seen with hindsight, it can be said that this appraisal neglects the possibility of an epistemic interpretation of historism (one that would admit an epistemology of the historical human sciences) but prefers instead an ontic interpretation. Given an ontic interpretation of Dilthey's historism, only one step is necessary for a transition from the ontological priority of the historical or spiritual world to the absolute being of the transcendental EGO versus the merely relative being of the world.

It was a disputed question among the phenomenologists in the tradition of the New School for Social Research in New York whether or not this way out was necessary for the further development of phenomenological research. The alternative was to start with the priority of a phenomenological analysis of the basic structures of the lifeworld in general because the results of this analysis provide a sufficient system of structures "a priori" for all further intentional intentional analyses of cogitative types of higher degrees of complexity. There is enough textual evidence in Husserl's later writings that such an approach is also compatible with the research program for a phenomenological philosophy indicated in his earlier writings. The dilemma causes, of course, a widely neglected problem for the philological interpretations of Husserl's late unpublished writings.[18] It is, however, obvious that choosing the first way out and opting for the absolute Being of a transcendental Ego necessarily end in a Fichtean type of speculative idealism that is no longer interested in pedestrian epistemological reflections on empirical and formal sciences that restrict themselves to an epistemic understanding of their results.

One of the basic epistemological principles of the empirical sciences (one accepted even in the analytic philosopher's theory of science) requires that only *intersubjectively* verifiable observations can be recognized as the empirical foundations of empirical sciences in general. Observations are intersubjectively verifiable

[18]The problem is whether Husserl was either unaware of the incompatibilities between the recognition of the phenomenological analysis of the lifeworld as the region of ultimate grounding, and an ultimate metaphysical grounding beyond the lifeworld as the foundation for further phenomenological research or whether he was aware of it and offered a solution has not yet been shown in his unpublished writings. A solution for this problem is not of significance for attempts to develop a phenomenological epistemology of the empirical sciences.

only if all of their parts, the pre-given intersensorially observable phenomena, are also accessible for Others. The recognition of such observables requires their accessibility in principle not only for contemporaries in the present, but also as identifiable with the same or at least equal intersensory observables in the future horizon for contemporaries and/or their successors. The requirement of an empirical basis in intersubjectively verifiable observations is a requirement for all empirical sciences and, hence, for the human sciences as well. The originally pre-given intersensory observables for the theories of the natural sciences are the phenomena that represent the reality of the natural environment in the lifeworld. The immediately pre-given intersensory observables for the interpretations carried out by the human sciences are phenomena that represent immediate and fixed life expressions of Others in the lifeworld. Objective validity and intersubjective validity are correlates. The phenomenological analysis of the constitution of intersubjectivity, and with it the lifeworld as objective correlate of intersubjectivity, presupposes the analysis of the primary and secondary passive constitution of the givenness of the Other in the primordial sphere (Sect. 3.1).

The structure of a lifeworld *with sciences* has its generative but also its static foundations in certain partial structures of the lifeworld *in general*, i.e., the primordial structures that are pre-given as structures of pre-scientific lived experience. These basic structures of a lifeworld in general have been analyzed in part I of the main text. For a phenomenological epistemology the analysis of the system of foundations of the empirical sciences has to start with an exposition of the structure of certain aspects of the deepest layer of these foundations, aspects that have been considered in part I.

Of basic significance for these investigations is first of all the phenomenological typology of understanding and its distinctions between animalic, elementary, and higher understanding and for all three types the distinction between first-order understanding, and second-order understanding (Sect. 3.2). Of basic significance is, furthermore, the phenomenological analysis of different types of causal relations and their foundations in the structures of subjective and intersubjective temporality. These analyses had to begin with the primordial temporal structures of the emergence of contents in the hyletic field because these structures are the foundation and justification for the objective validity of the conscious cogitative types in which different types of causality, i.e., effective, formal, and final causes, causal explanations and predictions, are given in the lifeworld (Sect. 3.5).

The structure of the system of the empirical sciences has the deepest layer of its foundations in different types of intersensory observations and the types that are correlates, i.e., given in reciprocal foundation relations with different abstract aspects of social practical interactions and collective interactions that are immediate correlates of practical interactions on the level of elementary understanding.

There is (1) the aspect of the encounter with the natural environment in practical interactions. The natural environment indicates itself only as an blind and brute, i.e., not yet "understood," power of reality in disappointments of primordial expectations in the sphere of ownness and then of intersubjective tacit and explicit expectations in practical interactions (Sects. 3.1 and 3.5).

There is (2) the first-order understanding of the purpose or the system of purposes of practical interactions together with the values that determine the purposes as in-order-to-motives of the participants in the practical interaction. The purpose of practical social interactions determines as "final" cause the selection of the "efficient" causal relations that can be discovered in the natural environment and serve as means for the realization of the purpose(s). Such means can be certain materials offered by the natural environment, or they can be the use of tools, but they can also be certain actions of certain participants in the interactions.

It is (3) necessary for successful interactions that both (3.a) the system of purposes (3.b) the system of applicable means for the realization of the purpose(s) are recognized and accepted systems for the participants in the interactions. Presupposed for (3) is (4) the possibility of successful communications between the participants of practical interactions in civil interactions eliminating misunderstandings and not-understandings on the level of secondary understanding, i.e., the understanding of the first-order understanding of Others about the choice and/or understanding of purposes, or about difficulties in the selection and/or the application of means. The correlate of the possibility of successful communications is the possibility of failing communications that end in partial and even total disagreement. The outcome of total disagreement is the disruption and even the destruction of practical interactions. The consequences of total disagreement about purposes on the level of higher understanding can be violent hostile interactions disrupting all civil interactions.

Referring to the analyses of the preceding investigations, (1) is the foundation and (2) is bracketed by the methodological abstraction of the natural sciences (Sect. 7.2). If (2) is bracketed, then (3) and (4) are bracketed, but it has to be kept in mind that (3) is a necessary dependent part and, hence, a presupposition also in the structure of the practical interactions of scientists in laboratories; it is involved in organizing intersensory observations without itself ever being an object of the natural sciences in its own right.

The second-order understanding of first-order understanding of Others (4) is of basic significance for the human sciences, but it is also of basic significance that (4) implies (3) on the level of elementary understanding in the lifeworld, and (3) implies (2) and its correlate (1). The thesis that human sciences can only be interested in interpretations and not in causal explanations is misleading. Of significance is, furthermore, that encounters with brute reality happen for elementary understanding in the pre-scientific lifeworld only in (1). The human sciences without a foundation in (1) are, hence, hanging in the clouds of interpretations that have lost contact with the reality that is given in the encounter with the natural environment as brute, blind, and not yet interpreted reality.

A possible emergence of empirical sciences in cultural traditions presupposes further levels of foundations in the development of such cultural traditions. The counting of objects and the measuring of spatial distances were already of interest for elementary practical understanding in cultures without a literary tradition (Sects. 8.1 and 8.2). Counting and measuring were also implied in the elementary understanding of trading products, tools, materials, and human labor (Sect. 10.5).

Traces of rudimentary knowledge of theorems about arithmetical operations and geometrical constructions can be found in the earliest phases of literary cultures. Geometry and arithmetic were later recognized as systems of higher understanding representing *deductive* sciences (Sect. 8.2).

Of significance for reflections on the generative foundations of the empirical sciences is that new inventions in mathematical sciences before the emergence of the empirical sciences have only been applied in the invention of sophisticated tools and weapons and in architecture, i.e., in cases where new technologies are applied in practical interactions. However, neither arithmetic nor geometry was applied in physics before the emergence of the modern empirical sciences. The systematic application of mathematics in physics presupposed first the transition from arithmetic to algebra and then the algebraic calculation of geometrical relations and proportions in analytic geometry (Sects. 8.1 and 8.3).

Of significance for the foundations of empirical sciences on the level of higher understanding in literary traditions are, furthermore, the meta-genres of philosophical contemplations that are interested in theories of how things are given for their own sake after bracketing all practical interests and involvements (Sect. 8.3). One of the two main genres of pre-scientific philosophy is practical philosophy. The *theories* of practical philosophy are interested in the systems of norms and values that determine the guiding purposes of systems of social interactions. Special disciplines of practical philosophy are the philosophy of the law, of politics, and of economics. The system of these disciplines of practical philosophy is a pre-figuration of the system of the three disciplines of the empirical social sciences. The Diltheyan system of systematic human sciences is complete if psychology, a discipline of theoretical philosophy, is added. There is, however, in that time no philosophical discipline that can be considered as a foundation of the historical human sciences.

The cognitive attitude of theoretical philosophy does not only bracket immediate involvements in practical life. It also brackets the interest in theoretical reflections on systems of norms and values carried out in practical philosophy. The two main disciplines of pre-scientific theoretical philosophy are physics and metaphysics. Physics is the theory of the phenomena that are left after bracketing abstractions that are constitutive for the cognitive attitude of theoretical philosophy. Left are observables that belong to *physis*, nature, and the possibility of discovering regularities in the ongoing changes that can be conceptualized as efficient and as formal causal relations determining temporal sequences of regular change. Metaphysics in pre-scientific philosophy could be understood as the theory of the "first principles" of physics in the old sense.

By including the theoretical interest of theoretical dogmatic reflections of religious systems, it was possible to understand the God of metaphysics as the highest principle of all principles of *physis*. However, it was also possible to reduce metaphysics to a theory of the principles of physics, i.e., of atoms and the efficient causality determining mechanistic systems of the movements of atoms. The elimination of metaphysical theories (including divine powers and *final* causes) in the naturalistic metaphysics of, e.g., Democritus and Epicurus is a philosophical pre-figuration of the methodological abstraction that determines the region of the natural sciences.

Essential for the generative foundations of the philological-historical human sciences in pre-scientific literary cultures is scholarship as a meta-genre of higher understanding. Scholarship is interested in interpretations of the texts and monuments that represent the tradition of a culture and its application in the present. The name for this meta-genre of higher understanding in Classical Antiquity was *philologia.* Rhetoric as part of *philologia* was the art of the application of the wisdom of the interpreted tradition of texts. Philology in this sense already developed a hermeneutics, i.e., a doctrine of methods for the correct reading and understanding of texts (Sect. 4.1). Certain rules of hermeneutics were applied in the Middle Ages in the exegesis of the Holy Scriptures. The method was fully restored and extended by the humanists in the Renaissance. It finally appeared first as a methodology of the science of Classical Antiquity and then of scientific philological research in general (Sect. 5.1).

Two remarks and a caveat must now be added. (1) Counterparts of the scholarship of the philologists in Classical Antiquity can be found in all developed literary traditions in other cultures, e.g., the Chinese, the Indian, and the Arabic cultural traditions. Such literary traditions include geometrical, arithmetical, algebraic, astronomical, and other branches of mathematical literature. Their knowledge about their natural environment in elementary understanding but also in systems of higher understanding is comparable with the development of Western European literature before the emergence of the empirical sciences and has influenced the cultural development of Western Europe. What has been said about the sequence of generative and static foundations for a possible emergence of the empirical sciences is, hence, only a case study of the development of the foundations of different levels of lower and higher understanding and their sedimentations in the developed and complex literary traditions in general.

(2) The traditional epistemology of the last century subsumed the historical and the systematic human sciences under the heading of "sciences of understanding." It should have been, however, some food for second thought that different types of "sciences of understanding" have quite different foundations in the development of literary traditions. The social sciences have generative foundations in the disciplines of pre-scientific practical philosophy. Psychology as a systematic human science in Dilthey's sense has one of its foundations in psychology as a discipline of theoretical philosophy. The historical human sciences have, on the contrary, foundations in the philological scholarship and the art of historical narrations in Classical Antiquity. Philosophers in Classical Antiquity, and even still in the beginning of the nineteenth century have always argued that these disciplines are only able to know the facts but are unable to know the truth. In the contrast, philologists and humanists considered their knowledge as universal wisdom that includes philosophical wisdom (Sects. 3.4 and 4.1). Epistemological problems that have their roots in the different foundations of the historical and the systematic human sciences will be considered in the next section.

(3) A correct understanding of what has been said in the present section requires keeping in mind that foundations are logically only necessary and not sufficient conditions (2). It is, hence, *only a historical fact* that the transition to the

development of a system of empirical sciences happened only in Western Europe. It is the task of historical research to discover the sufficient conditions in the specific historical circumstances that are responsible for this historical fact.

11.3 The System of the Empirical Sciences: Concluding Remarks

The preceding investigations had to start with a critical deconstruction of the presuppositions of the strict separation between the sciences of explanation (*Erklären*) and the sciences of understanding (*Verstehen*) in the tradition of the last century. The main task for the preceding investigations was the rejection of the thesis that the methodology of history, including in its fringes pre-history and contemporary history, can be reduced to a hermeneutics that had its basis in reflections on the methods of interpretations of fixed life expressions, i.e., texts and monuments. After the summary of the analyses of the generative foundations of the emergence of the empirical sciences in the last section, it is now possible that the summary of conclusions relevant for the system of the empirical sciences is able to follow the historical order of the emergence of the disciplines of the empirical sciences.

Some traditional epistemologists of the empirical sciences, e.g., J.S. Mill, emphasized the analysis of the logic of the method of experimental research in general. Others, e.g., Descartes, Kant, but also Husserl in the *Crisis,* emphasized the significance of the application of mathematical theories for the methodology of the natural sciences. A tacit assumption behind this approach is that it in the future will be possible to reduce the life sciences to the hard sciences. Seen from the viewpoint of phenomenological psychology, the advantage of the empiricism of Mill and his predecessors is that this approach covers the ground of the methodological abstraction that is constitutive for the natural sciences in general. The methodology of the experiment requires that generalized conditionals that refer to cause-effect relations can be confirmed or disconfirmed in predictions referring to the consequent and presupposing in the antecedent the givenness of the cause plus initial required circumstantial conditions. The givenness has to be givenness in *inter*sensory observations. The ideal methodological case is that the generalized conditional should be derivable from a theory.

The methodology of the experiment is of basic significance for the hard natural sciences, i.e., first of all physics, and for the soft natural sciences, i.e., the life sciences. The residuum of the methodological abstraction includes the region of objects determined by categorial structures that are of significance for the soft as well as for the hard sciences. The methodological abstraction excludes the region of objects that cannot be recognized as objects accessible for the empirical natural sciences (Sect. 7.1 and 7.2). This methodological abstraction restricts the empirical basis to objects and categories that are constitutive for possible objects that can be given in intersensory observations in elementary first-order and second-order

understanding. All other types of objects, purposes, values, norms, but also any access to the conscious lived experience of other persons, though presupposed in the requirement of *inter*sensory experience, are excluded from the residuum of the abstraction.

According to the general methodological abstraction of the natural sciences the application of mathematical techniques, including statistical and other mathematical techniques, is not restricted to the hard sciences. It was and is a necessary implement of all empirical sciences, first of all the life sciences (Sect. 8.5), but then also, e.g., the systematic human sciences such as economics (Sect. 10.5). Such applications are even possible in the historical human sciences in grammatical and even individual hermeneutics, i.e., the methodology of philological text interpretations (Sect. 5.2). The foundation for this type of universal applicability of mathematics in the empirical sciences is that counting and measuring are already necessary implements of the elementary understanding of practical and civil social interactions in archaic cultural lifeworlds and systems of higher understanding in such cultural lifeworlds.

The application of mathematics in physics is different. It presupposes as one of its foundations mathematics as a formal science, i.e., as a meta-genre of higher understanding in its own right, including algebra and the algebraic treatment of geometry in analytic geometry (Sects. 8.1 and 8.2). Significant "revolutions" in the progress of physics always presupposed progress in mathematical research. The application of mathematics in physics (and only in physics among the empirical sciences) implies that algebraic formulas and equations are used from the outset in the definitions of the basic categories of the region of the theoretical entities of physics. The theoretical objects of the theories in physics must, hence, be distinguished from the objects given for intersensory observations in experimental research. An immediate consequence of this distinction is that objects of intersensory observations are objects for physics only to the extent to which their properties and relations are measurable. Observable properties of objects in experiments serving to test theoretical hypotheses of physics have to be reduced to one genus of their dependent parts, i.e., the abstract moments that belong to the genus extension (Sect. 8.2).

A further implication is that pictorial representations in the strict sense are possible only for the objects that are given for intersensory observations in experimental research. The methodological abstraction that determines the region of the theoretical objects of physics is, hence, a reductive abstraction. Answers to problems of possible quasi-pictorial or even only *per analogiam* quasi-pictorial representations of theoretical objects presuppose an analysis of the level of the development of the mathematical theories that have been applied in the theories of physics.

The first step beyond Cartesian mechanistic push-pull physics was the Newtonian application of differential and integral calculus in the theory of gravitation. The mathematical objects required for this step are exact essences that can be given in variations in imagination that are determined by a rule-governed process of an and-so-on progress toward an ideal limit. Representations of the objects of mathematics on this level of its development and, hence, theoretical objects of classical physics as well are accessible in quasi-pictorial representations (Sect. 8.2).

The methodological difference between classical and post-classical physics has its foundations in the difference between the above mentioned idealizations of classical mathematics that are applied in classical physics, on the one hand, and on the other hand, post-classical mathematics. The objects of post-classical mathematics are given in formalizing abstraction, and this implies that they can only be given in quasi-pictorial representations *per analogiam*, abstractions that have merely heuristic value (Sect. 8.3). However, everything that can be said on the level of formalized abstractions about the theoretical entities of physics is of significance for physics as an empirical science only if it permits the derivation of theorems that cover already given experimental evidences or admit confirmation or disconfirmation in future experiments.

A phenomenological epistemology of the empirical sciences has to presuppose the phenomenological theory of the cognitive attitude in which the objects of a *mathesis universalis* in the broad sense of a general formal ontology are given (Sect. 2.2). Two regions in the *mathesis universalis* understood in this sense can be distinguished. There is first the *mathesis universalis* in the narrower sense, i.e., the region of the pure formal algebraic structures of the objects that are given on the material level as objects of idealizations in the region of phenomena belonging to the genus extension. The second region is the region of the formal ontology of the whole and the parts (Sect. 2.2). Only the first region is of interest for physics. In contrast, what is of interest for the categorial structures of the objects of the life sciences is the formal ontological theory of the whole and the parts.

Objects of classical physics presuppose a second methodological abstraction in the realm of objects given in the residuum of the first abstractive reduction that is constitutive for the natural sciences in general. However, the life sciences presuppose only the first methodological abstraction. They have to start with *descriptions* of life forms, the different empirical types, i.e., species of organisms and their internal structures. The descriptions are "phenomenological" in the old sense (Sect. 2.1), i.e., they are interested in the empirical type of the external gestalt of living organisms, their internal anatomical and physiological structures, and the structures of the web of relations between specific empirical types and their environments.

The second step is the classification of different empirical types of organisms. The main problem of the construction of taxonomies is the selection of specific differences of properties first in descriptions of the external gestalt and then in the other descriptive dimensions just mentioned that determine different degrees of similarities and affinities between species. A basic requirement is that such descriptions are able to refer on this level to their objects in *pictorial representations*, and this remains a requirement for all levels of research in the life sciences down to pictorial representations of the internal structures of monocellular organisms and up to the interpretation of fossils that can serve as traces for the reconstruction of the history of the evolution of species (Sect. 8.5).

Seen from the viewpoint of formal ontology, living organisms are organic wholes, i.e., first-order independent wholes that presuppose a generation in which their gestalt as form of an independent whole is realized (Sect. 2.2). The material ontological characteristics of different species of living organisms with more or less

complex *forms* given in the lifeworld are already given in intersensory observations for elementary understanding as having a genesis with a beginning in "seeds," such that something realizes or "actualizes" itself and deteriorates in the end. Intersensory observation on the level of elementary understanding also teaches that living organisms are able to reproduce other living organisms of their own species in different ways.

Pre-scientific philosophical ontology already introduced the ontological category of *formal cause* as the force behind the actualization of the generation of the form of living organisms out of dead inorganic matter. Formal causes have often been interpreted as final causes, i.e., purposes, in the Aristotelian tradition (Sects. 8.3 and 8.5).[19] A methodological analysis of experiments in the life science *before* the twentieth century indicates that most of these experiments refer to cases in which efficient causes promote, disturb, or destroy the "force" behind the formal causes, but an explication in terms of an empirical science of this "formal cause" was missing. Before turning to the problems connected with this lacuna in the life sciences four basic achievements of the life sciences in the nineteenth century must be mentioned.

The four discoveries are (1) that higher life forms are complex symbiotic systems of cells; (2) that the simplest organic structures are the external and internal structures of monocellular living organisms; (3) that the smallest parts of monocellular organisms are complex molecular structures of organic chemistry; and (4) Darwin's theory of the evolution of life forms. Of epistemological significance is that the "conditions of the possibility" of the "discoveries" are abstractions based on descriptions of intersensory observations. The observations (2) and (3) presuppose sophisticated instruments, and the construction of the instruments presupposes technological applications of the results of experimental research in the hard natural sciences, e.g., optics. Progress in the life sciences has, hence, one of the generative foundations of the empirical basis of its intersensory observations in the progress of the hard sciences.

It is tempting to understand the transition from (2) to (3) as an ontic reduction of organic life to inorganic matter. Seen from the viewpoint of a phenomenological epistemology, however, it is only possible to recognize that the discovery of (1) has its *epistemic* foundation in (2) and that the discovery of (3) also has its *epistemic* foundation in (2). It is possible to assume in an ontic *interpretation* that (3) is the genetic foundation of (2) and (2) is the foundation of (1), but it depends of the state of the art whether it can be shown in *experiments* that (2) is the *effect* of a specific sets of factors in (3), i.e., not only as a necessary but also as a sufficient effective condition.

[19]The actualization of the form of a living organism was understood as an analogue of the realization of a purpose. Even Kant's transcendental reflections in KGS V *Kritik der Urteilskraft* on the life sciences had to refer to teleology and with it to the purposes and final causes of pre-scientific philosophy in his interpretation of the meaning of "formal cause."

Darwin's "theory" of the evolution (4) of the species is not a theory like e.g., the kinetic theory of gases or of the function of the liver in the metabolism of mammals. It is rather a *history*, and the research leading to its discovery shares, notwithstanding essential "specific" differences, some essential aspects with the reconstructions of a past reality in historical research in the human sciences. The method of a history of the evolution beginning with monocellular organisms up to animals of the species *homo habilis*, *homo erectus,* and *homo sapiens* starts with the "interpretation" of fossils, i.e., *traces* of past life forms. For Darwin, the guiding thread of the reconstruction of *past* real developments was geology. The presuppositions of the reconstruction of life forms from the very beginning are, hence, the reconstructions of the natural history of the planet Earth. Fossils are the traces of past organic life, and it is the task of paleontology to reconstruct the forms of organic life in "interpretations" of the traces. There is, hence, a formal epistemological analogy between the methods applied in the history of evolution and the methods applied in the reconstructions of history as a human science. This has further implications that will be considered below. Such further considerations presuppose the explication of "form" and "formal cause" in the life sciences as empirical sciences (Sects. 8.5 and 9.1).

According to the discoveries just considered the origin of the development of organic forms is given as an origin in certain phases at different places in the history of nature (Sect. 8.5). The organic forms of a species, forms that have been considered as formal causes determining the course of the generation of individuals belonging to the species are understood as products of the generation of organic forms themselves. Given the state of the art it is neither necessary nor possible to give a satisfactory categorial explication of the ways in which genetic codes internally pre-determine the development of organisms or of the external and internal factors that are able to cause changes in genetic codes. What can be said is that "genetic code" is the explication of the ontological category "formal cause" in terms of the life sciences as empirical sciences.

The problem of this lacuna in the life sciences was a welcome occasion for the attempts of the theologico-metaphysical creationists of the nineteenth and even in the twentieth century to explain the "teleology" determining the forms of living organisms and their development as "caused" by a divine intelligence. This answer transcends all possible epistemological reflections that are restricted to reflections on what really happens in empirical research in the empirical sciences. The epistemology of analytic philosophy deduces the possibility of a reduction of the life sciences to physics from an epistemologically normative (and even in addition ontological) physicalism but others also recognized the possibility of, and even the need for such a reduction.[20] Seen from the viewpoint of a phenomenological epistemology such answers to the problem also transcend the possibilities of reflection on what really happens in empirical research.

[20]In his *Third Critique* Kant recognized the problem that explanations in the life sciences that use analogues of final and formal causes are only of significance as heuristic means for the discovery of causations that are explicable in terms of classical physics. Husserl's *Crisis* was able to neglect the

Following this explication it is possible to understand formal causes as genetic *codes*, and the task of empirical research is to decipher these codes. The metaphors "code" and "deciphering" already indicate a certain similarity with linguistic methods that have been applied for the solution of problems of deciphering texts written in an unknown language in lower hermeneutics. Statistical mathematical methods have also been applied in linguistic research looking for solutions of deciphering problems.

"Formal causes" that determine the development of organic forms are genetic *codes* that admit a deciphering, i.e., an interpretation of the code as an "instruction" that determines the development of the gestalt or form of the organic species. The history of organic species admits determining changes and then also the discovery of effective causes that are responsible for the changes in genetic codes.

There is, hence, (1) a certain analogy in the epistemological structures between the "deciphering" of a genetic code as determining the generation of an organic species and its gestalt on the one hand and the "reading" of a certain text written in an unknown written language and the deciphering of its meaning on the other.

There is also (2) a certain analogy in the epistemological structures between the "reading" and reconstruction of organic life forms in past periods of the history of evolution with the aid of *fossils*, the *traces* of past life, and the "reading" of certain historical *sources,* the *traces* of a past period and the reconstruction of a past reality with the aid of the sources in history as a human science.

An analysis of these analogies requires a summary of the basic epistemological structures of the human sciences. The immediately pre-given objects of intersensory observations of the human sciences are life expressions. The first task of research in the human sciences is the *interpretation* of these life expressions. Essential for the problems of the methodologies of the human sciences are the immediate and fixed life expressions of consociates and contemporaries in the present and the fixed life expressions of predecessors in the past.

The first task for the systematic human sciences is the interpretation of life expressions in the present. Interpretations of fixed life expressions of authors in the past are of interest only to the degree to which they are relevant for the interpretations of present life expressions. The social sciences in particular presuppose social history, but the historical dimension is only of significance as the source of material for the construction of empirical and ideal types of systems of social interactions (Sect. 10.4). In this respect reflections on the methodologies of the systematic human sciences presuppose reflections on the methodology of the historical human sciences.

The historical human sciences are interested in fixed life expressions of authors in the historical past. Pre-scientific secondary understanding of the first-order

problem because it does not distinguish between the methodological abstraction that is constitutive for the natural sciences in general and the additional abstraction within this first reduction that is constitutive for physics. The immediate consequence is once again that the life sciences ought to be reducible to physics.

understanding that is represented in fixed life expressions is the immediate foundation for methodologically guided secondary understanding of these fixed life expressions, i.e., first of all of texts in *philological interpretations*. An essential condition for the possibility of philology as an empirical science is that fixed life expressions can be given again as the same (or in high-quality copies) for critical re-considerations not only of the pre-scientific secondary understanding, but also of pre-given methodologically guided interpretations.

Methodologies of empirical sciences require methodological abstractions that both determine the region of the objects that can be recognized as objects of the empirical science and exclude all other types of objects. Such methodological abstractions have to determine a distance between researchers and research activities on the one hand and the objects of research on the other. This distance is the presupposition for so-called disinterested observations and applications of methods. In the case of *philology as an empirical science*, the required distance is a *quasi-historical* distance. It prevents the process of interpretation from modifying the original intentions of the first-order understanding of the authors of texts. The first canon of hermeneutics is the first principle of the methodology of text interpretation. The *quasi-historical* principle requires that a text has to be understood on all levels of hermeneutics out of the context of texts in this text's past horizon. The canon is a methodological *abstraction* because it determines that the context of a text includes only texts in the past horizon of the text and excludes all other contexts of texts in the future horizon of the text, especially the context of the interpreter, i.e., it separates interpretation and application.

The universal *formal* methodological principle of methodologically guided interpretations is the hermeneutical canon of the whole and the parts. Seen from the viewpoint of a phenomenological epistemology, this canon is the indicator of the possibility of deriving methodical rules that have to be applied on all levels of philological hermeneutics. Both canons are also of significance for archaeological interpretations of monuments and traces (Sects. 5.2, 5.3 and 5.4).

The task of *history as a science* is the reconstruction of a past reality. This reconstruction presupposes texts as its material, texts that have already been philologically interpreted. Texts are possible historical sources if they refer explicitly or implicitly to reports about events in a past real lifeworld. Of significance for the philological-historical method is, furthermore, that all texts implicitly indicate an author in the historical past. All fixed life expressions implicitly refer to authors in the past because a fixed life expression without an author is an eidetic impossibility. However, this reference has only the character of an empty indicator. It is the task of biographical historical research to determine the place and the historical period of the authors (Sect. 5.5).

The reconstruction of a past reality and its historical events or historical "facts" of *history as a science* presuppose philologically interpreted sources, but the methodology of historical *reconstructions* presupposes in addition a pre-given framework of temporal and spatial coordinates that admit the determination of the precise location of historical events and facts in this frame. Without such a framework history is reduced to historical narrations and myths as pre-scientific

literary genres that can serve different purposes, e.g., religious and moral education but also simple entertainment (Sect. 5.4). Given such a frameworks, however, historical research is able to apply different types of historical conditions and explanations, including explanations borrowed from the natural sciences. Causal explanations borrowed from the natural sciences can also be applied in looking for solutions to problems of the determination of the spatial and temporal location of sources, including texts but also archeological traces and monuments.

Epistemological justifications for this aspect of the methodology of historical research cannot be derived from the methodological principles of philological interpretations. Such a justification requires, hence, further analyses of the foundations of historical reconstructions in the structures of the intersubjective temporal and spatial structures of first-order elementary understanding. A survey of the above-mentioned analogies and parallels in the methodologies of the life sciences and the historical human sciences is a useful preparation for such analyses. To start with the historical human sciences is advisable because problems connected with such analyses in the systematic human sciences are of an even higher degree of complexity.

Analyses of analogies require the determination of what is the same and what is different in the analogues. What is the same in the analogies in the epistemological structures of the methodologies of reading, deciphering, and reconstruction of past events admits explications in terms of the formal ontological theory of wholes and parts (Sect. 2.2). Objects of *classical* physics can be first-order wholes that have only dependent parts. The objects of the life sciences are organic wholes, i.e., wholes with parts that are wholes of the first order, but cannot be at the same time parts of a higher order. Objects of the historical human sciences, i.e., texts, fixed life expressions in general, reconstructed past real lifeworlds, and empirical or ideal types of systems of social interactions are wholes with parts that are themselves independent wholes that can indeed be parts of more than one whole of a higher order (Sects. 5.2 and 5.5). Equal are, hence, the formal ontological structures of the objects as wholes of a higher order. The difference is only a difference in the degree of the complexity of part-whole relations.

The difference in the analogy is a difference of the material categories that determine the parts and wholes in types of objects that are accessible in the life sciences and in the philological-historical sciences. The methodology of interpreting texts already presupposes on the level of grammatical hermeneutics that the meaning of signs in written languages are pre-given for the secondary understanding of a first-order understanding. There is only a certain material similarity between the methods of deciphering texts written in an unknown written language and deciphering genetic codes. What is equal is the application of the method of trial and error, starting with assumptions about the significance of the signs of the code and confirmations/disconfirmations of the assumptions, but what is assumed and how it is confirmed or disconfirmed is different.

Moreover, the method of philological deciphering is interested in the deciphering of contexts of *meaning* for a secondary understanding of the signs of the text. The text is successfully deciphered to the degree to which it can be translated into meaning contexts that can be expressed in other already known written languages

(Sect. 5.2). The deciphering of genetic codes is different because it is in this case a deciphering not of the meaning of signs, but of *sequences of markers that determine* the temporal process of a *formation* of an organic whole. A stronger analogy for this type of deciphering is the deciphering of programs of computer languages. The markers have to be understood in both cases as instructions, i.e., as commands to perform an action in the first-order understanding of the scientists who are able to decipher the genetic code or the code of the computer program.

The difference is that the program for a computer language has always been designed in a process of practical interactions that has been guided by the *purpose* of designing precisely this program for a language with certain properties. To assume an "intelligent design" behind genetic codes and the evolution of such codes in the evolution of the species is a meaningful *metaphysical* explication of formal causes as final causes. However, such a design is not as such a possible object of natural sciences because it presupposes categories that are excluded from the residuum of the methodological abstraction that is constitutive for the natural sciences.

Darwin's "theory" of evolution presupposes *fossils* as material for the reconstruction of past organisms, i.e., traces of organisms that lived in a *past* period of the history of nature given for *present* intersensory observation. The reconstructions of history as a human science presuppose traces, i.e., fixed life expressions given in the present for intersensory observation and possible interpretations. The analogy of the methods of deciphering traces and reconstructing a past reality in the life sciences and in the historical human sciences is of basic significance for the analysis of the overlap of paleontological reconstructions of the evolution of the human species and the reconstructive interpretations of human cultural lifeworlds in pre-history (Sect. 9.1).

The analogies considered have their foundations in the structures of the primordial constitution of the givenness of Others as living animate bodies and of an intersubjectively given lifeworld as conditions of the possibility of animalic and elementary understanding as well as of social interactions with Others. However, in the last instance this first-order understanding is the foundation for the intersensory observations that are presupposed on the level of empirical research in the empirical sciences (Sects. 3.1 and 3.2). The Other is originally given as an animate living *body*, and in a lifeworld with sciences after the methodological abstraction of the natural sciences, an animate living body is given as an organism.

The empirical material of historical human sciences is the region of fixed life expressions of authors in a distant past. The region of empirical material for the systematic human sciences includes, in addition, fixed life expressions of contemporaries and immediate life expressions of contemporaries that are accessible for intersensory observations in the present. This seems to be an advantage because it implies the possibility of the application of methods that are able to confirm or disconfirm predictions. It is thus tempting to accept the positivistic thesis that the principles of the methodology of the systematic human sciences can be reduced to the principles of the methodology of the natural sciences. A difference is that the degree of the complexity of the clusters of factors in the initial conditions and in the effects is much higher in the systematic human sciences than in the natural sciences.

The positivistic thesis has to face the additional difficulty that only immediately given intersensory observations are needed for verifications of initial conditions and of predicted effects in the natural sciences. Predictions in the systematic human sciences presuppose, on the contrary, interpretations of life expressions that are accessible in present intersensory observations. An epistemological analysis of the methodology of confirmation or disconfirmation of predictions in the systematic human sciences must, hence, start with the epistemological analysis of the methodology of interpretations in the systematic human sciences (Sect. 10.1). What follows is a summary of the results of the preceding investigations without references to the discussion of the different positions in the literature in part IV.

Prima facie there are no methodological and epistemological problems because secondary understanding of immediate linguistic life expressions of Others in present communications "works" without the need to apply methodologically guided interpretations. The problem is, however, that interpretations in the historical human sciences are able to perform a methodological abstraction that is constitutive for the possibility of separating interpretation and application and thus of the cognitive attitude of "disinterested" interpretations in the historical human sciences (Sect. 10.2), This distance vanishes gradually in contemporary history and completely in the secondary understanding of life expressions of Others in present communications. The question is, hence, how methodologically guided eliminations of misunderstanding and not-understanding in interpretations are possible in the systematic human sciences (Sect. 10.1).

Phenomenological reflections on possible eliminations of misunderstanding and not-understanding in the present have to start with the analysis of eliminating misunderstandings and not-understanding in dialogical communications. Dialogues that are interested in repairing disturbed communications between participants in the dialogue are productive dialogues (Sect. 10.2). Interpretation and application cannot and ought not to be separated in such dialogues. The common goal of all participants in the dialogue is to determine agreements or disagreements in the first-order understanding of the participants.

It is, however, also possible that a participant interrupts the process of productive dialogue and brackets the common interest of the participants in the first-order understanding of a state of affairs with questions that refer to what other participants *mean*, what they think about the subject matter of the dialogue. It is also possible that an *interrogator* in a pure *diagnostic* dialogue is only interested in the secondary understanding of the first-order understanding of their partners in the dialogue. The attitude of such interrogators is the attitude of a disinterested interpreter, and is the presupposition of the possibility of separating interpretation and application in dialogues and communication in general. The problem of developing methodologies for diagnostic dialogues that are interested in objectively valid and testable interpretations of life expressions of Others is the basic problem of an epistemology of psychology and the social sciences.

The preceding investigations distinguished (Sect. 10.3) three types of psychological research. (1) Of interest on the animalic level are the reactions of Others as animated living bodies to sensory stimulations and their system of animalic needs

and drives determining their reactions to such stimulations, including traumatic situations. This is the level of experimental psychology, and this level admits the application of the methods of experimental research. Different is that such experiments are also able to use, *in addition* to intersensory observations of bodily behavior, information that can be gained in linguistic communications between the researchers and the objects of research about immediate sensory experiences of the objects that are relevant in the context of the design of the experimental situations (Sect. 10.3).

(2) The results of experimental psychology are presupposed in methods that can be applied in social psychology, and the results of social psychology are methodologically presupposed in individual psychology. Psychology as a theory of subjective attitudes and reactions to social structures belonging to the levels of secondary understanding of first-order elementary and higher understanding presupposes psychological research in the region of secondary understanding of first-order animalic understanding.
(3) Individual psychology is interested in the system of the first-order and second-order elementary and higher understanding, the contents of this understanding, and the desires, values, actions, and reactions of other persons and types of other persons. Thus in the system of the human sciences of the first half of the last century individual psychology was *interpretative psychology par excellence*, and it still dominates the present everyday understanding of applied psychology in clinical psychotherapy. Essential for epistemological reflections on a theoretical psychological understanding and analysis of the lived experience of other persons is, however, that such interpretations presuppose social psychology, i.e., the understanding of the social environment of other persons, not only now but also with regard to the past of their individual histories (Sect. 10.3). A psychological analysis of individual history can transcend the realm of conscious memories of past lived experiences and analyze those preconscious and subconscious lived experiences in a distant past that are still able determine present attitudes and the behavior of the objects of the analysis.

The central methodological and epistemological problems of diagnostic dialogues emerge on the level of social psychology. The context of dialogical situations is itself a context of social interactions. The analysis of the formal ontological structures of social interactions (Sect. 10.2) indicated that psychological research in these contexts is first of all interested in subjective reactions to the systems of social interactions of the subjects's social environment. Seen from a formal point of view, individual persons are parts of wholes of systems of social interactions. They are independent parts because they can be parts of different wholes of social interactions.

What is of interest in social psychology is the interpretation of life expressions of types of individuals or groups of individuals that provide access to their first-order understanding of their social environment in elementary and higher understanding. Meaningful questions in such diagnostic dialogues presuppose, however, knowledge of the types of the structures of the social context on the side of the interrogator. It is,

therefore, necessary for keeping the required distance of disinterested interpretations that precisely this knowledge must remain in brackets in such questions (Sect. 10.3). More can only be said below because social psychology presupposes the results of research in the social sciences, and this research presupposes methodological criteria that cannot be reduced to techniques of diagnostic interrogations. They can only be determined in the analysis of the methodological principles of the social sciences.

Research in the social sciences has to begin with the "construction" of ideal types of the basic structures of social interactions and systems of social interactions (Sect. 10.4). The constitution of such ideal types presupposes empirically predetermined variations and in addition variations in imagination under the guidance of the formal ontological principles of the theory of the whole and the parts (Sects. 2.2 and 2.3). The pre-given material for such analyses of complex material structures of wholes of a higher order are descriptions based not only on presently available observations, but also on the results of research in social history, first of all in contemporary social history (Sect. 10.4).

Essential for the analysis of ideal types in the social sciences is the description of the system of purposes of social interactions. They determine the selection of the means, i.e., the efficient causes in the process of the realization of the purposes as final causes. Genuine historical causal explanations presuppose interpretations of systems of customary and legal norms and values that determine the purposes and the selections of means in social interactions (Sects. 6.2 and 6.3).

Ideal types can serve as schemata for final and efficient causal relations, and this implies that they can be applied in genuine *causal explanations* in social history. The social sciences are, however, first of all interested in the development of systems of social interactions in the present and its future horizon, i.e., they are interested in predictions. Predictions in the present about future steps in the process of social interactions are possible because the first-order understanding of the participants in certain types of social interaction already implies expectations and predictions. To the degree to which they have an explicit knowledge about the efficiency of the applied means, their behavior can be characterized as behavior of a rational ideal type and this explicit knowledge even includes mathematical calculations especially in the specific case of economic interactions (Sect. 10.4).

Furthermore, this first-order understanding includes also expectations of possible external disturbances of the interactions caused by factors in the social and/or natural environment as well as internal disturbances of certain types of interactions caused by destructive behavior of participants in the interaction. Of crucial significance for viable estimates about future effects of such internal factors can be interpretations of complex and even incompatible systems of different purposes of different groups of participants in complex systems of social interactions. The presupposition of the possibility of predictions derived from ideal types in the social sciences and its epistemological justification is, hence, that the material for the construction of ideal types is pre-given in interpretations of the first-order understanding of the social interactions of participants in the interaction.

Social sciences are empirical sciences and it is, therefore, necessary to test the *adequacy* of the presupposed interpretations, and then of the predictions that can be derived from the ideal types. Interviewing the participants in a system of social interactions about their own first-order understanding of their social interactions in *diagnostic* dialogues can be used as a test of the adequacy of an interpretation. Such diagnostic dialogues are supposed to be the warrants of the distance that is required for disinterested and objectively valid observations and interpretations. Tests for adequacy presuppose the techniques of social psychology. The methods of social psychology are, therefore, necessary implements of the methods of testing interpretations in the social sciences.

Applications of these methods have to face the basic problem of the methods of diagnostic dialogues. The problem is that the "objects" in these dialogues are the "subjects" of their own first-order understanding and are, therefore, able to develop an interest in the interpretations and the ideal type that serves as the model of the interpretation of their social activities for their interrogators. If this happens, the diagnostic dialogue is at an end, and the "objects" and the researcher will be either involved in a productive dialogue in the search for truth, or in attempts on the part of the "objects" to use the interpretation in ways that might serve their special interests in reaching the goals of their social interactions.

Since ideal types admit deriving *predictions* about future developments in social systems of interactions from ideal types in general (and especially from rational ideal types) it is tempting to assume that the testing of predictions derived from ideal types plus the knowledge of possibly interfering external and internal factors can be used as a way out of problems connected with testing the adequacy of ideal types in diagnostic dialogues. This assumption implies that social research is able to apply the methods of testing predictions of the natural sciences. But this assumption, together with other assumptions about the adequacy of hypotheses in the social sciences that have been mentioned at the end of Sect. 10.4, has to cope with further epistemological difficulties

(1) It is a minor epistemological problem for this assumption (Sects. 10.3 and 10.4) that the degree of complexity of factors in initial conditions and effects in causal relations in the systematic human sciences in general and especially in the social sciences, is much higher than in the life sciences (Sect. 8.5).
(2) It is also a minor problem that the "evolution" of structures of social interactions is much faster than even the evolution of the species in the life sciences. Of crucial significance for (2) is that even changes on the lowest level of the development of techniques and technologies for purposes of practical social interactions are already the results of *inventions*. It is characteristic for *inventions* that they cannot be known in advance. Such unforeseeable innovations also determine the development of civil social interactions and systems of higher understanding. Behind all inventions are authors and actors. Being *presently* interested in *present* developments of social life implies the possibility of being confronted with creative activities changing the systems of social interactions.

(3) The degree of precision of methodologies of the special disciplines of the social sciences depends on the character of the purposes that determine social interactions. Some of them require rational behavior presupposing explicit knowledge of the causal efficiency of the means that are necessary. Some require first of all aesthetic taste, some of them divine revelations, and some of them, first of all jurisprudence, require prudence, etc. The methodological problem of (3) is, hence, that the degree to which predictions can be derived from interpretations of an ideal type of social interactions depends on the degree to which rational behavior is required in systems of social interactions. Otherwise research is restricted to more or less pure descriptive accounts of developments in, e.g., the sociology of religious institutions, of the family, etc. Research in these fields presupposes material that can only be taken from research in history in general, first of all from contemporary history, and then also from ethnographical research.

(4) An essential implication for epistemological reflection on the social sciences is that the theories, and even their not yet tested and already tested predictions, are themselves "inventions" and therefore factors that are themselves able to cause unforeseen changes in social structures if they are "published" and if these publications are known to the objects of the published research of their social interactions. The *objects* of the interpretations that are constitutive for the ideal type and the derivation of the predictions are the *subjects* of their interpreted first order understanding of their own social interactions and are interested in the future realization of their purposes in their interactions.

Participants in the social interaction in question can discover that the prediction is of vital significance for the realization of their purposes, and whenever possible they will try to eliminate the factors in their activities that are responsible for a predicted harmful effect or to introduce factors that support the realization of their goals. The disinterested *researchers* who published their findings in the social sciences are at this very moment not disinterested *observers* but involved *advisors*, and in such situations the results of their research are immediately relevant factors for the development of the systems of social interactions that have been the objects of the research.

(5) In their analyses of factors in the initial conditions and of the effects of causal connections predictions in the systematic social sciences presuppose ideal types. As mentioned above, the constructions of the ideal types presupposes interpretations, and the tests of the adequacy of the ideal types presuppose communications in diagnostic dialogues. The difficulties of the application of the methodological principles of confirmations/disconfirmations of hypotheses about interpretations are in turn relevant for confirmations of hypotheses about causal connections because they are implicitly presupposed in the descriptions of the relevant factors in causal hypotheses.

(6) The epistemological difficulties (1–4) increase if the research interest of the social sciences is restricted not to parts of a system of social interactions in general, but to an ideal type of a system of social interactions that is immediately

of significance for the *whole* society. The "higher" social sciences, economics, the science of the law, and political science are such social sciences. All of them have their generative foundations in practical professions that required a background in theoretical reflections long before sociology was recognized as an *empirical* science in the second half of the Nineteenth century. Nobody expects that theoretical reflections on activities in these professions can be separated as pure "disinterested research." The majority of law students do not want to become scientists; their goals are professional activities as lawyers or judges.

The difficulties (4–6) have common roots in the temporal and spatial structures of intersubjective communications in social interactions. A short recapitulation of the basic presuppositions for possible disinterested research in the natural and the historical human sciences can prepare this analysis. "Disinterested research" in the empirical sciences is quite interested in confirmed knowledge in the region of *objects* of this type of research. "Disinterested" means to be disinterested in activities that can cause changes in the course of events in the region of these objects. Results of research in the natural sciences can be applied in technologies (Sect. 9.2), but neither the methodology nor the theories of the natural sciences as empirical theoretical sciences are determined by an immediate interest in such applications.

The basic presupposition for "disinterested research" in the natural sciences is a methodological abstraction that is constitutive for the objective validity of research. This methodological abstraction brackets all contents that imply an interest in purposes and values governing social interactions in the encounter with the natural environment in the lifeworld. But this implies that all practical purposes and, hence, interests in changing the course of natural events are also in brackets. The contents of the empirical basis for the confirmation/disconfirmation of hypothetically assumed universal causal conditionals in the natural sciences are, therefore, restricted to intersensory observations. The discovered causal "universal laws" presuppose mathematically explicable continua of space and time dimensions that determine the "world" of the region of objects of the hard natural sciences beyond the spatial and temporal structures of events, and the causal connections between events in the lifeworld.

The interpretations and reconstructions of life expressions in the philological-historical sciences are able to satisfy the requirements of "disinterested research" for their methods of testing hypothetical interpretations. They can satisfy these requirements because the methodological abstraction that is implied in the first canon brackets the cultural context of philological and historical research in the present, and with it the purposes and values that govern systems of social interactions in the present. It is again an abstractive reduction that is constitutive for the distance between the subjects of research and their objects. Of interest as objects of "disinterested research" are only the purposes and values of interactions, and in general the first-order higher and elementary understanding of and in the concrete lifeworld of authors of fixed life expressions in a distant past. To be disinterested

means to be value-free, i.e., free from a discussion of the values and purposes of interactions in the past from the viewpoint of the values and purposes of the present situation of the researchers.

The basic epistemological problem for the systematic human sciences is that this distance between the present and past historical reality shrinks in contemporary history and reaches the zero limit for the interest in the future development of social structures given in the actual present in the social sciences. The type of distance that is left for possible "value-free" objectively valid research in the systematic human sciences is the distance between a *disinterested* observer and interpreter of Others in the space of systems of social interactions in the present lifeworld. The objects of research are Others who are participants in social interactions and their first-order understanding of the social interactions. But these "objects" are themselves other subjects who can participate in communications and interactions with the subjects carrying out the research. As such they are potential partners in dialogues in the present. In contrast, the predecessors who are the authors of the presently available fixed life expressions, i.e., the immediate objects of historical research, cannot appear as partners in dialogues in the present.

Research in the systematic human sciences, i.e., psychology and the social sciences, is first of all theoretically "interested" in events in the *present*. Social psychology and by implication individual psychology implicitly presuppose interpretations of social interactions. Vice versa the social sciences presuppose methods of social psychology in tests that serve the confirmation or disconfirmation of their interpretations of social interactions. The problems (4–6) for psychology and the social sciences have, therefore, the same common roots.

The first aspect of this problem is that the construction of ideal types that are presupposed in possible explanations, predictions, and the testing of predictions already presuppose *interpretations* of life expressions of participants in social interactions in *present* communication. The elimination of misunderstanding and not-understanding in the medium of communications in a pre-scientific lifeworld presupposes *productive* dialogues on the level of elementary and higher understanding. The communication between the researchers and their *objects* who are themselves *subjects* in the systematic human sciences requires a distance between the researchers and their object/subjects. There is no such distance in productive dialogues.

The basic methodological assumption of the systematic human science is, hence, that *diagnostic* dialogues and diagnostic interpretations are able to serve as warrants for the required distance between the research and the objects of research and, therefore, also as the warrant for disinterested research. The ideal model for such dialogues is the "communication" between psychologists and clients on the level of individual psychology. Presupposed on the side of the psychologist are, however, always more or less reliable interpretations of the systems of social interactions of the "objects" of the psychologists in the social sciences.

The epistemological root problem for this methodological assumption of the systematic human sciences surfaces in the social sciences. Researchers in these contexts

can be disinterested interpreters/observers only if they themselves are not involved in the observed/interpreted system of social interactions. The presuppositions of this type of "distance" are that the system of social interactions considered is a comparatively small dependent or independent part of the whole of a larger context of interactions and that the required distance between the context of disinterested research and the context of the objects of the research is a distance in the "space" of the larger whole of the system of social interactions.

The distance breaks down (1) if the "objects" in diagnostic dialogues challenge the implicit assumptions about what is really relevant and really the case that are implied in the questions of the interrogator. This challenging implies the demand to recognize the "objects" as "subjects," i.e., as partners in a productive dialogue. The distance breaks down (2) if the "objects" of the theories of the researchers (2.a) reject or (2.b) accept the theories as a correct interpretation of the ideal type of their own social situation. The outcome of (2.a) will again be as in case (1) the request to discuss the theory in a productive dialogue. The problem of (2.b) is that in this case the theory itself will be a factor that determines the social behavior of the participants in the system of social interactions because the predictions that can be derived are themselves causal factors that are immediately of significance for the possible realization of their purposes.

As professionals, psychologists and social scientists are usually interested in the recognition of their theories in the social community in general and especially by the "objects" of their research, i.e., they are interested in their recognition as advisors. They are in this sense always interested and involved partners in social interactions and *productive* dialogues because they have to explain to their clients/partners that the application of the advice that can be derived from their theories can serve as efficient means for the realization of the purposes of their interactions. They can maintain the cognitive attitude of uninvolved, disinterested researchers only as long as and to the extent to which the system of interactions under investigation is a partial system in the context of a larger whole of such systems in which researchers can locate their own place as researchers and not yet as advisors in the process of other partial systems of this whole.

There are, however, systems of social interactions that ultimately imply purposes that are of significance for the whole system of social interactions. The reasons that determine the choice of values that are constitutive for such purposes are, therefore, of significance for all members of the society, including the social scientists, and among them first of all the political scientists and their research activities. In this situation empirical research has lost the ability to separate itself from its object.

The dimension of lawgiving, and with it reflections on positive laws and justice in political science, transcends the limits of an empirical science that is able to bracket all reflections on values, purposes, and normative principles. The model of civil social interactions in a court of law already indicates the limits of the application of the general methodological requirements for empirical sciences to jurisprudence. Jurisprudence demands that a court of law has to apply both the methodology of the interpretation of texts as a methodology of an empirical science and the methodology of history in the reconstruction of "what was really the case" in the

immediate past horizon of the present. The methods that can be applied include not only the interpretation of the testimonies of witnesses, but also knowledge about evidence that can be derived from the natural sciences and used for the purposes of the reconstruction (Sects. 10.6 and 10.7).

The final step, the application of the law to the case and the implied demand to enforce the law, immediately implies a chain of inseparable interested and involved "professional" social interactions that are required by the law itself. This "application" is in itself an "ought" determined by the law itself. For cases that have no precedent cases this "ought" requires creative and innovative actions and interactions in the court of law. Such cases mark the borderline between jurisprudence in the narrower sense and the political task of lawgiving. In the ideal case, of course, the *prudence* of the lawgiver in lawgiving *demands* that all relevant knowledge that can be obtained from the results of the empirical sciences *ought* to be taken into account in the act of lawgiving. The act of lawgiving itself is, however, a creative act of the lawgiver that is guided by purposes and values. Phenomenological reflections on social interactions in political science connected with lawgiving presuppose but also transcend not only the region of the empirical sciences, but also of the task of a phenomenological epistemology.

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