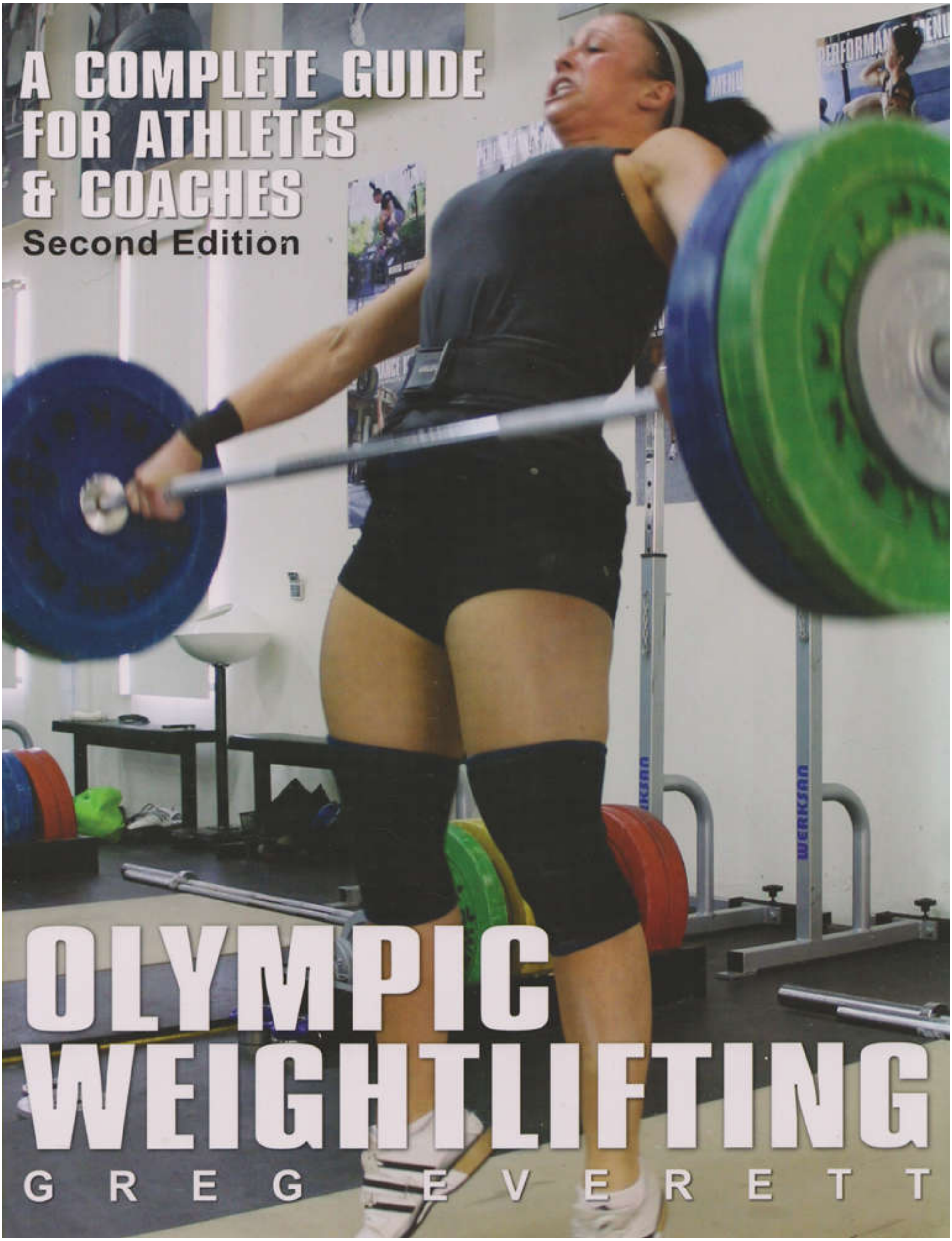

A COMPLETE GUIDE FOR ATHLETES & COACHES

Second Edition

OLYMPIC WEIGHTLIFTING

GREG EVERETT

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Acknowledgments

Although written in hard-won seclusion behind the closed door of a cluttered office looking out into the Catalyst Athletics gym, this book is in a sense a collaborative project. I feel compelled to recognize the achievements and contributions to the sport of the coaches and athletes who have come before me. My respect for these individuals is limitless, whether or not we agree on any given topic, because of their passion, commitment, and their work in and out of the gym that has propelled the development of training and coaching methodology. Without these individuals, I would not have had the opportunities that have allowed me to reach this point.

Coach Mike Burgener has been particularly important to my education as both my own weightlifting coach and mentor. Without him and his generosity, it's likely this book wouldn't exist.

I'd like to thank Aimee Anaya, Sage Burgener, Casey Burgener, Natalie Woolfolk, Cody Burgener, Beau Burgener, Matt Foreman, Rob Earwicker, Danny Camargo, Bob Takano, John Thrush and Don Weideman for their various contributions to my knowledge or their support of this book. Of course, thank you to all of my weightlifters, on whom I get to experiment and through the coaching of whom I'm able to continue to learn.

Thank you to Aimee Anaya and Steve Pan for volunteering for photography duty, which is far more miserable than most can even imagine. A great deal of gratitude is due to Aimee in particular for putting up with my obsessive attention to the most mundane details, and her willingness to participate in numerous capacities of support during the unexpectedly protracted process of writing both editions of the book. Video by Randall Strossen of IronMind and video and Dartfish work by Tracy Fober has been very helpful for lift and bar path analysis. Thank you to Robb Wolf for his confirmation of the content of the nutrition section, as well as teaching me most of what I know about nutrition in the first place.

Finally, thank you to Robb Wolf and Nicki Violetti of NorCal Strength & Conditioning for bringing me into their gym and convincing me I could in fact earn a living doing what I love.

Introduction to the Second Edition

I was initially reluctant to publish a second edition of this book, having endured the misery of formal education and being all too familiar with the continual production of new textbook editions in which the material is not improved in terms of quality or quantity, but simply reordered to create confusion sufficient enough to force the purchase of new books (Not that I necessarily purchased or read any of those books myself.).

However, as the process continued, the magnitude of changes and additions this update involved proved to be significant enough to warrant a new edition rather than simply another printing of the first. Since the first edition of this book was released, I've felt compelled to expand upon a number of sections, to improve upon many descriptions and prescriptions, and to update details of my teaching methods in accordance to how they've continued to evolve for what is, at least I believe, the better.

Against the advice of many, I've taken the time to read and consider all the reviews of the book that I've been able to find, particularly the unfavorable ones. Fascinatingly enough, many reviews were wholly contradictory of each other. Some readers believed the book to be too complicated, while some were disappointed by a shortage of complexity and detail, and for each of these, there were readers who argued the others' claims. Of course, these sets of readers were not viewing different material—they just had different expectations or wishes. This is a reminder that, in spite of my best efforts, it's impossible to please everyone.

This book is a guide for teaching, learning and coaching the Olympic lifts. It should be obvious that the intended audience, then, are those who are not yet entirely proficient at either lifting or coaching, or those who are simply seeking new perspectives (as I would hope all coaches and athletes, regardless of experience, are inspired to do). It is in this sense that the book is titled complete, and the overwhelming response of readers is that with regard to its intended goals, it is uniquely successful.

Quite simply, what I have attempted to do is create the book I always wanted to read as a new weightlifter. My hope is that this information proves helpful—at least to some extent—to every reader of this book.

—Greg Everett, August 2009

FOUNDATIONS

UNDERSTANDING THE LIFTS

Throughout the learning process, a continually improving understanding of the principles and mechanics of the Olympic lifts will remain an important component of technique development and coaching. The fundamental principles of the snatch, clean and jerk are universal, although expressed in distinctive manners. Described in the simplest possible terms, all three lifts employ the generation of force against the ground to first accelerate the barbell upward, then use force against the inertia of the barbell to accelerate the athlete downward and into position to receive the bar. Despite the segmented description, the lifts are performed with remarkable fluidity in their ideal execution.

The snatch and clean will be considered primarily in terms of three different phases in order to aid analysis—the first pull, second pull, and third pull. In addition to these phases, there will be the preparatory position, starting position, receiving position, and recovery. Other manners of dissecting the lifts exist, but the three-pull method is both simple and logical and consequently seems to be more effective in communication among athletes and coaches.

The first pull is the phase in which the barbell is lifted from the floor to the point at which the final upward explosion is initiated—typically when the barbell reaches approximately mid- to upper-thigh level. The second pull is the final upward explosion effort and brings the athlete into the fully extended position of the lift. The third pull is the athlete's transition from the extended position into the receiving position under the barbell.

The principles dictating the results of the lifter's movements are described by the constant interaction of Newton's Laws of Motion:

Law of Inertia: *Every body perseveres in its state of being at rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by force impressed.* In other words, an object will maintain its present motion or lack thereof unless and until acted upon by an external force. A barbell will remain on the platform until a lifter moves it; likewise, a moving barbell will continue traveling upward due to the lifter's force as long as that applied force and/or the resulting momentum remains greater than the force of gravity acting on the barbell in the opposite direction.

Law of Acceleration: *The rate of change of momentum of a body is proportional to the resultant force acting on the body and is in the same direction.* An object's acceleration is proportional to the applied force, but inversely proportional to its mass. That is, more force will create greater acceleration on a given object, but the greater an object's mass, the less acceleration will be created by a given magnitude of force application. To increase the acceleration of a given barbell, more force must be applied.

Law of Reciprocal Actions: *All forces occur in pairs, and these two forces are equal in magnitude and opposite in direction.* This law is most commonly paraphrased as, *For every action, there is an equal and opposite reaction.* When a lifter drives against the ground to lift the barbell, the ground delivers the same magnitude of force in return. The earth's far greater mass than the lifter/barbell unit results in all noticeable movement being undertaken by the lifter and the bar when driving against the ground.

In the initial stage of the snatch or clean, the athlete generates muscular force with the legs and hips against the platform, lifting and accelerating the barbell upward. When the athlete reaches the peak of productive body extension and can consequently no longer drive against the platform, the barbell will have been accelerated as much as possible and will now possess upward momentum, which would continue its upward travel temporarily even with the removal of any further force application by the athlete.

However, if performing the lift correctly, the lifter will not cease applying force to the barbell at this point. The effort to pull against the barbell will continue aggressively with the arms, but the lifter will cease applying force against the platform through the feet. As predicted by the law of reciprocal actions, this attempt to elevate the bar without pressure against the platform will result in both the barbell continuing its upward travel and the lifter beginning and continuing his or her downward travel. The degree to which each object travels relative to each other will depend on their relative masses; that is, the heavier the barbell relative to the athlete, the less it will travel upward and the more the lifter will travel downward (Of course, we have to also consider the influence of gravity on this interaction, which will assist the downward movement of the athlete and limit the upward travel of the barbell). In short, during this final phase of the lift, the barbell with its inertia acts as an anchor in space against which the lifter pulls to bring him- or herself underneath it.

What distinguishes a power snatch or power clean from a snatch or clean is the interplay of force application, barbell mass and athlete mass. If a lifter applies maximal force to the barbell, the depth at which it must be received will be dictated entirely by the mass of the barbell and the mass of the athlete. That is, a light barbell will accelerate more and travel higher, whereas the heavier barbell will accelerate less and not travel as high.

The force application can of course be controlled by the lifter, however. A light barbell can be received in the full squat position by reducing the force applied to accelerate the barbell upward. The lifter's effort to pull under the bar when not applying force against the platform will continue the barbell's upward motion to a greater degree the lighter the barbell is, requiring even less initial acceleration to receive the bar at full depth. The previous applies equally to the jerk—the difference is merely that instead of pulling against the barbell, the lifter pushes against it.

The entirety of these principles can be distilled into some simple rules for the execution of the lifts. During the first and second pulls, the lifter must maintain contact with the platform until maximal productive body extension is achieved in order to impart maximal acceleration on the barbell; in order to move into position under the barbell to receive it, the lifter must actively and aggressively continue pulling the barbell with the pressure of the feet against the platform removed or reduced; and the transition between these phases of the lift must be as rapid as possible—in fact, the final explosion of the bar up and the transition of the lifter under it will, with a proficient athlete, become in essence a single action.

Strength & Technique

There appears to be a great deal of discussion—largely among those outside the competitive weightlifting community—regarding the relative contributions and requirements of strength and technique to the snatch and clean & jerk. Some claim the sport is wholly dependent on technique, while others insist great enough degrees of strength will adequately compensate for poor technique. The reality is that neither strength nor technique will adequately compensate for a considerable lack of the other. Technique is the medium through which strength is expressed—the lifts are limited, then, by the weakest part of the equation. Neither strength nor technique can be neglected for the sake of developing the other.

LEARNING & TEACHING THE LIFTS

There is no single perfect learning progression for the snatch and clean & jerk. Different approaches are rooted in technical style variation, tradition, available time and resources, and the needs of individual athletes. Consideration of the broad spectrum of coaching methods in relation to the large number of successful weightlifters worldwide suggests this is not necessarily a problem. That said, it's apparent the breadth of successful coaching invariably relies on the same sound technical principles.

Just as there is with instruction, there is variation of lifting technique among athletes and coaches. Setting aside differences as symptoms of what could be considered universally to be poor technique, there exist iterations of correct technique. For nearly any detail of lifting technique presented in this book, at least one successful lifter who violates it can be found. There are more dramatic technical variations that remain passionately contended among coaches and athletes.

This book is written with the assumption that the reader intends to learn or teach the lifts in accordance with the technical style presented. That being the case, there will be little discussion or mention of different styles. This is neither a comment of any particular nature on the merit of any other style, nor the implication that none exist, but simply the recognition that I teach the way I teach because I believe it works. However, part of my coaching philosophy is that I will use anything that works; what works best varies among athletes. When reading this book, bear in mind that very little is set in stone and adjustments should always be made when appropriate.

Over-coaching is an easy mistake to make in consideration of the volumes of detailed information existing regarding the lifts. The coach must remain disciplined and provide the athlete what is needed, resisting the urge to delve into details for which the athlete is not ready and consequently cannot use productively. This kind of over-coaching can be a product of the coach's desire to impress with his knowledge, but at least as often, it's simply the result of the coach's eagerness to achieve progress with the athlete. Unfortunately, overwhelming the athlete with information he or she doesn't yet have the experience to apply is often counterproductive.

With this in mind, the information in this book needs to be used by both the coach and athlete discriminately. For the novice lifter, much of the detail can be overlooked and the attention focused on only the most fundamental points. I have placed gray summary boxes in each section of the snatch, clean and jerk learning progressions: these are enough to get a new athlete started learning the lifts without superfluous detail. As the athlete progresses, more of the information contained in the book will begin to make sense within the framework of experience and be successfully applicable in training.

I have made an effort to deliver a learning progression encompassing the snatch and clean & jerk that is simultaneously exhaustive and flexible. While the strategy must be complete, it must also be easily adaptable to individual athletes and circumstances. In a sense, then, it's as much a framework for teaching the lifts as it is a specific progression. This framework provides much opportunity for addition, omission and alteration by each coach and athlete as deemed appropriate. Steps may be skipped in some cases; in others they may be added or modified. And, of course, the process can be executed exactly as written.

The flexibility of the progression extends beyond the movements themselves. Each component can be considered merely a physical drill for the body, or an opportunity for education regarding the principles on which it's based. This accommodates athletes of all levels of experience, as well as the spectrum of coaching and learning styles. Inexperienced athletes can quickly learn the lifts with little or no explanation of principle simply through the repetition of drills, while more advanced athletes will be able to improve their technical performances by learning and better understanding the underlying principles easily underscored with each segment of the progression. Likewise, coaches who prefer the minimalist approach to instruction will be successful with the drills alone, while more cerebral coaches will be able to easily inject detailed but digestible lessons with each one.

Learning movement patterns is ultimately and unavoidably a matter of quality repetition, feedback, and effort. No advanced teaching technique or science will change this to any considerable degree—there will never be a substitute for time, focus and hard work, and eliminating these things would strip much of the potential for satisfaction from the process.

With respect to repetition, the emphasis is on quality. Not only is poor execution of a movement ineffective for developing technique, it's counterproductive in the sense that it demands time and energy that could be put to better use, as well as creating similar but incorrect motor patterns with which the correct patterns must compete. Of course movements will not be perfect in the early stages of learning, and there will be few if any demonstrating true perfection throughout an entire lifting career. This doesn't mean learning technique is a futile endeavor—it simply means that conscious effort must be made to execute each repetition as precisely as possible for the given stage of development. In other words, sloppiness, laziness, and inattentiveness need to be avoided as much as possible. This is a responsibility shared by the coach and athlete.

Tied in closely with repetition quality is the quality and quantity of feedback. Feedback will exist in forms of varying utility and accessibility. Easily the most productive will be the guidance and instruction of a qualified coach based on observation and analysis of the athlete. The primary concern in this case is the ability of the coach and athlete to effectively communicate with each other—no amount of accurate technique analysis by the coach will have any effect if the athlete doesn't understand the coach's feedback. Similarly, the athlete must be able to relay to the coach his or her experience with each lift. This kind of clear communication takes time to develop as the coach and athlete become better acquainted, but from the beginning, effort should be made continually to establish and improve the kind of rapport necessary to support the athlete's technical progress.

It's unnecessary for coaches to have been elite weightlifters in order to be successful with their athletes. It is, however, necessary for coaches to have experience with weightlifting training and competition. Being familiar with the feel of the lifts, responses to programming, and the process of competing will allow the coach to communicate far more effectively with his or her weightlifters.

Each coach will develop over time his or her own style of instruction and interaction with the athlete. The intention of this book is not to prescribe any particular style, but instead to provide a collection of both reliable principles and recommended strategies to be used as a solid foundation on which each coach can construct his or her own. One that warrants mention here is the notion of positive and negative cues. Commonly the coach will instruct an athlete to not do something, or to act in a way inconsistent with the nature of the movement. As an example of the former, the coach may tell the lifter to not lift the hips when lifting the bar from the floor; a more effective cue would be to instruct the athlete to lift the chest with the hips. As an example of the latter, the coach may tell the lifter to keep the hips down; a more effective cue may be to instruct the lifter to instead keep the chest or shoulders up. Whereas the first instruction causes the lifter to think down when needing to move up, the second keeps the instruction consistent with the nature of the movement. In short, athletes are more likely to respond as desired when told explicitly what to do instead of being told what not to do and left to figure out corrections on their own.

Video review can be an excellent means of feedback for athletes without access to a coach, or as an additional means for those who are receiving coaching. The effectiveness of video review is of course predicated on not only knowing what to look for but how to respond—in other words, it does no good for an athlete to watch video of a lift if he or she is unable to recognize faults and their causes, and to develop strategies to correct them. This is simply a matter of combined education and experience. The better the athlete understands the principles of the lifts, the better they will understand the rationale of positioning and movement mechanics, allowing them to recognize the roots of technique errors and to create drills or cues to correct them.

Video can be set up in a number of ways. Most effective is access to immediate review following a lift. This can be accomplished by connecting a video camera to a television, recording each lift, and rewinding the tape to watch after each lift; or a closed-circuit system can be set up with a playback delay that allows the athlete time after the lift to get into position to watch the screen. The former is less expensive but a little more of a hassle, while the latter is much easier but financially impractical for most. The least effective method of video review is to record entire sessions and watch the tape well after its completion—this allows neither immediate feedback when the feeling of the movement is still fresh, nor the opportunity to immediately attempt chosen corrections. The inherent problems of this kind of lag time notwithstanding, this type of video review is much better than none at all. In addition, these videos can serve in an archive as means by which to measure progress and evaluate training productivity over the long term.

The most basic feedback available is simply the athlete's own collective senses. Again, the greater the athlete's understanding of the guiding principles of the movement's technique, the better a framework he or she will have within which to make sense of what he or she feels. For example, it does no good for an athlete to recognize his or her weight is on the balls of the feet if he or she doesn't know the weight shouldn't be there at that particular moment.

The Olympic lifts are complex movements demanding great precision and focus. Patience and discipline will carry both athletes and coaches a long way, and attempts to circumvent the process will invariably result in failure to achieve mastery. Coaches disagree about how comprehensive the process for teaching the lifts should be. Some are extreme minimalists, preferring to show athletes what the lift should look like and allowing them over time to learn how to make it happen on their own. Others have very basic progressions that get athletes started but still require they essentially teach themselves through the observation of other lifters and feedback from what turns out to be experimentation in training. Still others use extensive and detailed teaching progressions that teach the mechanics of every segment of each lift.

The minimalist approach generally works satisfactorily for talented athletes, as these are the type of individuals who are able to mimic observed actions well and who have a natural feel for athletic movement. Even with such athletes, however, this approach can leave holes in technical performance or understanding that come back to haunt the athlete much later in his or her lifting career. This book unquestionably takes a very comprehensive and detailed approach for two basic reasons. First, such an approach will work for any individual, from the athletically talented to the completely unathletic. Any coach who works with anyone other than those destined for weightlifting greatness will need to be prepared to work with lifters who will need a great deal more guidance. Second, a detailed approach can always be simplified when appropriate. As a coach, it's always better to have more tools than you need than to need more tools than you have.

The progressions in this book are presented in the recommended order of execution, and as a consequence of this and the inherent overlap of principles among the lifts, information in later sections of the books often builds on information presented earlier. Specific sections may not offer the complete picture, and should be read as intended regardless of the reader's possible plans to skip certain exercises, drills or lifts in practice.

FACILITY & EQUIPMENT

Olympic weightlifting is a specialized mode of training and as such makes certain demands on the training facility and equipment. With the exception of a barbell and plates, none of the following items are absolutely necessary in the most fundamental sense, but the remaining items are all useful enough to be included, and their purchase should be considered.

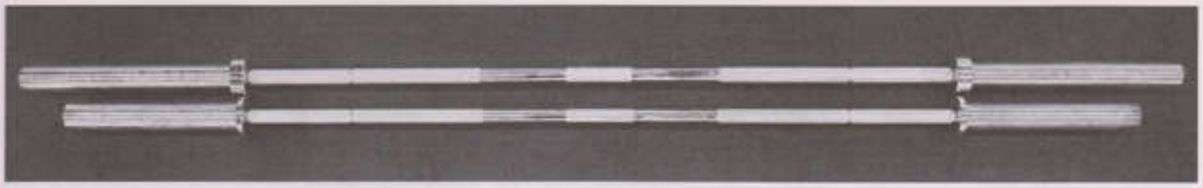
The Catalyst Athletics facility

Barbells

The principal requirement for the Olympic lifts is an Olympic barbell. These bars are remarkably strong yet provide flexibility without permanent deformity. The sleeves rotate smoothly on the shaft to allow the bar to be rotated by the lifter during the turnover of the snatch and clean without having to overcome the rotational inertia of the plates. A bar that doesn't spin well results in more difficult lifts at best and injuries at worst.

Regulation men's bars are 20 kg (44 lbs), with a shaft diameter of 28mm and a length of 2200 mm. Women's bars are 15 kg (33 lbs), with a shaft diameter of 25 mm and a length of 2010 mm. Both bars are the same length between the sleeves—1310 mm—and have the same markings in the knurling. As of this edition, men's bars continue to have center knurling, but the center knurling of women's bars has been removed.

For women in an athletic training setting, women's bars may not be absolutely necessary, but for



Regulation men's and women's barbells

many women, grip security on a men's bar will be a problem. For those intending to compete, a women's bar should be used to prepare for its use in competition.

Spending more money on a bar will prevent a lot of frustration and likely save money in the long run. Less expensive bars will spin poorly, oxidize more, bend permanently more easily, fit plates either too tightly or too loosely, and will have to be replaced more often than more expensive bars. The application will help determine the choice of bar—if lifting will be performed for competition, consider spending more money as the bar will be used more frequently and loaded with more weight, and movement precision will be a priority; if lifting will be performed simply for athletic training, less expensive bars will usually suffice.

There are two categories of Olympic bars: training and competition. The most noticeable differences—aside from price—are the deeper knurling and certification by the IWF of the competition bars. Certification and the extreme precision it indicates is unnecessary for training applications and even most levels of competition. More importantly, the deeper and sharper knurling of competition bars will typically prove too severe for daily use and destroy lifters' hands in short order.

In the early stages of learning or teaching the lifts, technique bars are important. These bars are ideally of regulation diameter and may be as light as 5 kg. This allows a more gradual loading progression for athletes while keeping the feel of the bar correct. Prior to this, 5-ft lengths of ¾" schedule-40 PVC pipe can be used for introducing the movements and will be the tool of choice for many of the initial teaching progressions in this book.

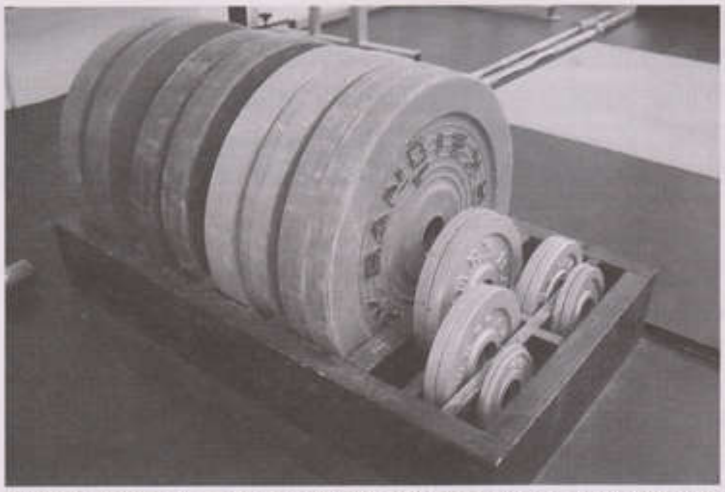
Bumpers & Change

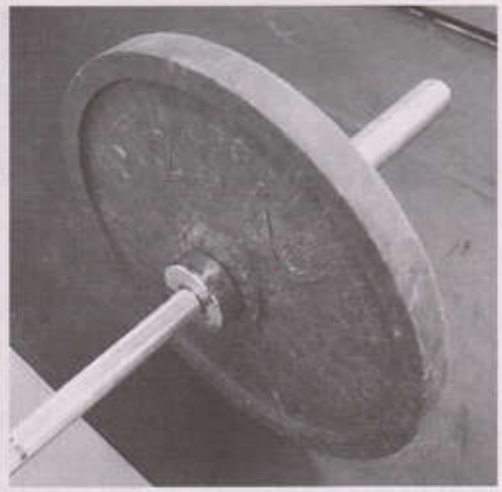
Bumper plates allow the barbell to be dropped after lifts or in cases of missed attempts with less damage to the bar, plates and flooring. There is a wide range of quality in the realm of bumper plates. Just as with bars, bumpers can be of competition quality and consequently extremely expensive. Their training counterparts are more than adequate for the highest level lifters in training. Very inexpensive bumpers, often composed of recycled rubber, are also available and are appropriate for many athletic training situations. It's common that the metal hubs used in many of these plates will become loose over time, but this is generally not problematic aside from being annoying. If the bumpers will be used frequently by a large number of athletes, such as in a college or high school athletic training facility, more expensive training bumpers will be a wise investment to withstand the abuse.

Bumper plates will come in 10 kg, 15 kg, 20 kg and 25 kg (or 25 lbs, 35 lbs and 45 lbs); Change plates will come in 0.5 kg, 1 kg, 1.5 kg, 2 kg, 2.5 kg and 5 kg (or 1.25 lbs, 2.5 lbs, 5 lbs and 10 lbs).

Kilogram bumpers and change are helpful for preparing for possible competition and ease of communication within the weightlifting community, but pound bumpers and plates can still be used to add up to the same loads. Convenience and convention aside, weight is weight.

With the exception of lower-budget sets, bumper plates will be color-coded in accordance with international convention. 25 kg is red; 20 kg is blue; 15 kg is yellow; 10 kg is green. Black bumpers can be lined with colored tape to allow association of weights with colors. Training change plates are usually





Bumper plates: 10, 15, 20 and 25 kg; Iron plates: 0.5, 1, 2, 2.5 and 5 kg (left). Technique plates allow athletes to pull from the correct height off the floor while weighing only fractions of the lightest bumper plate (right).

a single color, but competition iron plates are also color-coded: 5 kg and 0.5 are white; 2.5 kg is red; 2 kg is blue; 1.5 kg is yellow; 1 kg is green (notice colors are the same for corresponding bumper and change weights, e.g. 25 kg and 2.5 kg are red, 10 kg and 1.0 kg are green).

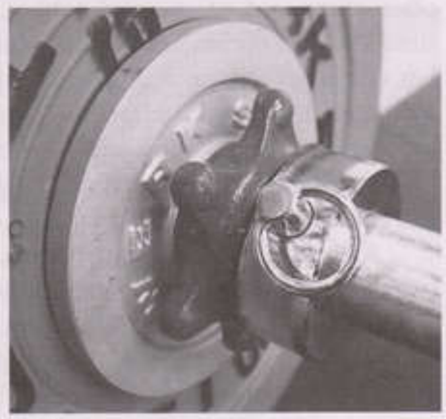
Technique plates are helpful in the early stages of learning and teaching the lifts. These plates are the standard diameter, allowing the athlete to pull the bar from the normal position on the floor, but are as light as 5 lbs and even less in some homemade instances.

Collars

Normally collars would be considered part of the barbell, but they warrant special mention here. Traditional weightlifting collars are 2.5 kg each, and quite bulky. They are comprised of two (generally) threaded components—a screw that tightens the collar against the sleeve of the barbell, and a screw around the circumference of the collar that then extends against the plates to tighten the assembly and prevent shifting of the plates.

It's comparatively uncommon for collars to be used in the gym, largely because of the additional effort required, but also because they tend to be in relatively short supply. This is not a safety concern when training with high quality barbells and plates because the tight manufacturing tolerances mean plates don't slide on the barbell's sleeves too easily to slide off during the expected jostling of a lift. With less expensive equipment, or inexperienced lifters who are more likely to tilt the bar and allow plates to slide, collars are a good idea.

Competitive lifters are encouraged to use collars periodically, particularly in the weeks prior to a competition, to get accustomed to the different feeling of the bar. Without collars, both the sleeves of the barbell and the plates on the sleeves are free to spin; with tightly applied collars, as will be seen in competition, the plates are unable to spin on the sleeves,



Collar

and rotation is confined to the actual bearings of the barbell. While quality bars will still spin very well, there is a definite and noticeable difference between a collared and un-collared bar. It can be surprising and disrupting to lift on a collared bar in a meet without prior experience of the feeling.

Lifting Platform

A weightlifting platform is the ideal lifting surface. Quality platforms can be built easily and inexpensively, or can be purchased very expensively. A wooden lifting surface can also be sunk into rubber flooring for a simple and unobtrusive platform.

However the platform is built, a wooden lifting surface will provide a stable, smooth and incompressible lifting platform, and rubberized landing pads will reduce the beating the bar and bumpers take and extend their useful lives, as well as reduce the abuse to the underlying flooring and limit noise somewhat.

To build an inexpensive platform, start with two 4 x 8 ft sheets of CDX ¾" plywood alongside each other to create an 8 ft x 8 ft footprint. Place two more sheets perpendicularly on top of these and screw down. Center a 4 x 8 ft sheet of smooth ¾" particleboard or MDF on top of this base, again perpendicular to the top sheets of plywood and screw down. Cover the remaining 2 x 8 ft sections with ¾" rubber—horse stall matting is relatively inexpensive and does the job well. A glued and screwed platform will be a little more solid, but screws only will allow easy replacement of single pieces if necessary. If time, tools and ambition are available, the top sheet can be cut narrower. The bumpers on a bar will be just barely outside the width of a 4-foot wide top sheet, meaning more accidental dropping on the wood. Cutting the top sheet to 3' 6" and the rubber sides to 27" wide will provide more than enough lifting surface and more landing area for the bumpers.

Lifting platform

To place a platform in existing rubber flooring, simply cut a sheet of plywood or particle board to the desired dimensions, which can be relatively small, such as 3 ft x 5 ft, and place it over the flooring where it will be placed. Trace the sheet on the rubber, remove the wood, and cut the rubber. Be sure to place the cuts inside the drawn lines to ensure a tight fit.

Squat & Power Racks

Squat racks will allow the athlete to perform heavier squats, jerks, presses and a number of other possible exercises without having to first lift the weight from the floor, which ranges from unnecessarily difficult and taxing to impossible. For the weightlifter, the squat rack is not optional.

Racks can either be a single unit, or two individual uprights. Individual uprights are helpful in terms of storage space and ease of relocation, but single-unit racks are more stable. The width of all quality single-unit racks is adjustable, so this is not a reason for individual uprights.

In any case, like a barbell and bumper plates, more money spent on a rack will mean one that functions better, lasts longer and supports more weight. The last thing that needs to go through an athlete's mind when finishing an extremely heavy squat is whether or not the rack will support the bar.

A couple basic elements to consider are possible heights, the mechanism of height and width adjustment, and the shape of the cradle. For athletes who want to use the squat rack for bench pressing, or for those who are particularly short, greater low-end height adjustability will be necessary. It's rare to find a rack that won't adjust high enough for any athlete.

Some racks have awkward mechanisms for height and width adjustment, and sometimes those of questionable reliability. Find a rack that adjusts easily and securely.

Finally, racks can have different shapes for the bar cradle. Typically these are flat-bottomed with a high vertical back and a lower, forward-slanting front. Occasionally the front is vertical as well, making replacement of the bar far more difficult. Other racks' cradles are curved at the bottom, meaning that the bar settles into a single position rather than being able to roll back and forth somewhat.

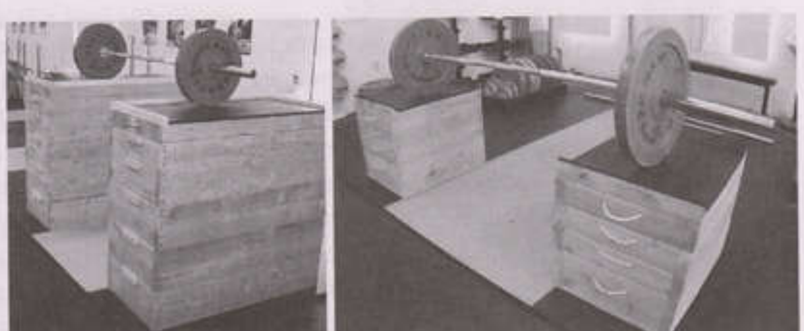
Squat rack (left); Power rack (right)

Power racks can also be used instead of squat racks, or in addition to squat racks. The drawback of using a power rack instead of a squat rack is the amount of space it takes up—placing a full-size rack on a standard-size platform will take up far too much space for non-rack lifting, and moving such racks is not an easy task. Power racks do offer options for more exercises or exercise variations, however, so if space and money allow, they're a nice addition to any facility. However, if space or budget is limited to one item, squat racks are the better choice.

Jerk/Pulling Blocks

Jerk blocks are a luxury out of reach for most athletes and facilities, less because of cost, and more because of space concerns. However, they do provide some unique training opportunities. The purpose of jerk blocks is to simply provide an elevated surface for the plates on the bar. The athlete can lift the bar from this elevated position much as he or she would from a squat rack; but more importantly, following a jerk, the athlete can drop the bar back to this elevated platform rather than dropping it to the floor or lowering it back to the shoulders. In this way, jerk blocks allow the athlete to perform multiple successive reps in the jerk with much heavier loads than could be lowered back to the shoulders safely by the athlete.

Depending on how they're constructed, jerk blocks can usually be lowered enough to be used as pulling blocks for snatches and cleans. The surface of these blocks is larger and their stability is greater than pulling stands, allowing the athlete to drop completed snatches and cleans onto them. Snatching and cleaning from the blocks is an alternative to lifts from the hang, and block lifts are arguably more effective than hang lifts for the purpose of forcing more rapid bar acceleration at higher positions of the lifts.



Jerk blocks (left); Pulling blocks (right)

Pulling Stands

Pulling stands are a version of pulling blocks that tend to be more portable and more easily adjustable. These allow lifts from an elevated starting position, although because they're relatively small and unstable, their use with lifts like snatches and cleans at weights that will need to be or have the potential to be dropped is not recommended. They're best used for lighter speed or technique work in the snatch or clean, or for exercises like shrugs or partial pulls.

Riser

A riser is a simple piece of equipment than can generally be made with leftover wood. This small platform on which the athlete stands elevates the athlete without changing the barbell's starting height; in other words, it increases the range of the pull from the floor. Pulls and deadlifts from the riser can be effective for increasing a lifter's pulling strength and speed from the floor.

Plyo Boxes

Plyo boxes can be purchased or built fairly inexpensively. A few boxes of various heights will allow an enormous number of training options, although most drills beyond box jumps, depth jumps and depth drops are marginally useful at best within the context of weightlifting.

Glute-Ham Bench

A glute-ham bench is a large and expensive piece of equipment that is certainly not necessary, but valuable if space and finances allow its purchase. It can be used for a number of supplemental back, hip and core exercises such as back and hip extensions, glute-ham raises, roman chair / GHB sit-ups, and reverse hypers.

Adjustable Bench

Although much less common since the elimination of the press in competition, it is not unheard of for weightlifters to bench press at certain times. If budget and space allow, a quality adjustable bench is worth having in the facility to allow both flat and incline bench pressing.

Weightlifting shoes; The lifted heels of weightlifting shoes increase the ankles' range of motion and allow better positioning in the bottom of the squat.

Shoes

Weightlifting shoes are an absolute must for all lifters for two primary reasons. First, the hard soles don't compress under loads, eliminating the instability found in soft-soled shoes as well as ensuring that generated force is transmitted more completely from the platform to the bar. Second, the lifted heels effectively increase the ankles' range of motion, allowing the lifter to keep the hips forward and torso upright as needed in the squat. This is particularly helpful for longer-legged athletes and those with limited ankle flexibility.

It's important to find a pair of shoes that support the arches well. Orthotics should be used by any athletes with collapsing arches to ensure proper foot and ankle position, which will in turn ensure the lifter is able to recognize his or her full strength potential and better avoid injury to the ankles, knees, hips and back.

Weightlifting shoes are fairly expensive, but should be considered an investment in both performance and longevity. Typically the shoes' uppers will hold up well over time, so with occasional repairs and resoling, a single pair of shoes will often last many years. It's important to retire shoes when the uppers are no longer supportive, however; this can lead to foot and ankle instability and cause injuries up the chain from the knees to the hips to the back and even the shoulders, elbows and wrists. Spending money now on shoes will save a lot of money later on physical therapy and support continued progress instead of plateaus from injury.

Chalk

Chalk will improve the grip on the bar by keeping the hands dry as well as provide some protection from bar friction. It's usually best purchased from gymnastics equipment suppliers as broken blocks. The broken pieces are less expensive and are already partway to the state in which they'll end up anyway. Purchasing chalk from rock climbing or fitness equipment stores will prove much more expensive in most cases.

Chalk belongs in four primary places: hands, the bar, clothing from bar and hand contact, and in the container it came from. Spreading chalk all over the facility because of an unwillingness to take the extra ten seconds to rub it into the hands over the bucket is disrespectful to the owner of the facility and a hassle for those who are responsible for cleaning it up; as importantly, loose chalk on lifting surfaces can result in potentially serious injuries from slipping feet. Remember—chalk trails on the floor lead to amateurs.

Along with chalk, hand-drying products such as Tite-Grip can be used to keep hands dry during training. Such products are extremely helpful for allowing tape to continue to adhere.

Tape

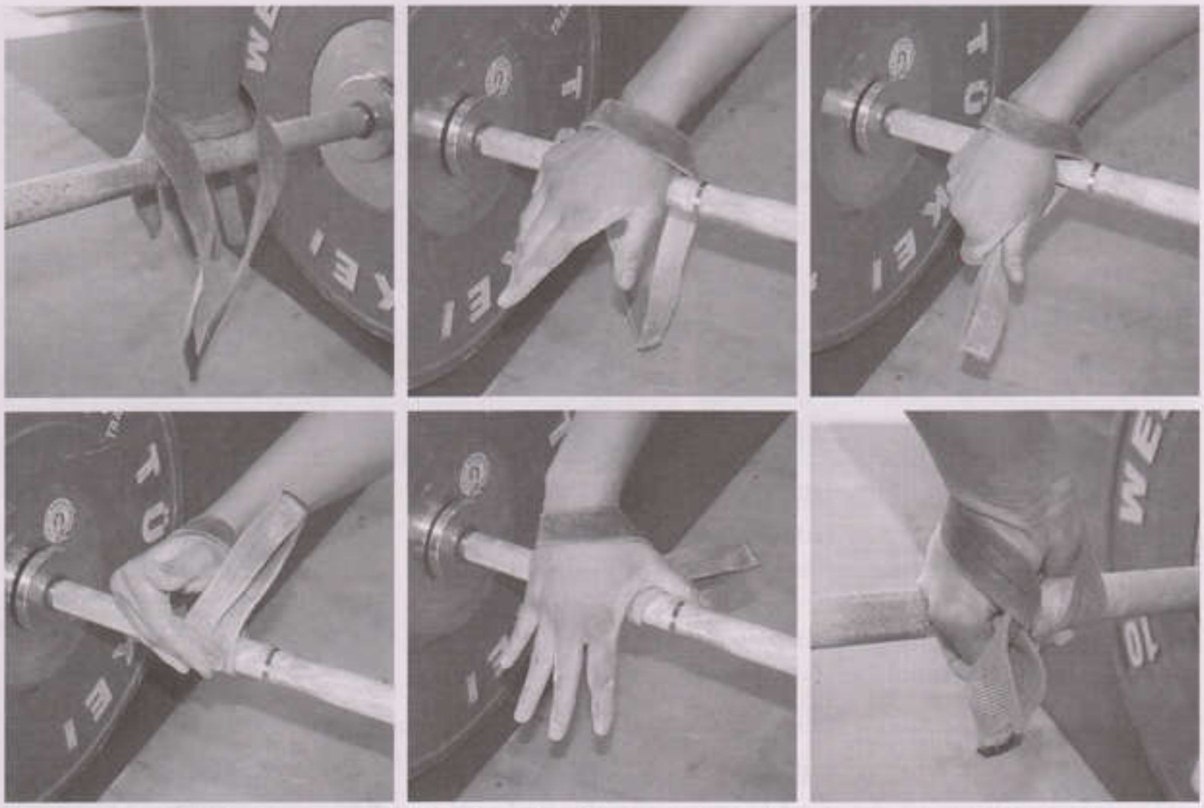
Tape may be used for a number of reasons. For the hands, it can serve as a means of prevention of injuries or protection of existing injuries. Taping parts of the hands that receive the most friction can reduce the potential for callus tears and sometimes improve grip. Taping the thumb can greatly reduce the pain of the hook grip. It's important in cases of taping over any joints in the hands to use elastic tape—non-elastic tape will prevent normal joint movement and often result in spraining of adjacent joints.

Tape is also commonly used on the wrists. In cases of existing injuries, it can provide some added support to reduce movement outside the comfortable range of motion. It's sometimes used as well in a preventative fashion to limit the extension of the wrists and reduce translation of the distal heads of the ulna and radius under heavy overhead loads. In these instances, caution should be exercised to limit its use to only the heaviest loads. Overuse can produce a lack of connective tissue strength development in the area being supported, and the resulting change of wrist position can potentially lead to elbow or shoulder discomfort or injury. Using wrist wraps may be a better option—their tension can be easily adjusted to avoid dramatic movement limitation and they can be used loosely to keep the joints warm.

Elastic and non-elastic athletic tape (top); Taping the thumbs can help reduce discomfort from the hook grip and increase grip integrity (bottom).

Straps

Straps are helpful tools in certain circumstances. Their use is generally limited to pulls and deadlifts, multiple rep, block or hang work in the snatch, or in times when the hands are too beat-up to grip the bar. Of course, using straps will by no means remove the need for grip strength entirely and will certainly not have a particularly dramatic effect for most athletes—it's simply a matter of judicious use to prevent excessive reliance on them and the feeling of security they provide. Ultimately, if you can't hold onto it, you can't lift it, so it's important to not allow overall body strength development to outpace grip strength development to a significant enough degree that an athlete is missing lifts due to grip failure. However, for athletes who are on heavy classic lift emphasis cycles, using straps for the snatch in particular is often a good idea to prevent undue



Placing straps: With the loop around the junction of the hand and wrist and hanging down behind the bar, the strap is grabbed and wrapped around the bar gripped between the hand and bar.

stress to the hands.

Generally it's advisable to limit the use of straps as an athlete approaches a competition, with the exception of cases in which strap use will prevent possible damage to the hands. For athletes with exceptional grip strength and no history of the hands slipping during lifts, straps can be used as much as desired.

Simple straps can be purchased or made inexpensively with nylon webbing. Smoother nylon will feel better on the hands, but it will take a period of use to roughen up enough to stick well to the bar. Wider straps will also feel better on the hands, but often they will interfere with the necessary mobility of the hand and wrist.

Straps can be wrapped somewhat differently depending on the exercise. For exercises like pulls and deadlifts, during which the bar will simply remain hanging from the hands rather than in or above them, a tighter wrap is acceptable. Some lifters may even wrap the straps twice around the bar to limit slipping and friction on the hands during extremely heavy, high-rep pulls or shrugs.

For the snatch, the manner of wrapping is more important. Because the hand and wrist must turnover as the bar is received overhead, the straps cannot limit mobility. Wrapping them too tightly or placing the straps over the wrists rather than the hands will prevent this turnover and correct hand position. Straps during these exercises can be left seemingly loose and still function as needed. An easy way to check a proper wrap is, before beginning the lift, to simply extend the wrist and flatten the hand against the bar as if holding it overhead. If this isn't possible, the straps are too tight or too high. Also, if the wrist cannot remain neutral when pulling—that is, it's in a partially extended position—the straps are too tight.

The use of straps for cleans is not recommended. Because the clean rack position involves the bar moving nearer to the ends of the fingers from its starting point deeper in the hands, straps will prevent the athlete from racking the bar correctly, placing a great deal of strain on the wrists, elbows and shoulders. Even for athletes who are able to still rack the bar well with straps on, there is a concern about missing lifts. In the snatch, no matter which direction the bar is lost, the straps will quickly and easily unwrap and present no problems. When missing a clean, because of the hand position, the bar is not able to roll out of the straps easily, and will more likely remain in the hands, forcing the elbows down and creating opportunity to strain the wrists, elbows and shoulders, and possibly causing the elbows to strike the thighs, opening the athlete up for serious wrist and lower arm injury. In the case of falling backward under a clean, an already precarious situation is made much worse by the lifter's ability to release the bar being limited. This has in more than one instance sprained and broken lifters' wrists when their elbows hit the floor at their sides with the bar still stuck in their hands.

To place the straps, slide the hand through the loop with the palm down and the length of the strap hanging. The surface of the strap should lie flat against the hand—if it doesn't, the strap needs to be flipped around the other way or moved to the other hand. In sewn-loop straps, the inner length should be on top of the outer length as pictured. Place the hand on the bar with the strap hanging down behind it. With the fingers, pull the strap under and around the bar to wrap it, and close the hand around it. To adjust the position or tension of the straps, rotate the bar and hands, or slide in and out. The hook grip is not necessary (or possible for most).

Sleeves & Wraps

Neoprene knee sleeves are common pieces of gear among lifters. These sleeves are tight enough to provide joint support, but not as tight as wraps, which must be removed in between sets. They keep the knees warm during training and consequently may reduce injury risk and improve function. They will also provide a degree of assistance in the bottom of the squat, but little enough that they remain legal in competition.

When joint warmth is not a concern, knees sleeves should be considered much like belts in that their use should be limited to heavier training. Many athletes choose, also like belts, to wear them only for the clean & jerk and not for the snatch. In training, their use may be restricted to heavy squatting and cleaning. Some athletes will find they provide some beneficial support when jerking as well.

In some cases, athletes will find that knee sleeves actually cause knee pain by opening the joint excessively when the material behind the knee bunches up in the bottom of the squat. Clearly in such cases, sleeves should not be used.

For older or particularly beat-up lifters, knee sleeves may be a necessity during all training. At this point, this is really not a concern and their use is encouraged to allow continued training. For younger and newer lifters, the longer sleeve use can be postponed, both in terms of a career and a given training session, the better off the athlete will be.

Wrist wraps come in a number of styles. They can be used in the same manner as knee sleeves—to warm and support the joints. Like sleeves, wraps should not be used unnecessarily—the longer a lifter can train

Neoprene knee sleeves

without them, the stronger and more flexible the wrist will become, and the less likely he or she will experience problems. Caution should also be exercised to ensure wrist wraps are not over-tightened—this can too greatly limit the mobility of the wrist and hand, preventing the correct overhead position and increasing the risk of elbow and shoulder injury.

Belts

Opinions regarding the use of belts vary widely among coaches and athletes. At the root of many of the arguments is the consideration of them as safety devices. The debate can be quickly ended (or at least attenuated) by agreeing that belts should be used for a single purpose: performance enhancement.

The spine is protected during heavy structural loading by the combination of internal thoracic and abdominal pressure and both deep and superficial muscular effort. Belts allow the athlete to increase the pressure in the torso by limiting the possible expansion of the abdominal cavity and therefore reducing the maximum volume of the container. In other words, they primarily reinforce the abdominal musculature, not the back musculature. The consequence of this increased pressure is increased rigidity of the torso, allowing it to function as both a more effective transmitter of force from the legs and hips to the bar as well as a more stable foundation for compressive loads.

The notion that belts should not be considered safety devices is not at all intended to imply their correct use will not increase the safety of heavy structural lifts. It's simply a perspective that helps discourage improper and excessive use. For the vast majority of athletic training situations, belts will never be necessary, and in fact are generally discouraged simply because the loads being lifted will rarely warrant them, and outside of weightlifting, competitive and recreational athletes rarely wear belts.

In the case of competitive weightlifters, belts can generally be reserved for the heaviest squats, cleans and jerks, or for higher-rep sets in which the core musculature is likely to fatigue significantly and increase the risk of postural instability. With weights lighter than this, refraining from the use of a belt will demand more effort from the musculature necessary to stabilize the torso as well as the athlete's conscious control of body positions and muscular activation, consequently improving the development of both. This is not to say, of course, that belts eliminate the need for great effort or the development of core strength—only that we can achieve better core strength development by limiting their use, and then adding them as a final performance boost.

A variety of belts are available, ranging from good to complete nonsense. Since the purpose is to reinforce the entire circumference of the torso, not simply the lower back, a wide surface in front is important—ideally the same width of the back of the belt. Belts that taper in the front still work, of course, but not quite as well.

Four-inch belts are wholly adequate and don't limit mobility in the deep squat or starting position of the pulls like 6-inch belts can. If the athlete intends to compete, note that belt width is limited to 120 mm—about 4.7 inches—so 6-inch belts are not legal anyway.

As long as it's reliable, the closure type is not important and the choice can be made based on personal preference. However, a traditional belt buckle's adjustability is limited, so for some lifters, the belt will always be either too tight or too loose. Cam devices avoid this problem by being adjustable to any position.

Belts should not be tightened excessively—their role is to reinforce the muscular wall, not to force abnormal compression of the abdomen. In other words, the belt should be tight enough to support the abdominal bracing position, not to prevent it and force the athlete into a hollow position. The lifter should place the belt in position, fill the stomach with air, brace, and tighten the belt down enough to pull the abs just inside their braced position—this will ensure the abs when braced will be both pressurizing the torso as well as pushing out against the belt for reinforcement.

WARMING UP

Warming up properly before training is critical not only for reducing the chance of injury, but also for optimizing performance. This stage of training is neglected by a surprising number of athletes and coaches simply out of impatience or unfamiliarity with protocols. Any athlete who is unwilling to spend five or ten minutes warming up is not serious about training.

If the facility is particularly cold or the athlete unusually stiff, some light monostructural activity such as rowing, jumping rope, cycling or jogging can be performed for 2-5 minutes. The idea is to get the body moving in a way that increases its temperature, blood flow through the muscles, and synovial fluid release in the joints without taxing it metabolically or introducing any excessive demands on range of motion, speed of movement, or force production. In addition to, or instead of if not cold, this activity, the athlete can spend a few minutes foam-rolling to generate some body heat and prepare the muscles for activity. (Foam-rolling is discussed toward the end of the book.)

After this initial warm-up, the athlete can progress to some dynamic range of motion exercises (DROMs) to begin preparing the joints and muscles for greater degrees of movement. Two sample dynamic warm-up series are described below. These can be modified to suit each athlete as desired and to address individual need.

Basic Dynamic Warm-up Series

A basic starting set of DROMs includes wrist circles, elbow circles, shoulder circles, over and backs, upright and bent torso rotations, and leg swings to the front and back and inside and outside. This is a quick and minimalist approach that will be sufficient for many athletes. Additional work on problem or tight areas should be included as needed.

Wrist Circles

Wrist circles in both directions will warm and loosen up the joints to prepare them to support weight at extreme ranges of motion. Keep the hands and forearms close together. 10-20 reps in each direction.

Wrist Circles

Elbow Circles

Elbow circles in both directions will help prepare the elbows for the stress of receiving and supporting heavy loads. The hands should be rotated along with the wrists to get more complete movement of the radius and ulna. 10-20 reps in each direction.

Elbow circles

Shoulder Circles

Double shoulder circles will help open up the chest and shoulders. This should involve maximal movement of the shoulder blades in all directions, not just the arms. 10-20 reps in each direction.

Shoulder circles

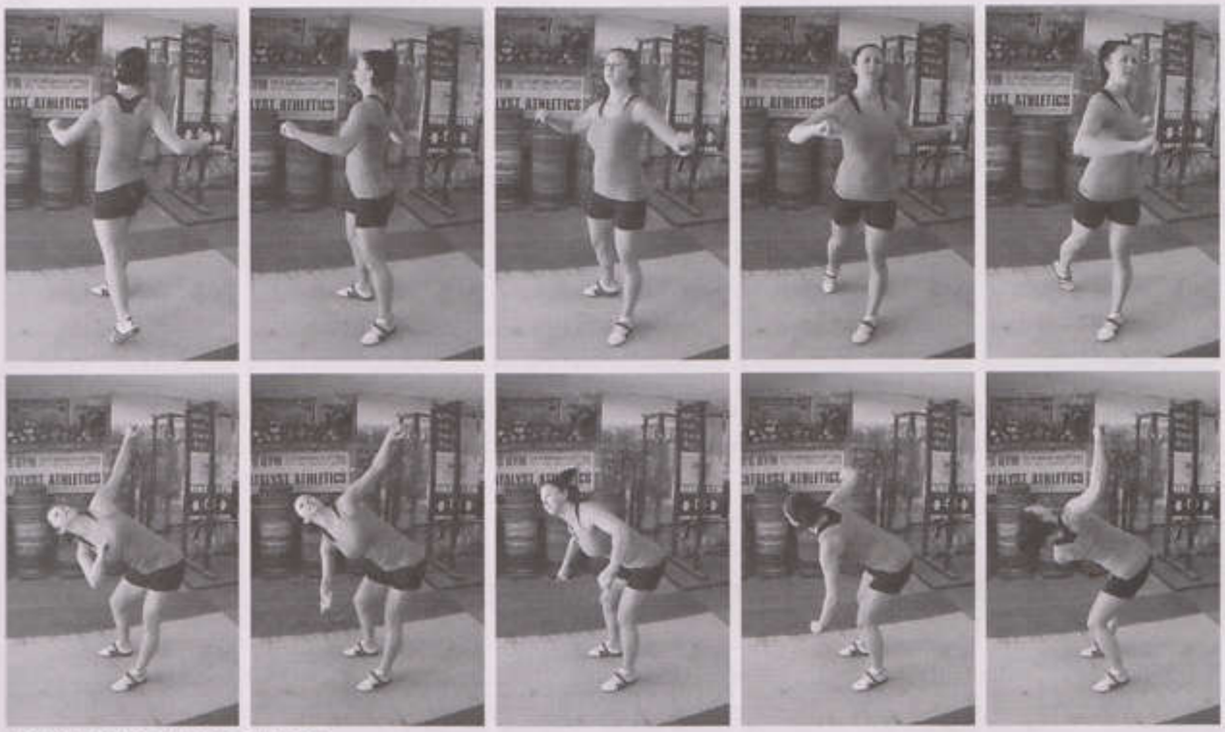
Over & Backs

Over and backs will further loosen up the shoulders, lats, triceps and biceps. Shrug the shoulders as the arms go overhead. 10-20 reps.

Over and backs

Upright & Bent Torso Rotations

Upright and bent torso rotations will loosen up the back and hips. When upright, allow the back foot to pivot on the toes to increase the range of motion. 10-20 reps each.



Upright and bent torso rotations

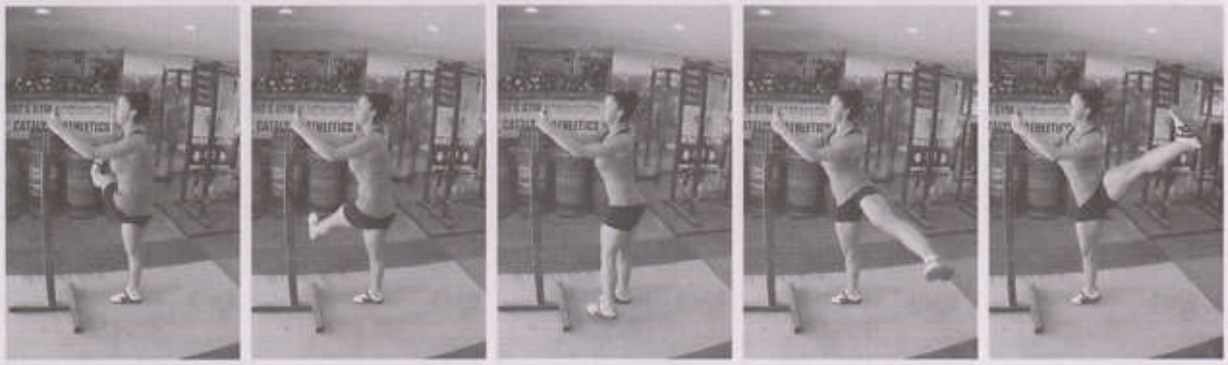
Leg Swings - Front & Back

Leg swings to the front will loosen up the hamstrings and the back will loosen up the quads and hip flexors. When swinging forward, don't allow the pelvis to rotate posteriorly. When swinging back, don't allow the pelvis to rotate anteriorly and try to get the knee well behind the hip. 10-20 reps in each direction.

Leg swings to the front back

Leg Swings - Side

Leg swings to the sides will loosen up the adductors, glutes, ITBs and other hip muscles. When swinging to the outside, keep the toe pointed forward. When swinging to the inside, point the toe up. 10-20 reps in each direction.



Leg swings to the sides

Advanced Dynamic Warm-up Series

The following warm-up series is more extensive than the previous and may be preferred by some athletes. This series begins with the same wrist, elbow and shoulder circles, and then progresses to internal/external arm rotations, bow and bends, hip circles, iron crosses, scorpions, walking lunges with twists, spiderman lunges, one-legged RDL + leg swings, and Cossacks. This series can be modified as appropriate to address individual need.

Internal/External Arm Rotation

With the arms extended to the sides and held horizontal, turn one palm up and the other down. Alternate the palms from up to down, maintaining the same arm position and keeping the torso facing forward. 10-20 reps.

Internal/External Arm Rotations

Bow & Bend

Reach to the floor by bending at the hips and back, return to standing, push the hips forward and lean the torso back without allowing the knees to bend. Tightening the glutes while leaning back will help prevent hyperextension of the lower back and stretch the hip flexors more. 10-20 reps.


Bow & Bend

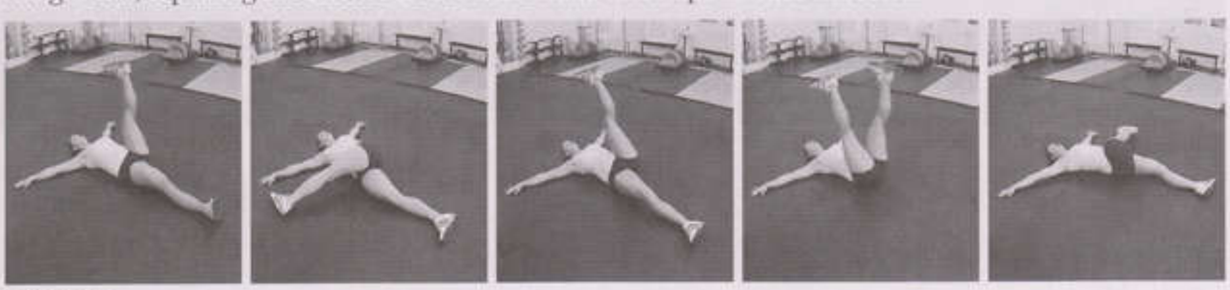
Hip Circles

With the feet in the squat stance, push the hips around in a relatively slow circle, feeling the stretch particularly through the lateral hips and hip flexors as the hips move from the sides to the front. 10-20 reps in each direction.


Hip Circles

Iron Cross

Lying supine on the floor with both legs extended and the arms extended perpendicularly to the torso, lift one straight leg up to vertical, and then bring it across the body to try to touch the foot to the hand of the opposite side. Return the leg to vertical and lift the other leg to vertical as the first leg is lowered back to the ground, repeating the stretch on the other side. 8-15 reps in each direction.


Iron Cross

Scorpion

Lying prone on the floor with the legs extended straight and the arms extended perpendicularly to the torso, lift and bend one leg and try to reach the foot to the hand of the opposite side. 8-15 reps in each direction.

Scorpion

Walking Lunge with Twist

Perform walking lunges with an emphasis on long steps. Sink to the bottom of each lunge, emphasizing an upright torso, pushing the hips in forward to the lowest position. In this position, rotate the torso toward the lead leg side, keeping it upright. 8-15 reps in each direction.

Walking Lunge with Twist

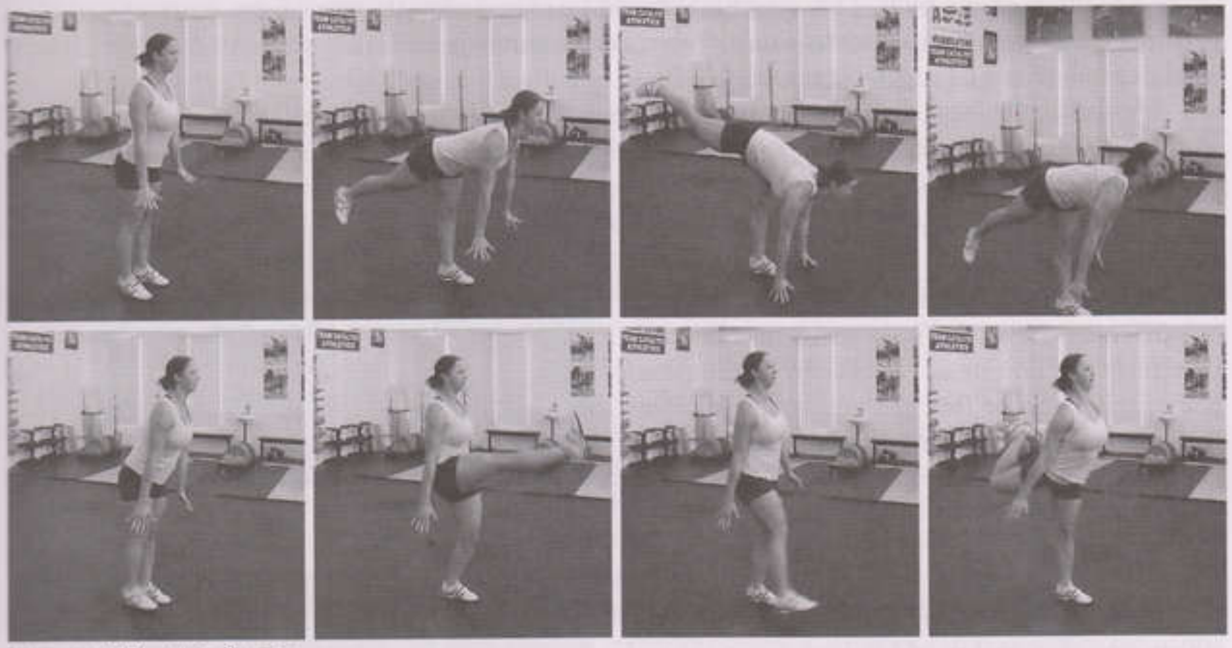
Spiderman Lunge

Perform walking lunges with the hands on the floor between the legs. Reach the front foot as far forward as possible and drop the hips and torso down as low as possible inside the lead leg. Keep the torso low and walk the hands forward as the back legs comes up to the next step.

Spiderman Lunge

One-Legged RDL + Leg Swings

Stand on one leg with the knee slightly bent. Keeping the free leg straight and in line with the torso, hinge forward at the hips, maintaining back extension, and reach for the floor. The goal is to place the torso and leg in a straight horizontal line as the hands reach the floor. Return to standing with this same alignment and return the foot to the floor briefly for balance if necessary. Still standing on the original post leg, swing the other leg forward with the knee straight and the torso upright, then swing backward and bend the knee to full open the hip and close the knee.



1-Legged RDL + Leg Swings

Cossack

From the bottom of a squat, extend one leg to the side and rest the back of the heel on the floor. The hands can be placed on the floor between the legs for additional support if needed. Staying as low as possible, shift the hips to the other side, extending the bent knee and bending the extended knee. Eventually the torso should stay upright and no support of the hands should be necessary.

Static Stretching

Static stretching, with a few exceptions such as the wrists, ankles and hip flexors, generally is not appropriate for training preparation. It will be less effective for improving flexibility than when done after training, is not an effective way to increase body temperature, and does a relatively poor job of preparing an athlete for movement.

Exceptions to this are specific areas of muscle tightness that prevent an athlete from correctly assuming a given position. For example, a lifter with remarkably tight hamstrings and adductors may need to use a bout of static stretching prior to lifting to help maintain his or her lumbar curve in the squat or starting position of the pulls. This stretching should be placed after the rest of the warm-up has been performed and the muscles are adequately pliable. Static stretching cold muscles at this or any other time will not produce any considerable results.

Flexibility training is discussed at greater length in its own section at the end of this book.

Exceptions

Because the demands on ankle flexibility will be so great, bent-knee static stretching of the calves prior to training is advisable. The best method of stretching the ankles is to focus on one at a time from the bottom of a squat by shifting the bodyweight over the foot and attempting to close the angle of the ankle as much as possible. The heel should be kept flat on the floor during this stretch to prevent unwanted stretching of the mid-foot and ensure the focus of the stretch remains the calf.

Two ankle stretches

If the forearms are particularly tight, the athlete may also need to add flexion, extension and hook grip stretching to help prepare the wrists to manage heavy loading in awkward positions. Before flexion and extension stretches, the wrist should be decompressed by pulling it straight out from the arm. This will help allow the small carpal bones to move more freely and correctly.

Flexion (wrist emphasis, finger emphasis, extension and hook grip stretches.

The hip flexors are another muscle group that warrant pre-training static stretching. Aside from often being very tight in athletes, which limits the possible extension of the hips, intense and longer-duration static stretches can somewhat inhibit their activation, which will allow the possibility of greater hip extension speed due to limited antagonist contraction.

Barbell Warm-ups

Following a general warm-up, the athlete will begin working with a barbell in preparation for the session's training. This will provide a more specific warm-up for the training to follow, and accordingly, this barbell work will vary depending on the contents of the training session as well as the needs of each athlete.

Athletes will generally perform a series of movements with the empty bar initially such as press, squat and pull variations. This initial work is a very basic warm-up that largely bridges the gap between the completely general warm-up and the more specific work to come. These movements are chosen by each athlete according to his or her needs or comfort. Examples for a snatch workout are snatch presses and push presses, overhead squats, back squat + snatch push press, snatch balances, Sots press, and muscle snatch variations. An athlete may rotate among a few of these each session. For example, 5 snatch presses, 5 snatch back squat + snatch push press, 5 mid-hang muscle snatches + overhead squats. Following this series, the athlete will move on to the first exercise of the session.

The basic notion of progressive loading of course applies here—that is, the specific warm-up will use incrementally increasing weights to bring the athlete to the working weight of the exercise. There are a number of approaches to this among athletes and coaches, and even among different training sessions for a single athlete. The fundamental principle of any warm-up is to encourage the body to perform optimally—that means preparing the muscles and joints for the necessary ranges of motion and movements, and preparing the nervous system for force production, without unnecessary fatigue.

The athlete will increase the load on the bar in progressively smaller increments as it makes its way to the working weight. Near the lighter end of the range, larger jumps in weight will be possible and desirable. In addition to this, the more technically demanding the exercise, the smaller the increments will be as the working weight is approached. For example, warm-up weight increases for the snatch will typically be considerably smaller than for the clean & jerk, and much smaller than for the squat or pulls.

Most athletes will perform better by spending more time with the lighter weights and subsequently taking larger jumps than by taking a greater number of warm-up weights. The former will allow adequate motor pattern practice and joint and muscle preparation with less muscular fatigue than the latter. For example, an athlete might spend some time with the empty bar, then snatch 50 kg for 2-3 sets of doubles or triples, then jump to 70 for a double, then 90 for a single, then 100, then 110, then 115. When compared to snatching 50 x 2, 60 x 2, 70 x 2, 80 x 1, 90 x 1, 100 x 1, 110 x 1, 115 x 1, the larger jumps with the longer light weight warm-up will nearly always be preferred by athletes. However, this method is something that the athlete will need to practice regularly to become accustomed to it—it may be difficult and uncomfortable initially if a more extensive and even progression has been the protocol used previously. Athletes who are not yet technically consistent will tend to perform better with more warm-up lifts using smaller jumps. Athletes should experiment with both types warm-ups to find which approach suits them better.

Specific warm-ups are also an opportunity for technique training. Athletes can take advantage of the need to prepare the body for performance to perform corrective or helpful training drills. This is often best accomplished through the use of exercise complexes. Common examples are power snatch + snatch for an athlete who may have trouble extending fully or aggressively at the top, or turning the bar over quickly enough; snatch + overhead squat for an athlete who is unstable in the bottom position; and muscle snatch + snatch for an athlete who has trouble turning over the bar aggressively or precisely enough.

Such complexes can be used as the athlete works his or her way up the weight increments, and then dropped at the point at which they become either impossible or too demanding to be considered warm-ups anymore. For example, using our previous snatch increments, the athlete may power snatch + overhead squat + snatch 50 for 2-3 sets, then 70 for 1-2 sets, then drop the complex and snatch 90. If the training session is more of a technique focus than load focus, or if the movements in the chosen complex indicate it, smaller increments may be used. An example might be a muscle snatch + snatch complex—because the muscle snatch loading is considerably lower than the snatch and will consequently be dropped relatively quickly, smaller increases may be desirable to ensure an adequate volume of work. In this case, the athlete may muscle snatch + snatch 50 for a double, 60 for a double, 70 for a single, 75 for a single, then snatch 90.

An additional consideration is developing the athlete's ability to manage unfamiliar conditions. Athletes will invariably use identical warm-up weights for long periods of time and become very accustomed to these weights. This can occasionally make it difficult mentally for the athlete to lift weights other than these, and may cause problems in a competition situation when circumstances require an unexpected change in attempt weights and according adjustment to the warm-up. While we want the athlete to be extremely comfortable with a given warm-up protocol for competition in order to minimize variables and fortify confidence, occasionally changing warm-up weights in training can help prepare the athlete for uncomfortable situations and improve mental toughness and resilience.

THE SQUAT

The squat is foundational to the Olympic lifts as a position, a movement and a strength exercise. Without a well-developed and consistent squat, neither pulling technique nor pulling power will produce entirely successful Olympic weightlifting. The great natural physical variation among athletes dictates that there will never be a universally perfect prescription for body positioning, but irrespective of this variation, the fundamental principles remain consistent. Continued reliance on them will ensure that modifications from the strict prescription are rational and sound instead of haphazard and likely improper.

Because the squat, more so than any other element of the lifts, will be affected by temporary impediments such as limited flexibility, a greater deal of modification will be necessary and allowable during an athlete's advancement. However, even in the cases of lifters for whom the strictest positioning prescription is initially impossible, this prescription will remain the ultimate goal, and continued efforts toward that end should be made.

Be cautious of defying the underlying principles with the excuse of individual variation—often this is inappropriately cited when the actual cause of an athlete's inability to adhere to these prescriptions is entirely correctable over time, such as flexibility-related limitations or simply stubborn habits. It's necessary to critically evaluate each athlete individually to make accurate determinations—avoid allowing an athlete to continue poor habits due simply to laziness or frustration with slow progress and, more importantly, increase the risk of injury.

The basic squat position

Depth

The depth of an Olympic squat should not even be a topic of discussion, but because there has been and continues to be discussion among coaches and athletes in sports outside of weightlifting, it warrants at least clarification: proper depth is full depth; full depth means full depth. That is, full depth is not parallel, nor is it breaking parallel—it is squatting to the lowest position possible without surgical alteration of body parts while maintaining correct posture. To simplify, we want to close the knee joint maximally while maintaining upright posture and a correctly arched back.

Depth is measured by the position of the hips, and the depth of the hips is governed by the position of the knees, the degree of dorsiflexion of the ankles, the absolute and relative lengths of the upper and lower leg, the horizontal position of the hips relative to the feet, the width and degree of external rotation of the feet, and the mass of the upper and lower legs. These factors are largely interdependent, and a change in one will typically effect change in others.

If the knees are prevented from moving forward over the feet, as is taught by many coaches and trainers, the hips must travel farther back behind the feet. With the hips behind the athlete's base, the torso must be inclined forward to a greater degree in order for the athlete's center of mass to remain balanced over the feet. If the hips are lowered from this position, flexibility will restrict the spine's ability to remain correctly arched, forcing the athlete to curl forward, again to remain balanced. For what should be fairly obvious reasons, neither of these positions will allow the safe and effective support of a barbell in the positions it must be received in the snatch and clean. (Note that shorter athletes will typically be able to achieve a proper squat depth and position without the knees passing forward of the toes significantly if at all.)

Inadequate ankle flexibility can also result in the knees remaining too far back—if the ankles are unable to dorsiflex to a great enough degree, the lower leg cannot reach an angle sufficient to bring the knees into a position that allows the hips to reach their intended placement. This is the reason for the lifted heel of weightlifting shoes—elevation of the heel effectively increases the ankles' range of motion.

Femur length will affect the depth of each athlete's squat simply by dictating how far away from the knees the hips will be. Athletes with great ankle flexibility and long femurs will typically be capable of extraordinarily deep squat positions, while their shorter-femured counterparts will appear higher even when at their maximal depth. For some athletes, femur length will exceed what can be compensated for through ankle flexibility in the basic squat position, and adjustments will need to be made to allow a better bottom position.

For individuals with largely muscled legs and who are capable of very upright torso positions in the bottom of the squat, the hips may not be particularly low relative to the knees even when the knees are closed completely.


Athletes with shorter upper legs (left) will not be able to sit as low as athletes with longer upper legs and good flexibility (right).

The Basic Squat Position

As the base from which all movement and positioning originates, the placement of the feet will dramatically influence the squat. The width of the stance and degree of external rotation will affect the movement and position of the hips and back, and will often be the deciding factor in whether a squat is successful or failed, mechanically sound or injurious. Individual variation notwithstanding, the feet must be positioned in a manner that allows and encourages proper biomechanics of the legs, hips and back, while allowing the greatest possible range of motion and supporting the unique positional and movement characteristics of the Olympic lifts.

Anthropometrics—in particular relative leg segment lengths—and hip anatomy will dictate appropriate width and rotation of the feet. Flexibility limitations and similar impediments may prevent an athlete from immediately achieving this ultimately proper positioning, but again, these are temporary obstacles that should be corrected.

The starting foot placement will be slightly outside hip-width at the heels with the toes turned out comfortably—generally between approximately 20-35 degrees from center. With the athlete sitting at the bottom of the squat in this basic position, adjustments can be quickly made according to leg segment and trunk lengths, hip anatomy, and ankle and knee alignment to place him or her in the proper position.

From here, there are two basic criteria with which we're concerned: When viewed from directly above, the foot and thigh are approximately parallel with each other; when viewed from the front of the toe, the foot is approximately underneath the knee. The hips should sit in between the heels somewhat; in other words, the heel will not be directly under the thigh, but slightly outside of its centerline. This positioning will keep the knees and ankles aligned well, but will also allow for slightly improved depth, and, more importantly, a more absorptive bottom position—that is, the final position will be structurally sound without having an abrupt and jarring stop.

With these relationships established—assuming the hips are at full possible depth—the remaining positional relationships will be unavoidably correct. This allows for a wide range of potential external rotation—athletes will in general naturally find what is most comfortable for them. That said, some athletes will need to be told explicitly to spread the knees farther than they wish; occasionally athletes will prefer a stance that prevents the hips from reaching adequate depth between the thighs due to the structures of the upper thighs being pushed into the forward edges of the pelvis. If the athlete is unable to achieve adequate depth and back extension, particularly if he or she is also feeling pressure near the front of the hips, a more externally rotated stance is more than likely needed.

The thigh and foot should be approximately parallel with each other when viewed from directly above. The knee should be approximately straight above the toes when viewed from the front of the foot.

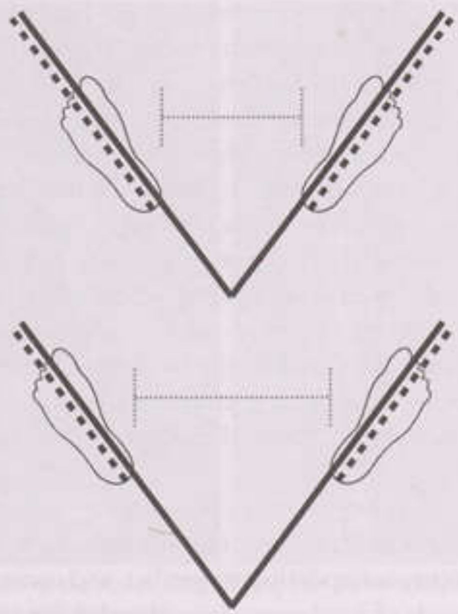
What this positioning achieves is simple but important—biomechanically sound alignment of the involved joints and muscles, optimizing performance and reducing the risk of injury.

These relationships of the feet and leg segments should be maintained for the duration of the movement—in other words, the knees should follow the line described by the angle of the feet as the athlete descends and recovers. For many athletes, this will, at least initially, require they consciously make an effort to push the knees out to the sides as the tendency will be for the knees to collapse inward.

From this basic position, there will be a degree of adjustment possible without considerable violation of these relationships. That is, once in this starting position, the athlete will find he or she can move the feet in and out and turn the toes in and out slightly and continue to meet the criteria fairly well. This small range will allow some latitude for personal preference, and the lifter is encouraged to experiment within this range until the most comfortable position is found. Typically athletes will feel more comfortable with the feet slightly wider.

The effect of hip width on foot placement should be self-explanatory—this is the origin of the legs and consequently the starting point for the stance. Relative leg segment length affects how far back the foot travels relative to the thigh as the knee flexes. The longer the lower leg is relative to the upper leg, the farther toward the hip the foot will be when the knee is closed—this means that the longer the lower leg is relative to the upper leg, the closer the feet will be in a sound squat position. In other words, the overall length of the legs is not enough to determine squat stance—how that length is created is what matters.

The foot position should be identical for all squat variations—back squat, front squat, overhead squat—and all receiving positions except the split in the jerk—snatch, clean, power snatch, power clean, power jerk, squat jerk. Many athletes will assume different foot positions for each type of squat—this is an indicator that the athlete has not learned and developed a correct squat position, and is likely in need of improved flexibility.



The width of the feet in the correct squat stance is not a product of total leg length or total height, but of relative leg segment length (along with hip width). This diagram represents two athletes with identical upper leg and foot lengths, but different lower leg lengths. If hip anatomy and external rotation are the same, the athlete with the longer lower leg (and therefore longer total leg length, and likely even greater total height) actually has a narrower foot placement. Athletes and coaches cannot simply assume that taller athletes will need wider stances than shorter athletes—each athlete's foot placement needs to be determined individually.

Modification

Modifications to the basic squat position may be necessary or desirable in certain cases. Most commonly, the position is modified inappropriately due to flexibility restrictions, and consequently increases the risk of injury and limits the lifter's progress in the lifts.

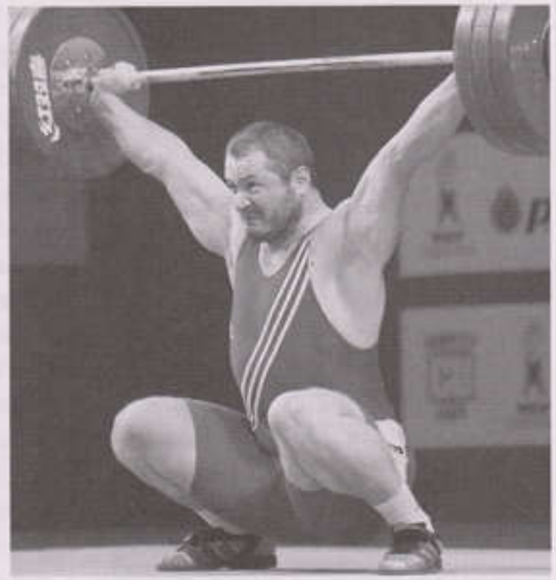
Occasionally athletes will find their ankle and knee joints are not in perfect alignment with each other when standing upright—in these cases, the angle of the feet should be adjusted accordingly, giving priority to the maintenance of proper knee mechanics. In other words, the proper alignment of the lower leg with the upper leg takes precedence over the alignment of the foot with the upper leg. This kind of misalignment is invariably minor and should have little if any effect on the squat.

Long-legged lifters may find it simply impossible to meet perfectly the alignment criteria while achieving a full-depth squat with correct spinal curvature. In these cases, the foot placement may be widened and externally rotated slightly more. This will allow the hips to remain closer to the feet as they travel down and in their bottom position, which will reduce the demand on hip extensor flexibility for the maintenance of spinal curvature. Such adjustments should be made incrementally and tested with caution—hip and spine position improvements should not force compromise of knee alignment to a degree that considerably increases injury risk. Note that this will still require an improvement of hip and ankle flexibility.

Defying the Basics

There are successful weightlifters who defy—sometimes dramatically—these positional relationships. In some cases, this defiance is simply the product of ignorance, unchallenged habit or improper instruction; in other cases, it's entirely intentional and serves to achieve specific objectives. The most common example of this is widening of the foot placement in order to allow the hips to drop farther in between the feet and achieve greater depth. This places enormous stress on the connective tissue of the knees by introducing torque on the joints not experienced in their natural alignment.

Arguments in favor of this kind of manipulation not solely focused on increasing depth will typically cite the use of the connective tissue's inelastic nature to help the lifter rebound out of the bottom of the squat. This is a legitimate phenomenon, but the very inelastic quality of the tissue that allows this is the same that leads to its ultimate failure. Repeatedly forcing inelastic material to stretch results in plastic deformation—that is, the ligaments involved will gradually become looser and never return to their original shape and length. Not only does this eliminate the very rebound effect being sought, but it creates essentially irreversible laxity in the joints that predisposes them to serious injury.



An excessively wide stance and forward toe position and the resulting torque on the knees. *(Photo - Rob Macklem)*

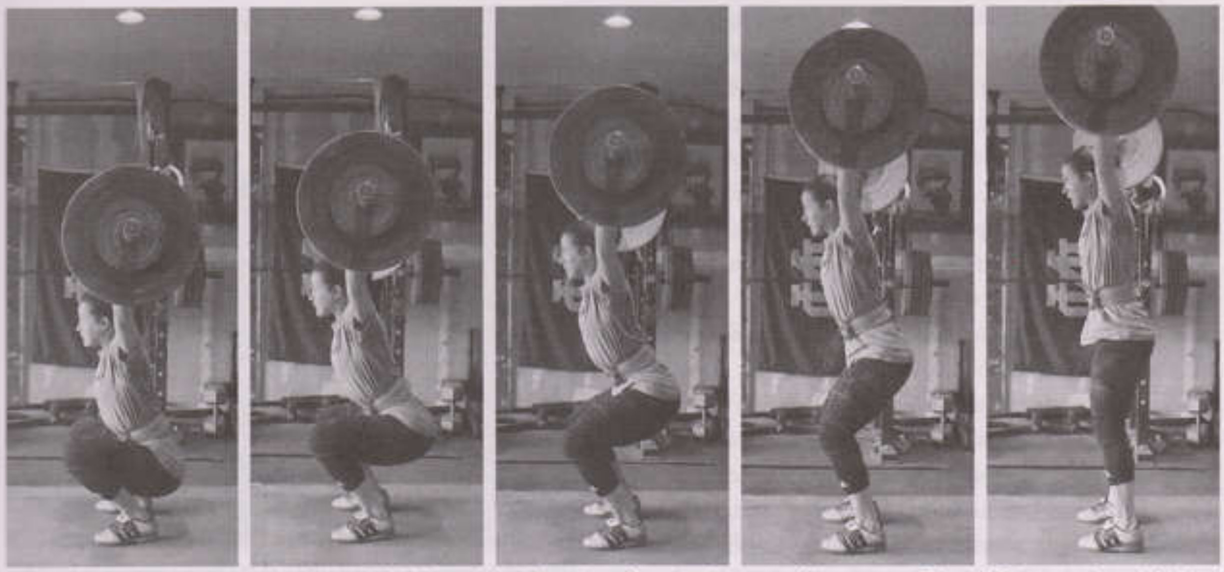
Whether this positioning will result in no apparent problems, chronic pain, or a career-ending injury is impossible to predict, and consequently these kinds of fundamental positional violations are strongly discouraged for anyone but the highest caliber athletes, who have not only proven to be extremely well-suited for the sport and able to withstand a great deal of abuse, but whose careers depend on making lifts, and for whom the risk is consequently worth the potential benefit.

That said, it should be noted that athletes will occasionally find themselves in such positions unintentionally during particularly heavy lifts. This is infrequent enough to not be a concern if the athlete is possessed of appropriate flexibility.

The Hips

The positional priority of the Olympic squat is maintaining essentially as upright a torso as possible (As will be discussed later, in the overhead squat, the torso should not be completely vertical because of the demands of correct shoulder positioning). In the clean, the barbell is supported directly by the torso on the shoulders, and for this to be possible, the torso must be erect. In the snatch, the barbell is supported overhead with locked elbows. This position is strong and stable within only a very small range of torso positions—excessive

The clean and snatch demand that the torso remain upright.



The hips will have to move backward slightly as the lifter rises from the bottom of the squat. This shifting can be minimized by focusing on maintaining an upright posture and moving the knees and hips simultaneously.

forward lean of the torso not only makes unreasonable demands on shoulder flexibility, but undermines the structural integrity of the system.

This requirement of an erect torso position dictates all remaining body positions. In order to maintain an upright torso, the hips must remain as near to under the shoulders as possible. Because the athlete must of course remain balanced over his or her base, this in turn requires the knees travel forward to allow the hips to travel in over the feet.

The nature of this knees-forward position is that the hamstrings' ability to contribute as hip extensors to the squat movement is somewhat reduced. This is clearly evidenced by the muscular development of advanced weightlifters—greater quad and glute development relative to hamstring development. (Note that this does *not* mean that the hamstrings are neither active nor necessary for weightlifting—they are important and active, particularly in the pulling phases of the lifts.)

For athletes accustomed to more traditional squat mechanics, this quad-dominant movement will feel weak and unnatural. While rising from the squat, these lifters will have a tendency to elevate the hips prematurely in order to give the quads better leverage on the knee and to engage the hamstrings more, which, initially, will allow a stronger movement for them. This hip elevation, however, will result in a problematic forward inclination of the torso. Aside from creating difficulty in supporting the barbell, this habit will limit the development of the quads and consequently become self-preserving. Eventually the athlete will reach a point at which he or she is handling loads that are literally impossible to support with such a posture and progress will cease completely. This can be avoided by forcing correct positioning and movement from the outset despite any temporary reductions in loading that may occur as a consequence.

When squatting, the hips must unavoidably travel in a slight arc backward, which will momentarily incline the torso farther forward. This movement of the hips and torso will be minimal and not problematic as long as the athlete focuses on standing straight up by moving the hips and knees simultaneously rather than leading with one or the other.

The Back

The spine in its neutral position curves through lordosis in the lumbar region and kyphosis in the thoracic region. Because of their accordingly angled surfaces, it is in this position that pressure is evenly distributed over the vertebrae and intervertebral disks and the back is structurally soundest when the body is standing vertically under a compressive load. However, in the squat, as in the pull from the floor, the athlete is dealing only partly with compressive forces—torque on the spine and hip must also be considered.

The first priority in the squat is the maintenance of the lumbar spine's lordotic arch. The joints of the lumbar vertebra and the joint of the fifth lumbar vertebra with the sacrum are the most susceptible to injury, and consequently warrant the greatest attention. This is due in large part simply to the fact that these joints are farthest from the application of force with a load on the shoulders or overhead and are therefore the natural fulcrums of the torque.

Neutral spinal curvature (left); complete extension (right)

Contributing to this unavoidable structural characteristic are the correctable factors of thoracic spine immobility and hip extensor and flexor inflexibility and the resulting hypermobility of the lumbar spine. It's extremely common for the natural kyphotic curvature of the upper spine to be exaggerated through years of poor postural habits and musculature weakness and inactivation, and for the mobility of the thoracic vertebrae to be reduced significantly over time from the lack of position change. The lumbar spine must compensate for the inability of the thoracic spine and hips to move properly, and in doing so, must move through a range of motion greater than intended, creating laxity in the connective tissue and allowing continued exacerbation of both the source and symptoms of the problem.

While hyperextension is of course potentially injurious, the potential is essentially limited to instances of compressive force. While the erect posture of the front and overhead squats allows opportunity for such compression, the more common force acting on the spine and hip is forward torque, and consequently the greater concern in regard to the safety of the lumbar spine is flexion under load. This places immense strain on the posterior connective tissue and undue pressure on the anterior aspects of the vertebrae and disks. Because the torso will be inclined forward to a small degree—the consequent line of force along with the tension of the hip extensors will encourage flexion of the spine and make hyperextension more difficult within the confinements of correct body and bar positioning. Further, the hip extensors and adductors pull the pelvis when under tension (such as in the bottom of a squat) in the direction of posterior rotation, which causes lumbar flexion.

Because of this, we want to actually exaggerate the lumbar spine's lordotic arch. This slight exaggeration acts as a hedge against flexion during the movement in a few ways: By increasing the degree of curvature, we reduce the length of the moment arm and therefore improve the ability to resist the applied force; greater extension improves the leverage of the spinal extensors and consequently their ability to maintain extension; and a greater degree of curvature means a larger margin of error—it will take more unintended movement to bring the spine into a compromised position.

This exaggeration of the lumbar curve should obviously be most pronounced at the point of greatest forward torso inclination and reduced as the torso nears vertical to reflect the changing torque and compression on the joints—in other words, the exaggeration should be greatest at the point at which the tendency for spinal flexion is greatest, and curvature should reach nearer to neutral as the spine nears a fully erect position with greater compressive forces.

In the back and overhead squats, the torso will never reach a perfectly vertical orientation even when the athlete is standing fully because the placement of the bar dictates slight forward inclination in order to maintain balance over the base—the lumbar spine will therefore never quite return to completely neutral, although it will be close. In the front squat, the torso can reach vertical in the standing position because of the placement of the bar in front of the hips. Neutral lumbar curvature can be achieved, and vigilance to maintain it will remain necessary, as there is now a possibility of hyperextension.

While simple in theory, this spinal curvature is often difficult to achieve and maintain in practice due to flexibility limitations. Inflexible hip extensors and adductors will prevent the pelvis from rotating anteriorly to maintain its positional relationship with the spine as the hip is flexed to move into the bottom of the squat. This inability of the pelvis to rotate adequately results in the lumbar spine taking up the slack in the system, at best limiting the maintenance of the lordotic exaggeration and at worst resulting in considerable lumbar flexion.

A very slight degree of flexion is acceptable in the earliest stages of training—at this point, the loads being handled by the athlete will rarely be great enough to create significant injury risk. In reality, it's rare for athletes to possess entirely adequate flexibility initially, so this is somewhat beyond control anyway. This must, however, be corrected as soon as possible, and certainly before the athlete is allowed to lift legitimately heavy weights. Flexibility training is discussed in detail in a later section of the book. More advanced athletes will typically experience a slight reduction in lumbar spine extension at the bottommost position of the squat; this is not problematic if the resulting degree of extension is still equal to or greater than neutral.

The thoracic spine curvature will need to be manipulated as well. Its natural kyphosis reduces the structural integrity of the system when resisting forward torque, as in the clean, or overhead, as in the snatch. The forward curvature places the load farther forward in relation to the base of the spine, increasing the moment on the joints and consequently the tendency for the spine to flex and the torso to drop forward. This can be effectively countered in the same manner lumbar flexion is prevented. In the case of the lumbar spine, the existing curve is simply exaggerated; in the case of the thoracic spine, the curve needs to be reduced as much as possible. Except in rare cases of hypermobility, the thoracic spine will not actually be extended—it will simply be closer to straight. This flattening of the thoracic spine effectively creates a single arch through the entire spine, or what will be referred to throughout the book as complete extension.

By creating this combined arch, the lever arm of the back is shortened slightly, reducing the mechanical disadvantage of the muscles extending it and the hip, the leverage of those muscles is improved, and consequently the strength and stability of the system is increased. This of course improves performance and further protects the spine from flexion injuries. As with the lumbar curve, this thoracic positioning should be adjusted according to the inclination of the torso—most pronounced at the point of greatest forward inclination, and returning closer to neutral as the torso nears vertical.

Weight Distribution

Throughout the squat, the lifter's weight should be distributed fairly evenly across the feet with a slight preference for the heels. Inadequate flexibility of the hips and ankles will commonly force the heels to rise and the weight to shift to the balls of the feet as the lifter descends. This imbalance becomes particularly problematic when attempting to stabilize a system that includes a barbell weighing sometimes dramatically more than the athlete. In the bottom position of a proper squat, the weight may shift slightly farther forward over the feet, but this can and should be reversed as quickly as possible as the lifter stands.

If the root of the problem is inadequate flexibility, a stretching prescription will be necessary. Otherwise, practice and coaching cues for the lifter to remain flatfooted and drive through the heels, as well as to avoid leading with the hips, should be sufficient.

Occasionally the outside edges of the athlete's feet will rise at the bottom of the squat. This is typically the result of inadequate ankle flexibility and the body's attempt to continue moving the knees into the necessary position after maximal ankle flexion has occurred. Ankle flexibility work is a must, and continued cues to the athlete to push out against the floor with the feet will help.

This may also be the result of an excessively wide foot placement. If the feet are positioned such that the knees must track inside them, the feet may be pulled along with them. This improper foot positioning may be due to nothing more than ignorance, but it can also be an unconscious attempt to compensate for inadequate ankle flexibility. This can be easily tested by placing the athlete into the correct position and observing the result.

The Head

The head should remain upright and the face directed forward throughout the movement of the squat. Commonly lifters will tilt the head back, occasionally to an extreme degree, and redirect their focus upward to help drive through the sticking point of a squat. While some degree of neck extension does generally help total back extension, any extension should not be allowed to become extreme to avoid straining the neck.

The eyes should remain directed approximately straight ahead with the eyes focused on a fixed point. It's important the focal point be distant enough from the lifter to not noticeably change its relative position and cause the lifter's head or eyes to move significantly during the squat. Lowering the head or even merely the gaze will commonly cause the lifter to drop the chest during the ascent, because of the tendency for the body to follow the eyes and head, potentially resulting in a failed lift.

The Bounce

In many squatting circumstances, particularly during the recovery of the clean, lifters will "bounce" out of the bottom of the squat. This both potentiates the concentric contraction of the muscles and increases the speed of the recovery, allowing the athlete to pass more quickly and easily through the sticking point of the squat at which mechanical disadvantage is greatest, which in turn reduces the fatigue of the legs (and may even allow the recovery to be successful) and leaves them fresher for the subsequent jerk.

The bounce is actually the summation of three distinct but interrelated elements: the muscles' stretch reflex, the collision of the upper and lower legs, and the whip of the bar.

When stretched to a great enough degree at a great enough rate, muscles will respond with an immediate and powerful involuntary contraction. This stretch reflex—or myotatic reflex—is the same phenomenon at play in plyometric training. By performing the squat with adequate speed and tension, this reflex can be harnessed to increase the total force production of the concentric movement and generate greater momentum during the recovery of the squat to carry the lifter through the most difficult point.

This movement can be easily misinterpreted as relaxing under the bar, and is occasionally practiced as such by athletes who have learned it solely through observation and possess no understanding of its principles. This is a critical mistake for two reasons. First, anything even resembling relaxation under heavy loads is an opportunity for injury. Second, the act of relaxing actually reduces the stimulus for the stretch reflex. The action that initiates the reflex is the rapid stretching of the muscle—if that muscle is relaxed, an adequate stretch isn't possible, and consequently, no reflex occurs. A collapse in the bottom position of the squat essentially means the reduction of tension on the hip extensors through the posterior rotation of the pelvis and flexion of the spine. The quads will not experience as great a reduction in tension simply because the knee is in its fully flexed position and the load of the barbell and the body reinforce this.

However, the stretch reflex in the quads will be of no value if the athlete is relaxed, because the initial force out of the bottom of the squat will be absorbed by flexion of the hip and spine.

This is a blow to performance and safety that can't be afforded when handling significant loads. The athlete must remain tight and structurally sound throughout the movement, bracing for the abrupt arrest of downward movement and the subsequent rapid change of direction. This being said, the athlete must also allow the weight to push his or her body into the bottom of the squat rapidly.

The second component of the bounce is simply the collision of the upper and lower legs with each other. This is no different than bouncing a ball—after colliding with the lower legs, the remainder of the lifter's body rebounds away from the feet. The larger the athlete's legs, the more pronounced this rebound effect will be.

Olympic barbells are very intentionally manufactured to exhibit remarkable elasticity. In other words, the bars are capable of flexing to great degrees without permanent deformity. This characteristic creates the opportunity for the final component of the bounce. If the lifter reaches the bottom of the squat with any reasonable speed, the plates on the barbell will have a considerable amount of downward momentum. The bar's flexibility in concert with the narrow area of support at its center leaves the weighted ends free to move somewhat independently, allowing the weights to continue traveling downward after the lifter's downward motion has ceased. This generates elastic energy in the bar, like loading a spring, and at the limits of the bar's elasticity, the weights will rebound back up. This whip of the bar reduces the downward force of the bar temporarily—an immediate transition out of the bottom of the squat will allow the lifter to take advantage of this temporarily reduced load and pass through the sticking point of the squat more easily. The degree of bar whip is of course related directly to the load on the bar, making this component of the bounce the most variable among lifters and lifts.

The bounce is of particular importance to athletes in possession of comparatively weak legs, who will be cleaning loads much nearer to their greatest squat efforts than their stronger-legged counterparts. Likewise, athletes whose jerks are weak in comparison to their cleans will need to conserve as much leg strength for the jerk as possible. Often a correct bounce will be the difference between success and failure for these lifters.

In cases of missed timing in which the lifter finds him- or herself stuck in the bottom position of the squat, the effects of the bounce can still be created to a lesser degree to assist in the recovery attempt. The athlete can initiate a small upward movement and drop again to create a small bounce, and repeat this cycle, in which each subsequent bounce will be incrementally greater, in an attempt to generate a final summative bounce great enough to power through the sticking point. While this can work, it will never be as effective as a correct single bounce.

Generally the bounce should be used to some degree in front squats to improve technique, timing and the neurological adaptations of the stretch reflex for the clean. The back squat more often should be performed with a more controlled speed through the bottom range of motion to ensure strength development in the lowest possible position, which is the weakest range of motion.

If the athlete is already squatting heavy loads but has not had experience with bouncing out of the bottom, bouncing should be introduced gradually to allow time for the connective tissue to adapt to the new stress.

A common mistake is diving from the top of a squat in the attempt to catch the bounce. So much distance at such a speed increases the downward force of the weight to a point that makes supporting it and changing its direction far more difficult. Athletes will find more success by controlling the downward speed until nearing approximately horizontal with the thighs, and then increasing the speed into the bottom while remaining tight. This will create the speed to the bottom necessary for the bounce, but keep the total downward force with the realm of control. Because cleans will be received at levels considerably lower than standing, this also more accurately represents the shorter distance of downward acceleration that will be experienced in the clean.

Breathing

Breath control during the squat is no different than what will be described in the next chapter for all structural lifting. Pressurization of the torso will improve the structural integrity of the spine during the movement, improving both performance and safety. The more rigid the spine remains during the squat, the more completely the force generated by the legs will be transferred to the bar. Movement of the back will absorb movement of the legs and hips and result in the need for the legs to work harder than necessary to move the barbell. This is particularly true when bouncing out of the bottom of the squat. This rigidity will also minimize extraneous movement and improve the stability and balance of the athlete.

Some athletes will only begin to draw in air as they initiate their descent. This can work if the breath is taken in quickly enough, but it can prevent the best possible pressurization of the torso, and can also shift the athlete's balance enough to be problematic with heavier lifts. More effective, and certainly more predictable, is drawing in air and settling into the pressurization before any movement begins. This ensures ideal pressurization and adds only a couple seconds at most to each rep's execution time—nothing too unreasonable considering the benefits.

Often under heavy squats—particularly front squats—athletes will find it difficult to take in as much air as they'd like. In these cases, an initial breath can be taken and held, and then the bar popped up slightly by the legs in order to momentarily lighten the load, during which time a final top-off of air can be taken in before beginning the descent into the squat.

The maintenance of this torso pressurization is most critical through the transition at the bottom of the squat during which the forces threatening the body's structure are the most intense. The breath as a whole should be maintained throughout the lift; however, some of the air can be released by making some noise during the recovery if the athlete finds it helpful. Such a release will also help prevent dizziness without significantly reducing the integrity of the trunk.

Learning & Teaching the Squat

With the previous information in hand, learning and teaching the squat is fairly simple. That said, it can for certain athletes be difficult, primarily due to limitations of flexibility, and occasionally due to limitations in an individual's body awareness and muscle recruitment abilities. These situations will require additional steps, but are all completely resolvable with a little patience and creativity. The importance of a well-developed squat, no matter how difficult attaining it may prove to be, cannot be overstated.

Foot Placement

Our first step is to find the correct foot position—because this will be our base, there is no use in considering other positions until the placement of the feet is sound. The athlete will simply place the heels just outside the width of the hips and turn the toes out comfortably, approximately 20-35 degrees from the midline.

With this stance established, he or she will squat down

Learning the Squat

Place the feet slightly outside hip-width and turned out comfortably.

Sit the hips down and relax in the bottom position, adjusting the foot position until the thighs are parallel with the feet.

Stand, arch the entire back, and squat slowly to maximal depth with the back remaining arched and the torso upright.

Keep the feet flat and the weight balanced with a slight preference for the heels.

and relax as much as possible in the bottommost position—literally attempt to sit on the heels with no concern for posture. From this bottom position, the athlete will adjust the feet and thighs until they achieve the relationship discussed previously, again with each turned out approximately 20-35 degrees from the midline. The width of the feet will likely need to be adjusted slightly as well to ensure the thigh is approximately parallel with the foot and the knee is approximately above the toe when viewed from the front of the foot. The degree of external hip rotation can be experimented with as well until a comfortable position is established. Once this position has been established, the athlete will return to standing without moving the feet.

Relaxed in bottom to find foot position

In this standing position, the athlete should view the feet and attempt to commit the stance to memory for quicker future positioning. For practice, the foot position can be first changed, and then the above process repeated until the athlete can find his or her correct stance reasonably well in the standing position.

Back & Posture

With the stance now established, we need to place the athlete into the bottom of the squat with the proper hip and spine positions. This is where flexibility limitations and muscle recruitment problems will become most evident.

For the sake of not complicating things unnecessarily, the athlete should first be simply instructed to set the back in complete extension and lower him- or herself into the bottom position of the squat while maintaining that extension. He or she will not be able to reach the same depth possible with the back relaxed, but it will be similar. The weight should be balanced across the foot with a slight preference for the heel.

If the athlete is unable to reach the bottom of the squat with the back set properly in extension, there are a number of possible problems. Most common is inadequate flexibility, an inability to activate the spinal extensors sufficiently, or a combination of these (this is assuming, of course, that the foot placement is already correct).

Inadequately flexible hip extensors and adductors will rotate the pelvis posteriorly as the athlete squats, preventing the maintenance of lumbar extension. No amount of spinal erector activation will be great enough to completely counteract the pull of these muscles. If the hip musculature is tight, it can also prevent proper femur movement and prohibit proper positioning.

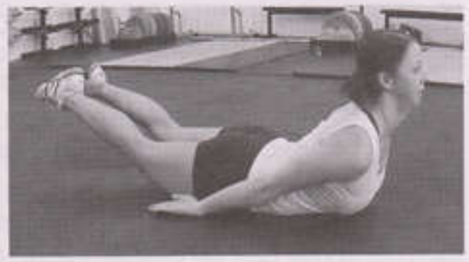
Limited ankle flexibility will also prevent an athlete from achieving the proper bottom position. This will usually be obvious from the shins being nearly vertical rather than inclined forward. Increasing flexibility is the only option in these cases (See the Flexibility section of the book).

Occasionally an athlete will be possessed of obviously adequate flexibility, but unable to establish the proper bottom position as would be expected. In these cases, the problem most often lies in that athlete's inability to activate the spinal extensors in order to counteract the strong posterior pulling action of the hip extensors. This can be a difficult problem to fix and will typically require a good deal of patience from both the coach and athlete.

To combat the inability of the athlete to maintain the proper alignment of the spine and pelvis in the squat—assuming the problem isn't inflexibility—we can attempt to improve the activation of the spinal extensors (This activation will actually counteract some degree of limited flexibility).

Spinal Erector Activation

There are numerous possible ways in which to teach an athlete to activate or better activate the spinal erectors, and which way is chosen may be more a factor of space and equipment than superiority of one over another. In essence our goal is to place the athlete into a position in which he or she is able to powerfully extend the back without necessarily knowing how to do so with only verbal cues—in other words, we need to force the body to do it whether or not the mind understands.


Superman drill

Superman The athlete will lie prone on the floor (face down) with his or her arms at her sides. From here, he or she will lift the chest and legs as high as possible (It may work better for some athletes to lift the chest first and the legs immediately after instead of simultaneously). It may help here to attempt to push the stomach into the floor to further encourage lumbar extension. The athlete will feel the contraction of the spinal erectors from the upper to lower back. This position should be held for a few seconds before the athlete relaxes. To further focus on the lumbar region, this drill can be modified by lifting the legs only and actually rounding the upper back forward. After this, a return to the full version will help integrate the lumbar extension into complete spinal extension.

If the athlete is having trouble, he or she can bring the arms forward and think of lifting them rather than the chest. Even more helpful will be placing the hands behind the head. Once these modifications have helped the athlete achieve the correct position, they should be removed and the original position attempted again. In this manner, we can gradually reduce the movement to the core action in which we're interested—isolated voluntary contraction of the spinal extensors.

Hand contact by the coach on the athlete's erectors during this drill can sometimes further encourage activation and help the athlete feel exactly what they're attempting to contract. Pressure with a finger or two on either side of the spine, particularly in the lumbar region, should be adequate.



Seated pelvic rock

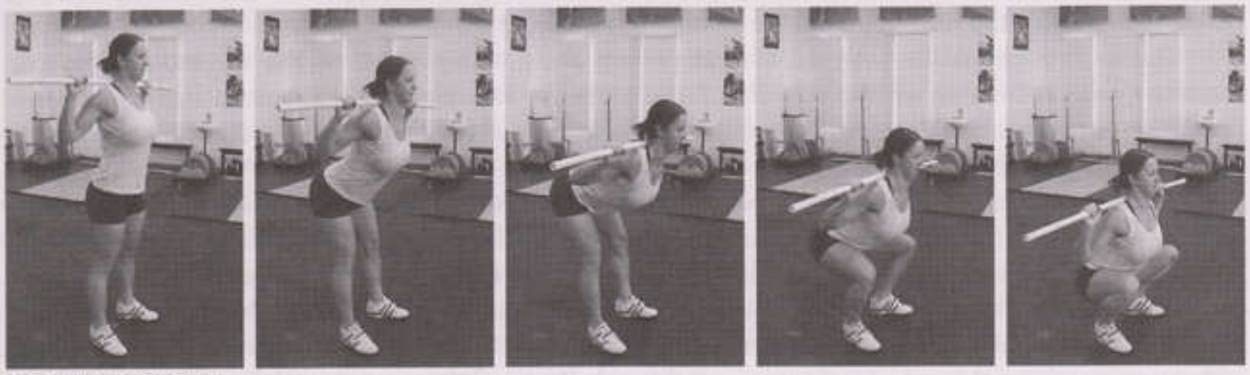
Seated Pelvic Rock This is a simple drill that may be used alone, or can be performed after the superman drill as a bridge to the squat. The athlete will sit erect on a bench, box or similar, with the feet flat on the floor and the thighs approximately horizontal and rotated out to a degree similar to the squat. The athlete will then attempt to rock the hips forward—that is, tilt the belly down and the butt up as if creating a shelf. The same sensation of lumbar erector contraction should be felt. Once this is done properly, the athlete can stand from the box while maintaining the lumbar extension and attempt to return again to the seated position without losing extension.

Putting it All Together

Once these drills have helped the athlete feel the correct active posture, we can transition him or her to putting it to use in the squat. We can jump right into a squat while attempting to maintain the back arch, or we can add in an intermediate step if needed.

From a standing position with the feet in the squat stance, the athlete will set the back arch with erector activation, unlock the knees slightly, and slowly flex at the hip as far as possible without losing the arch in the back (i.e. to the limit of his or her flexibility in that position). Once to this position, the athlete will slowly begin bending the knees, maintaining the closed angle of the hip, and lower into the bottom of a squat, again fighting to maintain the lower back arch.

This more gradual and step-wise entry into the squat will typically help individuals who are still unable to perfect the position when squatting normally. With practice, that squat will improve.



Good Morning Squat

The Back Squat

The most basic weighted squat variation is the back squat, which is a staple for all strength training, including Olympic weightlifting. Only a few details need to be addressed with regard to its performance as all the previous information on the squat in this chapter applies.

First is the placement of the barbell on the back. For most athletes, the correct positioning of the bar will be very natural. In cases in which this is not true, we can provide some simple instruction to ensure correct bar placement.

Correct placement of the barbell for the back squat

The athlete will first retract the shoulder blades completely and elevate them slightly. This will create somewhat of a muscular shelf with the traps and shoulder blades on which the bar can sit very securely. The bar will sit between the top of the traps and the top of the shoulders and be in contact with muscle—it should not be in contact with the bony protrusions of the cervical or thoracic spine.

The athlete should grip the bar with the hands fairly close to the shoulders—a width that will place the forearms approximately vertical or just outside vertical when viewed from the front or back of the athlete. This close hand placement will help reinforce the retraction of the shoulder blades and the extension of the upper back. The elbows should be kept under the bar or only slightly behind it. Allowing the elbows to rotate too far behind the bar will encourage forward rounding of the upper back and forward leaning of the torso during the recovery from the bottom of the squat.

The thumbs should be wrapped around the bar along with the rest of the fingers, and the grip moderately tight. Because of the security of the barbell's placement on the back, a tight grip is not necessary to maintain its position; however, most lifters find it helpful during the recovery of difficult squats to tighten their grips on the bar.

The squat is performed identically to the descriptions provided throughout this chapter. The athlete will draw in a correct bracing breath, control the speed of the descent, transition rapidly and aggressively, and drive through the recovery as quickly as possible (with the exception of intentionally slow squats).

Back squats will of course be taken out of squat racks. The athlete will position him- or herself under the bar with the correct bar placement in a partial squat. Once the bar is settled into position, the athlete will extend the legs and hips to lift the bar from the rack. With heavy squats, this lift from the racks should be aggressive to inspire confidence within the lifter—a slower, less aggressive lift from the rack will make the weight feel much heavier, and no athlete will feel confident squatting a weight that feels heavy right out of the rack. The athlete will take a couple small steps back away from the rack and set the squat position with the feet. A new breath should be taken for each rep in a set.

Following completion of the set, the athlete will step forward between the squat rack uprights and squat the bar down into the cradles in the same manner he or she lifted it initially. The athlete should not simply get close to the rack and lean forward to dump the bar into it. This practice is risky for a number of reasons, and is unnecessarily abusive of the equipment.

Spotting & Missing

There will be times when an athlete is unable to complete a back squat. As with all lifts used by the weightlifter, with the exception of the rare bench press, the athlete should be able to bail out of the lift safely without a need for spotters. This is done simply by leaning back to dump the bar backward and jumping forward out of the way. This is best done from the bottom of the squat because there will be no movement to contend with. Because most misses will occur above the bottom, the athlete can simply allow the weight to push him or her back down to the bottom (under control of course) and then dump the weight from there. In cases in which failure is due to forward leaning of the torso, this is even more important—this return to the bottom is an opportunity to bring the torso more upright and get the weight balanced across the feet again to allow a dump of the bar behind the lifter.

If desired, the back squat can be spotted. The hands can be placed either under or over the barbell.

Occasionally it will be desirable to spot an athlete during a back squat set in which a miss is possible. This can be done for two basic reasons—one, to save the athlete the trouble of having to bail out, strip the bar down, and lift it back up to the rack; and two, to force the athlete to complete the rep with as much of the weight as possible.

This spotting can be done by a single individual standing behind the lifter. In most cases of failed squats, the athlete will be incapable of completing the lift by only a fraction of the total weight—they will not suddenly cease to be capable of lifting anything at all. For this reason, a single spotter is usually able to provide enough assistance to unload that fraction of the weight momentarily to allow the athlete to drive through the sticking point and complete the lift.

Standing behind the lifter far enough to allow space for the hips as they travel back slightly during the squat, the spotter will simply keep his or her hands in close proximity to the bar as the athlete performs the squat. This can be done with the hands under or over the bar, either between or outside the athlete's hands depending on their width—when possible, inside the hands will place the spotter in a stronger position. In either case, it's important any assistance the spotter gives is directed upward and not either forward or backward, unless the bar is unintentionally moving in one of those directions (in many cases it will be drifting forward slightly because the athlete's chest is dropping).

If the athlete requires more assistance than the spotter can provide, it will be obvious, and the spotter should instruct the athlete to bail out. The athlete will dump the bar as normal, while the spotter helps guide it back and gets out of the way. It's important that the lifter and spotter communicate clearly before and during the lift so that both are working together in the case of a miss and know what the other intends to do.

The Low-Bar Back Squat

Outside of the Olympic weightlifting community, various coaches and athletes employ a back squat with a lower bar placement and more posterior chain emphasis than is seen in the traditional Olympic back squat, and some have argued that such a back squat is more appropriate for competitive weightlifters. This argument fails to be convincing for a number of reasons.

In this squat variation, the bottom position of the squat places the crease of the hips just below the top of the knee, the hips relatively far behind the heels, and the torso necessarily inclined forward considerably. The barbell is held just above the origins of the posterior deltoids to reduce the moment on the hip and spine.

The Olympic squat is defined by the extremely erect torso. This nearly vertical torso position requires the hips be close to the heels and the knees protrude considerably over the toes, and allows the hips to be lowered to the fullest depth anatomically possible with an upright torso.

As its name suggests, application for the Olympic squat is training specifically for the Olympic lifts. The argument that the low-bar back squat should replace the traditional high-bar Olympic back squat employed by weightlifters is predicated on two primary notions. First, that because this squat variation allows more weight to be handled, it will be superior in producing strength and consequently improve the lifter's performance of the snatch and clean & jerk; second, that because the positioning of this squat variation is very similar to the pulling position of the snatch and clean, its performance will improve the pulling strength of the athlete in these two lifts.

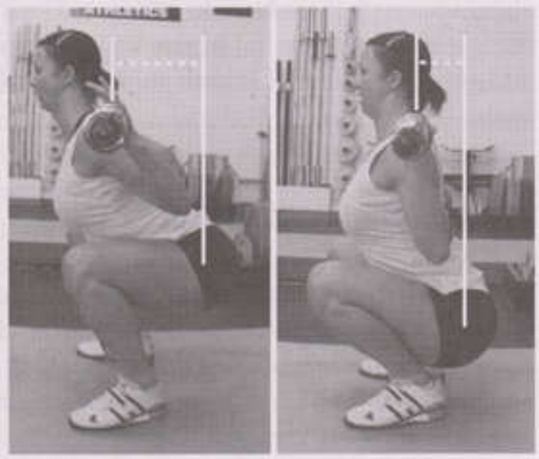

Low-Bar Back Squat

In addition to these points, it's occasionally added that the low-bar back squat is "easier on the lower back," and that because the squat is not actually contested in Olympic weightlifting, its sole purpose is as a strength exercise to improve the snatch and clean & jerk, and that weightlifters already use front squats to improve specific leg strength.

That the low-bar back squat will allow more weight to be lifted than a high-bar back squat is true, assuming the two are compared by an athlete with better posterior chain development (In other words, this is not necessarily true for a weightlifter who may have very well-developed quad strength and consequently be capable of squatting more with a high-bar position more reliant on the quads. For this athlete, it may take many months of training to bring the strength of the low-bar back squat to the level being discussed here.).

How similar the positioning of the low-bar back squat actually is to the pulling positions of the snatch and clean depends on the pulling styles of the lifter. To be generous, we'll assume the position is quite similar in terms of back angle and bar position relative to the torso, and that consequently the strength developed from this squat variation will certainly improve pulling strength for these two lifts.

There are a number of reasons these points are inadequately compelling. First, that the low-bar back squat is "easier on the lower back," than the high-bar squat is a statement requiring some qualification. By "easier" on the lower back, the implication is that less torque is placed on it. However, this is not at all correct. The common conclusion is that the closer the barbell is placed to the lower back, the less torque will be placed on the joints; but this is only true if the angle of the back doesn't change. The critical point is that the torso is at an entirely different angle in the Olympic squat and that basic comparison of direct distance between bar and joint is inadequate.



Moment on the hip and back with low-bar back squat (left) vs. back squat (right)

Torque is measured perpendicularly to the line of force. That force, in this case, is gravity, which acts perpendicularly to the ground. This means torque must be measured according to the horizontal distance between the load and the joint in question, irrespective of the angle of the body part connecting the two.

The upright posture of the Olympic squat results in an extremely short horizontal distance between the barbell and the hips and lower back. The low-bar back squat with its smaller torso angle relative to the ground, even with the placement of the bar farther down the back, creates a comparatively huge distance between the bar and the hips and lower back, resulting in far more lower back torque than the Olympic squat.

In response to this, it's stated that the greater distance between the hip and barbell in the high-bar back squat magnifies any disturbances in position and consequently makes stabilization more difficult. Again, this is true only when the moment on the lower back is similar to that of the low-bar back squat—that is, the horizontal distance between the bar and lower back is the same. Disturbances of that magnitude simply don't happen with athletes familiar with the Olympic squat and strong in its positions. Essentially, this argument assumes an inability by the athlete to perform the movement correctly, or a comparison not between the low-bar back squat and Olympic back squat, but between the low-bar back squat and that same squat position with a higher bar placement.

This should not be misinterpreted to mean we're interested in saving the lower back from work—there is no reason the back should be spared of heavy training. The point is simply that this rationale for the low-bar back squat is without basis.

The contention that the low-bar back squat is more beneficial for weightlifters than the high-bar back squat for reasons of strength development is comprised of four aspects: first, that the squat is not a contested lift in weightlifting and therefore there is no need for it to conform to any technique for reasons other than strength development; two, that weightlifters already use the front squat to improve strength for the clean; three, that because the positioning of the low-bar back squat so well resembles the pulling position of the snatch and clean that it will also develop posterior chain strength applicable to the pulls of these lifts, and this is necessary because weightlifters or their coaches refuse to use deadlifts; and finally, that because the low-bar back squat will allow greater loading than the high-bar back squat, it will develop more strength for the weightlifter.

Obviously the squat is indeed a training exercise and not a contested lift, and consequently it should be performed in whatever manner produces the best possible gains for the weightlifter in terms of improving snatch and clean & jerk performance. Let's consider the purposes of the front squat and back squat for the weightlifter. First, the recovery from the clean demands the most leg strength of any portion of any of the lifts, and that being the case, we can say that the development of greater leg strength will be most evident in the performance of the clean, although it will of course play an enormous role in all aspects of the classic lifts. The jerk, for example, relies overwhelmingly on quad strength because of the position of the dip and drive—increased posterior chain strength will have little if any effect on the jerk, while increased quad strength and the ability to maintain erect torso positioning under heavy loads will improve the jerk dramatically.

The front squat and back squat are very similar in position. This allows somewhat greater loading in the back squat with a high degree of strength transferability.

Quad strength plays a surprisingly great role even in the pulls of the snatch and clean, although far more focus tends to be placed on the muscles of the posterior chain in terms of developing pulling strength. While posterior chain strength is of course imperative, it's quad strength that allows an athlete to pull with the desired upright posture; inadequate quad strength relative to posterior chain strength will result in an athlete inadvertently leading with the hips in the pull and squat, creating an unwanted shift in position that will be discussed in much greater detail later within the context of pulling.

The front squat demands great leg strength, but also has a considerable core stabilization component due to the placement of the bar in front of the spine and the resultant torque. Forward collapse of the spine is arguably responsible for failed front squats as much as, if not more than, inadequate leg drive. That said, the front squat may be considered a core exercise as well as a leg exercise.

The Olympic back squat, however, positions the bar behind and in immediate proximity to the spine, greatly reducing the tendency for it to round forward. This is done with very little change in the position of the body, including the angle of the torso. This means the work the legs must perform in the Olympic back squat is very similar to the front squat—the difference is the greater security and comfort of the bar position and a considerable reduction in the core stability element. This allows the lifter to squat greater loads than with the front squat while in nearly the same position and consequently elicit greater leg strength gains. While the surplus of weight is not immense, the transferability of the strength development is extremely high—in other words, in terms of applicable leg strength, the Olympic back squat delivers the most.

With the right conditions—i.e. the posterior chain strength described previously—it's likely an athlete would be able to squat more with a low-bar conventional back squat than with a high-bar Olympic back squat. This greater loading, it's argued, makes the low-bar back squat more valuable for the weightlifter both in terms of direct muscle development as well as hormonal response.

All other things being equal, greater loading will obviously produce better strength gains. But all other things are not equal, and this is a critical point. The extremely upright torso and knees-forward position of the clean limits the ability of the hamstrings in particular to contribute to the movement, shifting more of the work to the quads, glutes and adductors.

Strength is not some magical quality that pervades all parts of the body equally—to a great degree, it is specific to positions and movement patterns. Granted, lifts like the squat and deadlift create a hormonal response that will in fact indirectly increase strength systemically—but not nearly to the degree direct training can.

The low-bar back squat allows greater loading quite simply by allowing more of the body to participate in the effort—the difference is greater hamstring involvement relative to the Olympic squat. In other words, the improved loading is achieved by involving a muscle group that cannot be equally involved in the primary movement we're trying to strengthen—the clean—and to a lesser extent, the jerk. This also means that at a given load, this increased participation of the hamstrings will reduce the work demanded of the quads relative to the front squat or clean, and consequently reduce their strength development. The loading of the low-bar back squat, then, would need to be dramatically greater than the high-bar Olympic back squat or front squat to produce better strength gains in the quads, the primary muscles at work in the clean and front squat. Whether or not such a dramatic difference is achievable is questionable, and very unlikely without a period of dedicated training with this squat variation. Further, quad strength is developed through a limited range of motion. Because the low-bar back squat stops when the crease of the hip drops below the knee, the knees never fully close, and the quads never have to work through their end range of motion, which is unavoidably used during the clean and snatch. This training of the knee's full range of motion is necessary both for performance reasons, as well as for the interest of joint stability and safety.

Finally, the observation that the position of the low-bar back squat is similar to the pulling positions of the snatch and clean is alone inadequately compelling for its use by weightlifters. There is no argument that a low-bar back squat would not allow strength improvement for the pulls of the snatch and clean primarily through strengthening of the posterior chain. The back squat performed in any manner will improve the pulling strength of a lifter because it does involve the posterior chain more than the front squat, particularly through the middle of the movement when forward torso inclination is at its greatest, which is the moment at which the squat most resembles the position of the snatch or clean pull. There is no need to exaggerate this emphasis by changing the squat dramatically.

Snatch and clean deadlifts, snatch and clean pulls, and snatches and cleans are also pulling strength developers. More importantly, deadlifts and pulls are far more applicable since they not only involve the positional loading, but also the increased difficulty of initiating the movement from a dead-stop, the crucial activity of the arms and the navigation of the bar up the legs, and, with pulls, the all-important component of speed. There is no sense in eliminating these elements if doing so will not somehow provide benefits elsewhere. To say that weightlifters need to employ the low-bar back squat because they don't employ the deadlift makes little sense—if we're going to encourage a change, it's far more logical and reasonable to encourage the use of deadlifts rather than dramatically change the style of squat. Further, many weightlifters do in fact perform deadlifts and pulls.

Direct posterior chain strength work can be performed with numerous exercises such as good mornings and stiff-legged deadlifts, which will provide strength gains without potentially interfering with movement mechanics for the squat and pull.

BREATHING

Breath control is critical for increasing and maintaining the structural integrity of the torso while under heavy loads. The supporting musculature is alone inadequate—in order to adequately stabilize the spine, the abdominal and thoracic cavities must be pressurized. Additionally, we need to create as broad of a base for the torso as possible—the rationale for this should be obvious if one considers the structural integrity of a pyramid versus an upside-down pyramid. Drawing in the abs may look nice on the beach, but it will dramatically diminish the ability of the body to support the kind of forces we intend to introduce.

> ### Breath Control
>
> Expand the abdomen to take in a full breath.
>
> Lock in the breath and tighten the abs without drawing them in.
>
> Release a small amount of air with noise during the most difficult moments of a heavy lifting effort if helpful.
>
> If dizziness occurs, stop the lift and recover safely.

The torso has only a single supporting structure along its height—the spine—on one side, and this structure articulates in all directions, requiring additional support to maintain rigidity. The weak point is the circumference below the ribcage in which there is no rigid structure tying the torso into the pelvis—this creates a compressible area into which the torso can collapse forward and to the sides.

This area is of course filled with organs, the tissues of which are relatively incompressible, but the space inside of which we cannot directly make more resistant to compression. Above this, separated by the diaphragm, are the lungs. This provides us a convenient way to reduce the compressibility of the contents of the torso. By filling the lungs, we increase the rigidity of the thoracic cavity, and we also force the diaphragm down, which compresses the organs of the abdominal cavity somewhat.

To improve further on this compression, we can tighten the musculature surrounding the torso, which prevents unwanted expansion of the container walls and the resulting reduction of the potential for the torso to collapse.

The athlete will need to draw in as much air as possible, allowing the abdomen to expand and the diaphragm to contract, ensuring the lungs are able to fill completely; filling the lungs partially by only allowing the chest to lift and expand is not adequate. Once this breath is taken, the lifter will tighten down the abdominal and back musculature to increase the internal pressure and reduce the potential for flexion or extension of the torso. This effort to tighten down around the pressurized torso will push air out of the lungs and up the trachea—the athlete will need to close the glottis in order to keep the air in (this should happen naturally with the effort to hold the breath).

It's important that the athlete not "hollow", or draw in the abdominals as many have been taught to do or believe is correct. If the abdominals are drawn in, the base of support is reduced in width, and this is obviously not beneficial. We want the muscles activated tightly while keeping the torso as wide and deep as possible, allowing us a broad foundation to support the load. It may help athletes having difficultly with this activation to think of pushing the abs down. (This does not mean that the transversus abdominis is not active; it simply means that it should not be the sole focus of the stabilization effort and should not be cinched in to a degree that limits the ability to fill the trunk adequately with air.)

Pressurization should be maintained throughout as much of the movement as possible. There will be times, however, such as during the recovery of a clean, that the lifter will feel dizzy and even near unconsciousness. This can be because the athlete is not properly racking the barbell and the pressure is compressing the carotid arteries and reducing blood flow to the brain (this will be addressed in later chapters), but it can also be from actually holding the breath and bearing down simultaneously; these actions, especially when combined, stimulate the vagus nerve and reduce heart rate and blood pressure (this can be easily demonstrated by feeling your pulse while breathing normally, then holding your breath—you will feel an almost immediate reduction in heart rate). In some cases, this can cause unconsciousness, but this can be avoided by paying attention and reacting appropriately.

If dizziness or light-headedness occurs during lifts, the athlete should release a small amount of air during the highest-pressure moment of the lift by making some noise. This will release some air and reduce dizziness while maintaining trunk stability. Some athletes will be more comfortable, and even feel stronger, making a habit of always releasing air with noise during the recovery of the squat, as long as the release is controlled and minimal. If dizziness is considerable, it is always advised that the athlete drop the bar immediately and sit down safely to recover.

During the explosive second pulls of the snatch and clean, and even sometimes during the drive of the jerk, some lifters will make noise with an expulsion of a small amount of air. This is not problematic and is usually helpful in increasing the athlete's aggressiveness.

The effect of torso pressurization can be demonstrated easily with a new lifter with nothing more than un-weighted squats. The athlete can pressurize the torso properly and perform a few squats, utilizing the bounce to recover. Following this, the athlete will expel as much air as possible, and squat again with the bounce. Invariably the difference is dramatic enough to immediately elicit some kind of exclamation from the athlete.

FOOT POSITIONS

With the exception of the split position used in the split jerk (or the rare split snatch and split clean) there will be only two foot positions—*pulling* (or *drive* in the context of the jerk) and *receiving*.

The receiving position has already been established—it is the same as the position for the squat. This will be the foot positioning used to receive the snatch, clean, power snatch, power clean, and power jerk, and will be the stance used in all squat variations. Again, consistency is imperative. The more consistent the receiving position of the feet, the more predictable the required positioning of the remainder of the body, and the fewer adjustments and corrections the athlete will need to make in a very brief window to produce a successful lift.

The pulling position will be predicated on two basic criteria—it must allow maximal power production during the pull of the snatch and clean, but also allow the athlete to set a sound starting position. This position may vary slightly between the snatch and clean because of the second criteria, and it may vary again for the jerk—the jerk drive positioning will be discussed fully in the jerk chapter.

In theory, positioning the feet such that the legs are approximately vertical when the athlete is standing—feet directly under the hips—will allow maximal power production during the final stage of extension. This is simply because the force against the platform is being directed straight down, and therefore straight back up through the athlete, rather than some of the extension power being lost due to being at an angle to desired direction of force. The more hip-centric an athlete's lifting style is, the less this matters. Similarly, the small difference this makes can be easily eclipsed by limitations imposed by an uncomfortable position for a given athlete.

The feet will be turned out to whatever degree is comfortable for the athlete, within reason—generally approximately 5-15 degrees from center. Angles beyond about 15 degrees fall outside the range of advantageous alignment for maximal drive against the platform and will make the maintenance of balance over the base more difficult.

In the basic pulling position, the feet are approximately under the hips and turned out slightly.

From this starting point, the athlete can adjust to accommodate for his or her unique anthropometry and how it dictates the starting position of the snatch and clean. Shorter-legged athletes may need to make no adjustments at all; longer-legged athletes may need to widen the stance and/or turn out the feet slightly more to bring the hips in closer to the bar—however, this positioning shift of the hips and torso can also be made to a large extent simply by flaring the knees to the sides without affecting the placement of the feet. Modifications in foot placement should only be made to improve performance, not to circumvent correctible problems such as inflexibility.

The athlete's line of gravity—a plane that splits the athlete's center of mass in half (in this case when viewed from profile) and describes the athlete's point of balance—is argued by various sources to be between approximately the front edge of the heel, and the center of the distance between the balls of the foot and the heel. In any case, the balance of the athlete should be somewhat behind the middle of the foot, i.e. closer to the heel than the toes.

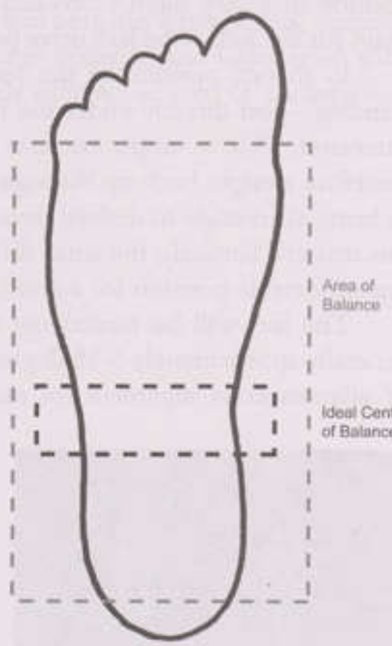
In reality, a person will be able to stand without falling on any point from the balls of the foot to the back of the heel, as can be demonstrated easily by anyone with decent balance. However, it's important to distinguish between possible and ideal, particularly when introducing the element of an attached, but moveable, weighted external object. Throughout a lift, the combined mass of the barbell and the athlete need to remain balanced over their base of support (the feet); otherwise, there will be movement forward or backward at some point in the lift, making it more difficult, or impossible, for the lifter and barbell to remain stable. With the additional weight of the barbell, which is also not fixed in a constant relative position to the lifter, shifts in balance can very quickly be magnified to degrees beyond control.

Standing still, this ideal balance can be felt simply by the slightly greater pressure on the heels relative to the balls of the feet. Essentially during the snatch and clean, the athlete will be attempting to maintain the line of gravity of the bar-body system through this same point of balance (the jerk will use a balance point farther over the heels). For our purposes, this point will be called the front edge of the heel because generally speaking, it will benefit us to maintain balance slightly farther back within the above-described range.

However, it's important to understand that the line of gravity and the pressure that can actually be felt on the foot do not necessarily correspond. During movement of sufficient speed, it's entirely possible to maintain a line of gravity over a point other than that on which the pressure on the foot is maximal, such as during the ankle extension of the second pull of the snatch and clean—at this moment, all pressure is on the balls of the feet, but the line of gravity is still over the front edge of the heel.

Athletes and coaches are most likely not working with tools that allow the monitoring or measuring of weight distribution over the foot with any kind of genuine precision—certainly not in real-time or in any way that would allow immediate adjustments during a lift. Athletes can simply think of keeping their weight balanced more toward the heels than the balls of the feet—it should be possible during the relatively low speed early stage of the lift for athletes to feel this pressure. This, along with the feedback provided during actual lift performance, such as being forced to jump forward, will be adequate for developing technical proficiency.

The line of gravity should pass through the front edge of the heel for ideal balance (unweighted on left; 150% of bodyweight on right).



Balance over the foot. The gray box represents the area of possible balance; the black box represents the area of ideal balance.

Foot Transition Drill

With the foot positions established, we can proceed to drilling the transition between them. The importance of footwork to the success of the lifts cannot be overstated, and a solid foundation built at this stage will encourage the speed, accuracy and consistency necessary for excellent technique.

Starting in the pulling position, the athlete will transition the feet to the receiving position as rapidly as possible with as little elevation of the feet as necessary, landing with flat feet at quarter squat depth. This transition must be aggressive and the reconnection of the feet with the platform may produce an audible clap. Note that this clap should be a product of speed and viciousness, not of elevation. It's important that the athlete place the feet flat rather than land first on the balls of the feet.

Foot Transition Drill

Start with the feet in the pulling position: approximately under the hips and turned out comfortably.

The weight should be slightly more on the heels than the balls of the feet.

Quickly move the feet to the squat position without lifting them more than necessary.

Reconnect the feet flat with the platform.

The receiving position can be verified by squatting if necessary, and should be adjusted to the correct position when necessary. The more time the athlete spends in the correct positions, and sees the correct positions, the more quickly he or she will develop consistency.

Foot transition drill

THE DOUBLE KNEE BEND

The double knee bend is a phenomenon that occurs in the final stage of the lifter's extension in the second pull. As the knees near extension as the bar reaches approximately the level of mid- to upper-thigh, the athlete initiates the final violent extension of the hips. As this hip extension occurs, the knees flex again slightly and immediately extend again along with the hips. This movement is a product of two elements: the bi-articular nature of the hamstrings and a need for the body to maintain balance. Because the hamstrings group crosses both the hip and knee joints, the contraction of the hamstrings to help effect the aggressive extension of the hip causes the knee to flex involuntarily; as this flexion is occurring the hips are extending, which forces the partially flexed knees forward under the bar in order to maintain balance with the upper body suddenly moving backward. This knee flexion is abruptly reversed through the continued voluntary extension of the knees in the lifter's effort to continue pushing against the ground. This movement of the knees is unavoidable when executing the lifts with proper positioning and speed.

The transition, scoop or double knee bend is the shifting of the knees forward under the bar at the beginning of the second pull of the snatch or clean.

The maximal flexion of the knees occurs as the torso reaches approximately vertical, placing the athlete into a position in which the knees are forward of the bar and the hips under the shoulders. This shifting of the knees under the bar is termed the *scoop* or *transition*. While technically not the same movement as the double knee bend, all three terms refer to the same phenomenon as a whole and are often used interchangeably.

Final knee position of the scoop in the snatch (left) and clean (right)

The Mechanics

A convenient consequence of the double knee bend is an increase in power production. The mechanics resemble those of a vertical jump: the legs are bent rapidly to a small degree, transition immediately at the point of greatest flexion, and violently extend to generate vertical force. This is a utilization of the Stretch-Shortening Cycle (SSC), the combination of the myotatic reflex, the time-tension relationship of muscles, and the energy storage capacities of the musculotendinous units as is seen in plyometric training.

The mechanical contribution to the SSC is from the elastic nature of parts of the musculotendinous unit, collectively termed the series elastic component (SEC), the primarily active of which is the tendons. As does a spring, the SEC temporarily stores elastic energy when stretched. If this stretch is reversed quickly enough through voluntary contraction of the muscle, the stored elastic energy will contribute additional force. If the stretch is not reversed quickly enough, however, the elastic energy will be converted to heat and will no longer be available to contribute to mechanical work.

In addition to anatomical elasticity, the basic nature of eccentric muscle activation contributes to the power of the double knee bend. Forced eccentric movements—that is, the resistance of muscles to a force as they lengthen—can produce tension that far exceeds that possible in either isometric or concentric muscle activation. This eccentric phase also provides more time for the creation of actin-myosin cross-bridges. Following this tension-generating eccentric phase is a brief isometric phase as the body transitions from eccentric to concentric, and tension is able to peak. This allows the concentric phase of the movement to be initiated with a greater magnitude of force than would be otherwise possible with the limited time to develop tension of such a rapid movement.

Neurological factors contribute to the SSC along with the mechanical. Among the intrafusal fibers of the muscles lie the extrafusal muscle fibers, or muscle spindles. Muscle spindles are proprioceptive units that sense both the degrees and rates of changes in muscle length and report to motor neurons for appropriate response. Extension of a muscle to a great enough degree at a great enough rate will stimulate an immediate, involuntary contraction of that muscle, known as the myotatic reflex. Although this reflex is presumably in place as a method of protection, it can be used to potentiate voluntary muscle contraction. As is the case with the elastic energy of the SEC, if voluntary muscle contraction is delayed following the initiating stretch, the summative benefit of the myotatic reflex will be lost.

The eccentric phase must be quick enough to stimulate the myotatic reflex yet not take the knees and hips into flexion beyond the threshold of reasonable mechanics or correct balance; the transition phase must be quick enough to capture both the elastic energy and reflexive contraction; and the concentric phase must be quick enough to impart adequate power on the barbell. These considerations dictate the double knee bend be left to nature—the movement that produces the double knee bend must occur so rapidly and with such precise timing that attempts to control it consciously will invariably result in premature scooping, which will violate the requirements listed above.

It's important here to clarify that the lifts are not actually vertical jumps. While the action of the legs and hips in the two movements are similar in many respects, there is a critical difference: the absence of vertical elevation of the body above the platform. This difference is attributable primarily to three elements—first, the athlete is holding a very heavy implement, which has obvious effects on his or her ability to leave the floor; second, the orientation of the force is slightly backward instead of directly vertical, with the hyperextension of the hips moving the shoulders back rather than straight up; and third—most importantly—the moment the athlete has completed the effort to accelerate the barbell upward (the moment in a jump when the athlete would separate from the ground), he or she abruptly and violently pulls under the bar while discontinuing the pressure against the ground. It is this forceful and properly timed change of direction that distinguishes a lift from a jump more than a dramatic difference in leg and hip mechanics.

The Controversy

There are contrary schools of thought with respect to the double knee bend—at one end of the spectrum is the claim that the motion is completely involuntary and any effort to teach it will harm lifting technique; at the other end is the claim that the motion can and must be taught in order to develop correct lifting technique.

Much of the disagreement is the result of imprecision and a general lack of clarity in the arguments of all parties. Arguments are often founded on points never actually established clearly, and often address improper pieces of the opposition instead of the actual counterparts. This perpetuates the disagreement, prevents collective progress within the coaching community, and creates enormous confusion. This in mind, the topic is being covered in much greater detail here than will ever be necessary or appropriate in the learning or teaching of the lifts in order to aid the progress toward a better collective understanding of the double knee bend from which more rational and sound arguments can be made.

While the double knee bend is a natural movement and unavoidable during correct execution of the lifts, it can be manipulated through instruction and conscious control. This manipulation is neither inherently beneficial nor problematic—the nature of the manipulation will be the deciding factor.

To state it as clearly as possible, the double knee bend itself—the actual rapid flexion and extension of the knees—need not be taught, and cannot be taught considering its involuntary nature. One of the issues in this discussion is that coaches continue describing their instruction as "teaching the double knee bend" when in reality, they're teaching the positions and movements that create and control the double knee bend. Clearly for many, this is an inconsequential distinction, but it is in fact critical, and alone has the power to eliminate the bulk of the existing disagreement.

What we do have complete control over is the positions of the body during the pull and the timing of the transitions between them. Opponents of teaching the double knee bend point out that this practice often results in a reduction in bar speed during the transition and ultimately less net acceleration. This is not an inherent response to teaching the related positions and movements, but the result of teaching them improperly. The same result can be attained without ever mentioning the double knee bend and simply instructing the lifter to place him- or herself in the wrong positions in relation to the bar and the base of support, or to initiate the hip extension of the second pull prematurely. Successful methods of instructing lifting technique all produce the same result in the same manner—control of body positioning and timing.

That said, coaches who don't understand the principles of the double knee bend are susceptible to being misguided by inaccurate interpretations of lifting mechanics and consequently providing less productive instruction. Mistaken interpretation of the double knee bend as a voluntary movement has resulted in many coaches instructing their athletes to perform it voluntarily, which results in an alteration of pulling mechanics in which the double knee bend actually becomes voluntary through premature scooping, which then feeds back during movement analysis into the interpretation of the double knee bend being a voluntary action. This is a dangerous dialectical process that can reduce or even completely eliminate the expected additional power, as well as contribute to improper positioning and balance.

As was mentioned previously, conscious attempts by an athlete to create the double knee bend nearly always result in an early scoop. This premature shifting of the knees under the bar is problematic for a number of reasons. At the most basic level, this movement will drive the bar forward through contact with the forward shifting thighs, often resulting in its swinging out away from the lifter. The movement will also shift the balance of the lifter's weight too far forward on the feet, and this weight shift is increased with a swinging bar. At the more complex level, this premature scoop flexes the knees before they reach enough extension to create adequate tension in the hamstrings to create the sharp, natural double knee bend, and consequently greatly reduces if not completely eliminates the potentiation of the knee extension through the stretch-shortening cycle, as well as reduces the potential explosiveness of the hips due to slack in the hamstrings upon entering this final extension effort. Adequate hamstring tension upon entrance into the final explosion is imperative for maximal power production and the resulting speed on the bar.

In short, a genuine double knee bend is achieved only by allowing it to occur naturally through ensuring correct positioning and timing.

Demonstrating the Double Knee Bend

While teaching the double knee bend in the strictest sense isn't possible, because it can be a confusing concept for both athletes and coaches, it's helpful to have a way to introduce the movement, allow athletes to feel the proper position of the body to create it, and allow coaches to observe it. This is fairly easily accomplished by performing a vertical jump from the optimal second pull position.

The primary reasons for failing to produce a legitimate double knee bend during a snatch or clean is a failure to achieve enough knee extension before initiating the final hip extension (and therefore the proper hamstring tension and balance) or a failure to continue pushing with the legs through the completion of hip extension. This can be avoided by teaching lifters the feeling of the proper position and balance over the feet from which to initiate the final explosion of the lift.

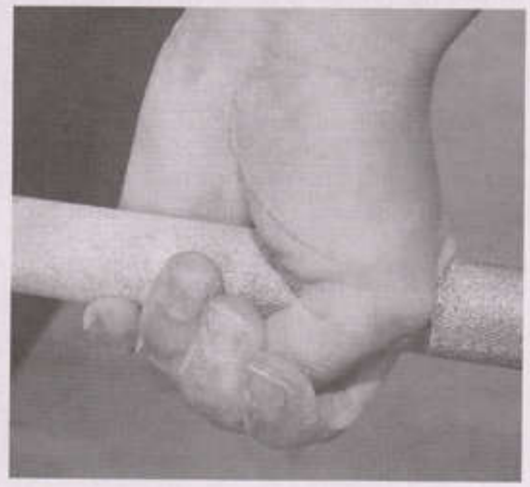
Double Knee Bend Demonstration With the feet in the pulling position, the athlete will bend the knees slightly and hinge at the hips, bringing the shins approximately vertical, the shoulders slightly in front of the knees, and the weight toward the heels. From this position—without a countermovement and keeping the weight back over the feet—the athlete will simply jump as high as he or she can. Focus should be placed on driving aggressively with the legs as the hips are slightly hyperextended. While the complete extension of the hips is critical, primary focus at this point should be on knee extension because it tends to be the neglected element in this case. If we focus excessively on hip extension, we nearly always see a failure to finish the drive with the legs, resulting in marginal vertical acceleration and an unproductive forward slide of the hips due to an absent base.

To anyone observing, such as a coach or other athletes, the knees should be the focus. It will be clear that as the athlete initiates the jump, the knees drive forward before extending—it's important that the athlete jumping not be given any instruction to shift the knees forward: only to jump straight up or even very slightly backward if he or she has difficulty jumping while trying to keep the weight over the backs of the feet.

If this shifting of the knees is not evident, it can be made more visible by creating a reference line with a length of PVC. With the athlete in the starting position, the coach can hold a PVC bar vertically with the front edge in line with the front of the athlete's knee, standing as far behind it as possible to allow a clear view for the observers, who should be positioned directly to the athlete's side. When the athlete jumps, the knees will clearly travel in front of the bar.

Double knee bend demonstration. If the athlete simply drives against the floor and extends the hips to jump vertically, the knees will naturally and unavoidably shift forward, just as they do during the second pull of the snatch and clean.

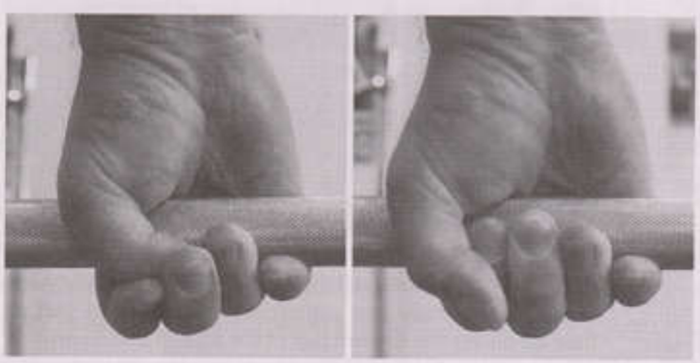
THE HOOK GRIP



The hook grip is a pronated (palms facing the lifter) grip in which the thumb is trapped between the bar and usually the first and second fingers, depending on hand size. For the pull of both the snatch and the clean, this method of gripping is a necessity to maintain control of the barbell during the violent second pull and the powerful turnover.

It's important to understand that the thumb is itself wrapped around the bar inside the fingers and not simply pinned parallel to the bar. With the thumb wrapped over the fingers as it would be in a conventional overhand grip, it will typically reach only the index finger and have a weak purchase on it due to being only partially flexed. By wrapping the thumb around the bar directly, we create a powerful hook on the bar, which can then be reinforced by the grip of both the index and middle fingers. This allows the thumb to reach around the bar enough to significantly contribute to grip integrity without limiting the ability of the fingers to wrap around the bar adequately to grip it.

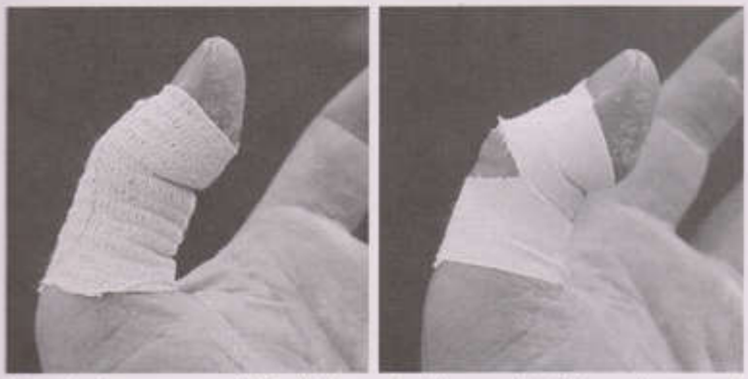
Additionally, this creates a system of balanced hooks on the bar. In a standard overhand grip, the bar is supported by the fingers, which all open in the same direction, creating a tendency for the bar to roll backward out of the hand. The mixed grip—one pronated and one supinated hand—is commonly employed in the deadlift by powerlifters because the backward rolling tendency on the pronated side is countered by a forward rolling tendency on the supinated side, thereby stabilizing the bar.



With the hook grip, the thumb is able to wrap farther around the bar than in a conventional overhand grip, while the fingers are still able to wrap considerably, allowing more overall contribution to grip security.

The hook grip creates a similar system of countering this tendency of the bar to roll while allowing the necessary movement and position of the hands and arms during the snatch and clean that a mixed grip precludes. The bar will try to roll out of the thumb in one direction, and out of the fingers in the opposite, eliminating to a great degree the spinning element of grip loss.

Finally, because of the increased security created by the hook grip for the reasons described above, the athlete can



When taping across a joint, it's important to use elastic tape to prevent sprains adjacent joints (left). Non-elastic tape can be used if cut over the joint to allow unrestricted movement (right).

rely on lower levels of grip tension during a lift. This reduction in finger and wrist flexor tension allows a reduction in elbow tension during the pulling phases of the snatch and clean that improves the transmission of leg and hip power to the bar and the speed and fluidity of the transition between the second and third pulls. In short, the hook grip optimizes the anatomy of the hands for this application.

The more relaxed the athlete can keep the hands during a lift, the more relaxed the arms will remain, and the better the transmission of force from the legs to the bar will be. However, the hands can only relax so much before the grip begins slipping with the violence of the body's extension. Depending on grip strength and hand size and shape, athletes will be able to maintain different levels of gripping effort, but all should make it a goal to grip only as tightly as necessary.

In the snatch, because the wide hand placement of the lift results in the angle of the hand attachment to the bar being such that the origins of the two shortest fingers are the farthest from the bar, the third and fourth fingers will typically have little purchase for everyone but those possessed of fairly large hands. This being the case, the integrity of the grip of the first and second fingers in combination with the thumb is critical.

In order to ensure this integrity, the athlete needs to use the fingers to actively pull the thumb around the bar rather than simply pressing it against the bar. This hook of the thumb under the bar with the fingers reinforcing it is what provides the primary grip power. However, the third and fourth fingers are still important contributors, and their slipping can initiate a complete grip failure, or at least enough of a psychological hit to prevent the necessary commitment to the rest of the lift.

The wrist can be flexed somewhat so that the back of the hand is in approximately straight alignment with the forearm, which will relieve the thumb of some pressure and shift it more into the fingers. For most lifters, this will increase the comfort and security of the grip both by reducing the discomfort of the thumb and by allowing the shorter fingers to wrap farther around the bar.

Typically the hook grip will be uncomfortable if not considerably painful initially. Consistent use will condition the offending structures appropriately over time and the grip will ultimately offer no trouble. It will often, in fact, become more comfortable than a conventional overhand grip. Covering the thumbs with flexible athletic tape can reduce the discomfort and, for some, improve the feeling of grip security by increasing friction. Lifters can submerge the hands in ice water for 5-10 minutes after training to help reduce pain and speed the adaptation.

If taping the thumb (or other fingers) across a joint, it's important to use elastic tape rather than conventional athletic tape. Non-elastic tape will limit the motion of the taped joint and create potential for sprains in the next joint up the chain. If elastic tape isn't available, non-elastic tape can be used if wrapped and/or cut in a manner that prevents it from covered the back of the joint.

The Hook Grip

Press the webbing between the thumb and index finger into the bar.

Wrap the thumb around the bar.

Wrap the fingers around the bar with the first and second fingers over the thumb.

Use the first two fingers to pull the thumb farther around the bar.

Flex the wrist slightly to move the fingers farther under the bar.

THE SNATCH

THE SNATCH

The snatch is the first of the two lifts contested in Olympic weightlifting in which the barbell is lifted from the floor to overhead in a single movement. With its unparalleled speed and extensive range of motion, it epitomizes mechanical power—the performance of maximal work in minimal time—as well as technical precision.

The fundamental pulling mechanics of the snatch apply to that of the clean and to a lesser degree the drive of the jerk, and learning the snatch is typically more difficult than learning the clean and jerk for new lifters. For these reasons, teaching the snatch first is generally recommended—once a new lifter is reasonably comfortable with the snatch, the learning time for the clean and jerk will be greatly reduced.

For the initial learning progression for the snatch, we'll use a length of PVC pipe as a substitute for a barbell. A 5-foot length of ¾" schedule-40 pipe will be of similar diameter to a bar, but will be light

The snatch is the first of the two lifts contested in Olympic weightlifting in which the barbell is lifted from the floor to overhead in a single movement.

enough for any athlete to manage for large volumes of training drills, and for certain drills that will be difficult if not impossible for some athletes even with an empty 15 or 20 kg barbell. The inexpensiveness of PVC also allows the teaching of many athletes simultaneously.

Temptation to attempt teaching or learning with a barbell should be resisted. Even for extraordinarily strong athletes, some of the following drills will be impossible to perform correctly with this weight. A 5-10 kg technique barbell can be used with these athletes if one is available. Otherwise, PVC is the best starting point for these learning drills. The goal will be to move the athlete to the barbell as soon as possible, but not before he or she is ready.

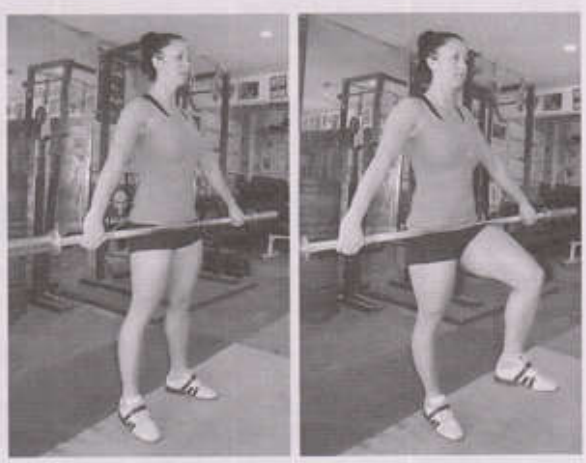
The Grip

The wide hand placement for the snatch serves to reduce the distance the barbell must travel in its path from the platform to over the lifter's head. There are numerous ways to determine starting grip width for the snatch, ranging from simple to surprisingly complicated. All will produce very similar results, so the chosen method is more a product of circumstances and personal preference than accuracy. More importantly, there is no formula for determining perfect grip placement for lifters, and spending great amounts of time with complicated measurements simply to locate a preliminary grip width is an ineffective use of training time at best.

To quickly determine a starting hand placement, the athlete will stand upright and hold a bar with the hook grip at arm's length. From this position, the width of the hand position will be adjusted until the bar rests in the crease of the hips. This method will account for not only arm length and shoulder width, but also their relation to the proportions of the trunk and legs. The position of the bar relative to the hips is the priority—not how the grip width relates to the length of the arms or width of the shoulders directly. In order to be sure the bar is in the crease of the hips, the athlete can simply lift one knee slightly; if the bar is lifted as the thigh rises, it's too low. The bar should contact the body just above the pubic bone to avoid painful collisions during the final extension.

This hand placement will serve as a solid starting point from which small adjustments can be made later to accommodate each athlete's strengths, weaknesses, personal preference. Athletes with unusual proportions will find that this can place them at a width too wide or narrow. For example, athletes with unusually long legs and short torsos will find this method places their hands far too wide and will need to bring the hands in closer. For these individuals, a secondary check can be to raise the bar overhead and adjust until there is approximately 4-8 inches of space between the bar and the top of the head.

Each end of the grip width spectrum is accompanied by its own benefits and drawbacks. Wider grips will reduce the distance the bar must travel, reduce the demands on shoulder flexibility overhead, and tend to increase the proximity of the bar and body and the speed during the third pull, but will make the starting position more difficult, generally place greater strain on the wrists because of the awkward angle in which they're placed under the bar, make gripping the bar during the pull more difficult because of the angle at which the hands connect to the bar, and can make both keeping the elbows locked and the bar from drifting backward overhead more difficult. Narrower grips will allow a



The placement of the bar in the crease of the hips can be checked by lifting a knee with no movement of the bar.

stronger and more comfortable starting position and first pull, improve grip integrity and typically reduce wrist strain, and allow better elbow lockout strength overhead, but will increase the time of the turnover and the distance the bar must travel, make the overhead position more difficult in terms of flexibility, as well as make it more difficult to guide the elbows up and out during the pull under, increasing the chances of the bar and body drifting apart.

Erring on the narrower side with new lifters initially is advisable to allow time for the wrists to adapt to the new stress. At this stage of training, the greater distance of travel for the bar will not be much of a concern, and quite likely the need to accelerate the bar more and pull under farther will improve the training adaptation. As the lifter progresses and his or her joints become better conditioned, variations in hand placement can be experimented with until a width that best suits each lifter is found. For example, if a lifter has great grip strength, the more difficult grip of a wider hand placement is not an issue, and this wider grip may improve the snatch with a quicker turnover. On the other hand, a lifter with smaller hands whose grip integrity is consequently the weak point may not even have the choice to widen the grip. Smaller hands typically accompany shorter frames, meaning the athlete will not need to move the bar a great distance anyway.

Once a lifter has determined his or her ideal grip and has progressed to a barbell, it's important he or she note the hand placement relative to landmarks on the bar—either the breaks in the knurling or the insides of the sleeve flanges—in order to ensure consistent hand placement each time the bar is grabbed. If the athlete and coach don't know where the grip is on each lift, the process of evaluating movement technique takes on an unnecessary element of speculation.

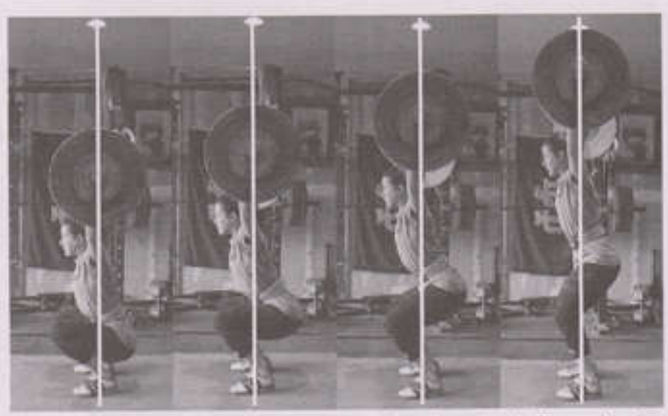
THE RECEIVING POSITION

The overhead position of the arms and bar in the snatch is critical for successful lifting, as it will be in the jerk. In preparation for receiving and supporting heavy loads, we need to establish extremely strong and structurally sound positioning.

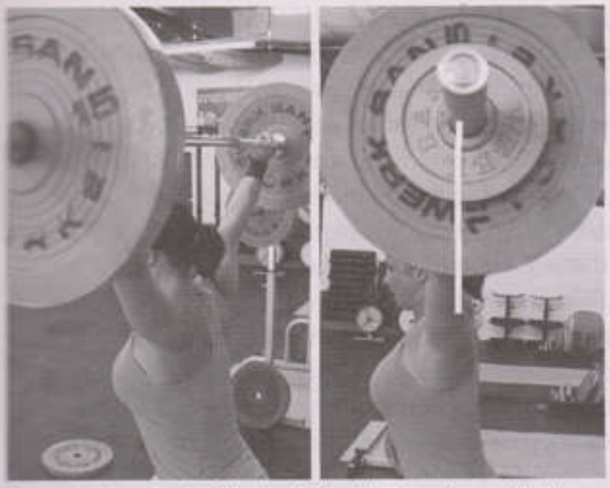
To quickly find the correct overhead position, the athlete will take a snatch-width hand placement with no hook grip on a PVC bar and place it across the shoulders behind the neck as he or she would for a back squat. The shoulder blades should be squeezed back together as completely as possible, which will create a shelf at the base of the neck on which to place the bar. This will naturally cause the torso to lean forward very slightly and position the bar over the foot as it needs to be in order for the athlete to remain balanced with the addition of weight. From this position, the athlete will press the bar straight up with no change to the torso or shoulder positions. The elbows should point approximately halfway between down and back, the wrists and hands should be relaxed, and the lower portion of the palms facing the ceiling.

To find the correct overhead position, place the bar on the back of the neck with the shoulder blades fully retracted and press straight up. The torso should be inclined forward slightly and the bar should remain directly above the base of the neck with the head pushed forward slightly.

We will have a small range of possible arm and torso positions during the overhead squat or recovery of the snatch. The weight of the barbell and athlete as a unit must remain approximately centered over the feet in order to remain balanced. Because any forward shift of body mass (within a reasonable limit) tends to be naturally accompanied by a countermovement, the body itself will generally remain balanced over the feet even through unintended postural changes. For example, if the torso leans forward, the hips will shift back, because people by nature prefer not to fall



The bar must remain balanced over the feet at all times. Notice also the correct position of the bar, shoulders, arms and torso.



Correct placement of the barbell will place it over the base of the neck.

on their faces.

Fortunately this means the barbell can remain in the ideal position for support, which is centered over the feet. The torso will lean forward to a slightly greater degree in the bottom of the squat than at the top, and will incline forward the most through the middle of the movement (when the thighs pass through a horizontal orientation; see photo series at the bottom of page 78) as the hips are forced to travel back somewhat.

This forward lean of the torso must, with adequate flexibility and active posture control, be minimized. Balance of the system is only part of the equation. The arms and shoulders can only support heavy weights if the proper structure remains in place. Losing the upright posture with which we create the ideal shoulder and arm positioning prevents that very quickly reduces the structural integrity of the system.

The arms will be oriented approximately vertically from their base at the shoulders, placing the bar over the top of the shoulder blades. Because the hands and bar are sitting behind the forearm slightly, the arms will be slightly in front of the vertical line passing through the barbell's center and the top of the shoulder blades or the base of the neck. Failure to maintain these positions within a tight tolerance will result first in reduced stability and increased unwanted barbell movement and ultimately in a complete inability to support the load.

We want to create a solid base of support for the arms that will both allow the proper balance of the bar over the feet, connect as tightly as possible the bar to the body, and stabilize the shoulders against unwanted movement. This is best achieved by powerful retraction and slight elevation of the scapulae—anchoring the arms securely to the body and preventing potentially injurious shifts in shoulder position. This position is extremely active and a reduction in the effort to maintain it will result in unnecessary struggle to recover from the snatch or a failure to recover at all, as well as allow greater opportunity for injury.

In order to achieve this position of the scapulae and maintain the bar positioning over the feet, the head must be pushed forward through the arms and the torso inclined forward slightly. Attempts to maintain a completely vertical torso and head will prevent the scapulae from being able to reach proper retraction due to the demands of bar positioning over the feet and in the arms.

The ideal shoulder position is complete retraction with upward rotation and the very slight elevation that naturally accompanies this effort.

A simple way to establish the ideal position is to place a barbell on the top of the traps with a snatch-width grip and the elbows pointing down, squeeze the top inside edges of the shoulder blades together forcefully while pushing the head forward slightly, and press the bar straight up without changing

The Overhead Position

Forcefully retract the shoulder blades and allow them to upwardly rotate.

Orient the points of the elbows halfway befween down and back.

Relax the hands and allow the bar to settle down and slightly behind the middle of the foream.

Actively squeeze the shoulder blades and elbows to hold the bar securely over the base of the neck.

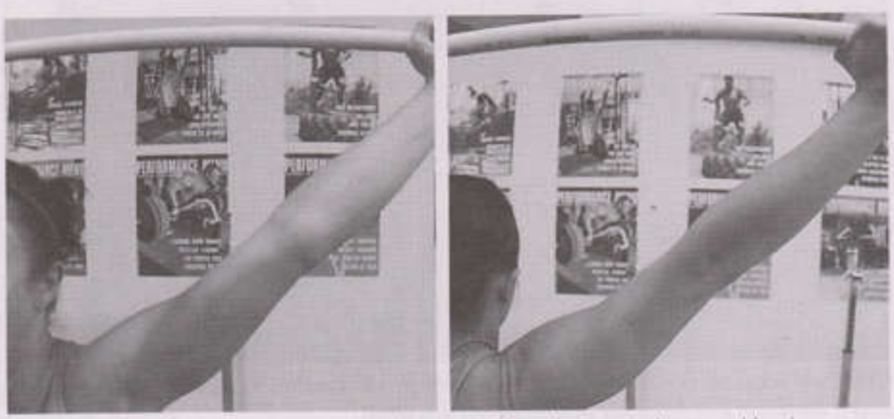
the position of the shoulder blades and head, keeping the points of the elbows directed approximately halfway between straight down and straight back. This effort to squeeze the top inside edges of the scapulae together will upwardly rotate them as necessary and will elevate them as much as is possible with complete retraction. Any further elevation will begin to spread the scapulae apart. The bar should finish directly above the base of the neck, in the same plane in which it started.

Likely the most common mistake in the overhead position is complete or significant scapular elevation. Any significant amount of scapular elevation requires protraction, and this creates what effectively becomes a floating shoulder—with no real structure to support it, the shoulder constantly shifts in response to an unstable overhead load rather than serving as a sound base for the arms in order to create a solid structure. This shoulder position is also often accompanied by excessive internal rotation of the humerus—that is, the elbows are turned to point backward—and a rearward tilting of the head and neck, which further forces the shoulder blades to spread and destabilizes the structure.

There are a multitude of cues different coaches use to get their lifters to hold the bar overhead correctly. What works for each coach and lifter varies, and ultimately all that matters is that a given cue communicates what the coach wants to the athlete. One athlete may hear "push" and shrug the shoulders up; another who has been instructed properly will simply apply the push cue to aggressively fighting the bar overhead. One athlete may be told to pull the bar apart and do a perfect job of setting the shoulder blades properly, forcefully extending the elbows, and properly cradling the bar in the hands; another may respond to this by gripping the bar tightly and consequently failing to lock the elbows adequately. The cue "squeeze" may encourage a poorly instructed lifter to grip the bar too tightly; if the athlete has been instructed properly, he or she will instead squeeze the shoulder blades together tightly and squeeze the elbows into extension.

If an athlete is possessed of adequate body awareness (as all athletes should be eventually), a direct focus on forceful elbow extension and scapular retraction as described previously is simpler and more effective than finding indirect descriptions of the proper action that leave room for incorrect interpretation.

The arms in the overhead position are acting as support columns. As such, their rigidity is imperative. A fully extended elbow in the correct orientation will create a remarkably solid structure able to withstand extremely great compressive forces. Attempting to support a similarly heavy load with even slightly flexed elbows will provide markedly more difficult and, with the exception of pre-approved anatomical issues preventing full elbow extension, any elbow flexion during the receipt and support of the snatch will prevent the lift from passing in competition, a rule that should be observed equally in training for the



The elbows should be oriented approximately halfway between down and back.

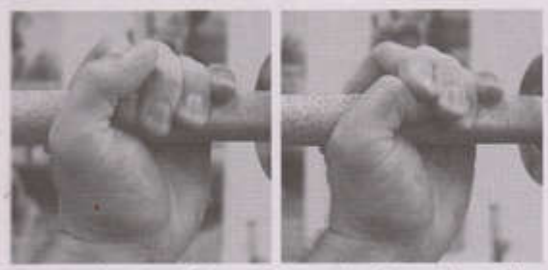
sake of maintaining consistent standards and accurate measurement of progress.

In the overhead position, the elbows should be pointed approximately halfway between backward and down. This position will provide the greatest structural stability for two basic reasons. First, this elbow orientation encourages and allows correct positioning of the shoulder blades; second, if the elbows are oriented directly downward, the force of the weight must be resisted almost entirely by muscular strength—with the elbows turned back halfway, the elbows' articulation is no longer aligned with the downward force and the rigid structure of the skeleton can assist in supporting the load (This is not entirely true if an individual can extend the elbow beyond 180 degrees—this will provide more structure even if the elbow is directed downward).

Correct hand position: Hand relaxed, wrist extended, bar slightly behind the center of the forearm.

Elbow orientation can be manipulated during the recovery of a lift to save a barbell that has failed to come to rest precisely in the desired position. This manipulation will be minor and effect only minor change—it will not overcome the imbalance of a significantly misplaced barbell. This kind of repositioning will generally happen naturally during an effort to save a lift.

The grip on the bar will affect both the athlete's speed of turnover during the snatch and his or her ability to lockout the elbows quickly and completely. The hands overhead should be as relaxed as possible while maintaining control of the bar, cradling the bar rather than gripping it tightly, with the wrist allowed to extend back and the heel of the palm driven up aggressively. This does not mean that the bar is in the fingers or that the hand is open—the bar should be in the palm, slightly behind the center of the forearm, with the fingers wrapped around it completely.



Incorrect hand positions: Bar too bar forward over the forearm, wrist neutral and hand rigid.

It's important to understand that the bar is in the palm, not farther up toward the joints of the fingers to the hand. Holding the bar this far back will place excessive strain on the wrists and limit how forcefully the elbow can be extended against the load, usually resulting in a soft and unstable overhead position.

The correct placement of the bar results in a consistent tendency for it to move backward, making its stabilization simple; with the wrist and hand in a neutral position and the barbell centered over the wrist, it becomes more difficult to stabilize the bar because it will have a tendency to shift both forward and backward equally. A neutral wrist position is also virtually impossible to maintain with significant weight.

An excessively tight grip overhead will prevent the bar from settling down into the hand as it should. Instead, the bar will be slightly more forward than can be supported well, which places an additional burden on the shoulders and elbows, and often is forward enough to shift the athlete's balance to a degree that disrupts the receipt and recovery of the snatch, or causes a failed lift. A single inch, as weights increase, is more than enough to prevent success.

In addition to problems with positioning, a tight grip overhead will limit somewhat the extension of the elbow. Activation of the flexor muscles of the wrist and hand encourages activation of the flexor muscles of the elbow, which inhibits activation of the extensor muscles of the elbow—such inhibition both slows the lockout of the elbows and limits the final strength of that lockout. This phenomenon is typically quite noticeable by an athlete if instructed to compare his or her overhead lockout with a tight grip versus a loose hand (This is the same neurological phenomenon at play in reciprocal inhibition stretching; for example, we can encourage the hamstrings to relax for a stretch by contracting the quads).

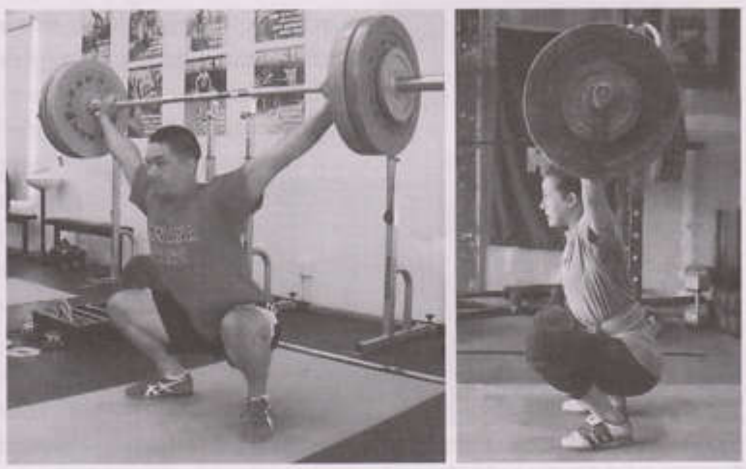
With this is mind, when overhead, we will generally not be using the hook grip. The actual process of releasing the hook grip during the turnover of the snatch will be discussed in detail later.

The overhead position of the bar will usually be thought of as the end of a rotation of the arms into place as appears to occur in the snatch. In reality, the final phase of the third pull is actually a push under the bar. Attempting to swing the bar back into place overhead will usually result in the bar being too far backward for the athlete to support, or will cause a compensatory forward dive of the chest to maintain balance, but ending with the arms angled too far backward to provide the structure necessary to support the weight.

This being the case, it will be better from the earliest stages of learning to encourage considering the position as one of aggressively pushing the bar straight up instead of rotating it back. An active drive up on the bar immediately following the turnover will be imperative during the receipt of a snatch to create the solid structure needed and contain movement within a vertical plane.

The Overhead Squat

The overhead squat is the position in which the lifter will receive the bar in the snatch. Until this position is both solid and consistent, the lifter will not be able to progress substantially with the lift. This is cause, during the earliest stage of an athlete's development, for a great deal of emphasis on establishing the flexibility for and consistency in this position.



The overhead squat meets all the position criteria described for the squat and the overhead position.

All of the position requirements described previously for the squat must be met in the overhead squat. Foot positioning should result in the thigh being approximately parallel with the foot when viewed from above and the knee approximately above the toes when viewed from the front of the foot. The hips should be pushed in over the heels as much as possible and the torso nearly upright. Recall that the correct overhead position demands slight forward torso lean; violation of this will be impossible for the majority of athletes anyway due to its demands on flexibility.

It's rare for a new lifter to be capable immediately of a perfect overhead squat, although it's more common among female athletes due to their typically greater flexibility. Flexibility limitations should be immediately and actively addressed to ensure the athlete's progress is not delayed unnecessarily. Specific weightlifting flexibility training is discussed in detail in its own section of the book.

The athlete's present flexibility will determine the details of his or her lifting progression. The coach will need to adjust instruction accordingly. Typically the initial learning progressions can and should be attempted irrespective of flexibility—the light or absent loading prevents any real injury risk, and attempting to achieve the various positions is itself excellent flexibility training. The coach and athlete should remain vigilant, however, and avoid forcing any positions that may lead to injury in the extraordinarily inflexible.

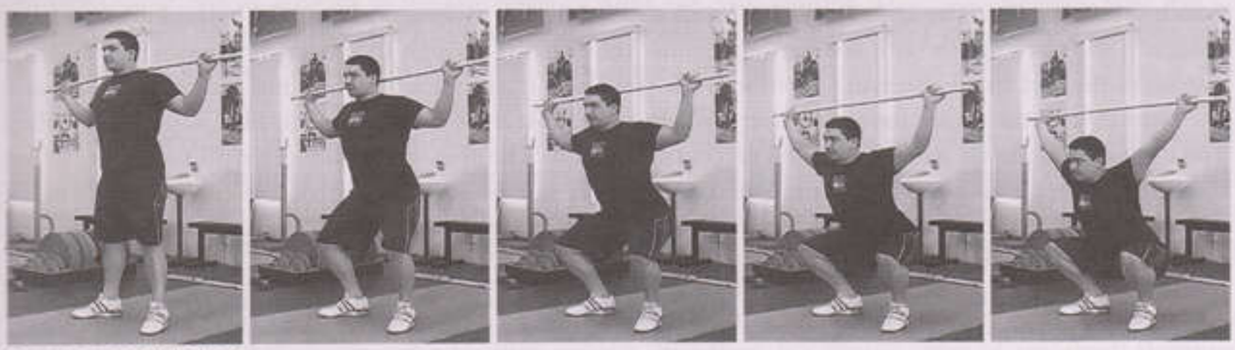
Snatch Balance Series

With the overhead squat positioning established, we can begin introducing layers of complexity and speed. The series of snatch balance exercises adds dynamic entry into the position with increasing complexity and speed in order to better prepare the athlete to receive the snatch successfully.

Pressing Snatch Balance

The first of the series is the pressing snatch balance. This step serves simply to introduce the athlete to the basic movement pattern, positioning and timing, and acts as well as being an active stretching drill. The lifter will begin with the feet in the receiving position and the bar racked across the back with a snatch-width hand placement in the same manner that was used to establish the overhead position earlier—that is, the shoulder blades should already be locked tightly into the correct position. The hook grip is not used, and the hands should be relaxed with the wrists allowed to settle back. All that needs to occur, then, to achieve the correct overhead position, is extension and orientation of the elbows.

At a deliberate speed, the athlete will press him- or herself down under the bar without elevating it until reaching the bottom position of an overhead squat. The path of the bar is nearly non-existent—because it starts in the correct plane over the foot, and because the athlete is pressing him- or herself down without elevating the bar, it should travel only slightly downward, and in a straight vertical line when viewed from the lifter's side.


Pressing snatch balance

Drop Snatch

As the intermediate step in the series, the drop snatch bridges the gap between the first and last drills by adding the element of speed and the transition of the feet. The starting position will be identical to that of the pressing snatch balance with the exception of the feet, which will now be in the pulling position; the bar is still racked on the back with a snatch-width hand placement and the shoulders already tightened into the correct position.

The name drop snatch is somewhat misleading—the athlete must push under the bar rather than simply dropping. After taking in a stabilizing breath, the athlete will settle with proper balance over the feet, then initiate the exercise by beginning to transition the feet from the pulling position to the receiving position. As the feet begin moving, the athlete will aggressively punch under with the arms, driving him- or herself into a squat with the barbell locked out in the proper overhead position. The feet must reconnect flat with the platform—the athlete should not land on the balls of the feet.

The goal is to allow the bar to rise as little as possible, and instead to push the body underneath it. The athlete should attempt to achieve a locked-out overhead position at least slightly above the bottom of the squat and then continue to sit into the bottommost position, stabilizing and holding this position momentarily before standing again with the bar overhead.

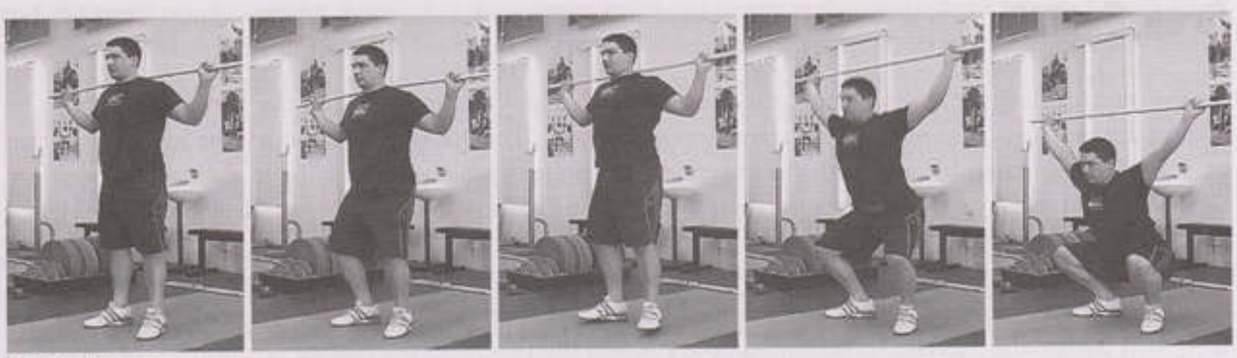
Drop snatch

Snatch Balance

The series is completed with the snatch balance, which adds a dip and drive with the legs to initiate the punch under the bar. The athlete will start with the feet in the pulling position, dip at the knees without dropping the chest, push with the legs up against the bar just enough to unweight it momentarily, then transition the feet to the receiving position while punching down under the bar into the overhead squat.

Just as with the earlier foot transition drills, the feet must leave the platform as little as possible—they lose contact only to be moved into the receiving position. The feet will reconnect with the floor before the drive under the bar has been completed, but usually not noticeably. The athlete can attempt to lock the elbows out at the same time the feet reconnect to encourage more speed. Again, the athlete needs to punch the feet back to the floor flat.

The snatch balance is an extremely aggressive exercise and demands maximal speed and effort. Eventually, athletes will generally be able to snatch balance as much or more weight than they're able to snatch, making the snatch balance an excellent way to increase both strength and confidence in the receiving position (This assumes the snatch balance is performed regularly, at least during certain periods of training, so that the athlete is able to develop the necessary technical proficiency with the lift.).



Snatch balance

LEARNING THE SNATCH

With the support positions now established, we can learn the movement that will deliver the athlete there. This is accomplished by breaking the whole movement into a series of brief sections to isolate elements of the lift. It's far easier and more productive to drill these elements individually than to simply attempt to teach the movement in its entirety—such drills allow the body to learn the constituent movements with less interference from the brain. The more we can ingrain the positions and movements into the body and the less we can involve the brain, the more quickly and easily the body will be capable of executing the entire movement accurately. These sections are eventually assembled to produce the entire movement, which will be performed remarkably well simply through the body's retention of the drills with which it has been constructed.

When and how these drills are introduced and practiced by various athletes can vary considerably. In most situations of athletes in the late teens to adult age with existing training experience, they will all be learned and practiced together in a single training session or in a handful of consecutive sessions, and most athletes will be able to transition to using at least a training bar from the hang in this time, if not actually transitioning to performing the full lift from the floor.

In other cases, the coach may choose to introduce only certain drills in a given session, and expose the athlete to the complete progression in smaller individual doses over a longer period of time. A more gradual progression is usually a better choice for young athletes beginning to specialize in weightlifting in combination with instruction and practice of general and specific strength exercises. Such a protocol is discussed and demonstrated in the Programming chapter of the book.

The effectiveness of these drills can be significantly diminished through poor execution. We need to understand now, and throughout the learning process, that there is a simple order of priorities: Position, movement, speed, load. Performing a correct movement from an incorrect position is impossible, because it is, by definition, a different movement, and the introduction of excessive speed or weight before the development of sound movement is counterproductive, because again, we're simply practicing an incorrect movement. These points are critical to keep in mind at this earliest stage of learning. If the coach or athlete fails to ensure correct positioning, or insists on speed over accuracy, the execution of the drills is far less likely to be correct and consequently will create poor motor patterns that will have to be overwritten later—this process is much more difficult than simply ingraining the correct patterns from the beginning.

Athletes are often in a hurry to complete these drills, and will attempt to perform a series in immediate succession at high speed and without even the briefest pause in the starting position. This needs to be stopped immediately, and the reps controlled by the coach to allow him or her to ensure correct positioning and better guide the athlete through the movements.

This hierarchy should be clear already as we've started by establishing first positions and then introduced movement and finally increased speed of execution. It applies equally at all scales—that is, from the learning process as a whole to each individual component thereof. With these learning drills, practically this means each section must begin with correct positioning, and may be performed initially as slowly as necessary for the athlete to repeatedly execute the movement correctly. Certain sections cannot be performed slowly, but these fall at a point at which a solid enough foundation should already exist to prevent any considerable trouble.

In some cases, additional drills may need to be created to help the athlete through the following progression. With a legitimate understanding of the principles of the lifts, this should present no problem. In short, we first isolate the problem as much as possible, determine a method of improving it, practice that corrective method, and gradually reintegrate the corrected component into its parent movement. This basic method is precisely what will often be used later for effective fault correction.

With these progression drills, we're generally attempting to mimic the actual movements toward which we're working as well as possible; in some instances, however, drills that deviate from what will actually occur in the lift are used in order to more effective teach a given component of the whole skill (an example being a muscle snatch or muscle clean). As long as these deviations are recognized by the athlete and coach, they will present no problems.

Certain movements and positions will change very slightly with the addition of a loaded barbell. This load shifts the athlete-barbell unit's center of mass and consequently changes the necessary positioning of the body at any given phase of the movement. These changes are extremely minor and, if understood, will not prevent successful learning. Ultimately, every lift, irrespective of the weight on the bar or lack thereof, must be performed according to the present center of mass of the athlete-barbell unit. The principles guiding the positions and movements do not change—if they are observed correctly, the resulting movements will be correct at any weight.

For example, with a heavy snatch, at the peak of extension the athlete's body will be leaning backward slightly. This is possible only with the barbell's weight to counterbalance the body's mass, and is in fact necessary in order to maintain the center of mass over the athlete's base. Attempts to achieve this same position with a PVC bar will result in the athlete pushing the hips too far forward to balance, which can and likely will develop into the dreaded horizontal hip thrust, a counterproductive habit that will prove remarkably difficult to break.

The simple solution to this is to focus on maintaining the correct weight balance across the foot—this will remain constant no matter how much weight is or is not on the bar. If this weight balance is maintained, the body will necessarily be positioned as it needs to be with regard to the above aspects.

The Mid-Hang Position

Our first step is establishing the starting position for the following drills. This will be what we refer to as the mid-hang position, in which the bar will start at approximately the level of mid- to upper-thigh. This will position the athlete in what will become the beginning of the second pull—that is, the position he or she will be in immediately prior to the initiation of the final explosion of the hips and knees.

This starting position begins familiarizing the athlete with the proper positioning and timing for the all-important second pull, and allows the double knee bend to occur naturally as it should with no specific instruction (other than perhaps the demonstration described in the Double Knee Bend section).


Mid-Hang Position

With a snatch-width hand placement and the hook grip on a PVC bar, the athlete will stand with the feet in the pulling position. The wrists should be neutral and the elbows rotated to point to the sides. This rotation of the elbows does not involve any scapular protraction—the athlete's shoulders should not round forward. The shoulder blades should be held in a neutral position and the rotation of the elbows achieved only with internal rotation of the arms.

The athlete will arch the back completely and push the hips back, bending the knees slightly, and, using the lats and shoulders to keep the bar in light contact with the legs, slide the bar down to the level of mid to upper thigh. The athlete should arrive in a position in which the shins are approximately vertical, the shoulders are slightly forward of both the bar and the knees, the arms are long and relaxed, and the face and gaze directed straight forward. The shoulder blades should remain in a neutral position, or very slightly retracted, and held tightly in place along with the spine. The shoulder blades will be slightly depressed in this position as a natural result of the spinal extension effort—no further intentional depression is necessary. The lats should be engaged forcefully to both aid in the extension of the upper back and the push of the bar back into the body.

Mid-Hang Position

Shins are approximately vertical.

Weight is balanced over the front edge of the heel.

Knees are bent slightly, back is set tightly in complete extension, shoulders are slightly in front of the bar and knees.

Bar is held in light contact against the mid to upper thigh.

Arms are long and loose, with the elbows turned out to the sides while keeping the shoulder blades neutral and lats engaged tightly.

Head and eyes are directed straight forward.

The athlete's weight should be over the heels more than the balls of the feet, and the hamstrings, glutes and back under obvious tension. If the hamstrings and glutes are not tight, the knees are either too far forward or bent too much. The knees should be pushed out to the sides slightly rather than directed straight forward.

The actual angle of the back and how far forward of the bar the shoulders are positioned will vary among athletes depending on their body segment lengths. The key points are approximately vertical shins, slight knee bend, and the shoulders slightly ahead of the bar and knees, but no farther forward than necessary.

Athletes will invariably want to move the bar farther down the thighs than they should, and over the course of a series of drills starting from the mid-hang position, the bar height will usually creep incrementally lower. It's very important in this early stage to establish the correct position; later when snatching, the athlete will be able to achieve a far more explosive finish and transition under the bar if he or she has the discipline (and the knowledge) to stay over the bar to this height on the thighs. Learning and practicing it at this point is far easier than attempting to correct premature hip extension later.

Jump

The initial drill, a jump from the mid-hang position, is simply to provide an opportunity for the athlete to feel a violent and abrupt concerted explosion of the hips and knees from the proper position while controlling the bar. The presence of this drill should not be misinterpreted to mean that we want the athlete to jump in the air when snatching, as has been discussed in multiple places previously. Too often athletes fixate on either hip or knee extension and neglect the other; this drill helps establish the feeling of both contributing simultaneously to the explosion effort,

Jump

Start in the mid-hang position. With no countermovement, jump vertically as high as possible while hyperextending the hips somewhat.

Keep the arms relaxed and push the bar into the hips with the back and shoulders.

and also teaches the feeling of timing the explosion high on the legs. This movement will not look exactly like the finish of a snatch; the point is not to mimic the lift perfectly, but to create an extremely quick, sharp extension of the hips and knees together.

Starting in the mid-hang position, the athlete will simply jump vertically while hyperextending the hips slightly, actively pushing the bar into the hips with a forceful activation of the back. Prior to each jump, the athlete should be sure to have his or her weight balanced toward the heels, and to prevent a last-moment shift to the balls of the feet before initiating the jump. It's equally important for the bar to start high on the thigh—this jumping motion must be extremely brief and violent. The height of the jump is secondary to the speed of the movement and the finished open position with vertical legs, the shoulders behind the hips and the bar pushed into the hips.


Jump Drill

Athletes will often perform what they believe the coach is looking for and attempt to execute a snatch pull, which typically means excessive hip extension and soft knees. It needs to be made clear that what we're looking for at this time is literally a jump—no need for interpretations—just an aggressive vertical drive against the floor and an attempt to hyperextend the hips against the bar. The movement will be refined as the athlete progresses.

This jump can be repeated several times until the athlete is moving quickly and aggressively, his or her weight is balanced correctly, the hips are opening past neutral and the bar is being actively pushed in against the hips.

Mid-Hang Snatch Pull

The mid-hang snatch pull brings together the aggressive concerted hip and knee extension of the previous jumping drill and the control necessary to channel it into what will become the snatch. The importance of learning and practicing this section correctly cannot be overstated. This movement—the second pull of the lift in isolation—is responsible for the overwhelming majority of the barbell's acceleration, and will feed directly into the transition and pull under the bar. It can be difficult for athletes initially to feel the movement and perform it properly with the weightlessness of a PVC bar; if needed, an empty barbell can be used in this stage to provide some feedback, and the PVC returned to for the following drills.

From the mid-hang position, the athlete will perform the extension practiced in the previous drill, focusing on extending the hips and pushing against the floor without jumping. The glutes must be activated to finalize the extension of the hips, or hyperextension will originate in the lower back rather than the hip joint. The feet should remain in the same position—if the athlete is sliding forward, he or she needs to keep the weight farther back over the feet and is likely ceasing the push against the floor prematurely; if the athlete is jumping backward, he or she needs to keep the weight farther forward over the feet, and is likely starting with the shoulders too far back and knees too far forward and bent too much.

With a forceful activation of the lats and shoulders, the athlete will actively push the bar back against the body as he or she extends. Contact prior to the hips is not necessary, and in fact it's preferable for the bar to remain in immediate proximity without contacting the thighs, and then smoothly come into full contact at the crease of the hips and remain in contact as the extension is completed. Never should the bar be allowed to swing away from the body either before or after it's contact with the hips.

The arms should remain as loose as possible during this extension—they remain straight not because the athlete is actively extending the elbows, but because the athlete is not bending them. The distinction between these two actions is important—stiff elbows will both slow the transition between the second and third pull, and force the bar to swing forward at the peak of the extension.

To this point, we have not instructed the athlete to shrug at the top of the extension, and this is wholly intentional. The shrug presents an interesting dilemma in teaching the lifts. Commonly athletes are obsessed with the idea of shrugging the bar up, of extending from the toes to the shoulders in order to lift the bar, and too often, their coaches and trainers reinforce or even teach this.

The shrug, often taught as a continuation of the lifter's upward extension, is not a part of the action that accelerates the barbell upward. In other words, during a snatch or clean an athlete should never be in a position of full ankle, knee and hip extension with a complete shrug. The shrug is part of the athlete's effort to pull under the bar; this being the case, it should not be occurring unless the athlete is presently moving down.

Mid-Hang Snatch Pull

Start in the mid-hang position holding the bar with the hook grip in a snatch width.

Perform the jump from the previous drill, but control the force in order to keep the balls of the feet in contact with the floor.

With the shoulders and lats, push the bar back against the body throughout the extension.

Extend the hips aggressively and slightly beyond neutral while simultaneously driving against the ground with the legs.

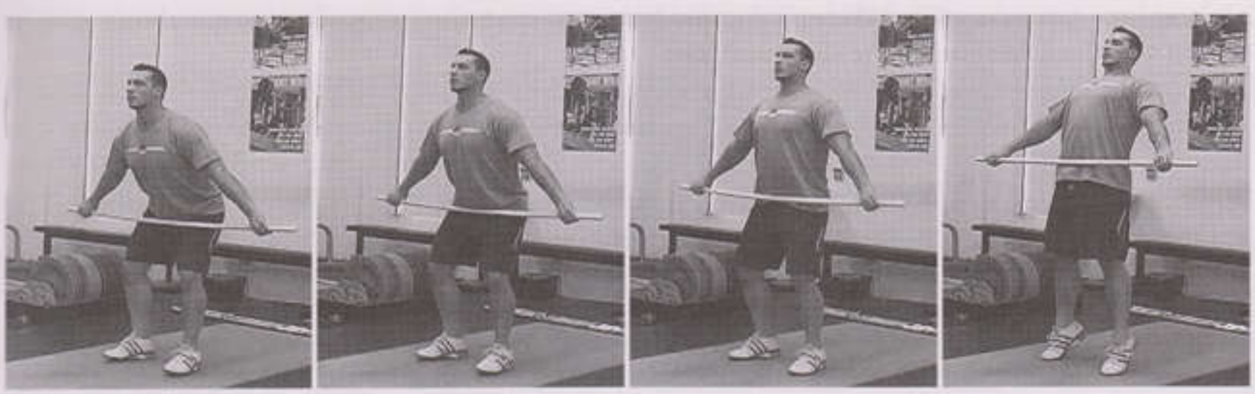
Relax and return to flat feet immediately after extending.

At this point, however, it is difficult to eliminate any upward movement of the shoulders at the peak of extension. If they are relaxed and allowed to move freely as they should, they will naturally pop up slightly as the athlete completes hip and knee extension. This is not a concern and should be allowed to happen. The key is avoiding an effort to actively shrug the barbell up and instead focusing on knee and hip extension.

This movement can be performed as slowly as necessary initially for the athlete to master it. Again, the importance of correct positioning and movement here eclipses speed. For example, the athlete may start at the upper thigh and slowly extend into a position in which the legs are vertical and the hips hyperextended slightly, placing the shoulders slightly behind the hips. When performing this movement slowly, the athlete should remain flat-footed and maintain the weight toward the heels.

Once the fundamental positioning and movement is established, speed can be increased as tolerated until the athlete is able to perform the movement as we ultimately desire, which is of course as fast as possible. If the athlete is struggling, he or she should return to the initial jump to regain the feel of the concerted, abrupt and violent hip and leg extension, and progressively work back to this final pull.

Irrespective of any given rep's speed of execution, the athlete should not pause at the peak of extension. This will encourage the habit of prolonging the extension during the lift and result in a reduced



Mid-hang snatch pull

window for the lifter to pull under the bar to receive it. The final extension of the lifts must be reached violently and the direction of the lifter reversed immediately. In fact, the final explosion at the top and the transition under the bar should ultimately be considered a single fluid action. Time spent in extension after the accelerating force has been applied to the bar is merely time the bar has to lose its upward momentum and begin falling. As mentioned previously, it's critical the athlete not continue trying to extend the body after it's already extended fully—this over-pulling during the snatch or clean is disastrous. At the peak of the extension, the athlete should immediately drop back to flat-footed and allow the shoulders to drop to their neutral position.

Static ankle extension (left) and dynamic ankle extension (right): If the ankles are held in extension, the athlete's center of mass will have to shift forward to remain balanced; If the ankle extension is quick and not maintained, the athlete can keep his or her center of mass farther behind the center of pressure on the feet to achieve the desired positioning.

This return to flat feet is of particular importance because of the effect prolonged ankle extension will have on body position. If supported on the toes statically, the lifter must shift the body forward in order to remain balanced over this new base. If this extension is not prolonged unnecessarily, the weight of the lifter can remain balanced farther back over the foot even as it loses contact with the platform. In other words, the athlete's weight must remain over the same base to ensure correct body positioning and balance. Athletes often accomplish this best by thinking of driving through the heels throughout the movement; however, this is merely a cue and in no way suggests the center of pressure is actually the heel—the center of pressure will shift to the balls of the feet as the athlete completes the extension effort, even though the line of gravity will remain farther back over the foot.

There are a number of considerations with regard to the extension of the ankles during the second pull of the snatch or clean. The classic notion of triple extension—hips, knees and ankles (and usually including a shrug of the bar upward as well)—assumes that this produces the greatest elevation and acceleration of the barbell. Whatever elevation ankle extension produces on the bar it also produces on the athlete; that is, it's not achieving any greater net elevation of the bar. This of course is also true of hip and knee extension. What distinguishes the latter two from the former, however, is the far greater magnitude of acceleration they're able to achieve.

The structure of the ankle in the context of plantar flexion—what we've been referring to as ankle extension—is one that is able to produce great magnitudes of force due to the class-two lever created with the insertion of the calf muscles behind the ankle joint. That is, the force lever arm—from the fulcrum of the balls of the foot—to the point of force application—the insertion of the calf muscles—is longer than the resistance lever arm from the fulcrum to the point of loading—the attachment of the body and barbell at the ankle joint.

This unusual mechanical advantage allows extremely heavy loads to be lifted through ankle extension; however, it simultaneously results in less potential movement speed. In any case of mechanical advantage, the end of the force lever must travel farther than the end of the resistance lever arm; that is, the calf muscles must contract a great deal to produce relatively little motion, and consequently less speed is possible. How much ankle extension is able to contribute to the drive against the ground varies a great deal among athletes, depending largely on the genetically-determined composition of the calf muscles (i.e. those with a greater percentage of fast-twitch fibers in the calves will be capable of generating more acceleration through ankle extension) and to a lesser extent training that improves the power of the calves.

All this being said, ankle extension is naturally coupled with aggressive extension of the knees and hips. A simple way to illustrate this is to instruct an athlete to perform a standing vertical jump without extending his or her ankles—the resulting jump will not only be remarkably awkward, but its height not even measurable on the same scale as a natural vertical jump effort. In short, if an athlete makes an effort to violently extend the knees and hips, the ankles will extend naturally to some degree without any direct action.

Very little ankle extension occurs during the lifts of numerous world-caliber weightlifters. This is usually not, however, a result of these athletes not aggressively driving against the ground as they extend the hips; rather, it's a result of these athletes being extraordinarily proficient in transitioning into the pull under the bar. In other words, the timing of their change of direction begins pulling them down before the ankles extend any further, but not before the extension of the knees and hips has imparted the necessary upward acceleration on the barbell. (In some cases, a lifter does in fact use less leg drive or discontinues the leg drive earlier and relies more on hip extension and the pull under the bar.)

All of this boils down to a single critical point. Primarily, ankle extension, just like the double knee bend, should not be performed intentionally—it should be allowed to occur as a result of violent concerted knee and hip extension. Intentional extension is not only unnecessary, but will actually become counterproductive in the same manner as attempting to complete a shrug at the top of the extension—that is, it will delay the transition between the upward acceleration of the bar and the downward movement of the athlete, limiting the opportunity to complete the pull under, as well as more than likely shift the athlete's center of mass forward undesirably.

This again means that during this mid-hang snatch pull drill, like the shrug, ankle extension must not be prolonged—the athlete must immediately drop after finalizing the hip and knee explosion.

Tall Muscle Snatch

The tall snatch drill is simply the movement of the arms during the third pull. At this point, the progression has diverged from strict reality by bending the arms to elevate the bar without any downward movement of the athlete. That is, in an actual snatch, the arms bend only to pull the lifter underneath the bar, and consequently, we should see no elbow flexion without concurrent downward travel of the lifter's body to at least some degree. At this stage, however, we need to isolate and establish the movement pattern of the

Tall muscle snatch

arms before integrating it with surrounding details.

Beginning in the tall position—the athlete standing erect—the movement is initiated by a slight backward lean of the torso and an aggressive pull with the arms, bringing the elbows as high as possible and out to the sides. A shrug of the shoulder blades will naturally accompany the effort to maximally elevate the elbows—it should not be performed as an isolated movement.

The importance of rotating the elbows outward should become apparent here. This orientation will allow the elbows to travel up and to the sides as the arms are flexed, which allows the bar to remain close to the body as it travels up. During the snatch, this upward and outward pull of the elbows is imperative to maintaining proximity of the barbell and body to maximize mechanics, speed and accuracy. If the elbows are not turned out maximally from the start, it's very unlikely they will be adequately rotated in time for the pull under the bar. Instead, the elbows will move backward, swinging the bar and body away from each other and greatly limiting the power of the pull under.

Once the elbows reach their maximum height, the athlete will turn the arms over to bring the bar into the overhead position, keeping the bar traveling as close to the face as possible by tightly retracting the shoulder blades. The elbows should never drop from their elevated position—they should remain in approximately the same position as the arms turn over, and then drive up as they extend to finalize the overhead position.

As the hands reach the top of the movement, the wrists should be flipped over and allowed to settle back with a relaxed hand as described previously with regard to the receiving position. This flipping of the wrist and relaxing of the hand should allow the hook grip to be released smoothly and quickly, although the weightlessness of PVC pipe will make this more difficult. The thumb should be slid out without the hands opening any more than necessary, and only as the wrist begins moving back into extension—if the hook is released earlier, the lifter is sacrificing the grip while still pulling against the bar. Tthe bar should be secured tightly overhead with aggressive elbow extension, retracted shoulder blades, and the heels of the palms pushed up.

Often athletes will intentionally flex the wrists during the snatch and clean in the mistaken belief (or according to the request of a coach) that it's a necessary action to keep the bar close to the body. It should be understood that wrist flexion will occur naturally during the third pull of both lifts due to the activation of arm flexor groups, and that the wrists should be allowed to remain neutral during the first and second pulls (or very slightly flexed as described in the Hook Grip chapter). Premature wrist flexion is similar in effect to premature elbow flexion in that it creates a component in the chain that can be re-extended by the power of the knee and hip extension, reducing the transfer of power to the bar. Bar and body proximity should be achieved with the action of the back and shoulders.

This drill can and should be initially performed slowly to ensure correct movement. The bar must remain as close to the body as possible as it travels up into place, and the elbows must travel high and to the sides. Initially this may be difficult due to limitations in shoulder flexibility, but mobility will improve with practice. Once the movement is sound at low speeds, it can be executed as rapidly as possible.

Tall Muscle Snatch

Start standing tall, holding the bar with the hook grip in a snatch width, with the arms long and loose and the elbows turned to the sides.

Lean the torso back slightly, pull the elbows as high as possible and to the sides, keeping the bar as close to the body as possible.

As the elbows reach maximal height, rotate the bar overhead while driving up, keeping the bar close to the face.

As the bar is turned over, flip the wrists, relax the hands, and drive the heels of the palms up.

Secure the overhead position with fully retracted shoulder blades, aggressively extended elbows, and relaxed hands with no hook grip.

Scarecrow Snatch

The scarecrow snatch drill is a variation of the tall snatch exercise in which the bar begins in a higher position to focus on the most important principle of this section—learning the action of pulling under the bar with the proper mechanics—before adding another layer of complexity.

The athlete will begin standing with the feet in the pulling position and the elbows maximally elevated and out to the sides with the bar against the body—what we'll call for obvious reasons the scarecrow position. From here, the athlete will pull him- or herself under the bar as aggressively as possible, turning it over into the overhead position while moving the feet from the pulling to the receiving position, initially landing at approximately quarter squat depth.

The movement should be initiated with a very slight backward lean just as there was in the counterpart section of the muscle snatch. It will also be helpful to attempt to initiate the foot transition before the pull under—this will encourage the two to occur simultaneously. If the athlete instead attempts to pull first with the arms or even at the same time the feet move, there will typically be a delay before the feet actually move, transforming the drill of pulling under the bar into one of lifting the bar up.

The movement of the arms is identical to that practiced in the muscle snatch drills, and the movement of the feet is identical to the foot positioning drill practiced previously. Again, the feet should lose contact with the platform only enough to replace them in their new position—no additional elevation should be achieved. A sharp clap as the feet land again can be expected as an indicator of speed and aggressiveness. However, focusing on creating this noise can encourage too much foot elevation, so the sound should considered diagnostic marker rather than a cue. Although the athlete will attempt to pull under the bar while elevating it as little as possible, the bar will travel upward unavoidably due to its extremely light weight.

This movement introduces the feeling of turning over the bar while transitioning the feet as will

Scarecrow Snatch

Begin standing tall with a snatch-width grip on the bar, the elbows elevated as high as possible and out to the sides, and the bar in contact with the chest.

Initiate the transition of the feet from the pulling position to the receiving position while performing the upper body movement of the muscle snatch to pull under the bar.

Secure the bar aggressively in the overhead position in a squat.

Scarecrow power snatch (top); Scarecrow snatch (bottom) occur during the third pull of the lift. The athlete should attempt to snap the bar into place overhead at the same time the feet reconnect with the platform. Although in the snatch the feet will actually reconnect with the platform before the bar reaches its final position overhead, the effort will encourage speed and decisiveness that will carry over into the lift. The athlete should emphasize a forceful drive up on the bar as he or she contacts the platform again. Once settled in this receiving position, the athlete will recover to a standing position with the bar still overhead.

When the athlete is able to perform this drill satisfactorily in terms of position, movement and speed, it should be performed with a full squat receiving position. With the full squat variation of the drill, the athlete should still attempt to complete the turnover of the bar as quickly as possible. Because there is virtually no weight, this turnover will be completed relatively early in the movement and with the athlete in a relatively high squat position. This will happen with the snatch as well—that is, depending on the weight on the bar, the turnover may be completed considerably high—so the athlete needs to begin practicing receiving the bar at this height and smoothly continuing into the bottom of the squat with the bar already secured overhead.

A common mistake is to allow the speed of the turnover to drop when moving into a full squat receiving position because there appears to be more time. In reality, even the heaviest snatches will be received at least slightly above the bottom of the squat, and the height of receipt will be closely related to the weight on the bar, so the athlete will need to be accustomed to securing the bar overhead as quickly as possible and riding it down into the squat without hesitation.

Tall Snatch

Building on the movement of the scarecrow snatch, the tall snatch is an identical movement that begins with the arms extended rather than bent. Like the muscle snatch, the tall snatch will have application later as a training exercise to help improve the athlete's third pull speed and accuracy, although it will remain a technique drill with little utility for strength development.

Starting in the tall position with the feet in the pulling position and flat on the platform, the athlete will begin by leaning back slightly and initiating the transition of the feet to the receiving position, immediately pulling under with the arms violently into a quarter squat position.

Because this drill begins prior to the elbows' elevation, athletes will have a tendency to stiffen the elbows and swing the bar away from the body. The elbows must be turned out completely in the starting position, the arms relaxed as much as possible, and focus directed on pulling the elbows to the sides as they travel up.

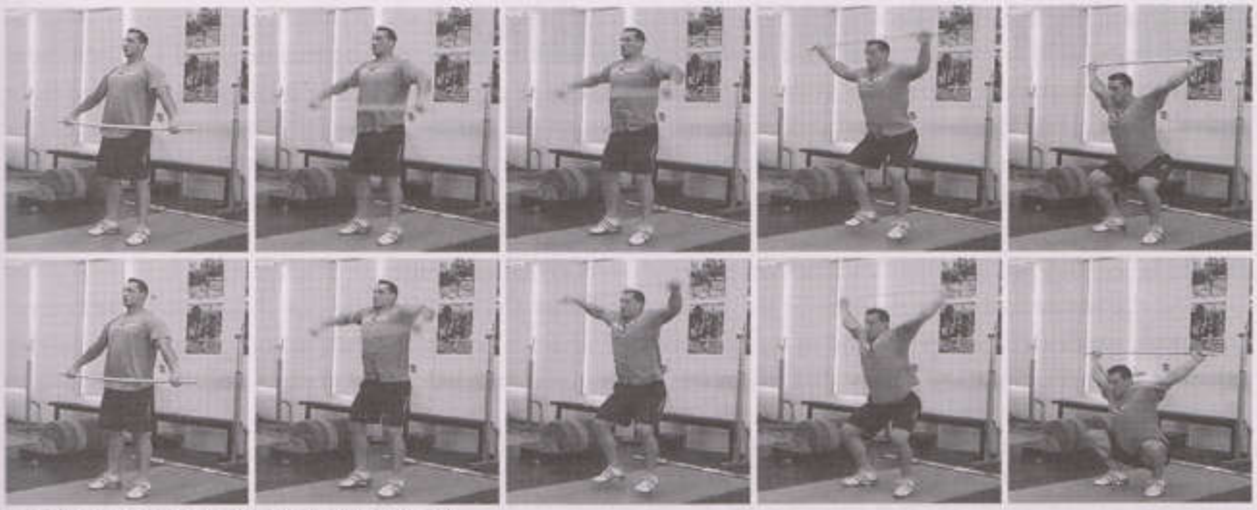
The tall snatch is sometimes begun with the athlete on the toes instead of flat-footed, the idea being to eliminate even more of the ability to elevate the barbell to increase the required aggressiveness of the pull under. The principle notwithstanding, this is arguably counterproductive. By forcing the athlete to balance on the toes, we shift his or her weight forward in a way that will not—or should not—occur in the actual lift. Even when considerable ankle extension occurs in the snatch, the center of mass of the athlete and barbell remains farther back over the foot, as discussed previously. This cannot happen in a static ankle extension position because without movement, the

Tall Snatch

Begin standing tall with the bar in a snatch-width grip at arms' length, the shoulders neutral and the elbows turned out to the sides maximally.

Initiate the transition of the feet from the pulling position to the receiving position while performing the upper body movement of the muscle snatch.

Receive and secure the bar in the overhead position and finish in an overhead squat.



Tall power snatch (top); Talll snatch (bottom)

athlete cannot balance over an unsupported point. If we consider our priorities, positioning supercedes movement, and beginning on extended ankles with the weight so far forward is a violation of correct positioning.

Again, because the bar is essentially weightless, it will travel up significantly even with the athlete attempting to pull his or her body down underneath it—it has no considerable inertia to resist the force being applied to it. The timing and mechanics are more important than the actual height of the bar in this case.

Once the tall snatch can be performed well at the quarter squat depth, the athlete should progress to receiving the bar in a full squat. The same attempt discussed with regard to the scarecrow snatch to complete the turnover of the bar as quickly as possible and ride the overhead squat to the bottom fluidly applies here as well.

Mid-Hang Snatch

The final drill assembles all the elements of the previous sections into a mid-hang snatch—initially, a power snatch. The lift is defined as mid-hang because of the mid-thigh starting position, and power because the bar is received with the athlete's thighs above horizontal. Again, beginning with the power variation simply reduces the number of considerations for the athlete and allows more focus for the remaining components of the movement. As was discussed previously, a power snatch should be identical in terms of mechanics to a snatch, so the transition between the two should involve nothing more than the athlete simply controlling the force of the extension and pulling under the bar more aggressively. However, as was covered early in the book, because of the extreme light weight of the PVC bar, the athlete will not be able to pull all the way into a full squat, but will end up receiving somewhat higher

Mid-Hang Snatch

This is simply the previous drills assembled into one fluid movement.

Begin in the mid-hang position with a snatch-width grip.

Extend the hips explosively while pushing against the floor, actively pushing the bar back into the hips.

As the hips snap open, transition the feet immediately to the receiving position while pulling aggressively under the bar with the elbows oriented to the sides.

Secure the bar overhead aggressively in an overhead squat.

and riding down into the bottom position.

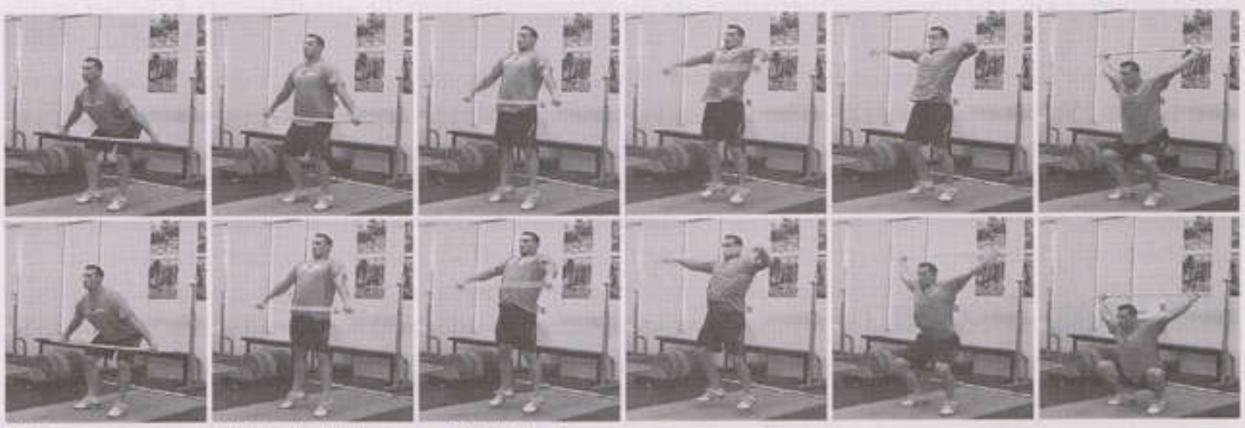
Beginning with the bar at mid to upper thigh with the feet in the pulling position and a snatch hand placement with the hook grip, the athlete will extend the hips explosively while pushing against the floor with the legs, using the back and shoulders to actively push the bar back into the hips.

As the hips finish extending, the athlete will immediately initiate the pull under the bar with the arms while transitioning the feet, keeping the elbows rotated to the sides and the bar as close to the body as possible. The completion of the extension should transition seamlessly into the pull under the bar—it should be considered a single fluid motion rather than two distinct stages.

As the bar and athlete pass each other, the lifter will turn the bar over and punch it up into the correct overhead position, whether that be in a full or partial squat. The athlete should settle into the receiving position for a moment and verify that his or her positioning and balance is correct before recovering to the standing position with the bar still overhead.

Even if having little difficulty to this point, many athletes will struggle making the leap to this section, as evidenced by protracted moments of consideration before the movement. It's important to remember that at this point the body already knows the movement surprisingly well. It has practiced its constituent elements—ostensibly correctly and in reasonable volume—and the motor patterns exist in at least a basic and temporary sense. The more the athlete can remove the conscious mind from the movement, the more accurately the movement will be executed. Without rushing unnecessarily between reps, don't allow analysis of the movement before its performance—let the body move as it knows how to do.

The athlete has now performed a basic snatch. The starting position of the bar can now be moved down to its ultimate destination—the floor.



Mid-hang power snatch (top); Mid-hang snatch (bottom)

PROGRESSING TO THE BAR

To the basic movement pattern of the snatch established with the PVC bar, we need to begin adding weight incrementally to allow the athlete to execute the lift with increasing degrees of resistance until able to use at least a regulation barbell. In cases of young lifters, we may not actually progress to a regulation bar, and instead begin training the lifts from the floor with a lighter technique or junior bar. The movement to a barbell is not only the obvious necessary progression to being able to snatch with weight, but the weight of a barbell will allow the lifter to better feel the movement and further refine the technique that was established with the PVC bar.

The decision to transition directly to a regulation bar (20 kg for men and 15 kg for women) or to some kind of intermediate bar (e.g. 5-10 kg training bar) should be made based on each athlete's strength and consistency with the movements. When in doubt, err on the light side. It will be immediately obvious if the athlete can handle a given light bar and the weight can be increased. If instead the athlete moves directly to a regulation bar and struggles, the process slows and frustration ensues. Keep in mind that no benefit will come from attempting to lift a heavier load if that attempt results in divergence from the desired technique, and it will in fact be wholly counterproductive.

The Grip

Step one with the new bar is finding the lifter's hand placement. This should be accomplished in the same way it was with the PVC bar. Once the hands are placed, their position relative to landmarks on the bar should be noted to allow the athlete to more quickly and easily place the hands correctly on the bar. When lifting from the floor, the athlete will obviously not be able to first lift the bar to the tall position and adjust the grip based on the bar's position relative to the hips; he or she must be able to grip the bar with confidence in the hand placement's correctness.

Inconsistency in hand placement on the bar will lead to inconsistency in every other aspect of the lift. For the athlete, this means difficulty progressing with technique development; for the coach, this means difficulty recognizing the source of faults and consequently unnecessary trouble correcting them. Adjustments to hand placement can be made as needed to accommodate each athlete, but these adjustments need to be deliberate and evaluated fairly before being changed again.

The Support Positions

With the athlete now handling an implement with some mass and consequently at least some ability to influence his or her movement and positioning, we need to ensure the integrity of the basic support and receiving positions before proceeding, which will also establish confidence for the lifter.

Overhead Squat

Until the overhead squat is sound, athletes are encouraged to train only the power snatch with any considerable loading and train the snatch with only technique loads. These power snatches should whenever possible and practical be followed by overhead squats to allow practice and active flexibility work.

The athlete should fix the bar in the correct overhead position and squat slowly, pausing in the bottom. This bottom position should be evaluated against the criteria set forth previously in terms of squat stance and bar placement. After making any necessary adjustments, the athlete can recover and repeat a number of controlled overhead squats to further adjust and practice the movement and positions. Again, if the position criteria cannot be met through intentional adjustments—as with the case of flexibility limitations—the athlete will need to spend a period of time developing the overhead squat in isolation and limiting his or her fully loaded snatching to the power variation.

Snatch Balance

With the positions and movements of the overhead squat re-established with a barbell, the athlete can progress to the snatch balance. Initially, we followed the three-step snatch balance series to introduce in increments the final snatch balance. This progression shouldn't be necessary at this point, but it can be returned to if the athlete is struggling with the exercise.

With the feet in the pulling position, the bar racked across the back of the shoulders, and the hands in a snatch-width placement with no hook grip, the athlete will draw in a full breath and lock down the torso. Popping the bar with a dip and drive of the knees just enough to unload it momentarily, he or she will aggressively drive under the bar, quickly transitioning the feet with as little elevation as possible into the receiving position and receiving the bar with locked elbows near the bottom of the squat, continuing into full depth and maintaining this bottom position until stabilized completely.

The athlete should attempt to time the lockout of the elbows and replacement of the feet simultaneously—however, as mentioned previously, the feet will in fact reconnect with the platform first; it's the effort in which we're interested. We're attempting to receive in a deep squat, but somewhat short of absolute bottom to provide a small margin to absorb what will eventually be a great deal of force. Irrespective of the depth at which the athlete fixes the weight overhead, he or she should continue squatting to full depth, and with practice, improve the consistency of depth by minimizing the upward drive of the bar and maximizing the speed of the drive underneath it.

The snatch balance must move the bar in a completely vertical path in order to allow a stable receipt. Any forward leaning of the torso during the initial heave should be corrected as soon as possible—this is a problematic habit that will be much more difficult to correct later.

Missing

Before progressing to snatching, it's important to familiarize the athlete with strategies for escaping immanent doom. Bailing out of a failed snatch isn't complicated, but it does require commitment and a strategy that has become second nature before its employment is needed—under a heavy bar that's threatening to split the athlete in half or injure a shoulder, elbow or wrist, is neither a good time nor place to consider exit strategies.

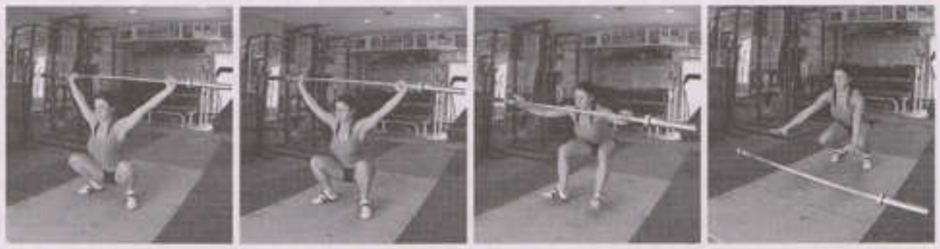
There are two directions to dump the bar with a failed snatch: forward or backward. Even if a lifter somehow manages to be losing control of a bar to the side, dumping it either forward or backward is necessary—no athlete, irrespective of talent and strength, can launch a seven-foot-long barbell far enough to the side to avoid its downward path.

Keep in mind, the location and present direction of travel of the bar determines the dumping location, not the lifter's preference. The athlete is simply guiding the bar and body safely away from each other; heavy weights with momentum in such a position cannot be controlled more than this.

It's important to maintain clear lifting areas. Bumpers, change, other bars, architecture and small children can all be objects onto which a bar may fall and off of which it may subsequently bounce unexpectedly, setting up some potentially ugly collisions.

Forward

Dumping a bar forward is the easiest direction because it will require the least movement of the lifter, flexibility is not an issue, and the bar will be in the lifter's field of vision. Typically this happens involuntarily when a lifter leaves the bar out front during the pull or fails to turn it over aggressively enough—it will simply come to rest overhead in front of the lifter's base and promptly fall right back to the floor.



Missing a failed snatch in front

More of a concern are the instances in which the bar lands correctly in the slot directly overhead, but for one reason or another, one or both of the lifter's arms fail to lock and the bar begins descending. In these cases, the lifter must actively push the bar forward, keeping the arms as long as possible, and jump backward (Note that this is assuming the bar is directly overhead or slightly forward. If when an elbow or the elbows break the bar begins to favor the back, that's the direction in which it must be dumped.). Attempting to jump the feet backward as the bar is pushed forward is important to avoid having the bar fall onto the knees or thighs.

Backward

Three things are critical when dumping a barbell backward: extending the arms as fully as possible, loosening the grip on the bar, and jumping forward. Extending the arms or keeping them extended will maximize the radius of the falling bar's arc, creating more safe space for the lifter. However, not all athletes will have the shoulder flexibility to maintain their grip on the bar throughout said arc—it's therefore important that they open their grip on the bar as it travels down, ideally letting it go at the farthest possible point behind them. At the same time, the lifter must jump forward as far as possible to prevent the bar from dropping onto his or her lower back.

Missing a failed snatch behind

Mid-Hang Snatch

With the demonstration of sound receiving positions and movements with the barbell and practice of missing failed lifts now completed satisfactorily, the athlete can move on to snatching the bar from the mid-hang. This will be the first opportunity to evaluate the integrity of the snatch technique when challenged with a less cooperative load. Any lack of aggression or accuracy masked by the weightlessness of the PVC bar will now become very apparent—the athlete will be forced to accelerate and control the bar to a much great degree. Both power snatches and snatches should be practiced at this point.

These mid-hang snatches should be evaluated according to the same criteria used in the final learning drill. The feet should begin in the pulling position with the weight centered at the front of the heels, the knees bent slightly and shins approximately vertical, the shoulders slightly forward of the bar, the back set in complete extension, the bar held in light contact with the mid to upper thigh by the lats, and the elbows turned out completely. The athlete should not be allowed to rush any reps such that he or she fails to establish the correct starting position—many will attempt to blast through several consecutive reps without the slightest pause, and in doing so will waste everyone's time by failing to ever place themselves into the proper starting position, preventing the possibility of entirely correct movement.

From this starting position, the athlete will extend the hips violently while pushing against the floor, continuing to push the bar back into the hips with the lats. Immediately upon finalizing hip extension with the glutes, the lifter will move under the bar by pulling the elbows up and out aggressively before turning the bar over and fixing it overhead forcefully as the feet transition rapidly into the receiving position on the platform.

Now that the bar has weight of its own, however little at this point, it has the ability to affect the lifter's body position and balance. Very common at this stage will be the athlete either receiving the bar too far forward, or actually jumping forward in order to receive it in the correct overhead position. This is a result of the forward shift, albeit minor with only an empty bar, of the combined center of mass of the bar-lifter unit and the athlete's inability to now easily direct the bar in any chosen manner. If the athlete attempts to extend his or her body perfectly vertically, the bar will remain in front of the lifter's base and will pull him or her forward. Again, the center of mass should remain slightly behind the middle of the foot with the hips hyperextended slightly to place the shoulders behind the hips in the final extension position.

It's imperative at this point to ensure the athlete actively drives up on the bar as it's turned over into the overhead position. Soft elbows and shoulders with an empty bar will evolve into serious trouble as the weight increases. The feet should reconnect with the platform flat, not with the balls of the feet first.

Until this snatch variation is executed with decent technique, there is no reason to proceed. Typically continued practice with the bar along with feedback on errors will be sufficient. If glaring technical problems exist and are not quickly remedied with coaching cues, the athlete can return to the learning progression drills with the PVC bar to re-establish the fundamentals.

MOVING TO THE FLOOR

At this point, the athlete is able to perform a snatch and power snatch from the mid-hang position with a barbell. To complete the snatch, we need to introduce the pull from the floor. The addition of the first pull often proves surprisingly difficult for many athletes and may temporarily disrupt their technique; however, with a smart progression and proper attention to the principles, this section of the movement can be learned quickly and correctly. It's helpful for the athlete to practice snatching from the hang with the additional weight of technique plates before starting from the floor with this additional loading.

Starting Position

Our first step in teaching the pull from the floor is of course the starting position. This will be discussed in much greater detail in the following section; for now, we simply need to place the athlete in a sound position to bring the bar from the floor to the mid-hang position from which he or she is comfortable snatching. Flexibility will be a limiting factor for many athletes at this point and a considerable number of them will be unable to achieve the correct position initially. In this early stage it's more important to work on learning the basic position with regard to knee and hip angles, bar position and balance over the feet than to have a perfectly arched back, which might only be possible by altering the starting position significantly. However, flexibility needs to be made a priority so this can be improved as quickly as possible.

How much weight is used at this stage can be left to the coach's discretion, but there is no good reason to use anything more than light technique plates. The only requirement is setting the bar at the height at which it will start with regulation bumper plates. If light enough technique plates are not available, this can be achieved with an empty bar placed on blocks to elevate the bar appropriately.

The snatch starting position: The arms should be approximately vertical, placing the shoulders slightly forward of the bar, with the bar over the balls of the feet, the head and eyes up, and the knees flared out to the sides.

We have two basic criteria for the starting position. First, the barbell should be placed approximately over the balls of the feet; second, the arms should be oriented approximately vertically when viewed from the side of the athlete.

The feet will remain in the same pulling position used to this point, and the knees will be flared to the sides as much as the arms will allow. The back should be set in complete extension with an upright posture and the head oriented straight forward along with the eyes. The elbows must be turned out to the sides completely.

Snatch Segment Deadlift & Halting Deadlift

In order to teach the correct positioning during the pull of the barbell from the floor to the upper thigh where the athlete will initiate the final explosion, we will use a segment deadlift, also known as a pause deadlift. This is simply a deadlift with the snatch pulling posture that uses pauses at multiple positions on the way up to ensure correct posture and balance.

The athlete should tighten the starting position and break the bar off the floor smoothly—no jerking should occur. The movement at this stage should be slow and controlled with a focus on maintaining correct positioning.

The first pause will be with the plates approximately 1 inch off the floor. This is much sooner than athletes think—most will stop several inches after the bar has separated. The attempt should simply be made to stop and hold the moment the bar separates from the platform. At this point, the arms should still be approximately vertical, but now the weight should be back more toward the heels than the balls of the feet as it may have been when the bar first left the floor. In other words, this first brief movement simply breaks the bar and shifts the weight back over the feet while maintaining the upright posture. The bar can be in very light contact with the shins, but should not be pushed back into them forcefully.

After holding this position with the proper balance for 2-3 seconds, the lifter will continue pushing with the legs until the barbell reaches the level of the knees and stop again. The balance should still be over the front edge of the heel and the arms approximately vertical. The knees should still be pushed out to the sides as they were in the starting position. Like the first position, the bar can be in light contact with the knees, but should not be pushed back into them forcefully.

After holding this position at the knees for 2-3 seconds, the lifter will proceed to the final pause position at mid to upper thigh. This will be the same mid-hang position practiced earlier, with the shins vertical and the shoulders slightly forward of the bar and the knees, the bar being actively pushed back into the body and the weight near the heels. The knees will still be flared to the sides somewhat, but to a lesser degree than when at the knee position.

Moving to and between these pause positions is accomplished primarily though knee extension, or

Snatch Segment deadlift. Left to right: Starting position; 1" from floor; knee; upper thigh (this will be the pause position for the halting snatch deadlift and for the segment snatch).

pushing with the legs against the floor. The angle of the back will stay approximately constant from the first position to the second position. From the knee to upper thigh, the hips will usually need to open somewhat along with the knee extension to prevent the lifter's shoulders from leaning too far forward over the bar. However, this hip extension should be minimal, the shoulders need to remain in front of the bar, and the majority of the movement accomplished through knee extension—aside from placing the lifter in the correct position to complete the final explosion at the top of the lift, this movement is laying the groundwork for the timing of this explosion. The athlete should not raise the hips without simultaneously raising the shoulders; this will tip him or her forward too far over the bar.

After holding this final upper thigh position, the athlete will stand into a simulated finish position by completing the extension of the knees and hips together, finishing flat-footed with the weight back toward the heels, the legs vertical, the hips slightly hyperextended with the bar in full contact and being actively pushed back into the body with the lats, and the shoulders slightly behind the hips.

The athlete should attempt to return the bar to the floor in a controlled manner through the same positions used on the way up to start a subsequent rep. Sets of 2-3 reps will allow practice without excessive fatigue of the back from holding the pause positions.

When the segment deadlift can be performed correctly, we will remove the first two pause positions and stop only at upper thigh for 2-3 seconds before moving into the simulated finish position. This movement is more commonly called a halting snatch deadlift. The lift should be performed slowly and the athlete's positions should remain identical to when performing the segment deadlift.

Segment Snatch & Snatch

Once the previous two snatch deadlift variations can be performed satisfactorily, the athlete can proceed to the next stages. This will first involve a segment snatch, and then finish with a complete snatch from the floor.

The lifter will perform a slow and controlled halting snatch deadlift to mid to upper thigh, ensure perfect positioning and hold for 2-3 seconds, then perform a power snatch or snatch directly from this hang position. Sets should be kept to 2-3 reps at the most.

When this is done consistently well, the pause should be removed and the snatch performed directly from the floor. However, at this point the pull from the floor to the upper thigh should still be slow and controlled—if necessary for correct positioning, extremely slow in fact. The priority is maintaining correct positioning, and more specifically, moving into the correct mid to upper thigh position before initiating the final explosion of the hips and knees. Speed will be added to the first pull as the lifter's technical proficiency improves over time.

THE COMPLETE SNATCH

At this point, the athlete has performed the snatch with a loaded barbell from the floor in at least a rudimentary fashion. Some athletes will already be demonstrating impressive technique at this stage; others will still be struggling with consistency, speed and accuracy. The following section expands on the information presented briefly in the context of the learning progression. For athletes at this point who are not yet comfortable with their technical performance of the snatch, it's advised to skip this section and focus on practicing the lift and its variations (e.g. hang and power) until a reasonable level of consistency is developed and the following information will be useful rather than overwhelming.

The Starting Position

The importance of the starting position is often underestimated and the resulting lack of attention it receives leads to unnecessary difficulty with technical proficiency. As was discussed previously, the hierarchy of technical aspects will remain sound guiding principles throughout both the learning process and the athlete's training career. At the top of this hierarchy—or possibly more appropriately viewed as the base—is position. It is impossible to generate a correct movement from an incorrect position, and neglect of this principle is responsible for a great deal of frustration and wasted training time and energy.

In slower movements such as the deadlift, the athlete can typically compensate to a fairly large degree for a poor starting position through adjustments during the lift. However, if we consider the ability to make such adjustments in terms of the time available, the degree to which this adjustment is possible is dramatically reduced in lifts as fast as the snatch, clean or jerk. While a maximal effort deadlift may take several seconds to complete, a maximal effort snatch by a technically proficient athlete will take approximately one-two seconds from the time the bar leaves the platform to the time it's received overhead. Considering the movement that must occur and the distance that must be

The snatch starting position: The arms should be approximately vertical, placing the shoulders slightly forward of the bar, with the bar over the balls of the feet.

covered in this remarkably brief timeframe, it's clear the opportunity for correction during the lift itself is extremely limited. This being the case, it's imperative that the starting position be correct and consistent to allow the athlete to execute the movement properly.

Distilled to its seemingly obvious essence, the purpose of the starting position is to allow the proper execution of the lift. Because the heart of the snatch and clean is the second pull, this purpose can be further refined to preparing the athlete for the ideal second pull in terms of positioning, speed and muscle contribution and preparation. In short, the starting position must be the one that optimizes the second pull—everything else is secondary to this objective.

The primary positioning goal in the start of the lift is an upright back angle for five basic reasons. First, this more upright angle minimizes the torque on the hip and spinal joints and consequently reduces fatigue of the spinal extensors during the first pull. Because the back is the most easily fatigued part of the chain, and these muscles are responsible for maintaining the rigidity of the spine, more fatigue of the back early in the lift will mean less rigidity during the second pull. Rigidity in the spine during the second pull (and throughout the lift) is critical because the back is the connection from the hips and knees to the barbell. The more rigid the spine during the violent explosion of the knees and hips, the more completely that power is transmitted to the bar; a loss of rigidity means some of that hip and knee extension power is absorbed by the back softening under the force.

Second, the reduced torque on the hips with a more upright back angle allows greater hip extension speed during the second pull because the lower degree of initial torque allows better acceleration and creates less fatigue. This briefer and smaller extension of the hips also makes the timing of the final explosion and transition under the bar easier.

Third, the shorter rotational distance of the torso during the second pull with an upright posture minimizes the demands on balance maintenance and allows the athlete to focus more on the power of execution rather than the balance of the system.

Fourth, such an upright posture encourages the bar to remain close to the body where it needs to be without as much additional effort due to the angle of the arms being nearer to their natural loaded orientation. That is, the closer the arms are to vertical, the less work the athlete must do in order to bring the bar back into the body.

Finally, athletes will generally feel more comfortable in a more upright position and consequently be better prepared psychologically for a successful lift.

This call for such an upright torso should not be misinterpreted to mean we would prefer a vertical torso over any kind of forward inclination. We need considerable hip flexion to allow explosive hip extension, along with knee extension, to contribute to the acceleration of the bar. Conveniently, it's essentially impossible with any weight to lift with posture that is too upright.

The limit to the back angle will be the attachment of the barbell to the shoulders through the arms. That is, the torso cannot be any more upright than in a position that places the arms in an approximately vertical orientation from the bar. Attempts to lift a bar (assuming it's heavy) from the floor from a position in front of the shoulders will in general result simply in the bar rolling back toward the lifter before it breaks from the floor, or the athlete's hips rising to reposition the shoulders over the bar. (If the break from the floor is quick enough and the athlete intentionally drives back as he or she lifts the bar, the bar can be lifted from the floor with the shoulders behind it to a very slight degree.)

Whether or not the angle of the back in the starting position can remain constant during the first pull will depend on the athlete's relative leg and torso lengths. Longer-legged athletes' knees will protrude farther forward in such a position. In order to move the barbell past the knees without swinging it forward, the knees will need to move back slightly more and the shoulders move forward slightly more, creating a shift in back angle as the hips momentarily rise faster than the shoulders.

Although cases in which this shift in back angle occurs are common, cases in which the shift is legitimately necessary are rare. Long legs are almost invariably accompanied by larger feet, meaning the bar's starting position will move farther forward along with the knees of a long-legged athlete. It takes fairly unusual height or odd combinations of leg and foot lengths to create a situation in which this shifting of the back angle is genuinely unavoidable. The excessive rise of the hips relative to the shoulders is more often the result of inadequate leg strength (or technique) than of the actual geometry itself.

In cases in which a shift in back angle must occur, the goal is to minimize that shift—to allow only what is necessary to clear the knees and no more. This shift in position will be natural to a large degree—long legs mean poor mechanics at the knee joint and more difficulty moving weight from a small knee angle, so the body will naturally want to shift into a more open knee angle before really moving the weight. In such cases, the shifting of the back angle simply needs to be managed properly and minimized, not performed actively.

On this point there exists some disagreement. Some coaches prefer to adjust the starting position to establish the precise back angle that would result from any early shift off the floor, citing that the athlete will end up at that angle irrespective of how he or she starts, so it makes sense in terms of efficiency to start there.

First, an expected slight change in angle isn't disruptive of balance or positioning, so if the technique is executed correctly, this is not a concern. Second, one of the goals of the upright back angle is to reduce back fatigue; at least some of this fatigue will be incurred with the separation of the bar from the platform—if we can break the bar from the platform with less fatigue to the back, even if the back angle shifts slightly following that separation, we're still at an advantage. Finally, efficiency is ultimately an irrelevant concept if we're interested in single repetition efforts rather than repeated efforts.

Some lifters have been very successful—to world championship levels—with a start that actually swings the bar slightly forward around the knees during the first pull in order to obtain the upright posture desired in the presence of long legs. Like any technical idiosyncrasies, this is acceptable to a very small degree if over time an athlete demonstrates that he or she is more effective with the lift with this divergence from more standard technique. However, efforts should be made to avoid it as much as possible by new lifters. Often this is simply the result of a lifter trying to start with the bar too far back over the feet or the shoulders too far behind the bar.

The feet will be in the pulling position—the heels approximately under the hips and the toes rotated outward slightly. Some lifters are successful with wider or narrower stances, typically as a product of relative leg length or a need to create more space between the thighs for a larger torso. Initially effort should be made to use the starting position described and gain some experience with the lifts from this position before experimenting with significant variations. Without this initial period of consistency, it will be impossible to legitimately evaluate the stance and make informed decisions regarding alteration. There will be more than enough inconsistency in technique further along in the movement to create frustration—the more variables can be reduced, the more easily and quickly effective technique changes can be made. In the long term, the foot position should be whatever is most comfortable and effective for each athlete.

The starting position of the feet will be approximately under the hips and rotated outward between approximately 5-15 degrees from center. The knees will be flared to an angle outside the feet.

The degree to which the feet are turned out in the starting position will vary naturally among athletes. The default position for most will be only a slight rotation—generally 5-15 degrees from center. As was mentioned with regard to the squat, some individuals may find that their ankles and knees are not aligned precisely with each other, and a small external rotation of the hips will appear much greater when judging by the orientation of the feet. Generally athletes can be left to place their feet at whatever angle feels comfortable unless that angle is extreme in either direction. The farther the feet are turned out to the sides, the shallower the lifter's base becomes and establishing and maintaining balance during the lift becomes more difficult. Additionally, excessive rotation can disrupt the mechanics of the knees and hips to the point of limiting strength during the pull.

The knees should be flared to the sides beyond the rotation of the feet to minimize the depth between the bar and the hips, allowing a more upright torso position and easier navigation of the bar past the knees. This will also help open the hips to allow better back extension and posture. This will mean that in the starting position and first pull, unlike in the squat, the thighs and feet will not necessarily be aligned with each other. Longer-legged lifters will typically find a slightly wider, more externally rotated stance helpful to further improve upon this posture; similarly, very large lifters will generally need to take a wider stance simply to clear space for their torso girth to fit between the legs.

The limit to this knee position is of course the contact between the thighs and the arms. While light contact is not necessarily a problem, the legs should not be allowed to intrude into the arms' path to the bar and force significant elbow flexion or any other unwanted change in position. Of course, the knees cannot be flared to an extent that actually moves them behind the arms either. Depending on a lifter's proportions, the knees may still be well inside the arms, or they may be in light contact with them.

As mentioned previously, the bar should begin approximately over the balls of the feet. This will be the base from which the shoulder, back, hip and knee positions will originate. Because ultimately the bar will move farther back over the foot in order to bring the lifter-barbell unit's center of mass into the desired balance over the base, it's often asked why the bar is started farther forward over the foot. The rationale is simple: In order to position the body in the low-hipped, upright torso starting position we want, for most lifters the bar must move farther forward over the foot to clear space for the shins. Over the balls of the feet is typically as far forward as the bar can be while still allowing the athlete to lift it from the floor without being pulled forward uncontrollably. This being the case, athletes who have the good fortune of proportions that accommodate the starting position while allowing the bar to be farther back over the foot can move the bar farther back.

The bar may or may not be in contact with the shins in the starting position. If it is not, it should remain in close proximity. If it is in contact, care must be taken to ensure that this contact is not a result of the shoulders being too far behind the bar—this will cause the bar to be dragged up the shins, more than likely causing a forward deviation in its path, a slowing or stuttering of the bar due to the friction, or abrasions that later interfere with technique and positioning due to the athlete's conscious or unconscious desire to avoid pain. Some lifters have an uncanny ability to trace the legs with the bar without ever dragging against them; most lifters will find it much easier and more effective to keep the bar just off the shins while maintaining immediate proximity.

The back must be set in complete extension—an arch from the lumbar to thoracic spine—as described in the Squat chapter. This creates the most rigid system possible to transmit the force generated by the legs and hips to the barbell, acts as a buffer against injurious lumbar flexion, improves mechanics by shortening the length of the back slightly, and improves the ability of the spinal erectors to maintain extension.

The shoulder blades should remain in an approximately neutral position fore and aft, although for some lifters, the shoulder blades will protract to some degree unavoidably in order to allow the lifter to reach the bar in the starting position. The shoulder blades should be depressed somewhat as a natural consequence of the effort to extend the entire back. The lats should be engaged forcefully to assist in extending the upper back; this will also naturally push the bar back in toward the body and allow the athlete to control its position better as the pull continues.

The arms should be approximately vertical when viewed from the athlete's side. This will place the leading aspect of the shoulders slightly forward of the bar because of the shape and mass of the shoulders themselves. The arms must be internally rotated maximally (the points of the elbows turned to face to the sides). This rotation of the arms should not affect the position of the shoulders or shoulder blades;

many athletes will roll the shoulders forward when internally rotating the arms. This may be a result of inflexibility or simply inadequate control of the movement without practice. The importance of this orientation of the elbows cannot be overstated. Most athletes will find it awkward and avoid committing fully to the position. Keep in mind that in no way is it necessary for the starting position of the snatch to feel comfortable or natural (although over time the proper position will become comfortable and natural due to the repetition of exposure).

Because the bar begins over the balls of the feet, at the moment it separates from the platform, if the weight is at all significant, the lifter-barbell unit's center of mass will be slightly farther forward than ultimately desired (as described in the Foundations section). Prior to separation, however, the lifter's weight should be balanced more evenly across the foot to prevent excessive forward shifting once the bar is separated. The weight does not need to be on the heels in the starting position; in fact, it's usually impossible to center the weight that far back over the feet without altering the starting position undesirably (sitting behind the bar) and resulting in an unwanted forward shift as the bar separates due to overcompensation.

The head should be upright and the eyes focused straight ahead. Because of the great range of motion and diversity in positions throughout the lift, the ideal direction of vision is one that can be consistent from start to finish—the direction that best meets the demands of all positions is straight ahead or slightly above. Shifting the focus of the eyes during such a rapid and violent movement is disruptive at best. The focal point should be as far in the distance as possible to minimize any movement relative to the lifter.

Concerns occasionally arise regarding extension of the cervical spine in the starting position. Because of the upright posture in the start, and the extension of the entire back, which minimizes the curve of the thoracic spine, an upright head position should not hyperextend the cervical spine to a significant degree, and accordingly, no concern is necessary. Additionally, cervical extension has been shown to strengthen overall spinal extension force; however, excessive extension should be avoided in order to prevent any undue strain.

When making adjustments to the starting position, it's important to remember the body is a whole system, not a collection of unrelated segments, and a change in one will always affect another. For example, elevating the hips will mean pulling the knees farther back and moving the shoulders farther forward. A common mistake for new lifters is to attempt to move a single body part without moving others. This may be seen, for instance, as moving the shoulders forward by rocking the entire body and shifting the weight onto the toes, keeping the positions of the body segments the same relative to each other, but inclining the entire system forward. In short, each adjustment must be accompanied by others in order to maintain the balance of the bar-body unit over the base.

A full breath, as described in the Breathing section, should be drawn in and held for the duration of the movement. This will, as in all other cases, help increase the rigidity of the torso and consequently allow greater transfer of power from the legs and hips to the bar. It will generally be easier to take this breath before entering the starting position, in which the abdomen will usually be compressed to some degree.

Entering the Starting Position

To a great extent, how the athlete enters the correct starting position is inconsequential. If the starting position and first pull that result from the entrance is consistently correct, that entrance can be left entirely to personal preference.

That said, a word on the two broadest categories of entrances for the starting positions of the snatch and clean—static and dynamic—is warranted here. With a static start, the athlete sets the starting position for a moment before initiating the lift; in a dynamic start, athlete moves in a number of possible ways into

In a dynamic start, the athlete moves into or through and back into the starting position and initiates the lift without ever setting the starting position before separating the bar from the platform.

or often through and then back into the starting position, initiating the lift without ever setting the starting position.

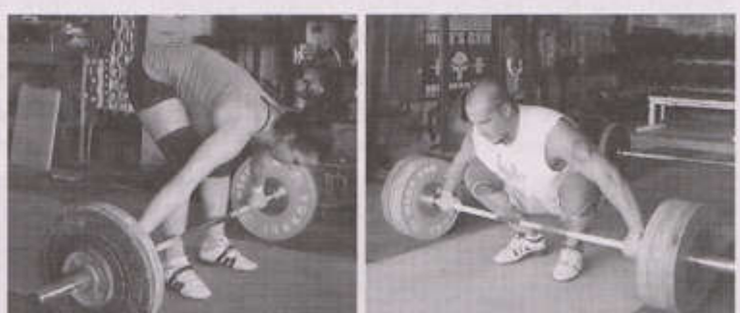
The concern with the dynamic start is the potential for inconsistency. Even athletes who have been employing dynamic starts for years are often in different positions at the moment the bar leaves the platform in each lift. This inconsistency in the starting position is clearly not conducive to consistency in the remainder of the lift. From a coaching perspective, the dynamic start makes fault recognition and correction more difficult due to the reduced ability of the coach to accurately evaluate the athlete's starting position.

Dynamic starts will make the separation of the bar from the floor and the initial pull easier through the mechanisms of either a stretch-shortening reflex or the generation of more muscular tension through stretching. For lifters who quickly pump the hips down into position and immediately break the bar from the floor, there is usually sufficient speed to elicit a stretch-shortening reflex. For athletes who instead perform a movement such as sitting the hips down slowly and then lifting them back up into position to initiate the lift will be generating tension in the muscles prior to moving the bar so that more force will be developed by the time the lift begins. In either case, the separation of the bar will be made easier, incurring less fatigue, increasing the speed of the pull and generally increasing the lifter's confidence and consequently his or her commitment to the lift.

In short, dynamic starts offer the potential for an improved first pull and better lift overall, but also present potential difficulty technically, primarily for beginning lifters. No novice lifter has the need to employ a dynamic start, and any experimentation with one should be reserved for more advanced lifters who have established technical proficiency.

The static start still offers options for entrance. Again, how the starting position is entered is less important than the position itself. Irrespective of each lifter's chosen entrance, consistency is imperative. The process should be ritualistic in many respects, both for the sake of encouraging the correct starting position and bolstering the athlete's confidence—the fewer variables in the system, the smaller the chance of mistakes, discomfort and doubt.

There are two basic types of preparatory positions. In the first, the athlete stands with the feet in position and the grip set and leans forward over the bar. In the second, the athlete squats behind the bar with the feet and grip set. Which—or which variation of either—is used by each lifter doesn't matter. Caution should be exercised when using the latter, however—leaning



Two basic preparatory positions. Which is used is personal preference, but care should be take if leaning over the bar to ensure the athlete's weight doesn't remain too far forward once the starting position is set and that the back isn't unnecessarily fatigued.

forward over the bar in preparation for a lift often results in the athlete beginning out of balance forward once the lift begins, and can also be surprisingly fatiguing for the lower back.

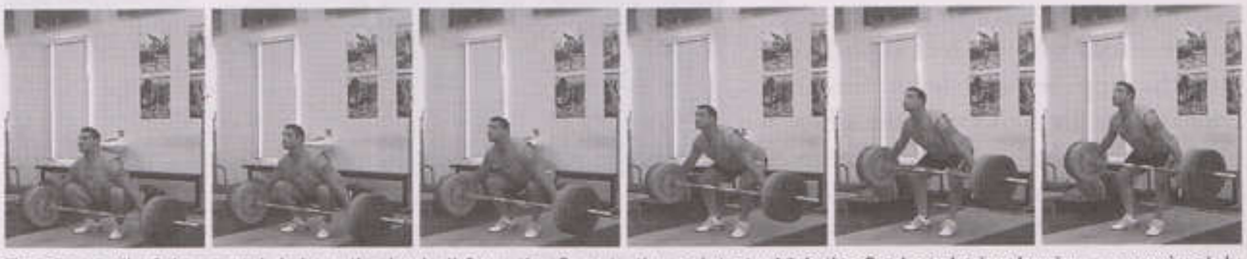
An example of a starting position entrance may be walking the shins to their position relative to the bar and setting the feet properly. The athlete may then squat down behind the bar and set his or her grip, carefully placing the hands relative to landmarks on the bar, and setting the hook grip comfortably although relatively loosely to prevent the accumulation of unnecessary fatigue while preparing to initiate the lift. Here the lifter may pause for several calming breaths with eyes closed or focused on the platform, possibly testing the comfort and integrity of his or her grip with a tug on the bar. Once ready, the lifter may then take in his or her final breath while slowly tightening the grip on the bar, setting the back in complete extension, and elevating the hips into position. When the correct position has been achieved with the weight balanced properly on the feet, the lift begins. The more accurately this process is repeated for each lift, the greater control the athlete will have over the technical facets of the rest of the lift. Athletes should experiment and find the process that feels most comfortable and effective for them.

The First Pull

The first pull brings the barbell from the floor to the point at which the scoop begins—approximately the level of mid-thigh. The purpose of this initial movement is primarily positioning and secondarily power generation—that is, the priority is bringing the bar and lifter into the most advantageous position from which to perform the second pull, the source of the overwhelming majority of the power delivered to the barbell; the speed of the pull is secondary to this.

The position of the athlete in the first pull is one of great mechanical disadvantage—the knees and hips flexed as much as they'll be in the pull, creating the longest levers—preventing this segment of the lift ever reaching the same speed as the second pull (the shorter the athlete's legs, the faster the first pull can be). The first pull can remain relatively slow without detriment to the lift, and in fact a more deliberate first pull generally improves the ability of the lifter to enter into a better second pull position, leading to improved lifts. Aside from with beginning lifters still establishing technical proficiency, we don't want to actually slow down the first pull—the closer the barbell's movement is to none at all, the more force must be applied to create a given magnitude of acceleration. However, as bar speed increases, the ability for the athlete to apply force decreases because the generation of force requires time—more speed means less time to generate force.

Essentially we want to find the ideal balance between positioning and bar speed—to move the barbell through the first pull as fast as possible without interfering with the positioning or acceleration of the second pull. For most athletes, particularly those with longer legs for whom the first pull is dramatically more difficult technically and mechanically than for their shorter-legged counterparts, this will necessitate a relatively slow pull initially. The speed of the first pull should be gradually increased after the early



The first pull of the snatch brings the barbell from the floor to the point at which the final explosion begins, approximately mid- to upper-thigh.

learning stages once the athlete's technique is well established to find the ideal speed.

It should be understood clearly that the control of first pull speed is really only an issue for beginning lifters and sub-maximal lifts. The beginning lifter is limited by technique and consequently his or her maximal lifts are not genuine maximal efforts in terms of strength and power. This being the case, it will be easy to perform an excessively fast first pull. As the athlete progresses and the weights he or she is lifting increase, the speed of the first pull will be naturally limited by the combination of the disadvantaged mechanics of the movement and heavy loading; that is, even maximal or near-maximal efforts to accelerate the bar in the first pull will result in relatively low bar speeds. This will eliminate the need to actively limit the speed of the first pull.

While seemingly a relatively simple movement, the first pull commonly presents many problems for even experienced lifters because of the interaction of the knees with the bar. Much of this trouble can be eliminated through the development of a correct and consistent starting position and separation from the floor.

The initiation of the pull from the floor should be smooth and deliberate. There should be no abrupt shift from slack to tension in the body, but instead a more gradual increase in tension until the force separates the bar from the platform. Note that gradual doesn't mean particularly slow—we don't want to spend any more time under tension than necessary because we want to minimize fatigue. Note that a properly executed dynamic start will achieve this goal. With a static start, the lifter should build tension briefly before separating the bar.

This approach to breaking the bar from the floor will ensure the maintenance of the positioning and balance established in the start. An abrupt jerk of the bar from the platform will often lead to unwanted shifts in weight distribution across the feet and alterations in hip and shoulder positions, creating unnecessary difficulty in controlling the path of the bar throughout the lift. Such a jerk from the floor will also create momentary slack in the system as the body attempts to catch up with the bar, typically resulting in a slower and more difficult movement overall.

As described in the starting position section, the initial phase of the first pull may involve a slight shift in back angle as the bar separates from the platform. This movement should be brief and the back should reach the angle at which it will remain for the remainder of the first pull by the time the bar travels the first couple inches. Once this angle is achieved, the first pull is essentially accomplished through knee extension exclusively—the angle of the back will remain approximately the same until the bar reaches the level of mid- to upper-thigh.

During the first pull, the weight of the athlete and bar should be centered over the front edge of the heel. Because at the moment of bar separation the center of mass will farther forward over the feet due to the bar's starting position, this must be immediately corrected and the weight shifted back over the foot. The shift back of weight is accomplished by a collective backward shift of the knees, hips and shoulders, which brings the bar along slightly backward as it travels up the first couple inches off the floor. In other words, the athlete should not attempt to simply lift the bar vertically, but instead shift back and up with the bar. If the posture is maintained and simply moved back slightly as the body rises, the bar will naturally follow. This movement will create the slight backward sweep of the bar off the floor that can be seen in bar path tracings.

If the weight is forward during the first pull, it will be exaggerated as the athlete extends and the combined center of mass is elevated. At best this will result in the athlete being forced to jump forward to receive the bar—a precarious feat and one that places unnecessary strain on the knees and shoulders—and at worst will result in the lift being missed entirely in front. Such forward imbalance will typically disrupt the timing and position of the explosion of the second pull, limiting the speed of both the finish at the top and the transition under the bar.

As it rises, the barbell should remain as close to the lifter's legs as possible without dragging. Any friction resulting from light contact is negligible and is preferable to the remarkable increase in mechanical disadvantage and shift in balance caused by the bar swinging away significantly from the body. However, contact will be problematic when the bar reaches the knee, which will be an obstacle for the bar to catch on. If the athlete is wearing knee sleeves, the bar may hook the bottom edge. In either case, this interruption may be significant enough to reduce bar speed and possibly cause unwanted position shifts. This being the case, ideally the bar remains as close to the shins and knees as possible without actually contacting them.

Once past the knees, very light contact with the thighs is acceptable, and certainly preferable to any considerable gap between the bar and body, although immediate proximity to the thighs without actual contact is ideal—this will allow optimal mechanics and prevent any friction. Again, the bar should not drag up the thighs. The forceful engagement of the lats that was initiated in the start position will come into play fully at this point because as the knees move back during extension, the bar must be actively pushed back toward the body to maintain immediately proximity while allowing the shoulders to stay in front of the bar.

Continuing the flaring of the knees to the sides initiated in the starting position until the bar passes them will allow the maintenance of the more upright posture desired in this phase of the lift by minimizing the necessary distance between the hips and the bar—essentially by moving the knees back out of the way in a manner that doesn't force the shoulders down and forward. The purpose is simple—to allow a first pull that leads to a better position at the entrance to the second pull, which is our priority as the source of the real upward acceleration of the bar. After the bar passes the knees, the active effort to flare the knees can cease, and the legs will naturally and quickly move back together as needed to enter a more advantageous position for the second pull. While this flared position will in fact reduce the potential for drive against the floor, the athlete is not in need of maximum force generation in this phase—he or she is in need of preparing for maximum force generation in the second pull, and the reduction due to flaring is negligible, particularly if the athlete is strong in this position as they will become through proper training.

The arms during this and the next phase of the lift serve as nothing more than connections from the torso to the barbell, and as such should remain passively extended in order for force to be transmitted as completely as possible through the body. The arms should be kept as relaxed as possible in this extended position. This passive extension of the elbows can be viewed as simply allowing the weight of the bar to stretch the arms out. In other words, the arms remain straight not because they are being actively straightened, but because they're not being actively bent. Intentionally locking the elbows will encourage forward swinging of the bar during the second pull and interrupt the transition between the second and third pulls when the arms must immediately engage powerfully to pull the athlete under the bar.

While the arms remain extended and relaxed, they are by no means inactive, although their activity is indirect. The arms will remain internally rotated maximally to orient the points of the elbows to the sides and continue pulling the bar toward the body to whatever degree is necessary to maintain immediate proximity.

The spine will be responsible for transmitting the force of the legs and hips to the bar through the arms. Accordingly, its rigidity during the pull is critical. However, because there is little acceleration actually occurring during the first pull, the concern regarding this rigidity is less about losing force transfer to the bar, and more about ensuring the back arrives at the start of the second pull in the rigid extended position we need and without any unnecessary fatigue. This extension during the first pull must be extremely active.

The Second Pull

The second pull is the final, vicious explosion of the hips and knees beginning at approximately the level of mid- to upper-thigh. This movement is the source of the overwhelming bulk of the upward acceleration of the barbell, but is also continuous with the pull under the bar. That is, the final acceleration of the bar is as much about allowing the athlete to pull under it than it is about elevating the bar; elevation of the bar itself is meaningless without the lifter's transition underneath it. This should not be misinterpreted to mean that elevation of the barbell is unnecessary—the higher the bar is elevated, the more time a lifter has to reposition him- or herself underneath it. The athlete should simply consider the final explosion upward as the first stage of a single fluid movement also involving the pull under the bar; in other words, the second and third pulls might best be considered a single continuous action rather than two distinct stages in practice. We will simply separate the two for the sake of instruction within the context of this book.

While the second pull is dramatically faster than the first, the transition between the two pulls should be seamless. Many novice lifters will mistakenly slow, pause or even reverse the bar's movement briefly as the bar reaches the thighs. Any cessation or reversal of the bar's upward movement—termed hitching—during the pull is in the most practical sense wholly counterproductive (this is analogous to slowing a car from 60 mph to 40 mph so you can accelerate to 80 mph), and in competition is illegal.

As the second pull begins, the athlete's shoulders should still be over the bar in the same manner he or she was during the final phase of the first pull and in the mid-hang position practiced in the learning progression—the hips and knees are back with the shins approximately vertical, the shoulders are in front of the bar, and the bar is being kept in immediate proximity to the body by forceful activation of the lats. The patient maintenance of this posture is critical for maximal explosiveness and balance.

It will be common for athletes—particularly those with legs stronger than their backs—to begin shifting the knees forward dramatically the moment the bar passes them, and occasionally even sooner. By waiting until the bar is at approximately the level of mid- to upper-thigh with the shoulders over it and the knees back properly before initiating the final violent hip and knee extension of the second pull, the athlete ensures optimal hamstring tension and balance, and will maximize his or her potential explosiveness. This timing is usually difficult for lifters, who will often feel they are waiting far too long to initiate the explosion. However, with practice and discipline the correct timing can be learned and perfected.

The bar should be in immediate proximity to the thighs as the final explosion is initiated and actively pushed back into the body with the lats throughout the movement. The bar will and should come into full contact with the body at the level of the hips as the hips extend in the second pull. By maintaining close proximity of the bar and body prior to this contact, the athlete will avoid a collision that results in the bar bouncing forward away from the body after the two connect. However, even if the athlete mistakenly allows the bar to move too far from the hips, or the hips are hyperextended excessively, and it is consequently bumped forward, the athlete should be actively pushing the bar back into the body with the lats and shoulders, which will prevent the bar from actually moving away to any considerable degree.

This is the point at which the width of the grip and resulting height of the bar as it hangs from the

The second pull is the final, vicious explosion of the hips and knees at the top of the lift and begins at approximately the level of mid- to upper-thigh.

shoulders will become very important. Ideally the bar comes into contact with the body directly in the crease of the hips, as was described earlier in the book. This will allow the hips and knees to extend in the second pull most freely without the bar disrupting the movement through contact on the thighs. If the bar connects with the upper thighs, it will be pushed forward somewhat as the knees move forward in the scoop, slowing its upward acceleration, as well as slowing the extension of the hips. With the bar moving into the crease of the hips, the hips can extend powerfully without interference and the double knee bend or scoop can occur without the bar being pushed forward.

For lifters who use a narrower grip or whose proportions would otherwise place the bar against the upper thigh, the bar can still be guided up into the crease of the hip during the second pull. As the final explosion is initiated, the athlete can shrug the shoulders back and slightly upward while pulling with the lats to lift the bar back and up into the hips rather than the thighs without bending the arms. This will allow such lifters to still optimize the explosion of the hips. (As an aside, many proficient lifters who are seen bending their arms during the second pull are doing it to bring the bar up into the hips as described here, not as an effort to lift the bar with the arms as is seen commonly with beginning lifters. This is more prevalent with the clean than the snatch because of the narrower grip.)

As the bar nears the level of mid- to upper-thigh and the athlete begins the final extension of the hips, the knees will begin shifting forward. This is the scoop element of the double knee bend described previously in the book. With proper timing and position, the double knee bend will be subtle and extremely quick. If the knees are shifting forward dramatically, it's likely the lifter is initiating the second pull too early rather than waiting to hit the upper thigh position.

The second pull should be a concerted extension of the hips and knees, or described in a more practical way, an effort to punch down against the ground with the legs while exploding the hips. Generally, based on individual strength, athletes will focus on either hip or knee extension more than the other to the detriment of the lift. That is, athletes with powerful hips will tend to focus on hip extension, while athletes will stronger legs will tend to focus on pushing against the ground. Each needs to learn to coordinate the two.

A focus on leg extension will typically result in too vertical of an extension of the body, a premature scoop of the knees and a sub-optimal or essentially absent double knee bend, forward imbalance due to body position, and limited speed. A focus on hip extension will typically result in limited bar height and forward imbalance due to the bar being pushed forward by excessive hyperextension of the hips, which is usually compounded by soft knees that shift forward during the hip extension because of the absence of adequate drive against the ground.

This being said, athletes will and should always capitalize on their strengths. Some lifters will be more hip-centric and others more leg-centric. This is not necessarily problematic; athletes simply need to avoid technical limitations as a result of allowing a particular strength to disrupt the movement as a whole.

While the extension of the hips must be violent, the extension of the knees must be equally aggressive to ensure the force is directed vertically rather than horizontally. The forceful drive against the ground with the legs creates the foundation for the explosion of the hips. If this action is performed properly, the lifter should finish in a position in which the legs are oriented approximately vertically and the hips are hyperextended slightly, bringing the shoulders behind the bar and hips somewhat and maintaining the balance of the system over the front edge of the heel, even with the heels elevated off the platform. If the leg drive is inadequate or is ceased prematurely, the hips will be pushed forward of the vertical plane in which the legs should finish, pushing the bar away and shifting the lifter's balance too far forward.

Note that extension of the knees during this push against the ground with the legs does not mean that the knees are extended into a locked position; "complete" extension means the degree of extension that is proper for the movement. In a well-executed snatch or clean, the knees will stop slightly short of the maximal extension that is possible at the joint (which for most athletes will actually be some degree of hyperextension). Similarly, pushing against the ground with the legs during the second pull does not imply any particular timing at the top of the lift; this action must be as violent and abrupt as the explosion of the hips to prevent unwanted prolonging of the extended position. The athlete must attempt to explode the hips and knees together to achieve maximal bar speed and elevation, but then immediately transition into the pull under the bar. Neither the push with the legs nor the extension of the hips can be protracted past the moment of completion.

The purpose of the second pull is to vertically accelerate and elevate the barbell as much as possible without delaying the transition under the bar. It's imperative to recognize that elevation of the bar and elevation of the body are distinct pursuits beyond the body's maximal extension when still in contact with the platform. That is, the bar must be elevated as much as possible relative to the body, not only to the platform. This net elevation is what allows the athlete the opportunity to pull under the bar in order to receive it. Any vertical elevation of the body beyond maximal hip and knee extension with the feet in contact with the platform is simply additional distance the athlete must travel back down to get under the bar. In short, the athlete must not jump off the platform. Separation of the feet from the platform should only occur during the third pull as the lifter is traveling down and repositioning the feet into the receiving position.

The action undertaken to accelerate the barbell in the second pull is similar in certain respects to a vertical jump, but there are three primary and very simple reasons this action doesn't actually become a jump. First, the athlete is attached to a heavy weight—this of course limits how much any amount of driving against the ground will elevate the athlete. Second, the body is oriented slightly backward rather than completely vertically as it would be for a jump. Third, and most importantly, the moment the athlete has finished the explosion of the hips and knees to accelerate and elevate the barbell, he or she immediately stops driving against the platform, brings the hips back, and aggressively pulls under the bar with the arms.

Extension at the top of the second pull. Notice that the entire body is leaning back slightly in order to maintain balance over the feet, and the hips are extended slightly beyond neutral to finalize the violent extension effort.

At the finish of the second pull, the athlete should not be extended vertically—the body as a whole will need be leaned backward slightly in order to maintain the correct balance over the feet. Again, the legs should be approximately vertical with the hips hyperextended somewhat to bring the shoulders behind the hips. This finish position allows violent extension (and hyperextension) of the hips without shifting the weight of the barbell and body forward undesirably and encourages the bar to move upward rather than forward.

If we view a standing lifter holding a PVC bar at arms' length, we can see that the bar is in fact not directly above the center of balance (between the center of the foot and front edge of the heel)—it must rest against the hips or thighs, which places it in front of the center of the base of support. The heavier the load held in this position, the farther back the body will need to lean to bring the barbell closer to the center of the base in order to maintain balance. In other words, extending the body vertically with a loaded barbell will mean the system is off balance, and the bar will pull the athlete forward.

Because a lifter cannot actually see his or her own angle of final extension, this cannot be used as a reference except in video review. Typically a lifter attempting to lean back will over-extend the hips or lean

The mass of the body is centered over its base of support, at approximately the front edge of the heel. This means implements that cross the body horizontally, such as a barbell, cannot actually be centered over the base with the body vertical because of the mass of the body protruding forward (left).

The heavier the barbell (pictured above at 150% of bodyweight), the closer to the center of the base it will need to be in order for the system to remain balanced, as it will account for a greater portion of the combined mass (right).

too far back, even with an accurate understanding of the correct position. What can be evaluated by any lifter is the pressure across the foot, the approximate degree of hip extension and the ease of the lift. Conveniently enough, the pressure on the foot, a result of the location of the athlete-barbell unit's center of mass over the base, should be the same irrespective of the weight on the bar. If this pressure is monitored and maintained correctly, layback will occur as a necessity to a degree that corresponds with the barbell's weight relative to the athlete's. In other words, as the weight of the barbell increases, layback will increase along with it in order to maintain this balance over the foot. Past a certain point, however, this layback will cease to increase despite increases in the barbell's weight. As the weight increases to a point at which it's heavy enough relative to the athlete's bodyweight, necessitating positioning approximately between the center of the foot and front edge of the heel, it will have settled into its farthest position back. Any continued shifting back will move the center of mass too far back to maintain balance over the original base.

Once backward leaning of the body reaches a certain degree, the entire bar-body system will actually be directed backward. In other words, the athlete will be forced to jump backward in order to receive the bar. This is not necessarily problematic, and in fact, some of the world's most accomplished weightlifters have used such a balance in their pulls. Lifters for whom this backward movement works well will discover it naturally—there is no need to teach it explicitly.

If this style does in fact allow an athlete to perform better, it should be encouraged; however, vigilance should be continued to prevent it from becoming excessive and passing the threshold of productivity. There will be a point after which any further backward shifting of balance over the feet or increase in layback at the top will fail to improve the lifter's performance. Usually this is due to the body, or at least the feet, moving farther backward than the bar does, making it impossible to secure the bar overhead. Layback can be considered excessive if the distance of the resulting backward jump is greater than can be reasonably compensated for by the slight backward trajectory of the bar and the power of the athlete's third pull. A general idea would be less than 3-4" of backward foot movement.

As will be discussed with regard to the third pull, backward movement during the lift may actually be the result of an error in foot placement, rather than direction of the entire system's center of mass slightly backward. It will be important to distinguish between the two so errors can be corrected before they become habit.

The arms during the second pull function as nothing more than connections between the body and the bar to transmit leg and hip power. Accordingly, they must remain extended to maximize that transfer of power. Again, this extension should be passive, with the arms remaining as relaxed as possible. If the elbows are actively extended, and the arms consequently stiff, the athlete will encounter problems when finalizing the extension. Once the bar has been accelerated upward by the extension of the legs and hips, it has to continue moving somewhere. Stiff arms will delay the transition into the pull under the bar because of the additional time required to begin bending the arms (this itself is a problem because of the need for immediate transition from elevating the bar to pulling the body under it); if the arms are not bending and the bar still has upward momentum, the only option is for the bar to swing forward away from the body. For this reason, passive elbow extension is critical.

This passive extension again can be imagined as allowing the force of the bar to stretch the arms out as if they were elastic bands; as the lifter finalizes the explosion of the second pull, the arms are fully-stretched and loaded, and violently snap the athlete underneath the bar.

The same orientation of the points of the elbows to the sides that was set in the starting position must be maintained throughout the second pull to ensure the correct bar path during the third pull. If the elbows are not correctly oriented going into the third pull, it's unlikely the athlete will be able to make the necessary adjustment in time.

Again, because it warrants repetition, the second pull should be considered continuous with the third pull. There should be no hesitation or delay between the completion of the final explosion of the hips and knees and the violent pull of the athlete under the bar. Time spent in the extended position only reduces the time available for the lifter to reposition him- or herself under the bar; it does not contribute any further elevation or speed.

As was discussed in the snatch learning progression section and will be discussed next, the upward acceleration of the bar is achieved with violent knee and hip extension. The shrug, while overlapping very slightly because of the seamless connection of the second and third pulls, is actually a component of the third pull (a natural element of the action of the arms' pull under the bar)—it is not an effort to further elevate the bar in the second pull.

The Third Pull

The third pull is the athlete's pull under the barbell after having accelerated it upward. Many athletes and coaches misunderstand this final part of the snatch or clean as dropping under or catching the bar. The third pull must be just as active and vicious as the second, and passivity or a lack of connection to the bar will prevent success as weights increase—as the term suggests, this segment of the lift is an aggressive pull under the barbell.

The violent explosion of the hips and knees in the second pull has maximally accelerated the barbell upward. In addition to the elevation it has gained simply by virtue of being attached to the arms as the body extended upward, at this point the bar possesses momentum from the force applied to it and will continue its upward movement temporarily even with the removal of all external force application. The distance the bar will travel under this momentum decreases as the weight of the barbell increases because maximal force application will have created less acceleration. This being true, the heavier the barbell, the sooner its upward travel will be arrested and reversed by the force of gravity.

After finalizing the extension of the hips and knees in the second pull, the lifter will immediately retract the hips and bend the knees to begin a squatting movement. However well-timed and quick this may be, this movement alone will not reposition the lifter under the bar. Unless the feet are attached to the

The third pull reverses the lifter's direction and pulls him or her under the bar into the receiving position.

ground, the lifter cannot pull his or her body down significantly faster than the speed of gravity by simply flexing the knees and hips (the lifter will get some downward acceleration beyond the pull of gravity through this action because of the inertia of the legs, but it will be minimal and the effort will elevate the feet as it lowers the rest of the body).

Because we all of course know that objects fall under the force of gravity at the same rate irrespective of their masses (assuming no interference of friction), it should be clear that the athlete cannot simply drop after the second pull and expect to arrive underneath the barbell—at the peak of the second pull, the barbell is near the level of the abdomen and must finish at arms' length overhead, meaning the athlete's body must travel a great distance relative to the barbell. Even in consideration of the momentary continued upward travel of the bar under its own momentum and the small degree of downward acceleration possible from pulling the hips down into the squatting motion, it's impossible to rely on gravity to accomplish this repositioning underneath the bar.

During the first and second pulls, the inertia of the earth itself is used as an anchor against which the athlete applies force with the lower body to move the barbell. After upward acceleration of the bar has occurred, the barbell's inertia in its elevated position becomes the new anchor against which the athlete must apply force. This is accomplished by removing the pressure of the feet against the platform—they do not necessarily need to lose contact, but the force against the ground must be less than the force being applied to the bar, and the closer the force against the ground is to zero, the more effective the pull under the bar will be during the first stage of the pull under. The heavier the barbell is relative to the athlete, the greater its relative inertia, and the farther the athlete will move relative to the barbell as a result of the pulling force he or she is applying to it. In other words, there is in reality no difference in the force application to the bar during the three pulls—the only difference is that the anchor point around which movement occurs shifts from the platform to the barbell, and the parts of the body responsible for applying the force changes from the legs to the arms.

The notion that the barbell is not at all elevated by the bending of the arms is not entirely accurate. While the net effect of the continued effort to pull the barbell with arm flexion following the completion of knee and hip extension is the movement of the athlete under the bar, the bar is in fact further elevated simultaneously to a degree consistent with its relative mass. Insisting arm bend doesn't contribute to the elevation and acceleration of the barbell is more of a coaching cue than a statement of fact—it's intended to discourage rowing the barbell up with the arms as a substitute for hip and knee extension.

Assuming the force applied by the athlete during the second and third pulls remains constant among lifts, the height at which the barbell is received will be determined by the relative masses of the athlete and the barbell. A heavier barbell will result in less upward travel of the barbell, more downward travel of the athlete, and a lower receiving position; a lighter barbell will result in more upward travel of the barbell, less downward travel of the athlete, and a higher receiving position. In other words, if the efforts of the lifter remain constant and maximal, it is the relative masses of the barbell and lifter that dictate the height at which the bar is fixed overhead. This can only be altered through the manipulation of force application or timing at some point during the lift.

The immediate retraction of the hips and knees from their extension in the second pull is accompanied by a violent pull with the arms against the bar. The release of the pressure against the platform will occur at approximately the same time as the pull with the arms. Attempts to shrug or pull with the arms while continuing to drive against the platform will result in a prolonged extended position, during which the bar has far too much time to lose upward momentum. This reversal of direction by the athlete must be as vicious as the explosion of the second pull in order to capitalize on the barbell's temporary upward inertia.

The backward lean of the torso achieved at the end of the second pull will be continued in the initial phase of the third pull to allow the athlete to complete the pull under the bar with minimal disruption to its desired path. This layback should be as minimal as possible in order to keep the combined center of mass concentrated over the base to reduce extraneous movement and limit the potential for imbalance, as well as ensure optimal mechanics. As the athlete pulls under, the torso will begin coming forward again so that as the trunk and head pass the bar, the torso can continue into it's final position in the squat, which will be one of slight forward inclination.

The athlete will be attempting to maintain as direct of a bar path as possible. It will never be perfectly straight due simply to the mechanics of the body, but the closer it is within the constraints of those mechanics, the more effective the movement. The bar will travel slightly forward during the third pull and then back into its final position overhead. The layback initiated in the second pull and continued in the third pull will open a clear path for the bar, while the efforts of the third pull will guide it, and the body, to their final positions. This path is impossible with a vertical torso, as can be easily demonstrated with a muscle snatch viewed from the side—the bar must travel forward around the chest and then back into position overhead. The athlete leans back away from the bar to counterbalance it during this movement rather than allowing the bar to drift forward.

The torso must remain leaned back slightly during the third pull to allow a path for the bar and maintain balance over the base. This backward lean should be only as much as necessary; the goal should be to keep the barbell and body as close to each other as possible.

The repositioning of the feet during the third pull must be extremely rapid, and this is achieved through limiting their movement to only what is necessary to achieve the correct receiving position. As was mentioned previously, in order to pull under the bar, the feet do not actually have to lose contact with the platform—the pressure on them simply needs to be reduced dramatically, and ideally removed completely during the initial pull down. That being the case, the sole reason for the feet leaving the platform is to transition them from the pulling to receiving position. In other words, the only significant movement is lateral—elevation of the feet from the platform should not exceed what is necessary to allow unobstructed lateral movement, but must also remove pressure against the floor to provide opportunity for maximal acceleration of the athlete under the bar.

The athlete should attempt to complete the turnover of the bar at the same time the feet reconnect with the platform, although the feet will in reality reconnect with the platform first despite the athlete's best efforts, due to the obvious disparities in the magnitudes of the two movements. However, the attempt will encourage greater turnover speed and aggression. The feet should contact the platform flat rather than with the balls of the feet first.

The mechanics of the arms during the third pull were learned with the muscle snatch exercise. The points of the elbows must remain oriented to the sides as much as possible. The initial change of direction after the upward explosion of the second pull is the combination of the retraction of the hips and knees from their extended positions and the aggressive pull of the elbows high and to the sides. This pull of the elbows up and out will naturally be accompanied by a shrugging motion. Performing a shrug as an isolated action will usually just delay the movement under the bar; it should be allowed to happen as part of the whole effort to pull down with the arms. Just as during the second pull the athlete actively pushed the bar into the hips with the lats and shoulders, during initial pull under, the athlete must actively pull the barbell and body together to prevent the separation that will be natural. It's only the awkward internal rotation of the arms and the effort to pull the elbows up and out that will maintain the desired proximity.

The need for this initial pull down to be aggressive and complete should be underscored. The turnover of the arms—external rotation—is not a strong movement. The strongest athletes can move very little weight in this motion. The key to executing this portion of the pull under is generating momentum during the initial pull down with the arms. If this movement is fast and the body and bar are moving past each other with adequate momentum, the turnover can occur quickly and smoothly. Without that speed, the athlete will be attempting to externally rotate the arms against a great deal of force, and will be unsuccessful.

The third pull begins as a pull under the bar, but finishes as a push up against the bar, as was described in detail within the context of the muscle snatch drill in the snatch learning progression. The transition between the two will occur rapidly, and will not be entirely obvious during the lift itself. It will suffice to know that once the elbows are no longer being pulled up past their highest point—the "scarecrow" position—and the forearms have turned over from under to over the elbows and are approaching vertical, the elbows begin moving up again as they are extended. It is at this point that the movement has transitioned into pushing, as can be demonstrated by the fact that the grip on the bar can be loosened and the hand flipped over without the bar slipping.

By this time the feet will have already reconnected with the platform in the receiving position. This connection means that while the athlete is driving down against the bar into the platform, he or she is also driving against the platform up into the bar. This further slows the bar's descent now that it's long past the upward acceleration that was imparted during the second pull and creates space for the athlete to drive under and extend the elbows into the final receiving position. The resistance applied in this squat position must balance the need to support and stabilize the bar while simultaneously allowing enough downward movement of the athlete to achieve a complete lockout position overhead. In other words, the athlete needs to sit into a squat, but with enough control and resistance to arrest the downward movement securely.

As the arms transition from pulling to pushing, the hands will need to be flipped over into their final position with the wrist extended and the hands relaxed as much as possible while maintaining control of the bar. Many athletes, particularly males, will not be able to turn the hand over and achieve a stable hand and wrist position while maintaining the hook grip. With the exception of individuals who have adequate flexibility and slender enough fingers, the hook grip will limit the mobility of the hand and wrist. Those with adequate flexibility can maintain the hook grip as long as the same speed of hand turnover and final hand and wrist position are accomplished.

The release of the hook grip is more of a passive movement than an intentional action—that is, the hook grip is not released because the athlete is pulling it out, but because the athlete is not holding it. If the hook grip is not held tightly, the movement of the hand and wrist flipping over should cause the thumb to slide out from under the fingers. As part of this turnover, the athlete should think of driving the heel of the palm straight up—because the bar will be slightly behind the heel of the palm, this action will encourage the wrist to turn over and the bar to settle into the hand properly, as well as feed into the action of punching up against the bar to secure it overhead.

Receiving the Bar

At the completion of the third pull, the lifter will be in some degree of an overhead squat with the body and bar positioned in accordance to the description provided previously with regard to the overhead squat—movement of the bar and lifter must now be arrested and the system stabilized. Just as with each prior segment of the lift, successful receipt of the bar must be active and aggressive.

Failure to actively fix the correct overhead position immediately will cause the bar to drop in front or behind the lifter, or possibly the collapse of the support structure, resulting at best in illegal elbow flexion.

At this point, the lifter should be focused on confining all movement to the vertical plane. That is, the lifter should be actively punching up vertically against the bar while sitting in vertically to the bottom of the squat. This vertical alignment is what allows stability. Significant horizontal movement of the barbell or body at this point will usually be impossible to control. This vertical alignment is possible only with the delivery of the barbell to the correct position overhead, the proper placement of the feet on the platform, and the correctly timed and positioned movement of the athlete down into the squat during the third pull.

Receiving the bar is a very active attempt to secure the bar with proper posture and re-establish stability of the bar-body unit. Upward and downward forces must be oriented vertically.

The air pressure being used to stabilize the torso should be maintained. Release of the breath at this point will reduce structural integrity and potentially result in either a missed lift or injury. This is the point of the lift at which the torso will be managing the greatest compressive forces, and consequently the added rigidity from pressurization is critical to prevent unwanted flexion of the spine or other shifting in positioning.

The depth of the hips at the moment of receipt will never be absolute bottom in even the deepest receiving position, although extremely proficient snatchers will manage to come remarkably close. This distance above absolute bottom, however minimal, allows the athlete to absorb the downward force of the bar and make microadjustments to establish stability.

It should be obvious that the more precise the second and third pulls, the more accurately placed the barbell will be upon its receipt and the less effort will be necessary to establish stability. That said, perfection is rare, and some degree of effort, however minimal, will usually be required to stabilize the bar. It's critical this stabilization take place before the athlete attempts to recover from the squat. Often athletes will rush the recovery and lose a lift that should have otherwise presented no problem. Exceptions are cases in which movement of the feet is necessary, which will be facilitated by at least partial recovery from the squat. Such foot movement, however, is a gamble and by no means certain to be successful.

While the athlete will obviously need to apply effort during the bar's receipt, it's important that he or she not attempt to lock up the legs abruptly as one would when arresting a power snatch. The athlete should allow the bar to push him or her down into the bottom and finalize the tightness of this receiving position there. Attempts to lock up too much too soon will limit the ability to stabilize the bar.

Unlike in the clean, in which a bounce from the bottom position will often be necessary for a successful recovery, the priority in the snatch is establishing stability prior to initiating the recovery to standing. Premature recovery attempts with an unstable overhead position will most often simply magnify such instability and push the bar farther to whatever direction it's shifting; for example, an attempt to rush a recovery with a bar that is slightly forward will typically just push it even farther forward to the point at which it can't be supported. The athlete needs to settle into the bottom and patiently establish stability. Of course, in the event the bar is obviously stable upon receipt, the athlete can recover immediately.

Recovery

Once the bar is secured and stabilized overhead, the athlete will recover from the squat to a standing position. As mentioned previously, there may be times in which movement of the feet is necessary to achieve balance. This stepping, however minimal, is more easily accomplished the closer to standing the athlete is. Duck-walking under a heavy unbalanced snatch offers great potential for knee injury and should be discouraged outside of the most clinch competition situations, as it is rarely successful anyway.

During the recovery, the athlete must continue aggressively maintaining posture and stability, pushing the bar straight up and following it with the body.

Occasionally the athlete will feel the bar moving out of position forward or backward and will be able to begin standing and re-establish the base under the shifted center of mass to regain control. This typically looks like one or more short, quick steps as the athlete is standing from the squat, although at times dramatic steps may be taken. This is an acceptable practice within reason, but athletes should never be allowed to chase poorly executed lifts at the risk of injury. Instead, they need to improve their technique and consistency to avoid placing themselves in such situations.

Commonly the imbalance inspiring this kind of chasing is unnecessary and simply the result of the athlete rushing the recovery or recovering with improper mechanics at the expense of stability. A simple diagnostic and often correction of this habit is to force the athlete to stay at the bottom of the squat for a couple of seconds before recovering on every snatch. It will quickly become clear whether the imbalance is occurring in the receiving position or during the recovery.

The lifter should lead the recovery with the bar rather than with the body. That is, instead of thinking of standing from the squat with the bar overhead, it will be more effective to think of pushing the bar up and following it with the body. Too often simply standing from a squat will result in the athlete's hips rising too quickly relative to the shoulders and bar, tipping the trunk forward and undermining the integrity of the structure supporting the weight. By leading with the bar, athletes are more apt to stand with the posture upright and maintain the necessary structure. Additionally, this will help ensure that the shoulders and arms remain fixed tightly throughout the recovery.

Once the athlete has returned to standing—unless there is a current wrist or elbow injury—the bar should be held overhead for a moment before it's dropped to the platform. Dropping the bar immediately upon standing—or as some athletes do, just before full knee and hip extension—often masks imbalances and prevents the recognition and correction of the causative faults. Holding the bar overhead momentarily will not only ensure its stability, but will improve the athlete's strength in this position and condition the joints.

Athletes intending to compete will need to be prepared to hold the bar overhead until receiving the down signal from the officials. A lift is not complete until the lifter is standing fully with the feet in line parallel with the barbell and stability is obvious.

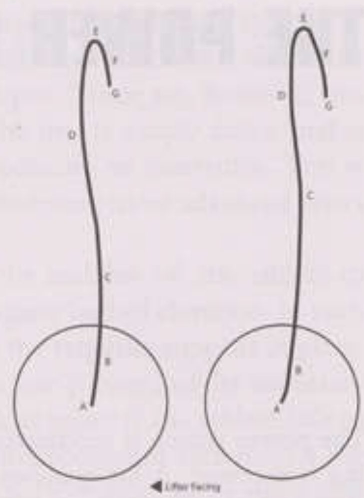
The Barbell's Path

As has been alluded to in previous sections, the path of the barbell during the snatch is not a straight line, but describes a slight S shape (when viewed from the lifter's profile). This minimally curved path is not a goal itself, but is the result of optimal pulling mechanics due to the body's interaction with the barbell and the maintenance of balance over the base. It would be convenient to be able to lift a barbell in a perfectly vertical line, but this is not how the body functions mechanically; additionally, a straight vertical line would not allow the bar-body unit to remain correctly balanced over its base with the necessary movements of the body during the course of the lift and the end point of the barbell.

Viewing the diagram of the bar's path during the snatch, we can associate points of the curve to moments of the lift. The beginning of the path (A) represents the center of the barbell's diameter in its starting position over the balls of the athlete's feet. As the bar is separated from the floor and the athlete begins extending the legs, the bar sweeps back farther over the feet (B), bringing the athlete into better balance over the foot while maintaining the desired posture for the remainder of the pull. The bar reaches its farthest point back (C) during the pull approximately between mid-thigh and the hips. Once the athlete has extended the body completely, the bar moves slightly farther forward (D) to account for the position of the body behind the bar as the athlete pulls under it. The bar reaches its maximal height (E) as the arms turn over and the hands flip back. As the bar is received, the athlete completes the squat under and extension of the arms under the bar (F) and settles into the bottom position (G), the bar moving back slightly more to settle into the correct overhead position.

We would like to keep this S curve as flat as possible, but never sacrifice effective mechanics in an effort to flatten it completely. Quite simply, we want to lift with the mechanics that allow optimal acceleration, balance, and receipt of the bar, and these mechanics will naturally force this slight horizontal deviation from the bar's vertical rise.

The diagram shows two examples of slightly different bar paths from two different lifters. While they differ somewhat, the basic shape is the same, and will remain essentially the same among proficient lifters. Bar paths will deviate from this type of trajectory with less technically proficient athletes, or during poor lift execution.

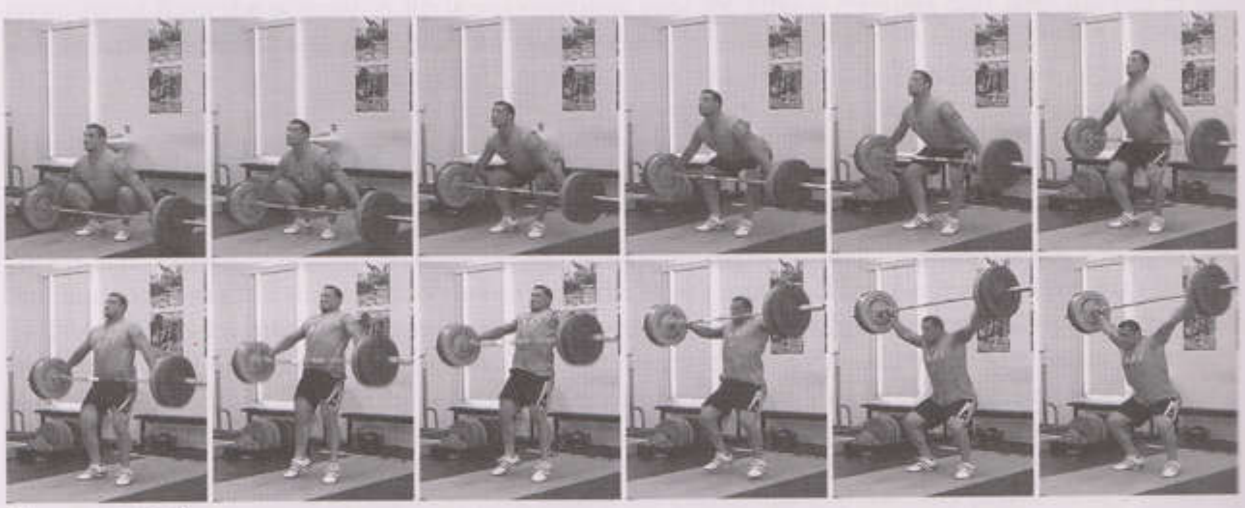


A. Starting point of the center of the barbell; B. Backward sweep of the bar during the initial lift from the floor; C. Farthest backward point during the pull, approximately between mid-thigh and the hips; D. Slight forward curve during the third pull; E. Maximal elevation of the bar; F. Final squatting under the bar into bottom position; G. Final position of the bar as it's received and stabilized in the bottom of the squat.

THE POWER SNATCH

The power snatch is mechanically identical to the snatch—the sole difference is the height at which the bar is received. A lift qualifies as a power variation if the bar is received and stopped with the thighs above horizontal (In some cases, power height is defined as being a 90 degree angle of the knee of above; coaches and athletes should choose the definition that best suits their present training needs and goals). If the bar is received with the thighs above horizontal but the athlete fails to arrest the descent quickly enough and the thighs pass below horizontal, the attempt is not a power lift, no matter how high the initial receipt is. Unlike in the snatch in which the athlete more gradually controls the downward force of the bar and rides it into a squat, the power snatch must be received with an immediate and powerful tightening of the legs to arrest downward movement.

Often the power snatch is taught independently of the classic version and as if it's unique in respects beyond the height of receipt. Commonly athletes will pull entirely differently and even more often will receive the lift with an extremely wide foot placement. As was discussed early in the book, a power lift occurs when the weight on the bar allows it with a maximal attempt at upward acceleration. The lighter the weight is, the more it will be accelerated during the second pull and the higher it will travel under the resulting momentum. As the athlete executes the third pull and continues pulling on the bar with flexion of the elbows, the athlete will begin descending while the bar continues to rise. The degree to which each object descends or rises depends entirely on their masses relative to each other, assuming constant effort by the athlete. The lighter the barbell relative to the athlete, the higher it will rise and the less the athlete will descend with a given magnitude of force application. If the bar is light enough, the athlete will be able to elevate it high enough to receive the lift with the thighs above horizontal, thus performing a power



The power snatch

snatch. In short, the pulling mechanics that are ideal for the snatch are identical for the power snatch.

A significantly wider receiving position for the feet is occasionally used simply because it allows the athlete to more easily arrest the downward force of the bar at a given depth. There are, however, two potential problems with this method of power snatching and cleaning. The first is simply that it makes consistency in the receiving position of the snatch more difficult by introducing an alternative. This is admittedly a concern largely exclusive to novice lifters not yet technically proficient; more advanced lifters will be less susceptible to negative influences in snatch technique.

The second potential problem with a wider receiving position is the inability of the athlete to transition into a full depth squat if necessary due to a failure to achieve adequate barbell elevation. In such a situation, we necessarily have an abrupt stop without necessarily having the requisite support in place. A power snatch may be received with partially flexed elbows and/or the bar forward of its necessary position for balance—this offers the opportunity for wrist, elbow or shoulder injury if the athlete fails to abort the lift appropriately. If the athlete instead receives with a foot position consistent with that of the squat variations of the lifts, in such a case of a failure to achieve adequate bar elevation, he or she is able without adjustment or consideration of any kind to simply ride the lift down into a full depth receiving position and save the lift safely.

The power snatch can be learned with the same progressions outlined in this book—the only change that needs to be made is the receiving depth.

Benefits & Uses

The power snatch is used by weightlifters for a number of different reasons. One is as a substitute for the snatch on lighter training days—this allows the athlete to continue performing classic lift technique with less taxing loads, but still with a demand for speed and precision. Another use is as a tool for improving certain aspects of an athlete's snatch performance—the power snatch forces an extremely violent second pull, abrupt transition at the top, and a vicious turnover of the bar, all because of the need to elevate the bar higher and secure it overhead in less time. The power snatch can also be used as an early variation of the snatch for new lifters who are not yet flexible enough to snatch with a full squat.

The power snatch is sometimes used in strength and conditioning programs of non-weightlifter athletes, although its appearance in programs is considerably less frequent than the power clean, due in large part to its more technical nature, its greater demands on flexibility, and the greater difficulty of teaching and coaching it with large groups or teams.

The power snatch is often preferable over the snatch for non-weightlifter athletes because it focuses on the aggressive hip and knee extension element, demands less flexibility, and uses loads that maximize power production by allowing (and even forcing) greater speed. That said, athletes who learn the classic versions of the snatch first tend to immediately perform the power versions with greater proficiency because they learn to perform them in the same manner, rather than as two completely different exercises. Athletes who initially learn and practice the power snatch exclusively tend have far more difficulty performing the snatch—again, this is often in part because they learn the lift as a different exercise technically, but also because they tend to be lacking in the flexibility and bottom-position strength required by the snatch.

THE SPLIT SNATCH

The split snatch was the dominant lift style prior to the squat. As the sport and lifting technique evolved through the efforts of athletes to lift heavier weights, the squat became the dominant style and the split faded into obsolescence within the competitive arena, with the exception of some master lifters and a very limited number of national and local level senior lifters.

The split receiving position limits the possible receiving depth of the lifter and as involves a more dramatic repositioning of the feet requiring somewhat more time, consequently requiring the athlete elevate the barbell somewhat higher than would be necessary for a squat snatch. While not ideal for lifters at the highest levels of competition, the split snatch certainly has value in a number of situations. First is as an exercise for non-weightlifter athletic training. Because of the greater bar elevation requirements, the split snatch offers many of the same benefits of the power snatch. Further, the split receiving position both requires greater coordination and provides more opportunity for strengthening a staggered foot position, which is considerably more common in athletics than a perfect squat stance (although in few cases will an athlete actually find him- or herself in a deep split position). Additionally, the split snatch is an option for lifters with certain injuries, both current and past, and those with limited shoulder, hip and ankle flexibility that is not likely to be corrected. The split snatch allows the athlete to keep the torso vertical, and even behind vertical in some cases, greatly reducing the need for shoulder and thoracic spine mobility. This makes the split snatch an attractive option for master lifters, who are frequently lifting with the limitations of both past injuries and limited flexibility. This being said, switching to the split snatch is not a substitute for addressing correctible flexibility limitations.

The technique of the split snatch is essentially the same as the squat snatch aside from the receiving position. What may change is how far forward under the bar a given athlete must drive the hips. The less flexibility an athlete has in the shoulders, the more vertical the torso will need to be, even to the point of leaning backward slightly. In order to support the barbell overhead in this position, the hips must move in under the bar and slightly forward. This hip movement will occur as the athlete finalizes the pull under and settles into the ultimate depth of the split, dropping the hips and moving the lead knee farther forward over the toe rather than the shin remaining in a more vertical orientation. In a full split snatch as performed by the top lifters of the split era, the lead knee will be fully closed or close to it and the hips nearly as low as they would be in a squat. This is a different position than the split used for the jerk; it requires that the front foot not be as far forward and demands a great deal of flexibility in the hips. For athletes of the present era who employ the split in order to snatch, the absence of such flexibility is likely the reason for splitting, so the split position used will be higher and far more similar to the jerk.

THE CLEAN

THE CLEAN

The clean and jerk is a two-part lift, contested after the snatch in competition. The bar is lifted first from the floor to the shoulders with the clean and then driven from the shoulders to overhead with the jerk. Because of this segmentation and the stronger body positions, lifters are able to handle significantly greater loads in the clean and jerk than in the snatch. For most, the clean is more easily learned than the snatch, particularly when already familiar with the snatch, but it is not without its own technical subtleties. For athletes who have already learned the snatch, the learning progression for the clean may often be abbreviated successfully because of the fundamental similarities of the two movements.

Because of the difficulty of correctly racking a weightless PVC bar, a barbell—or lighter technique bar if necessary—should be used for the clean & jerk learning progressions whenever possible.

The clean is the first phase of the clean & jerk, and brings the bar from the floor to the shoulders.

The Grip

There is as much variation among lifters in terms of grip width for the clean as there is for the snatch. The grip width in the clean is more likely to be naturally adjusted to best suit the lifter than in the snatch. This adjustment can be allowed to occur unimpeded until it negatively affects the lift, at which time the coach and athlete should consider the grip placement more critically and attempt to establish a consistent and sound width.

The basic starting point for hand placement is approximately half a fist-width or slightly more outside the shoulders. With this hand placement, and the bar against the shoulders, the forearms should be able to be held approximately vertical when viewed from any direction. In any case, the hands should not contact the shoulders at all. With this hand placement, the bar will be in contact with the athlete's upper thigh when standing in the tall position. In the starting position, it will allow for a degree of knee flare without interference.

The hands should be placed approximately half a fist-width to a fist-width outside the shoulders.

Wider grips in the clean will mean that the barbell contacts the body closer to the hips rather than farther down on the thighs. As was described with regard to the snatch, this is beneficial mechanically.

This hand placement will work for both the clean and the jerk without any adjustment between the two lifts. As the athlete progresses, he or she may choose to employ different hand placements for each lift to accommodate individual strengths, weaknesses and anthropometrics, but in the early learning stages, a single grip is recommended.

Some lifters, particularly those who toe-out and flare the knees dramatically in the starting position, will have the arms actually bending somewhat around the legs when setting the start, straightening soon after the barbell leaves the platform. This is not necessarily problematic for an experienced lifter, but it should be avoided by new lifters.

As in the snatch, the hook grip is used in the pulling segment of the clean. Unlike in the snatch, the thumb is invariably released as the barbell reaches its destination on the shoulders. Although some athletes will have the particular anthropometrics in addition to the flexibility needed to rack a barbell on the shoulders with a hook grip, it is neither necessary nor helpful. The release of the grip will be discussed further in later sections.

THE RECEIVING POSITION

The receiving position of the clean is the front squat, in which the bar is racked on the lifter's shoulders to allow direct support by the torso. The placement of the barbell, its security in that position, and the position of the squat itself will determine to a large degree the success of the front squat or clean.

What's critical for the athlete to understand is that the barbell is not supported by the hands and arms. The weight is supported by the shoulders and consequently by the torso directly—the hands are in a sense just along for the ride in this phase of the lift, although they do provide a degree of resistance against bar movement and can be used to help correct poor positioning.

The receiving position of the clean is the front squat.

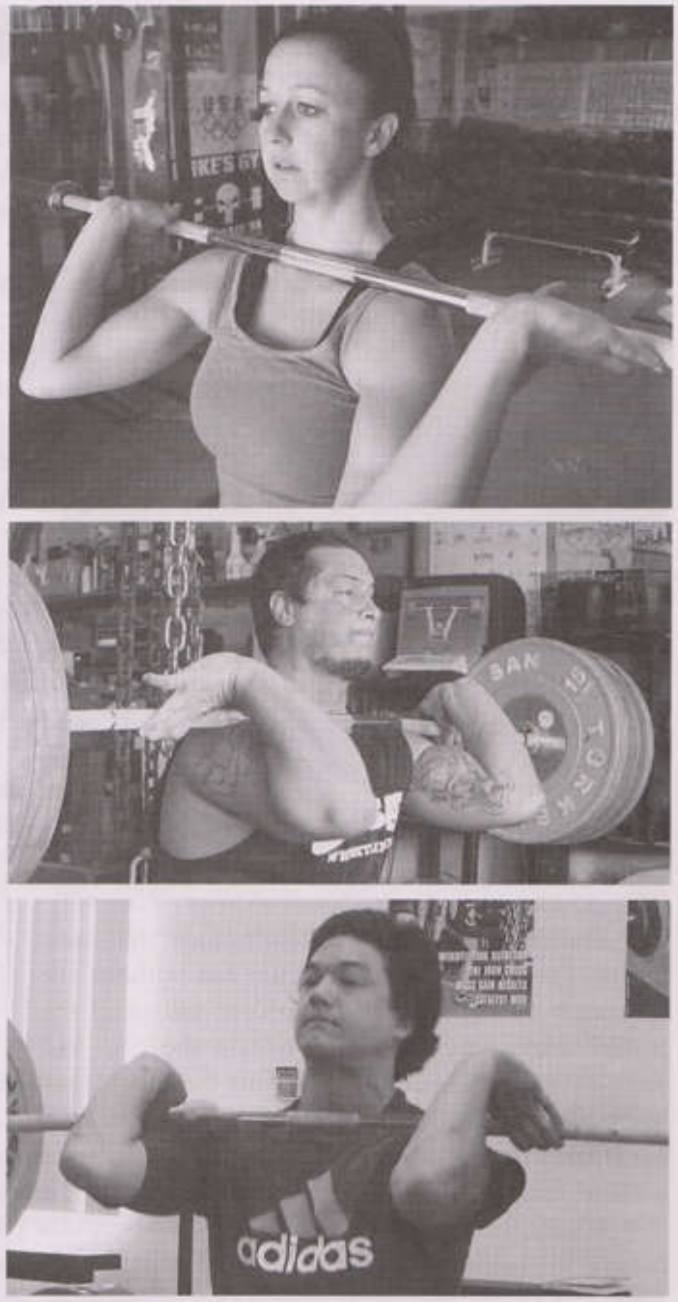
Frankenstein squats will introduce the basic position necessary to support the bar without the assistance of the hands. The athlete will place the barbell across the shoulders, release the grip and extend the arms horizontally, pushing the shoulders forward and slightly up to create a stable shelf for the bar, which should be in contact with the throat and behind the peak of the shoulder muscles. Once the bar is stabilized in this position, the athlete can squat with no movement of the bar as long as the torso remains upright, the back completely extended, the arms up and the shoulders forward.[1]

It's important to distinguish between scapular protraction and thoracic spine flexion—they are neither the same thing nor necessarily coupled. However, for many athletes the attempt to push the shoulders forward in order to create the shelf for the bar will result in simultaneous rounding of the upper back. If this becomes apparent for a particular athlete, the movement of the scapulae without spinal flexion can be practiced in isolation as needed before returning to the barbell.

The Frankenstein squat forces the athlete to rely on the bar's placement on the shoulders for support.

Once the athlete is comfortable with this position and is able to squat without any movement of the barbell, we can proceed to the actual front squat and clean rack position. The athlete will re-grip the barbell with the clean hand placement and bring it to the shoulders. Lifting the elbows as high as possible and driving the shoulders forward and up, the athlete will loosen the grip and allow the bar to roll out of the hands onto the fingers. This should deliver the bar to the shelf created by the shoulders and place it in light contact with the throat. Again, the shoulders must be pushed forward to create space for the bar behind the peak of the shoulder muscles, and should also be shrugged up slightly to prevent the bar from contacting the collarbones and from compressing the carotid arteries. While elbow position is actually secondary to shoulder position in terms of creating a shelf on which the barbell can rest, generally the elbows should be lifted as high as possible to further secure the bar's position.

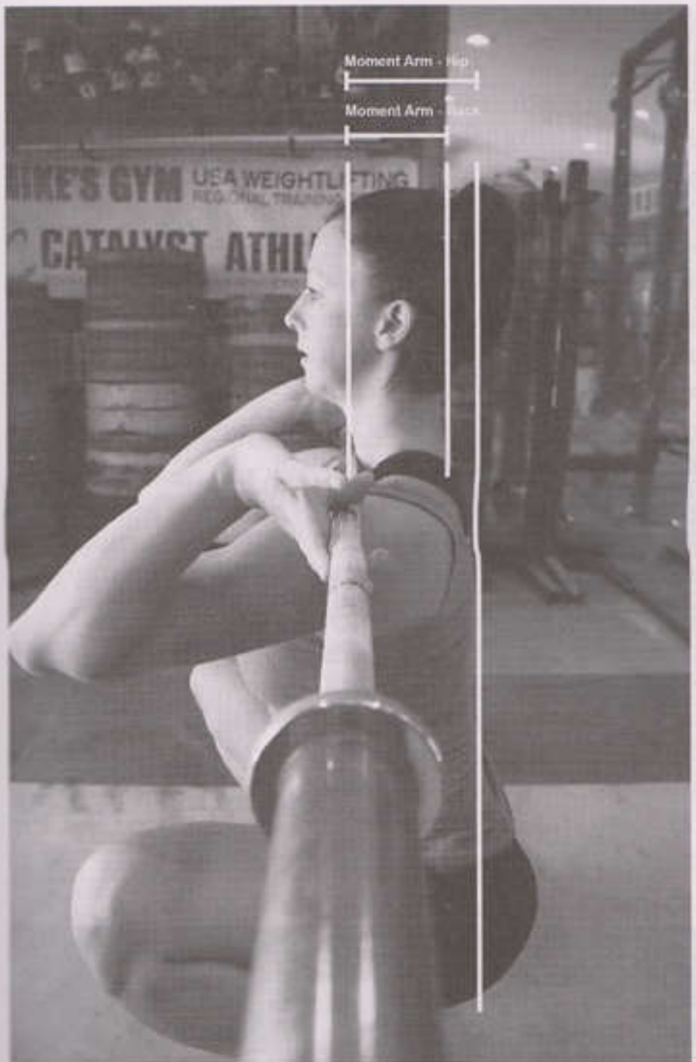
The possible position of the hands and fingers in the clean rack will vary among lifters along with their arm segment lengths and flexibility. Some athletes will be able to comfortably keep the hands under the bar quite deeply, whereas others may be able to keep only the tip of the first two fingers under the bar. Either position or anything in between is acceptable, although it's suggested that even those possessed of greater flexibility shift the hands to place the bar in the fingers.



The clean and front squat rack position

This fingertip placement of the barbell will position the hands at an angle with the heels of the palms above and in front of the bar. This improves the security of the bar by blocking the bar's possible path to roll forward off of the shoulders. Additionally, this prevents unwanted tightening of the grip on the bar that can occur unintentionally with the hands deeper under the bar. Such tightening of the grip encourages the shoulders to pull back and the elbows to drop, reducing the security of the rack position.

Some athletes—in particular those with large biceps—will find it literally impossible to achieve this position initially. Little can be done immediately about excessive bicep or forearm mass other than widening the hand placement, which reduces the contact area between the upper and lower arm and provides space for such mass to go. Occasionally an athlete will possess an imbalance in lengths of the upper and lower arm that greatly limits the ability to achieve the desired rack position. This problem can also be reduced somewhat by widening the hand placement, in effect reducing the length of the longer arm segment. Narrower grips can also be experimented with to find the position for each athlete that allows the most



The deeper the barbell is placed toward the throat, the less the torque on the back and hips.

secure rack position. Difficulty arising from flexibility limitations can be corrected entirely with time—specifics are addressed in the flexibility section of the book.

The placement of the barbell must be as far back into the throat as possible. In addition to being the most secure position on the shoulders, this will reduce the distance between the load and the spine and consequently the length of the moment arm, minimizing the torque on the back and hips and allowing the athlete to maintain the upright posture more easily.

The unfortunate nature of the rack position is that the bar is in contact with the throat and may place uncomfortable pressure against it. How much pressure it places on each lifter varies from unnoticeable to enough to bring him or her to unconsciousness during exertion. This problem can be mitigated if not eliminated entirely by ensuring the shoulders remain elevated and pushing the head and neck straight back (Note that this movement is actually cervical spine flexion, not extension—that is, the head is not being tilted back, but the curve of the neck flattened to shift the throat backward; the orientation of the head should remain unchanged and the thoracic spine only further flattened). Keeping the shoulders elevated somewhat will help prevent the bar from compressing the carotid arteries, which can cause dizziness and unconsciousness, and will prevent the bar from placing painful pressure on the clavicles (in the case of the clean, crashing onto them).

The movement of the front squat conforms to the criteria outlined in the Squat chapter. The importance of maintaining an upright torso will become extremely clear to the athlete who fails to adhere to this positioning and quickly finds the back rounding forward, the barbell's weight driving the arms down, and with heavy enough loads, the bar dropping to the floor. A constant effort to maintain complete spinal extension and an upright torso must be made.

The recovery out of the bottom of the squat is aided greatly by the effort to drive the elbows up. In addition to encouraging continued upper back extension and an upright torso, this drive of the elbows is a mental cue for speed and aggression. The transition at the bottom of the clean must be vicious in order to capitalize on the effects of the bounce described in the Squat chapter and minimize fatigue of the legs to ensure greater available power for the subsequent jerk. This aggressive transition and rapid recovery should generally be practiced with front squats. At times during the learning process and later training, a pause at the bottom of the clean or front squat will serve a specific training purpose, but the rapid transition and recovery should be the default. For example, a pause at the bottom is appropriate initially during the learning process to ensure correct posture and improve flexibility.

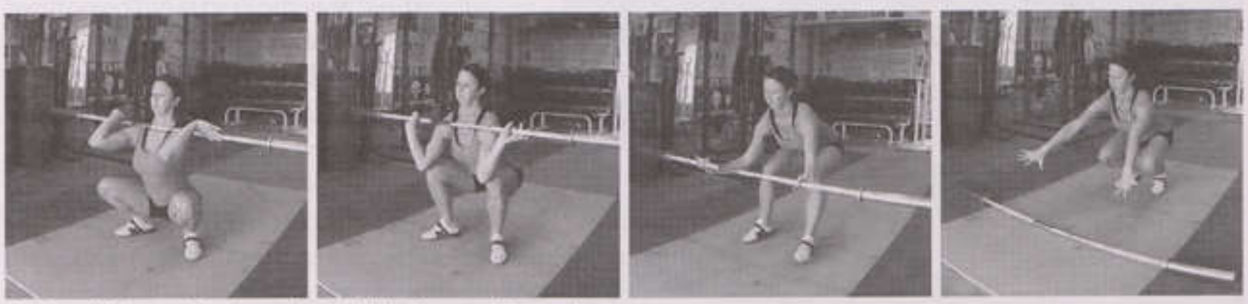
Missing

As with the snatch, there will be occasions when a clean is not completed successfully for any number of reasons and the athlete must safely discard the barbell. Unlike in the snatch, however, there is only one desirable option for missing a clean—dumping the bar forward.

With an empty or lightly loaded bar, the lifter can practice this procedure as he or she did for the snatch. From the bottom of the squat, the athlete will need to be the most aggressive in his or her exit. Pushing the bar forward, the athlete will jump the feet and hips back out of the way as far as possible. The movement of the feet and hips takes precedence over the upper body—because the bar is in contact with the shoulders, it will be difficult to move them as quickly and consequently attempts to move the entire body back together may be too slow to be successful. This jump back is critical—many times in a failed clean attempt, the bar is not racked securely or at all and will immediately begin dropping. If the athlete doesn't move the hips back quickly enough, the bar may drop onto his or her thighs.

When pushing the bar away, the athlete should bring the elbows in toward the midline too prevent their colliding with the thighs as they drop—this collision can easily injure the wrists. (Depending on the position of the arms in the rack position and the position of the legs in the squat for, the elbows may need to be directed outward instead to avoid the knees.)

Occasionally a clean will be received with the athlete's balance too far backward on the feet. Ideally, the athlete will respond immediately and dump the bar forward while jumping back. If the athlete fails to react quickly enough or the weight is too far back to allow it, however, he or she will fall backward. In this case, the best course of action is to lie flat—the height of the bumpers will keep the bar safely off the throat and most likely over the face. The lifter should not attempt to hold up the bar—if the weight of the bar comes down in the hands with the elbows in contact with the platform, serious wrist, hand and arm injury is likely. Incidentally, this is why it's recommended to never use straps for the clean.



A missed clean or front squat should be dumped forward.

1 This drill was introduced to me by Mike Burgener

LEARNING THE CLEAN

If the athlete has already learned—or begun learning—the snatch, learning the clean will be considerably easier and faster. The fundamental principles of the lifts are of course identical, and the movement of the legs and hips is essentially the same. The similarities are great enough that in many cases the athlete will be able to successfully perform a clean with no specific clean instruction beyond the rack position and front squat.

However, because some of the nuances of the clean that will ultimately have great effect on the lift are neglected, this approach is not recommended. What will seem initially to save time will nearly invariably result in more total time spent on instruction as the athlete progresses and technique flaws become more evident and their influence on lift success increases. It's more effective to teach technique in a rational order that addresses the details as they arise than to attempt to later correct technique faults that have already become habit.

The learning progression drills for the clean follow the same order and principles of those of the snatch. If the snatch section has been skipped with plans to learn the clean first, it should be read before proceeding—much of the foundation and many details of the following drills are discussed with regard to the snatch and will need to be read in order to complete the understanding of the following progression.

The mid-hang position of the clean is identical to that of the snatch, but with the slight changes that correspond with a narrower grip (the bar will contact the body at the upper thigh rather than at or very near the hip), and is consequently not discussed. Similarly, this section of the book skips the initial jumping drill that was performed during the snatch progression with the assumption that this movement and concept are already understood at this point.

Mid-Hang Clean Pull

The mid-hang pull drill for the clean learning progression is identical to its snatch counterpart with the exception of the narrower hand placement and the corresponding position of the barbell against the body. From the mid-hang position, the athlete will aggressively extend the legs and hips. Again, this extension should not be prolonged to even the slightest degree. At this point, the athlete has already performed all of the jumping and extension drills during the snatch progression and should be able to perform this pull correctly without a jump off the floor. If needed, the jump drills can be revisited.

Mid-Hang Clean Pull

Start in the mid-hang position holding the bar with the hook grip in a clean width.

Perform the same motion practiced for the mid-hang snatch pull.

With the lats and shoulders, push the bar into the upper thigh and maintain contact with the body as the pulls is completed.

Mid-Hang Clean Pull

Because the narrower grip places the barbell against the upper thighs instead of in the crease of the hips as it was in the snatch, it will travel forward with the legs slightly as the knees naturally move forward with the scoop. The athlete will need to push the bar back into the upper thighs and continue pushing the bar in as the pull is completed to prevent the bar from moving away from the body. The elbows should not be locked and the arms should be internally rotated maximally as they were in the snatch.

Rack Delivery

The purpose of this drill is to teach the delivery of the barbell to the rack position on the shoulders. The precision of this movement is imperative, and a smooth delivery of the bar to the shoulders will often be the deciding factor in the success of heavy cleans. The key point is that in this drill, as in the clean, the athlete must actively bring the bar to the shoulders, not simply accelerate the bar upward and drop down underneath it indiscriminately.

This involves an acute awareness of bar and body positions and consistent movement regardless of the weight on the bar. We want to bring the elbows around as quickly as possible and correctly time the opening of the hands to allow the barbell to slide into the proper position without any jarring against the torso. In order to do this, we completely isolate this segment of the clean and practice it without any distractions before integrating it into the whole movement.

The athlete will begin by holding the barbell in the scarecrow position with the hook grip set in the clean hand placement. This is an awkward position and may be difficult to maintain with the weight of the barbell. Athletes can use a lighter bar if necessary.

In this position, depending on arm segment length and flexibility, the barbell will be resting against the body between the lower and mid-chest. There will be a tendency to bring the bar higher by dropping the elbows and raising the hands—this should be avoided by focusing exclusively on elbow elevation rather than bar elevation.

From the scarecrow position, maintaining the bar's proximity to the body, the athlete will bring the elbows around the bar, delivering it to the shoulders and assuming the clean rack position learned previously by loosening the grip as the elbows come around—approximately just after

Rack Delivery

Begin with the elbows in the scarecrow position—elevated as much as possible and pulled out to the sides. The elbows should remain above the bar.

The bar should be in light contact with the chest and the athlete standing upright—not leaning over the bar.

Pull the bar up and back to the shoulders and rotate the elbows around the bar quickly.

As the bar is delivered to the shoulders, open the hands to finish with the bar in the rack position learned for the front squat.


Rack Delivery

the forearms pass vertical. The key point in this movement is that the elbows pivot around the bar, not the other way around as they would in a curl and as they often do in poorly executed cleans.

The proximity of the bar to the body is absolutely critical for a smooth delivery—distance will mean a collision of the bar against the body, which will with heavier loads cause unwanted rounding of the upper back and forward leaning of the torso, neither of which are conducive to a successful recovery from the clean. This can be best achieved by attempting, from the high and out elbow location of the scarecrow position, to pull the bar back into the shoulders by retracting the shoulder blades and pulling the elbows back to initiate their rotation around the bar, rather than simply moving them straight down as many athletes will naturally do.

This movement can be performed slowly initially to lay the movement pattern, and the speed increased gradually until the elbows are whipping into place as quickly as possible without the bar shifting and crashing onto the shoulders. Once the delivery of the bar to the rack position is quick and precise, the next layer of complexity can be added.

Tall Muscle Clean

This drill, like the first, is essentially the same as its snatch counterpart—the isolated arm movement of the third pull. Because the athlete has already learned the turnover of the bar and its delivery to the rack position in the previous drill, this section simply adds the initial pull of the bar from its starting position at arms' length against the thighs to the scarecrow position from which the turnover is commenced. It's important the athlete not lean over the bar or allow the shoulders to round forward as will be the tendency.

Again, this movement can be performed slowly initially to ensure correct movement of the bar and elbows before increasing to full speed. The keys to this movement are the orientation of the elbows and resulting path of the bar and the pull of the elbows to a reasonable height. With the athlete in the tall position to start, the elbows must be turned out to the sides and the bar kept in light contact with or immediate proximity to the body. If the elbows are allowed to travel backward prematurely, the bar will fail to reach adequate height and the likelihood of the bar swinging out away from the body will increase. As was discussed with regard to the snatch, the turnover itself is not a strong movement; it can only be executed quickly and accurately if the initial pull down with the arms is aggressive enough.

Although the athlete first practiced the turnover of the bar in isolation, it should be understood that

Tall Muscle Clean

Begin in the tall position with a clean-width hand placement and the hook grip.

With no movement of the legs or hips, initiate the movement with an elevation of the elbows to the scarecrow position of the previous drill.

Without pausing in the scarecrow position, transition smoothly and quickly to the movement of the rack delivery drill to rack the bar on the shoulders.

Tall Muscle Clean

there is no segmentation of the initial pull of the arms and the whipping of the elbows into place. That is, there should be no pause between the two parts—it is a single, fluid movement. However, the athlete must avoid bringing the elbows around prematurely; they must stay up and to the sides until the bar has been elevated as high as possible in this manner. This will encourage the athlete to complete the initial pull down under the bar in the clean before attempting to turn the arms over.

Scarecrow Clean

With the upward acceleration of the bar and its delivery to the rack position now learned, we can introduce the movement of pulling under the bar. Again we'll start with an abbreviated movement to allow focus on a key segment. This drill is similar to the rack delivery practiced earlier. The athlete will begin in the same scarecrow position and perform the same movement with the arms, but will now simultaneously transition the feet from the pulling to receiving position and squat under. As was the case with the

Scarecrow Clean

Begin in the scarecrow position.

Initiate the transition of the feet from the pulling to the receiving position, squatting the body down under the bar.

As the feet begin moving, perform the rack delivery movement to rack the bar on the shoulders aggressively.

Receive initially in a quarter squat and finally in a full squat.

Scarecrow power clean (top); Scarecrow clean (bottom) similar snatch drills, this drill will be more successful if the athlete attempts to begin the foot movement before the arm movement to ensure he or she is pulling his or her body down instead of the bar up.

Unlike the rack delivery, this drill cannot be performed slowly because of the movement of the feet. Again, minimal foot elevation and maximal foot speed during the transition is the objective. The drill should be performed initially with a quarter-squat receiving position, and finally with a full squat. With the latter, the bar should be racked just as quickly as in the former, and the squat ridden down to the bottom. Focus should be on a smooth delivery of the bar to the rack position—the bar should not drop and crash onto the shoulders. The athlete should pause in the receiving position briefly to ensure stability and correct positioning before recovering to standing.

Tall Clean

The tall clean is identical to the tall snatch with the exception of the receiving position of the bar—that is, it's simply the lift performed without any initial upward acceleration of the barbell. This exercise will often prove beneficial for athletes later in their training in cases of slow or inaccurate third pulls.

Beginning in the tall position, the athlete will again attempt to initiate the transition of the feet from the pulling to receiving position first. As the feet begin moving, the athlete will lean the torso back very slightly and violently pull him- or herself down under the bar with the same arm mechanics practiced previously. There should be minimal upward movement of the bar, and it should remain as close to the body as it has in the previous drills.

Like the tall snatch, the tall clean is often begun with

Tall Clean

Begin in the tall position with a clean-width hook grip on the bar.

Initiate the transition of the feet from the pulling to the receiving position, squatting the body down under the bar.

As the feet begin moving, initiate the movement of the muscle clean to rack the bar on the shoulders aggressively and smoothly.

Receive initially in a quarter squat and finally in a full squat.

Tall power clean (top); Tall clean (bottom) the athlete on the toes. This is not recommended with the clean for the same reasons provided for the snatch.

Initially receiving the bar at quarter-squat depth will allow the athlete to become familiarized with the basic movement and develop the confidence necessary to eventually receive the bar in a deep squat. Again, even if squatting completely under the bar, the turnover and racking of the bar should be performed as quickly as possible, securing the bar on the shoulders well before the bottom of the squat.

Mid-Hang Clean

As with the snatch, the final drill in the clean learning progression assembles the previous components into a clean from the mid-hang position. The constituent movements have already been learned by the body and this clean will typically be executed well with no further instruction.

Beginning in the mid-hang with a clean hand placement and the hook grip, the athlete will extend the hips and drive against the ground with aggression. At the finalization of extension, the athlete will immediately initiate the pull under the bar with the arms, keeping the elbows rotated to the sides and the bar as close to the body as possible. As the elbows reach their peak height, the athlete will pull the bar into the shoulders and whip the elbows around viciously, relaxing the hands and delivering the bar smoothly to the rack position on the shoulders. The athlete should settle in the receiving position for a moment and verify that his or her positioning is correct before recovering to the standing position. Again, the athlete may initially perform a power clean, receiving the bar at quarter squat depth, before proceeding to a full squat depth receiving position. Even when performing a full depth clean, the bar should be racked as quickly and as high as possible, with the athlete then riding it down to the bottom

Mid-Hang Clean

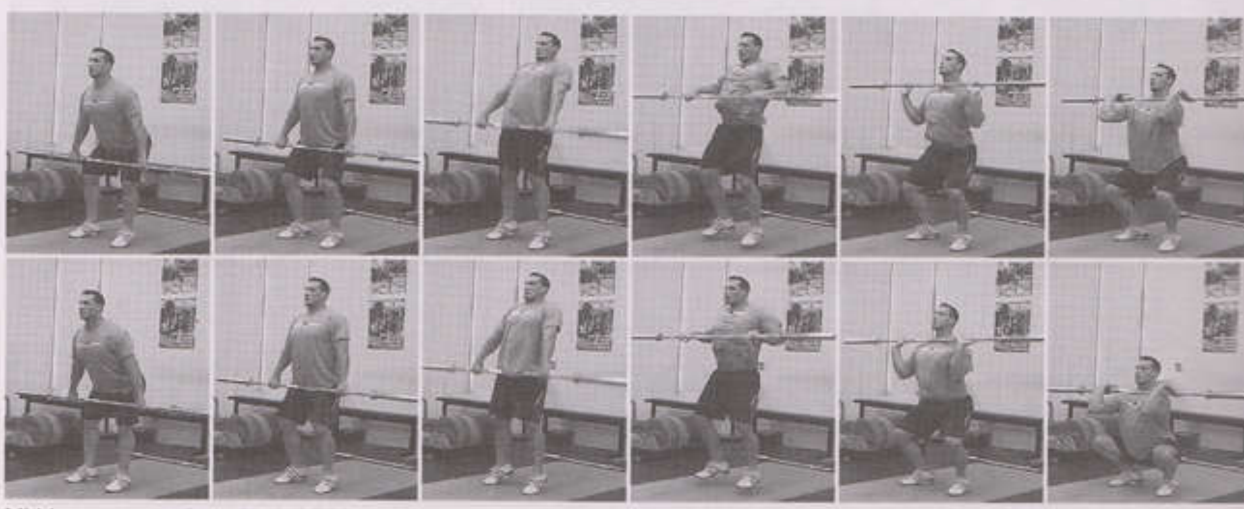
Begin in the mid-hang position with a clean-width hook grip on the bar.

Punch the legs into the floor and extend the hips violently to accelerate the bar upward.

Aggressively pull under the bar with the elbows directed to the sides and the bar and body in immediate proximity.

Bring the bar back into the shoulders and whip the elbows around to receive it in the clean rack position.

Receive the bar initially at a quarter squat depth, and finally at full squat depth.



Mid-hang power clean (top); Mid-hang clean (bottom) of the squat, rather than the athlete attempting to rack the bar near the bottom of the squat.

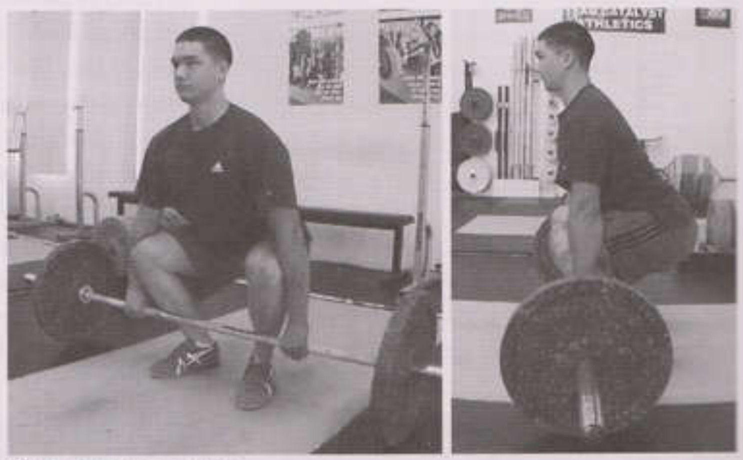
Occasionally at this point the athlete will abruptly forget everything and perform a movement more accurately described as a jumping reverse curl. The preceding drills can be returned to as needed to allow focused correction of the athlete's specific errors.

MOVING TO THE FLOOR

The athlete has now performed the power clean and clean from the mid-hang position. The process of moving the starting position to the floor will follow the same progression used for the snatch. If the athlete and coach are confident in the athlete's ability with the pull from the floor after the practice performed for the snatch, much if not all of this may be omitted and the athlete taken directly to a clean from the floor. If this proves unsuccessful, the athlete can return to this progression before attempting the complete movement again.

Starting Position

Our first step in teaching the pull from the floor is the starting position. The criteria for the clean starting position are no different than those outlined with regard to the snatch—the only noticeable changes will be the slightly greater height of the shoulders and hips and the limited flare of the knees due to the narrower grip of the clean.



Clean starting position

An appropriate weight should be selected at this point—enough that the regulation size plates can be used to place the bar at the correct starting height, at least with a light technique bar and technique plates, but not more than the athlete can easily handle for several reps without any significant fatigue. As in the snatch, if light enough technique equipment is not available to allow such a weight, this can be achieved with an empty bar placed on blocks to elevate the bar appropriately.

We have the same two basic criteria for the starting position as we did for the snatch—the barbell should be placed over the balls of the feet, and the arms should be oriented approximately vertically when viewed from the side of the athlete.

The feet will remain in the same pulling position used to this point, and the knees will be flared to the sides as much as the arms will allow—this of course will not be nearly as much as in the snatch, but with a clean grip of a reasonable width, there will be significant flaring possible. The back should be set in complete extension, the arms internally rotated maximally and the head oriented straight forward along with the eyes.

Clean Segment Deadlift & Halting Deadlift

As in the snatch, in order to teach the correct positioning during the pull of the barbell from the floor to the upper thigh where the athlete will initiate the final explosion, we will use a segment deadlift and halting deadlift.

The three pause positions of the segment deadlift will be 1" off the floor, at the knee, and at mid- to upper-thigh. The top position will be slightly lower than in the snatch deadlift, but still needs to be at least mid-thigh. Each position should be held for 2-3 seconds before moving to the next. After the final position, the athlete will stand into a simulated finish position by completing the extension of the knees and hips together, finishing flat-footed with the weight back toward the heels, the legs vertical, the hips slightly hyperextended with the bar in full contact and being actively pushed back into the body with the lats, and the shoulders slightly behind the hips.

The athlete should return the bar to the floor in a controlled manner through the same positions used on the way up to start a subsequent rep. Sets of 2-3 reps will allow practice without excessive fatigue of the back from holding the pause positions.

When the segment deadlift can be performed correctly, we will remove the first two pause positions and stop only at upper thigh for 2-3 seconds before moving into the simulated finish position. This movement is more commonly called a halting clean deadlift. The lift should be performed slowly and the athlete's positions should remain identical to when performing the segment deadlift.

Clean segment deadlift. Left to right: starting position; 1" off floor; knee; upper-thigh (this will be the pause position for the halting clean deadlift and segment clean).

Segment Clean & Clean

Once the previous two clean deadlift variations can be performed satisfactorily, the athlete can proceed to the next stages. This will first involve a segment clean, and then finish with a complete clean from the floor.

The lifter will perform a slow and controlled halting clean deadlift to mid to upper thigh, ensure perfect positioning and hold for 2-3 seconds, then perform a power clean or clean directly from this hang position. Sets should be kept to 2-3 reps at the most.

When this is done consistently well, the pause should be removed and the clean performed directly from the floor. At this point the pull from the floor to the upper thigh should still be slow and controlled to prioritize position and timing. Speed will be added to the first pull as the lifter's technical proficiency improves.

THE COMPLETE CLEAN

The Starting Position

The starting position for the clean is in its essence identical to that of the snatch—both adhere to the same principles. The only difference is the width of the grip and the consequent changes in the heights of the hips and shoulders and the degree of possible knee flare. Some athletes may also prefer a slightly different placement of the feet than they use in the snatch.

The bar should be over the balls of the feet, the back set in complete extension, the head and eyes facing straight forward, the arms extended passively and approximately vertical when viewed from the side, and the arms rotated internally to orient the points of the elbows to the sides.

The bar may be in light contact with the shins or in very close proximity. Prior to separation of the bar from the floor, the athlete's weight should be balanced fairly evenly across the foot.

The starting position of the clean differs from the snatch only in the height of the hips and shoulders and the degree of possible knee flare as a product of the narrower grip.

The First Pull

As we've established previously, the first pull brings the barbell from its starting position on the floor to the point at which the second pull is initiated, approximately the level of mid- to upper-thigh. The explosion point in the clean will be slightly lower when compared to the snatch in terms of the barbell's position relative to the body due to the narrow grip. Again, this is more of a positioning effort in preparation for the powerful second pull than a contribution of acceleration to the bar. This does not mean the first pull should be intentionally slowed beyond what is necessary to ensure correct positioning—as weights increase, the first pull will need to be extremely forceful, but will be comparatively slow due to the mechanics of the position. As athletes become more proficient, the effort and speed of the first pull can be increased as long as it never exceeds what allows the athlete to keep the positioning and timing of the start of the second pull

The first pull brings the barbell from its starting position on the floor to the point at which the second pull is initiated, approximately the level of mid-thigh.

correct or interferes with the ability to maximally accelerate the barbell in the second pull.

As noted in regard to the starting position, the initial phase of the first pull will be performed with approximately vertical arms. Once the bar leaves the platform, the athlete's back angle may shift slightly during the first couple inches of bar movement, but this will be very subtle and needs to be controlled to prevent excessive hip leading. Once this initial shift has occurred, the angle of the back should remain approximately the same until the initiation of the final explosion.

The back should remain set in complete extension, the arms relaxed, fully extended and internally rotated maximally, the torso pressurized with air, the weight focused over the feet at the front edge of the heels and the face directed straight ahead.

The Second Pull

The second pull begins with the initiation of the final hip and knee explosion effort. Just as in the snatch, this is the source of the bulk of the productive vertical acceleration of the bar, and the mechanics of the hips and legs are identical in essence.

This segment of the clean differs from its snatch counterpart in two consequential ways. First, the narrower hand placement results in the bar being in contact with the body on the thighs rather than in the crease of the hips. Second, the distance the bar must travel to its final position on the body (and the distance the body must travel to its final position under the bar) is dramatically shorter.

Because the point of contact of the bar is lower on the thighs, the knee movement of the scoop will have more of a direct effect on the bar's horizontal position. This makes it even more important to avoid collisions between the thighs and bar that would cause the bar to bounce away from the body. Just as in the snatch, it's important to maintain the barbell's proximity to the body during the second pull to prevent the bar from rebounding from the body following a collision as the hips extend. This is accomplished with a combination of proper upright posture rather than excessive leaning over the bar and the forceful activation of the lats to push the back toward the body as it moves behind the shoulders.

In response to this lower bar position on the thighs, it's common for athletes to flex the elbows during the second pull in order to bring the bar into the body higher up toward the hips instead against the thighs. This habit can also be attributed many times to a slightly early scoop—if the knees start moving forward too soon, the bar is still very low on the thigh, and the athlete will naturally attempt to get it out of the way by bending the arms. Many can perform at very high levels in this manner—the comparatively minimal need for bar elevation in the clean allows for greater power transfer loss in the arms without causing a failed lift (many athletes who do this are also more reliant on the hips and accordingly there is less

The second pull of the clean is the final explosive effort of the legs and hips.

of a negative effect). That notwithstanding, the habit should be discouraged except in cases in which correction will require more time and effort than its elimination will be worth.

As in the snatch, the athlete can achieve similar repositioning of the bar up and back toward the hips by shrugging the shoulders back and slightly up while pushing the bar in with the lats during the explosion phase. This motion can move the bar enough to significantly improve the ability of the lifter to explode at the hips without as much interference from the bar and as a consequence, increase the degree to which the hips can be extended (hip extension is often cut short undesirably in the clean because of the barbell's contact with the thighs).

It's surprisingly common for athletes, as a reaction to the heavier weights of the clean, to attempt prolonged extensions in an ostensible effort to elevate the barbell higher. It needs to be clearly understood that acceleration of the barbell is the product of the relationship between the distance and duration of the extension—the shorter the duration of that extension, the distance of which is constant, the greater the resulting acceleration and consequently momentum and elevation. More succinctly, speed is the key to acceleration and elevation, and any time spent in an extended position beyond that required to reach that position contributes nothing to the acceleration of the bar. As importantly, time spent unnecessarily in extension reduces the available time for the athlete to pull under the bar in order to receive it.

To be clear, the attempt for greater extension speed cannot be misinterpreted as simply reduced extension time, because this fails to consider the distance component. In other words, the athlete can't be allowed to mistakenly stop short of full extension for the sake of reducing the duration of the second pull. It is far more common in the clean than in the snatch to see incomplete hip and knee extension because it's less likely to cause a failed lift due to the shorter distance the bar and lifter must travel, and the far better ability of the athlete to pull under the bar quickly. This being said, the clean does not require the same degree of hyperextension of the hips as will be effective in the snatch. Many elite lifters are successful in the clean barely breaking the vertical plane with the torso. If the speed of the explosion, height of the bar, and timing and speed of the transition to the pull under are adequate, so is the degree of hip extension. Forcing more hip extension past what proves to be effective in practice will simply slow the lift.

Much prolonged extension can be attributed to mistaken efforts to perform a shrug at the top of the second pull in an effort to elevate the bar further. The athlete must allow the shrug to occur as a part of the pull under the bar with the arms. Separating the two actions creates an unnecessary and performance-limiting delay in the movement.

Similarly, ankle extension must be allowed to occur naturally as a product of violent leg drive against the platform. Any intentional ankle extension will invariably slow the extension down, prolong the extended position, and limit the athlete's ability to relocate under the bar in time. Ankle extension in the clean is generally more subtle than in the snatch for the same lifter.

The Third Pull

The third pull of the clean is the point at which the lift diverges considerably from the movement of the snatch. In principle, however, it remains identical. At this point, the athlete has accelerated the barbell as much as possible through knee and hip extension and must now take advantage of the barbell's inertia to pull him- or herself down to the necessary depth to rack the barbell on the shoulders.

The initial effort to pull under the bar is executed in the same manner as in the snatch—the athlete pulls aggressively with the arms, directing the elbows up and to the sides in order to ensure the barbell remains as close to the body as possible. It is this vicious arm pull in concert with a removal of the pressure against the platform immediately upon the completion of knee and hip extension in the second pull that changes the athlete's direction and accelerates him or her down under the bar. This immediate


The third pull is the active repositioning of the lifter under the bar.

and aggressive acceleration is what allows the turnover of the arms to be completed successfully as soon as possible—the turnover itself is not a particularly strong movement and cannot be relied upon to significantly move the athlete and barbell, nor can it happen without the pivot point (the barbell) being close to the shoulders.

The elbows will not reach their maximal possible elevation in this orientation—that is, they will begin moving backward and down before they reach the level at which we placed them during the initial learning progression. Generally they will rise only to approximately chest level (although there are a number of lifters who are able to elevate the elbows remarkably high). At this point, the barbell will have enough upward momentum, the athlete will have enough downward momentum, and the athlete and barbell will be enough within the range of relative positions that the turn over of the elbows can begin. The athlete will need to aggressively retract the shoulder blades and pull the elbows back to initiate their path around the bar to ensure the bar and athlete remain in close proximity. This can be thought of as pulling the bar back into the shoulders rather than simply pulling the body down.

The path of the elbows during the turnover is critical for the success of the clean attempt. The barbell is the pivot point for the arms' travel as they move into the rack position, and violation of this will shift either the bar or the athlete from their respective desired paths. If the elbows, instead of traveling up and to the sides, travel back prematurely, it's likely the athlete will fail to accelerate downward adequately due to the misdirection of the force of the arm flexion.

In addition, the elbows traveling back before the barbell and athlete have achieved their appropriate relative levels makes more likely the elbows becoming the point around which the arms pivot instead of the bar in its correct proximity to the shoulders. This results in excessive distance between the barbell and the athlete from a combination of the bar swinging away from the body and the athlete being pushed back away from the barbell.

Further, unless the bar is pulled up and back into the shoulders, the pivot point is in the wrong position, and the chances of the barbell crashing onto the lifter's shoulders increase. This correct positioning of the bar is achieved, again, by the effort to elevate the elbows as high and to the sides as possible during the first phase of the pull under, and then the active retraction of the shoulder blades and pull back of the elbows to initiate their path around the bar.

The elbows must whip around the barbell to enter their orientation for the rack position as quickly as possible. The aggressiveness of this turnover is what ensures that the elbows are high enough to create a solid rack in time for the delivery of the bar. An incomplete turnover of the elbows presents a number of potential problems. First, and most obviously, is the reduction of the shoulders' ability to support the bar. This will result in the load being placed in the arms, which will not be able to support heavy weights. If the bar is delivered too far forward on the shoulders due to the low position of the elbows, the upper back of the athlete will likely round forward under the weight, causing at best an unnecessarily difficult recovery and at worst a failed lift due to an inability to rise from the squat or the loss of the barbell. If the shoulders are creating a sufficiently secure rack for the bar, but the elbows are low, it's possible they will collide with the thighs as the athlete hits the bottom of the squat, producing anything from minor pain to a fractured wrist.

Generally the release of the grip on the barbell to achieve the rack position will occur naturally if the elbows are whipped into place correctly, just as the hook grip is released during the turnover of the snatch by not being held. That is, the elbows moving up into place will typically cause the hands to open as a result of the stretch of the wrist and finger flexors. An excessively tight grip at this point will prevent the release of the grip as necessary for a proper racking of the bar on the shoulders. Although less of an issue for the extremely flexible, a tight grip on the bar will greatly slow the elbows' final movement up into place, and will generally prevent their maximal elevation.

During the initial pull under and rotation of the elbows, the grip on the barbell must be maintained. As the bar reaches the approximate level of the shoulders, as long as the athlete doesn't intentionally maintain a tight grip, the hands will begin opening as the elbows move around the bar and the bar will roll onto the fingers where it will be in the rack position. The hands must remain relaxed to allow the bar to settle completely onto the shoulders during the remainder of the lift. Tightening of the grip again will decrease the security of the bar's position on the shoulders; a need to tighten the grip is indicative of an inadequately secure rack position.

It's important the athlete not simply attempt to pull down indiscriminately. Rather, he or she needs to pull him- or herself down to the bar with precision. Again, focusing on bringing the bar into the shoulders will also bring the shoulders into the bar, ensuring a tight and smooth connection rather than a crash of the bar onto the athlete. Helpful in ensuring a smooth connection will be the effort, as the elbows whip around, to lift the chest and drive the shoulders up into the bar.

The feet will begin their transition from the pulling to receiving position as the pull under the bar is initiated, and will reconnect very shortly thereafter, considerably prior to the racking of the bar on the shoulders. However, just as in the snatch, the attempt to finish the turnover of the bar along with the reconnection of the feet on the platform will help improve the turnover speed. Irrespective of weight, the bar should be racked as high as possible and then ridden down into the bottom of the squat.

Just as in the snatch, the movement of the body under the bar is a squat, and it should be approached as one. After the extension of the second pull, the hips and knees should be immediately retracted to initiate the squatting motion. This attempt to squat under the bar will help prevent errors like sliding the hips forward under the bar and sweeping the feet back too far behind the center of mass.

Receiving the Bar

The completion of the third pull will place the lifter in a front squat of a depth dependent on how high the barbell was elevated in the second pull and how quickly the athlete relocated him- or herself under the bar. With all cleans, the athlete should make an effort to rack the bar as quickly as possible. The sooner the bar is secured on the shoulders, the more time is available to tighten up the position and prepare for the force at the bottom of the squat. This means a greater eccentric segment, more potential for the stretch element of the bounce, more stability, and a far greater chance of successful recovery from the bottom.

The placement of the feet in the correct receiving position as previously established will play a large role in the success of the clean. Misplaced feet can considerably reduce the squatting power of the athlete and place joints at undue risk of injury. Positioning of the feet in the correct fore-aft location to support the mass of the athlete and barbell is key, although the potential for this type of misplacement is significantly less than in the snatch due to the generally smaller relative foot movement and elevation during the transition between the second and third pulls. However, it's quite possible for the athlete to place the feet too far forward, or more likely too far backward, and create an immediate imbalance upon the receipt of the bar. Again, the more quickly the feet can be transitioned from the pulling to receiving position, the less elevation with which the transition is executed, the less chance there is of incorrect replacement on the platform. As in the snatch, the feet should reconnect flat with the platform, not on

The receipt of the clean must be an aggressive attempt to maintain posture and change the barbell's direction.

the balls of the feet first.

One of the most critical elements of receiving a clean successfully is the stability of the torso. Even with the smoothest delivery of the barbell to the shoulders, the athlete will need to arrest the downward force of the barbell and change its direction abruptly. The position of the bar on the shoulders creates a considerable lever arm on the spine with even the most upright torso, and the force of the barbell will encourage the upper back to round forward, increasing the length of the lever on the back and hips and pulling the athlete forward. This structural collapse can very quickly exceed the athlete's ability to compensate and result in a dropped barbell or a failed recovery.

The first key to preventing this collapse of the torso is a correct pull and receiving position—that is, the closer the bar remains to the body during the lift and the more accurately it's placed on the shoulders, the less disruptive force the athlete will need to contend with in order to recover successfully and the more balanced the system will remain over the base. The next is pressurization of the torso—this is an absolute necessity irrespective of the technical accuracy of the lift. This pressurization needs of course to take place prior to the initiation of the lift. If anything, the athlete will involuntarily release a small amount of air during the second pull; there will be no chance to take in air during the lift itself. Finally, a focus on maintaining the extension of the spine is an important contributor to a successful receipt of the clean. Much like the pressurization of the torso, this is largely a product of the starting position and first pull of the lift. Because the third pull is so rapid, it's unlikely the athlete will be able to achieve adequate spinal extension to receive the clean if that extension doesn't already exist to a large extent—in other words, it's more an issue of maintaining back extension during the lift than creating it in specific preparation for the receipt of the barbell. However, during the pull under the bar, the effort to pull the back into complete extension should be made, assisted by the effort to lift the chest and push the shoulders up into the bar.

The elbows at this point will already be elevated to support the rack position. Depending on how well the shoulders are positioned, the rack position may be secure enough to support the bar even before the elbows reach their final height. Occasionally athletes who have excellent rack positions can be observed performing definitively successful cleans with seemingly slow elbows through the final elevation; that is, it appears the athletes elbows are momentarily lower than necessary to create such sound rack positions. However, as will later be made clearer in reference to the jerk, the security of the rack position is a function primarily of shoulder position and secondarily of elbow position. That being the case, athletes may be capable of racking the bar in the clean extremely well without the elbows being immediately elevated to what will be their ultimate position, or even with the elbows remaining relatively low. However, it should continue to be the goal of even these athletes to increase the speed of the elbows' turnover to attempt to create coincidence of the bar's placement on the shoulders with the elbows' snap into their final position. Such coordination will ensure the greatest possible security of the barbell.

Although we want the athlete to catch the bounce out of the bottom of the squat to facilitate recovery, this does not mean the athlete can relax or allow the bar to continue its downward path uncontrolled. The athlete, once the bar is racked on the shoulders, must actively resist the downward force of the bar to bring it to a speed that allows support of the bar on the torso. With heavy cleans, no amount of resistance to the bar's downward force will be capable of actually stopping it above the bottom of the squat (there have been a few elite lifters who defy this rule, but they are anomalies), and a considerable degree of downward speed will be unavoidable. This being the case, we can resist this downward force in an effort to stabilize and control the weight without concern for sacrificing the opportunity for the bounce out of the bottom.

Recovery

The recovery of the clean must be aggressive in order to maintain posture, catch the bounce out of the bottom, and drive through the sticking point of the squat.

The recovery of the clean is in essence no different than that of the front squat. Where it diverges is the entry into the bottom position—a much shorter, but generally quicker, eccentric phase, and a potentially quicker transition from a greater bounce effect if the positioning is sound due to the barbell's downward speed. The receipt and recovery of the clean is extremely violent with heavy weights, and athletes need to be prepared in terms of strength, flexibility, positioning and speed.

All of the criteria discussed in regard to the front squat apply. The athlete's weight should be balanced over the feet at the front edge of the heel (the weight may shift farther forward over the feet in the absolute bottom of the squat but should shift back quickly as the athlete recovers); the torso must be kept as upright as possible with the spine held in complete extension; the bar must be racked securely on the shoulders with the elbows elevated and the hands relaxed; and the torso must remain pressurized with air, or a controlled amount of air released as part of the recovery effort.

Actively driving the elbows up as the transition to the squat recovery is initiated will encourage a quicker recovery and the maintenance of proper spine position. In addition, immediately forcing the elbows up will discourage premature elevation of the hips by placing the elbows and consequently shoulders in a leading position. This movement must be aggressive and through practice should become a reflex associated with hitting the bottom of the squat.

The lifter should attempt to accelerate upward throughout the recovery effort. This will ensure momentum from the bounce is taken advantage of fully and will minimize slowing during the mechanically difficult mid-point of the squat, maximizing the chances of a successful recovery.

As was discussed with regard to the front squat, there may be times when air must be released during the recovery of the clean to avoid dizziness or possible unconsciousness. Again, this release should be limited to only the absolute minimum volume necessary. Forcing the release to be audible is typically a reliable way to ensure it's not excessive. Additionally, the shoulders must remain shrugged up slightly in the rack position to prevent pressure on the carotid arteries.

Occasionally a failure of timing or positioning will prevent the athlete from recovering immediately as intended. This of course should be avoided as much as possible, but its occurrence should not be necessarily accepted as failure before attempts at recovering are made. For athletes with comparatively weak legs, recovery without the advantage of the bounce may prove impossible, but it can still be attempted, and for those with stronger legs, it may pose little trouble at all.

Some degree of the bounce effect can be harnessed in this situation, although to a limited extent relative to what can be achieved in the ideal manner. From the bottom position, the athlete can initiate a series of progressively larger bounces by performing quick activation of the quads and glutes, building on the momentum from each previous bounce with the following one. Once the athlete has generated adequate momentum and height with these bounces, he or she can attempt to initiate a full recovery, which may or may not be successful. Again, this recovery method is a last-ditch option and should be avoided by correct performance of the clean.

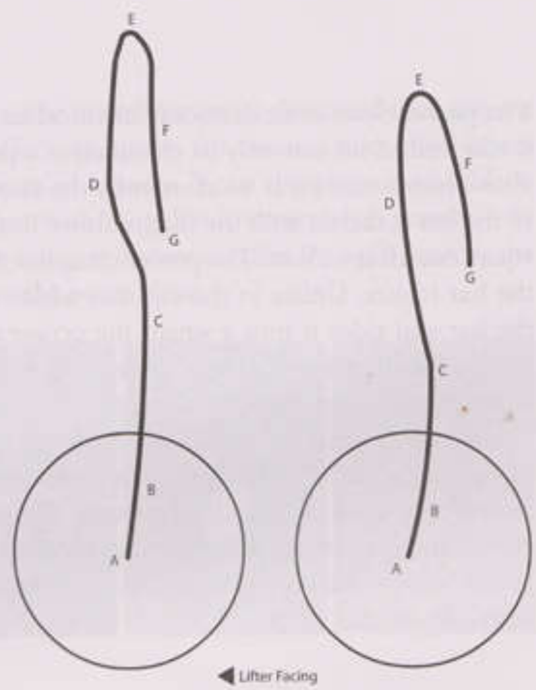
The Barbell's Path

As was discussed with regard to the snatch, the path of the barbell in both the snatch and clean naturally diverges from a perfectly vertical path as a result of optimal body positioning to impart force on the barbell and the need to maintain balance of the system over the base. The path of the bar in the clean is in its essence the same as in the snatch, although, as a result of the different grip width and receiving position on the body, the S curve is shorter, generally slightly flatter, and the distance between its maximal height and its end considerably longer.

The start of the curve (A) again represents the center of the barbell's diameter in the starting position of the lift, with the bar over the balls of the athlete's feet. As the lifter initiates the first pull, the bar shifts farther back over the feet (B) and reaches its farthest backward point (C) in the pull at approximately mid-thigh level. As the lifter finalizes the second pull, the bar is driven forward slightly, and continues in the slight forward deviation (D) during the pull under as bar and body must pass by each other. The barbell reaches its maximal height (E) as the lifter is squatting under it. Shortly thereafter, the lifter is bringing the elbows into place and the bar settling onto the shoulders as the squat under is completed (F) and the bottom of the squat reached (G).

Again, just as with the snatch, we are not intentionally creating an S-shaped bar path, but merely allowing it to occur as the result of optimal lifting mechanics. Most lifters are able to flatten the curve to a much greater extent in the clean than in the snatch, and bar paths can come quite close to vertical, largely as a result of very proficient third pulls that keep the bar and body very close to each other.

The diagram shows two examples of slightly different bar paths from two different lifters. While they differ somewhat, the basic shape is the same, and will remain essentially the same among any proficient lifters. Bar paths will deviate from this type of trajectory with less technically proficient athletes, or during poor lift execution.

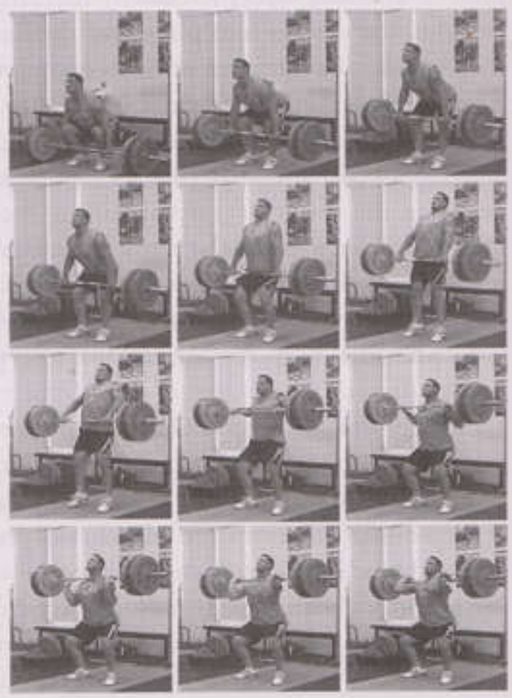


A. Starting point of the center of the barbell; B. Backward sweep of the bar during the initial lift from the floor; C. Farthest backward point during the pull at approximately mid- to upper-thigh; D. Slight forward curve during the third pull; E. Maximal elevation of the bar; F. Final squatting under the bar into bottom position; G. Final position of the bar as it's received and stabilized in the bottom of the squat.

THE POWER CLEAN

The power clean is mechanically identical to the clean—the sole difference is the height at which the bar is received. A lift can only be classified as a power clean if the bar is received and stopped with the thighs above horizontal (or if so chosen by the coach or athlete, with the knees at a 90 degree angle or higher). If the bar is racked with the thighs above horizontal, no matter how high, and the athlete continues into a squat, the lift is a clean. The power clean involves arresting the downward force abruptly, not just elevating the bar higher. Unlike in the clean in which the athlete more gradually controls the downward force of the bar and rides it into a squat, the power clean must be received with an immediate and powerful tightening of the legs to arrest downward movement.

The details of technique discussed with regard to the power snatch apply equally to the power clean, such as the problems of a wider receiving stance. The power clean can be learned with the same progressions outlined in this book—the only change that needs to be made is the receiving depth.

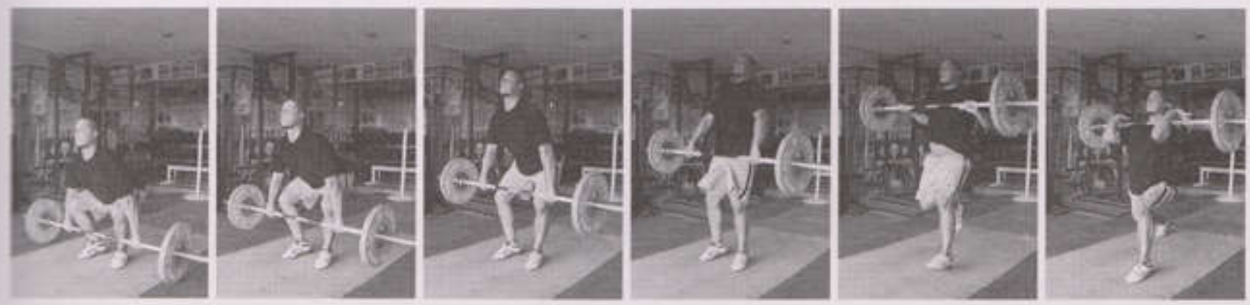

The power clean

Benefits & Uses

The uses of the power clean are the same as those outlined for the power snatch, although it's far more common in the strength and conditioning community because it's technically easier to teach and perform, demands less flexibility and precision, and allows the use of greater weights. While a failure of accuracy in the power snatch results in a failed lift, athletes can get away with quite horrific technique in the power clean and still complete a lift (as long as we generously define *completing* as not dropping the bar).

THE SPLIT CLEAN

The split clean, like the snatch, pre-dates the squat clean. It has the same limitations described with respect to the split snatch, as well as the same benefits. Again, it offers an option for masters and other lifters possessed of inadequate flexibility or working around limitations of injuries. It can also serve as an athletic training exercise with benefits similar to the power clean, but with the added demands of greater foot speed and coordination, as well as the benefit of training in staggered stances. Like the split snatch, the technique for the split clean does not vary in its essence from the squat clean.



THE JERK

THE RECEIVING POSITION

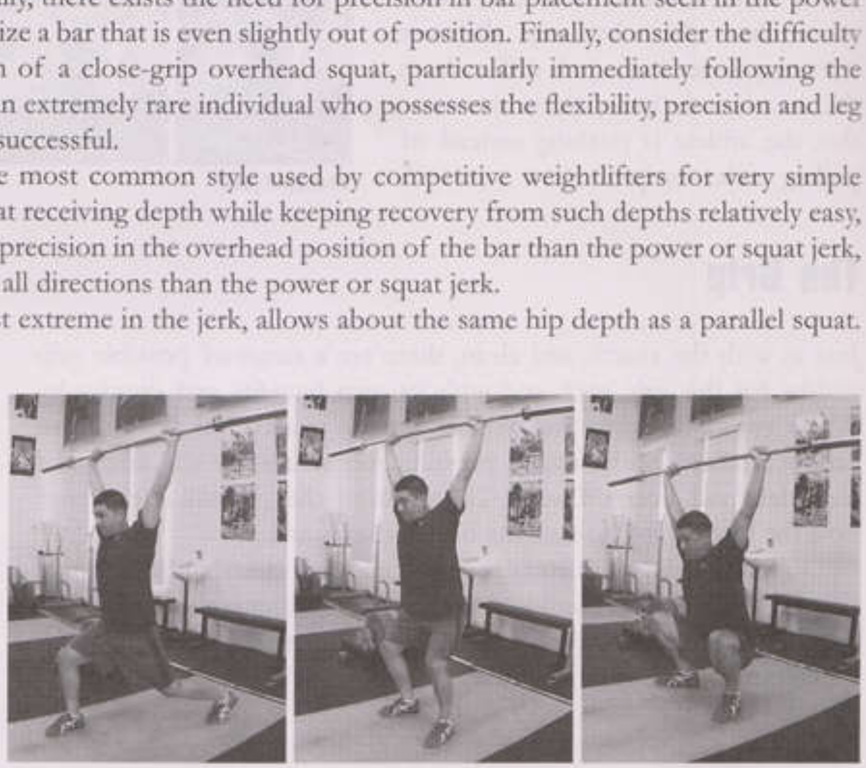
There are three variations of the jerk involving two different receiving positions of the feet—the power jerk, squat jerk, and split jerk.

The power jerk is named such because the receiving position is identical to those of the power snatch and power clean—feet in the squat stance and thighs above horizontal. (The name push jerk is often used synonymously for power jerk; we will distinguish between the two by defining a push jerk as a power jerk in which the feet remain connected to the platform rather than being lifted and replaced.) While the power jerk is a fairly common training exercise, it's a comparatively rare competitive jerk style because of its great demand on bar elevation. Additionally, there exists little margin for error in bar position—the bar must be driven quite precisely into position overhead in order for the athlete to maintain its stability.

The squat jerk is identical in foot position to the power jerk, but as the name implies, the ultimate receiving position is a squat. This clearly requires less elevation of the bar than the power jerk, but also introduces a few unique elements of difficulty. Flexibility is an immediate limiting factor for most athletes—a relatively narrow-grip overhead squat is out of reach for lifters outside of the most flexible end of the spectrum. Additionally, there exists the need for precision in bar placement seen in the power jerk—little can be done to stabilize a bar that is even slightly out of position. Finally, consider the difficulty of recovering from the bottom of a close-grip overhead squat, particularly immediately following the effort to clean the weight. It is an extremely rare individual who possesses the flexibility, precision and leg strength to make this jerk style successful.

The split jerk is by far the most common style used by competitive weightlifters for very simple reasons—it allows relatively great receiving depth while keeping recovery from such depths relatively easy, accommodates much greater imprecision in the overhead position of the bar than the power or squat jerk, and provides greater stability in all directions than the power or squat jerk.

The split stance, at its most extreme in the jerk, allows about the same hip depth as a parallel squat. Such a position is essentially impossible in a power jerk simply because the mechanics make arresting so much downward force extremely difficult and this depth is the point at which the hips must be farthest back, meaning there is significant forward inclination of the torso and consequently huge demand on shoulder and upper back flexibility. Additionally, an



The three jerk receiving positions: split, power and squat.

athlete can recover if necessary from such a split depth by wedging up under the bar through alternating between very small movements inward by each foot rather than being forced to simply drive straight up in a single effort. It's rare that such depth is actually achieved, but the position will allow it.

The split also offers great stability in all directions by expanding the lifter's base. The width of the feet is similar to that of the squat, and the length is even greater. Such a broad base, particularly in the fore-aft direction, not only improves the immediate stability of the system, but allows for much more corrective adjustment to stabilize the bar overhead. That is, unlike with a power or squat jerk in which bar position overhead must be remarkably precise, the split allows the athlete to quickly and relatively easily shift forward and backward, and even to either side, in order to better position the support structure under the weight.

Each lifter will find the jerk style that will allow the greatest weights to be lifted and spend the bulk of his or her effort developing technical proficiency and strength in that style. However, all lifters would be well served to become at least marginally capable in all three styles; each will have merit as training exercises.

Foot Positions

Just as in the snatch and clean, there will two foot positions for the jerk—the drive position and the receiving position, which will depend on the jerk style. The basic starting point is with the feet slightly wider than hip width and turned out about 5-15 degrees. Like the starting position for the snatch and clean, athletes will need to experiment to find the drive position that feels most comfortable and allows them to be most effective in the jerk.

It's rare for an athlete to prefer a significantly narrower foot placement, but slightly wider stances are fairly common. These wider stances are generally the same as or very similar to the squat width—the feet are simply left unadjusted following the recovery from the clean. This seems to reduce the disadvantage of longer legs somewhat and may also reduce knee discomfort during the dip. However, athletes may use this wider stance accidentally or without giving the basic stance a fair evaluation (or time to develop the necessary strength in the position).


The jerk drive position

The receiving position will depend on the style of jerk. If the athlete decides to power or squat jerk, it will be identical to the squat stance or the receiving positions of the snatch and clean. More likely is the split position, described in detail below.

The Split Position

In teaching the athlete the receiving position for the split jerk, the first order of business is determining which leg the athlete will lead with. There are a number of ways to do this, and most are unnecessary. Nearly invariably athletes will know intuitively which leg they'll feel more comfortable with in front before ever having performed a split jerk.

If this is not the case with a certain athlete, simply instruct him or her to perform walking lunges and provide no further detail. The athlete should unconsciously step out with the preferred forward leg to start the exercise. Following this, it's always wise to have the athlete switch legs to simply feel the position; if he or she is an exception to this rule, it should be immediately obvious. There will be rare cases in which

Split Jerk Receiving Position

Front foot is flat with weight toward heel.

Front shin is vertical with thigh 20-40 degrees relative to the platform.

Back heel is elevated with weight on balls of foot.

Back knee is bent.

Weight is balanced evenly between feet.

an athlete trains the split jerk with the same lead leg for a considerable period of time, happens to experiment with the other leg, and finds this side is preferred.

Once the lead leg is chosen, the athlete needs to learn the split position. The athlete will enter a lunge position with the determined lead leg forward. The width of the feet should be approximately the same as it is in the athlete's squat stance—we need to maintain the same lateral stability here as we do when receiving a snatch or clean. In fact, lateral stability in the jerk is even more critical because the combined center of gravity of the lifter and barbell is higher off the platform and consequently more difficult to stabilize.

The rear foot should remain in line with the leg to maintain the structural integrity of the ankle.

The athlete's lead foot will be flat on the floor with the weight focused near the heel, and the foot either straight forward or the toe turned in very slightly. The heel of the back foot will be elevated and the weight driving through the balls of the foot; the heel should not be elevated dramatically and the weight shifted onto the toes. The rear foot will be turned in somewhat (toes toward the midline, heel to the outside) in order to keep the foot in line with the lower leg as it would be if standing or squatting. Because the leg will be oriented at an angle away from the body, if the foot is straight forward, the ankle will not be aligned with the force traveling down that leg. Such misalignment limits structural integrity and opens the ankle for rolling out under the loading of the jerk.

The length of the split should be adjusted until the shin of the lead leg is approximately vertical with the front thigh at an approximately 20-40-degree angle relative to the floor. The back knee must remain flexed—this relieves tension on the ankle, allowing the heel to remain elevated, preventing hyperextension of the knee upon receipt of the weight, and more importantly, it relieves hip flexor tension on the pelvis, preventing anterior rotation and the resulting hyperextension of the lumbar spine.

This bend in the back knee is also critical for ensuring complete lockout of the jerk and balance of the athlete under the weight. Allowing the back knee to bend along with the front when driving under the weight will ensure the athlete moves straight down and remains in a supporting position under the bar. If the back knee locks while the athlete is bending the front knee to settle in under the bar, he or she will be pushed forward, which will push the bar forward as well, beyond a position that can be supported in most cases. This bend in the back knee does not need to be dramatic, but needs to be established in every jerk to allow better position under the bar as needed.

The split position

This split depth can be considered a default position for jerking and should be adjusted according to the demands of increasing weight. The depth of the hips in the split during an actual lift will be determined by how high the lifter is able to elevate the bar and consequently how far underneath it he or she must push him- or herself in order to receive it with fully extended arms. While athletes will obviously be able to get away with much shallower split depths with light weights, this will often lead to trouble placing the feet properly for a deeper dip when it becomes necessary. Because of this, it's suggested that even with light weights this default depth be used.

The torso should be essentially vertical, although inclined forward very slightly as required by the correct overhead positioning. Once the barbell is added to the system, the correct position will place the hips directly underneath it. The spine should remain in neutral curvature—if the lower back is hyperextended, either the back knee is not flexed enough, or the athlete's hip flexors need to be stretched.

If the foot and leg placement and the torso position are correct, the lifter's weight will be properly centered over his or her base and the position perfectly stable. Note that with the weight centered over the base, there will be slightly greater pressure on the lead foot than the back because of its greater proximity to the center of mass. It will usually suffice for the athlete to simply think of balancing the weight equally between the feet.

Split Footwork Drill

Once the athlete has become familiar with the correct split position, the transition from the drive to the receiving position can be drilled just as it was for the snatch and clean. The lifter will start in the drive position with his or her hands on the hips. From here, he or she will move the feet as quickly as possible to the receiving position.

It's very important that the athlete move straight down. Commonly athletes will leap forward into the split position, driving the chest forward and placing far too much weight on the lead leg. It will be helpful to focus on pushing the hips in under the shoulders in order to maintain the correct positioning.

In a proficient split jerk, the rear foot should connect with the platform just slightly before the lead foot. This will create a base against which the athlete will push as he or she completes the drive under the barbell, allowing the hips to move in under the bar as necessary. This will happen naturally if the athlete is balanced during the dip and drive of the jerk, and if the hips are moved in under the jerk properly.

Split footwork drill

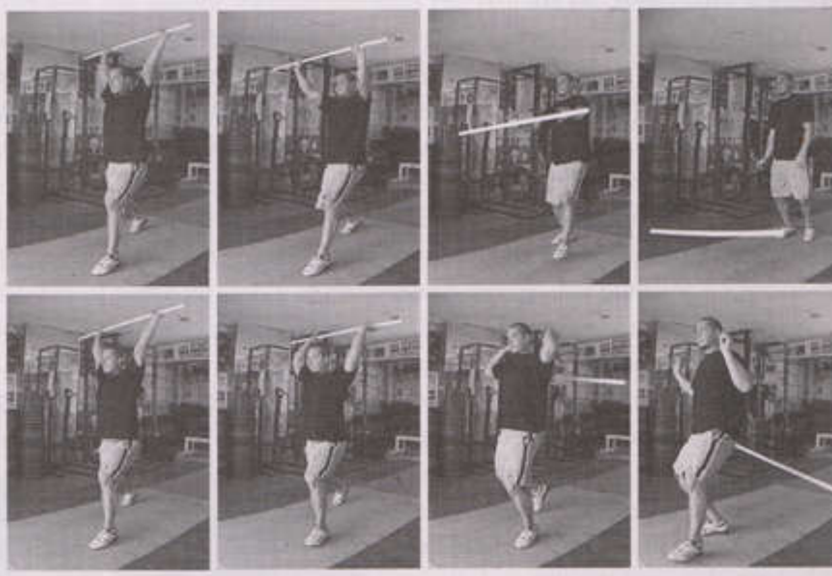
If an athlete thinks of driving the chest forward through the arms, usually as a result of thinking of the slight forward torso lean of the overhead position, this will tend to cause the rear foot to lift excessively and drive too far back—often so far back that it actually pulls the hips back with it, preventing the lead foot from moving far enough forward, causing the lead foot to reconnect with the platform before the rear foot, and the lifter to be too far behind the bar to support it.

For this reason, the athlete will need to focus on maintaining his or her balance far enough back over the feet in the start, keeping the back foot as close to the floor as possible during its movement backward, and pushing the hips forward into position. The lead foot will need to be elevated higher than the rear foot in order to allow the athlete to drive under the barbell deeply enough. If the lead foot is elevated inadequately, the downward drive under the bar will cause it to reconnect with the platform prematurely, resulting in too short of a foot placement to achieve the necessary split depth and a failure to lockout the load overhead. Of course, elevation in excess of what is necessary for correct split length is also undesirable.

From the split position, the athlete will recover to standing by first stepping approximately a third of the way back with the front foot and then forward the rest of the way with the back foot—this will reposition the feet directly under the bar. This sequence should be the default for all jerks. By moving only part of the distance with each step, the athlete minimizes movement of the bar overhead and limits opportunity to create instability. A complete forward or backward step pushes the bar a considerable distance. In no other lift will the athlete be holding as much weight at as great of a height; this extremely high center of mass makes establishing balance during and after any movement unusually difficult, so the less we can shift the bar's position, the more likely we are to complete a successful jerk.

It's often asked, if we relocate the feet directly under the bar with each step, why the rear foot can't be moved first. Largely this is simply because the vast majority of the time, the weight will be slightly forward rather than backward, and the attempt to recover back from the front foot will help shift the weight back into balance and better stabilize it overhead.

Missing



To miss a jerk in the athlete will push the bar away in the direction it's already moving and jump the body out from under it in the opposite direction.

We need to address the approaches to missing jerks to prepare the athlete for safe escapes from failed lifts. The fundamental idea is of course the same as the other two lifts—guide the bar away from the body and move the body out of the way as quickly as possible.

There are two basic directions in which to lose a jerk—in the front or in the back. As is the case with the snatch, which direction the bar is dropped will depend on which direction it's already moving, not the lifter's preference. Most common will be a miss in front after the athlete has failed to bring the hips under the bar enough or was unable to achieve a lockout with the elbows. In these cases, the lifter needs simply to jump back from the bar while pushing it away with the hands, making sure to quickly bring back the lead leg if split jerking.

If the lifter instead overshoots the body or brings the bar behind the base of support, it will be lost behind him or her. Most likely the arms in this case will have achieved lockout but the bar will not be supported by the body. Lifters typically react immediately to this and bend the elbows to guide the bar back and down, while quickly jumping forward. Some may turn their bodies away from the back leg in the case of the split jerk, but excessive rotation should be discouraged to avoid any potential back or shoulder injuries arising from unstable rotation under such heavy load.

With the bar overhead and the feet in the split position, the athlete can practice dropping the bar in front and behind.

LEARNING THE JERK

Just as with the snatch and clean, the athlete has learned the receiving position for the jerk, and can now learn the technique of the lift itself. As was the case with learning the clean, a barbell or light technique bar should be used for the following learning progressions due to the difficulty of correctly racking anything lighter, such as a PVC bar.

The Dip Position

Introducing the dip position to a new lifter is simple in principle, yet often proves surprisingly difficult. Most athletes will initiate any movement by pushing the hips back and consequently leaning the torso forward. It must be taught from the beginning that the dip and drive occurs at the knees, not the hips.

The feet will be placed in the drive position—slightly wider than the hips and turned out slightly. When viewed from the side, a vertical line can be drawn through the front of the athlete's shoulder, hip and ankle. The knees should be straight but not locked. The weight should be as far back on the heels as possible while maintaining full contact of the foot on the floor—that is, the athlete's weight should never be so far back that the balls of the feet are not connected to the floor.

To enter the dip position, the athlete will simply bend the knees slightly, allowing the hips and shoulders to travel straight down through that same vertical line. The feet should remain flat and the lifter's weight centered over the front edge of the heel. The spine should remain neutral—the pelvis cannot be allowed to tuck under, placing the lumbar spine in flexion or reduced extension. Muscular tension should be overwhelmingly present in the quads and minimal in the hamstrings. If significant hamstring tension is present, the athlete is inclining the torso forward and needs to bring the hips in under the shoulders more. The knees should move out to the sides over the feet just as they would in a squat rather than being allowed to move straight forward or dive inward.

This will be an approximation of the dip position—the actual degree of knee flexion will vary among athletes. Maximal possible depth will be the point at which the degree of knee flexion with the maintenance of an upright torso causes maximal ankle flexion and results in the heels rising from the floor. This is well beyond the range in which reasonable mechanics can be maintained. In fact, there will be a point prior to this on the way down at which the athlete will feel noticeably weaker, typically rather abruptly.

The Dip Position

The feet are in the pulling position with the weight balanced over the heels.

The knees are bent to a degree that keeps the athlete in a relatively strong position and pushed to the sides to remain in line with the feet.

The torso is vertical with the shoulders, hips and ankles remaining in the same vertical plane when viewed from the side.

The depth we want here is safely above this point—essentially the balance of range of motion with mechanics. Many lifters will want to dip too far in the jerk, believing that the greater the distance they have to drive, the greater the power potential. But this is true only insofar as the depth doesn't increase mechanical disadvantage to a point that prevents a smooth and powerful change of direction and unwanted shifts in positioning. A starting point for dip depth is approximately 8-10% of the lifter's height.


Practicing the jerk dip position

Once the athlete has established his or her dip position, it can be drilled briefly before moving on. From standing, the athlete should slowly enter the position, hold it for further familiarization, and recover to standing at the same low speed. This deliberate speed will allow for the coach to observe and provide feedback for the lifter to adjust during the movement, as well as allow the lifter to actually feel the correct position. The quads and glutes should remain tight throughout the movement; in the standing position, the knees should not be locked.

The Jerk Rack Position

The next order of business is establishing a new rack position that will be used for the press, the push press and the jerk. For the clean, our priority is securing the bar on the shoulders and connecting it to the torso as tightly as possible in order to support the load during recovery. For the jerk, we need to have this same direct connection between the barbell and the torso, but we also need to optimize pressing mechanics—for obvious reasons in the press, and in preparation for the continued arm drive of the push press and the drive under the bar in the jerk. This rack position must also encourage the correct bar path for all three lifts.

Questions occasionally arise regarding the use of the jerk rack position for the press, as it is often not clear why the bar must be connected the same way to the body, and because such a position places the bar slightly farther back in the hand than some lifters have been taught is ideal for pressing (in particular bench pressing). While it may be arguable that a bar placement closer to the heel of the palm is ideal for pressing in terms of the actual movement itself, there are two basic reasons this is not used. First, we do need to be able to support the weight prior to and following the press—it's difficult to support this much weight in the arms alone. A rack on the shoulders creates a base from which to press. (It should be noted that typically during multiple-rep pressing sets, the rack position is not reset, and reps after the first completed as "touch and go".). Second, and far more important, the press in this particular context is nothing more than part of a teaching progression and an assistance exercise for the jerk. This being the case, the positions and movements must reflect those of the jerk for greatest utility; however, all athletes should aim to sink the palm as deeply as possible under the bar without sacrificing its placement on the shoulders.

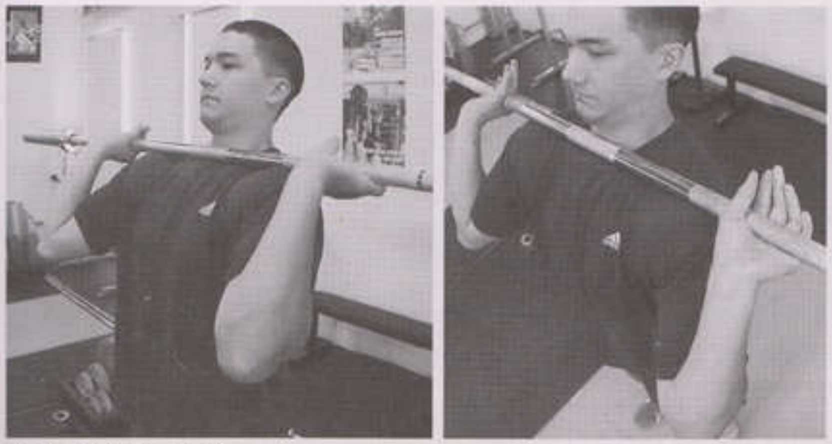
We begin with the clean rack position because securing the bar on the shoulders must take precedence over an advantageous pressing position of the arms and placement

The Jerk Rack Position

The shoulders are pushed forward and slightly up to create a secure shelf for the bar just as in the clean rack position.

The hands are pushed as deep under the bar as possible and the grip kept loose.

The elbows are pulled down and out, but remain slightly in front of the bar.



The jerk rack position

of the barbell in the hands. If the bar is not connected tightly to the torso, the transfer of power from the legs to the bar will be limited by the inability of the arms to withstand the forces and maintain the bar's exact position relative to the torso—in other words, when the athlete transitions from the dip to drive of the legs, a bar held primarily in the arms will continue descending after the legs have begun extending again. This robs a great deal of the power generated by the legs from the bar and typically results in a shift of balance that does not bode well for a successful lift even if adequate force is transmitted. Such a loss of force transmission in the jerk is analogous to the absorption of force of premature arm flexion in the snatch or clean.

From the clean rack position, the athlete will push the hands in as deeply under the bar as possible while keeping the grip loose and pull the elbows down and out, lifting the chest and spreading the lats somewhat. The shoulders must continue to be pushed forward under the bar and elevated slightly to maintain the same secure shelf, and the elbows should always remain slightly in front of the bar. We do not want the forearms vertical—if the elbows are too close to directly below the bar, the bar will tend to be driven forward rather than up and slightly back.

The actual arm and hand positions achievable will vary with each athlete's arm segment lengths and flexibility. Again, the priority is the security of the bar on the shoulders. The initial force will be imparted to the bar by the legs and only after this will the responsibility for elevating the bar or driving the athlete under the bar shift to the arms. Consequently, there is time to move the arms and hands into a better pressing position during the transition of force from the legs to arms, although limiting the necessary degree of this shift will improve the lift.

Press Behind the Neck

The lifter will place the bar across the back of the shoulders as he or she would for a back squat with the hands at the previously established clean width—no hook grip. Once the athlete has determined his or her ideal jerk hand placement, this will most likely be used for pressing and push pressing as well, with the exception of particularly wide grips. The elbows should be oriented down as much as possible and neutral upright posture should be maintained. Allowing the elbows to point backward will encourage the upper back to roll forward and disrupt pressing mechanics.

In this starting position, the bar is positioned in the same vertical plane in which it will need to remain as it's pressed overhead and the torso is already inclined forward

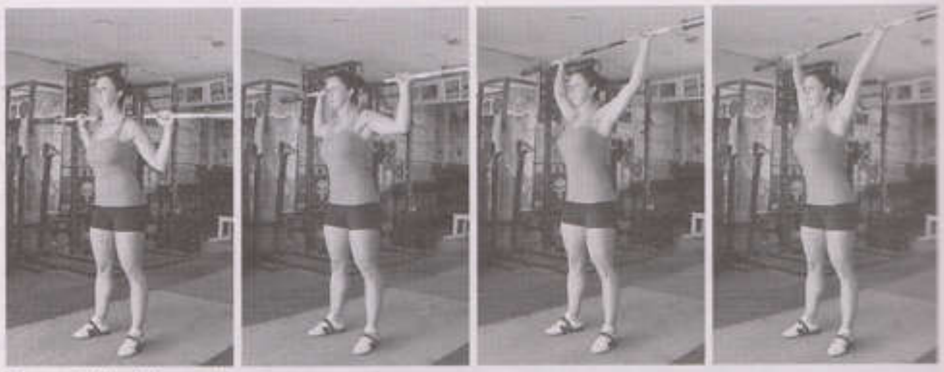
Press Behind the Neck

Begin with the feet in the drive position, the bar on the shoulders behind the neck, and the hands in a jerk-width grip.

The shoulder blades should begin fully retracted exactly as they should be in the correct overhead position.

Without changing the position of the torso or shoulders, push the bar straight up into an active overhead position.

slightly as it will need to be. This is the reason for performing the first presses from behind the neck—we reduce the movement to only the element on which we want to focus, in this case the overhead position.


Press behind the neck

The athlete will simply press the bar straight up without moving the torso, actively retracting the shoulder blades and extending the elbows completely at the end of the movement—this position is identical other than grip width to the overhead position of the snatch. The bar can be adjusted as needed to bring it into its correct position and the athlete should remain here for a few seconds both to familiarize him- or herself with the feeling of the position as well as encourage a habit of continuing to actively drive the bar up with the shoulder blades tightly fixed in place when overhead. Now the athlete can perform a series of presses behind the neck at a controlled, deliberate pace, focusing on a vertical bar path and an active, correct position overhead. Again, the position of the torso should not change.

Press

Next we'll bring the bar to the front and secure it in the jerk rack position. While the purpose of the press behind the neck was to familiarize the athlete with the proper overhead position, the purpose of the press is to teach the athlete how to correctly move the bar from the shoulders to its final position, which will require some horizontal movement of the torso, the head and the bar.

Viewing the athlete from the side, the center of the barbell should be approximately above the front edge of the heel. The shifting of the body behind the bar relative to the positioning with the bar on the back will happen naturally, although at this stage with such a light bar, it may not be precise. In other words, the bar will remain in essentially the same vertical plane in both front and rack positions, and the body will shift to accommodate this.

From the jerk rack position, the athlete will initiate the drive of the bar up, placing a very slight backward angle on it. This effort to press the bar through the face will ensure better positioning and prevent the common error of pushing the bar away from the body and leaning backward excessively.

The athlete must press the bar in as direct a line as possible into its final position. In order to do this, the face must be pulled back out of the way. The athlete should pull the face back more than tilt the head back as the bar nears the chin. This repositioning of the face can be started while the bar is still racked on the shoulders to reduce the

Press

Begin with the feet in the drive position and the bar secured in the jerk rack position.

Push the bar up from the shoulders, pushing it slightly backward and bringing the elbows out and under the bar as it rises.

Pull the face back to clear a path for the bar, moving it back through the arms after the bar has passed.

Secure the bar actively in the overhead position.

Press

magnitude of the shift that will be necessary as the bar passes. This partial pull and tilt back of the face is naturally coupled with the lifted chest position that helps rack the bar correctly on the shoulders. The same focal point straight ahead should be easily maintained during this movement.

As the bar leaves the shoulders, the elbows should move out and under the bar rather than remaining in front of it. Again, spreading the lats during this initial drive will help improve the position and strength The torso may also need to lean back slightly as the bar passes in front of the face, although usually such leaning of the torso is performed unnecessarily rather than better pulling back of the head. Any layback should remain restricted to what is absolutely necessary. Excessive distance between the body and the bar simply increases the mechanical disadvantage of the pressing motion.

Once the bar has passed the head, the lifter must push his or her head forward again through the arms in order to achieve the overhead position he or she learned when pressing behind the neck, which will place the bar over the back of the neck. The bar will also travel backward slightly because it no longer has body mass behind it as it did in the starting position to counterbalance it. This horizontal movement of the bar is subtle and generally an attempt to push the bar slightly back off the shoulders and to simply locate the bar in the correct plane over the back of the neck and maintain the correct balance over the feet will be adequate.

The press should be practiced until the bar path and elbow movement are smooth and consistent and the overhead position is correct and stable.

Push Press Behind the Neck

The push press is an intermediate movement combining elements of the press and the jerk. As a lift itself, it's an excellent strength builder, allowing the athlete to press greater loads overhead by using the legs to

Push press behind the neck

Push Press Behind the Neck

Begin with the feet in the drive position and the bar racked on the shoulders behind the neck with a jerk-width grip.

The shoulder blades should begin fully retracted exactly as they should be in the correct overhead position.

Take in a big breath, tighten down the torso and ensure the weight is over the heels.

Dip smoothly to the position practiced previously, and drive back up aggressively with the legs.

As the legs finish extending, keep the knees straight and push the bar up with the arms with the same mechanics learned for the press.

Secure the bar in the correct overhead position.

assist the arms and shoulders, as well as training the position and timing of the dip and drive. As a progression toward the jerk, it introduces the athlete to the idea of initiating an upward drive of the bar with a dip and subsequent drive of the legs, as well as the timing of the transitioning between driving with the legs to pressing with the arms.

We'll first perform the push press from behind the neck. Again, this allows the simplest movement to the overhead position, giving the athlete an opportunity to focus first on the dip and drive of the lift without being concurrently concerned with the bar path and torso movement from the front rack position.

The athlete will not be able to maintain a perfectly vertical torso with the bar behind the neck; this placement will necessitate a slight forward lean in order to keep the weight of the bar over the balance point of the feet. However, this slight angle must be maintained throughout the dip and drive, which will keep the path of the bar and the hips vertical.

With the bar racked securely on the back of the shoulders, the hands placed at jerk width, and the feet in the drive position, the athlete will prepare for the dip and drive by taking in air and stabilizing the torso in the manner described earlier in the book. This pressurization of the torso is critical for success—an unstable torso will succumb to the tendency for the spine to collapse forward, absorbing some of the upward force of the leg drive that should be transmitted to the bar, and shifting the athlete's weight over the toes and redirecting the path of the bar forward, resulting in anything from an unnecessarily difficult lift to a completely failed one.

After filling the torso with air and tightening down the surrounding musculature, the athlete should pause a second or two to ensure stabilization and balance over the heels has been achieved. Often a rush to commence the lift immediately after the breath or even as the breath is being finished will greatly reduce stability. This pause will allow the body to settle into this solid position, and as we've established previously, a correct movement is impossible from an incorrect position. At this point, the lifter should tighten the quads with the knees straight but unlocked to ensure a smooth initiation of the dip.

Once the lifter is stable, he or she will dip by bending at the knees only. As was discussed previously, the actual depth will vary among athletes. There will be a point at which the athlete feels a fairly abrupt loss of strength—the ideal depth of the dip is considerably above this point. The speed of the dip must balance the need to generate a stretch-shortening cycle to increase the power of the subsequent concentric movement, the ability to transition powerfully, and the need to prevent separation of the bar from the lifter. If the dip is too quick, the lifter's shoulders will drop out from underneath the bar. This creates a crashing effect of the bar on the shoulders that increases the magnitude of the downward force, increasing the difficulty of maintaining structural stability. The dip must be controlled to prevent this separation by accelerating gradually from the top to the ultimate downward speed. This ultimate speed will also need to be controlled to a degree—if the dip is too fast, the resulting downward force at the point of the transition will be greater than can be easily controlled and reversed and can cause unwanted shifting of position at the bottom as well as an unnecessarily slow transition and drive.

The transition must be powerful and the lifter must fight to prevent the torso from dropping forward. Once the direction has been reversed, the athlete will drive straight up with the legs, attempting to achieve maximal acceleration of the bar. As the knees reach full extension, the arms must be brought in to continue the bar's path upward. Timing this transition is key—pressing too early with the arms will prevent the full transfer of leg power to the bar and leave more work to the weaker arms and shoulders, while waiting too long before initiating the press will mean loss of upward momentum from the powerful leg drive. Keeping the grip loose while the bar is on the back will help prevent premature pressing.

Athletes will naturally rise onto the balls of their feet at the end of the leg extension just as they do with the final extension of the snatch and clean due to the aggressiveness of the leg drive. As with the snatch and clean, even with only the balls of the feet in contact with the platform, the center of mass must remain in its original position to prevent the balance of the system from shifting forward. Prolonged ankle extension will unavoidably result in a forward weight shift, and will reduce the net elevation of the bar. Further, the drop from ankle extension aids in elevating the bar by quickly increasing the distance between the athlete's body and the bar.

Overhead, the lifter must continue to attempt to drive the bar up from fixed shoulder blades even after the arms have reached full extension. This active overhead position is critical here as it is in the snatch to create structural integrity.

Push Press

Once the athlete can demonstrate competence with the push press behind the neck—meaning correct breathing, a smooth and solid vertical dip, quick transition, vertical drive, correct bar path and correct overhead position—we can move the bar to the front rack position.

Once the proper rack position has been established, the lift is identical to the push press from behind the neck with the exception of the slight shifts in torso and bar position that were discussed with respect to the press. Athletes will be more apt to throw their heads back to clear a path for the bar with the addition of this new speed. Just as in the press, the athlete should maintain a constant forward view and pull the head straight back more than tilting it back, although some degree of tilt will be unavoidable.

The lifter will take in a proper breath and take a moment to settle and stabilize before initiating the dip, tightening the quads with straight but unlocked knees and ensuring that the grip is not tight around the bar. Actually keeping the hands partially open is a simple way to prevent unwanted tightening of the grip, which will encourage separation from the bar, the elbows dropping and the resulting forward bar path, and an early or slow transition from leg drive to arm drive.

The push press should possess the qualities established with the push press behind the neck—a gradual enough acceleration downward in the dip to prevent separation from the bar, enough speed to encourage a stretch reflex but not more than can be arrested and reverse powerfully at the bottom; depth that allows a solid bottom position with no shifting and a quick transition; a powerful transition from

Push Press

Begin with the feet in the drive position and the bar secured in the jerk rack position.

Take in a big breath, tighten down the torso and ensure the weight is over the heels.

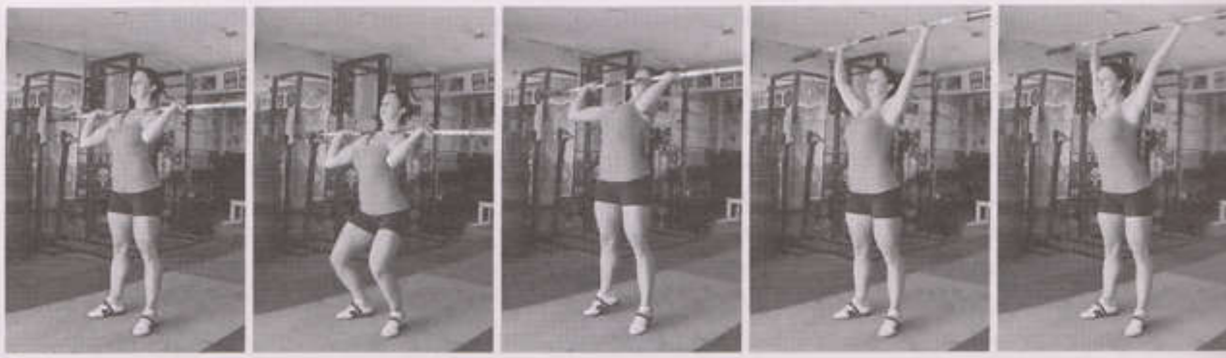
Dip smoothly and drive back up aggressively with the legs.

As the legs finish extending, keep the knees straight and drive the bar up with the arms.

Push the bar slightly back and move the elbows out and under the bar as it rises.

Pull the face back to clear a path for the bar, and push it back through the arms after the bar passes.

Secure the bar in the correct overhead position.



Push press

dip to drive with no horizontal shifting of the body or bar; a vicious and vertical drive of the bar; proper timing of the transition between leg and arm drive; as direct a bar path as possible; bar finishing in the proper overhead position; overhead position active and stable with the shoulder blades fully retracted.

Once the legs finish their extension, the quads should remain tight to keep the knees straight and provide a solid platform to push against. Soft knees will limit the driving force transmitted to the bar, and any bending of the knees following the drive technically makes the movement a jerk rather than a push press.

As a strength movement, the push press is excellent for developing pressing strength, elbow lockout ability, and correct and consistent dip depth and transition speed and timing. Athletes will be able to handle heavy loads once familiar with the lift, and heavy push presses will very quickly reveal weaknesses or technique flaws in the dip and drive that can then be corrected.

Tall Power Jerk Behind the Neck

Now that the athlete has learned to accelerate the barbell upward with the legs and transition to pushing with the arms, we need to introduce the movement of driving the body down under the bar. Again, we'll start with the bar behind the neck to allow a simple bar path and torso position while focusing on the new elements. To further isolate the new segment of the lift, the athlete will press the bar approximately halfway up and pause. The only remaining movement now is the push of the body underneath the bar with the transition of the feet from the drive to receiving position.

Once the athlete has set this behind the neck half-press position and taken in a proper breath to stabilize, he or she will initiate the transition of the feet to the power jerk receiving position and aggressively drive down under the bar, receiving it with locked elbows at approximately quarter-squat depth. Occasionally athletes will unintentionally slide the hips forward during this drive and receive in a position more similar to the dip position rather than a quarter-depth squat—the movement under the bar, just as it is in the snatch and clean, is the same as a

Tall Power Jerk Behind the Neck

Begin with the feet in the drive position, the hands in a jerk-width grip, and the bar pressed halfway up behind the head.

Initiate the transition of the feet from the drive to the power jerk receiving position.

As the feet are transitioning, drive with the arms against the bar to push the body down into quarter-squat depth.

Attempt to lock out the elbows and secure the correct overhead position at the same time the feet reconnect with the platform.

squat, just to limited depth.

The athlete should attempt to lock out the elbows at the same time the feet reconnect with the platform. In reality, the feet will reconnect prior to elbow lockout, just as in the snatch, but also as in the snatch, extremely quick elbow extension is a critical component of a successful lift, and the attempt to achieve this timing will encourage greater speed. A sense of viciousness must be instilled in the athlete at the outset, whether working with little weight or maximal loads.


Tall power jerk behind the neck

The overhead receiving position should be no different than that of the snatch—the shoulder blades must be fully retracted to create a tight and secure base for the arms. A habit of continued elbow extension effort should be encouraged at all stages of learning and with all weights. If an athlete is lazy about keeping the elbows extended, the receipt of heavier weights will prove unsuccessful and developing the habit is always more difficult later.

If an athlete is having trouble with the idea of pushing under the bar, this intermediate movement can be slowed down in order to allow a more controlled motion initially. Starting in the same half-press position, but with the feet already in the receiving stance, the lifter can slowly press him- or herself down into a quarter squat while locking out the elbows. The bar should remain at approximately the same height.

Once the bar has been received and stabilized in the proper position, the lifter will recover to a standing position with the arms remaining extended—the lift does not end until the athlete is standing fully again and the bar is stabilized overhead. At this point, the bar may be lowered for a subsequent rep.

Tall Power Jerk

With the basic movement of driving down under the bar introduced, we can now bring the bar to the front as it will ultimately begin. With the feet in the drive position and the bar in the jerk rack position, the athlete will press the bar halfway up as he or she did in the previous drill. The key with this partial-press starting position in the front is the position of the head. Because at this point in a jerk or push press, the head will be pulled back to clear a direct path for the bar, it should be in this position at the start of this drill as well with the bar in immediate proximity to the forehead.

From this position, the athlete will execute the same aggressive drive under the bar while transitioning the feet from the drive to power jerk receiving position, attempting to lock out the elbows as the feet reconnect with the floor, finishing at quarter-squat depth.

The depth of the receiving position of a jerk will

Tall Power Jerk

Begin with the feet in the drive position, the hands in a jerk-width grip, and the bar pressed halfway up.

The head should be pulled back out of the way of the bar and the bar in immediate proximity to the forehead.

Initiate the transition of the feet from the drive to the power jerk receiving position.

As the feet are transitioning, drive with the arms against the bar to push the body down into a quarter-squat depth.

Move the head back through the arms and drive the bar back into position over the base of the neck.

Attempt to lock out the elbows and secure the correct overhead position at the same time the feet reconnect with the platform.

depend directly on the height the lifter has been able to elevate the bar, and therefore indirectly on the weight being lifted. When learning and training with light weights, such as those that can be easily pressed or push pressed, a reasonable depth should be achieved despite it being physically unnecessary to bring the bar overhead. Practicing the jerk with a particularly shallow receiving depth will typically result in trouble in the future when the athlete begins attempting to jerk with heavier loads and finds him- or herself unable to achieve an adequately deep receiving position.

Tall power jerk

In actual practice, of course, the lifter must receive the bar at whatever height necessary, just as he or she must do with a snatch or clean, to prevent the weight from crashing and becoming unstable, or having to press it up. That being the case, the actual depth of the receiving position will vary with every lift, even lifts of the same weight since it's unlikely an athlete will accelerate the bar to an identical degree with every attempt.

Power Jerk Behind the Neck

Whereas the snatch and clean involve first an upward acceleration of the barbell with the lower body followed by pull of the body under the bar with the arms, the jerk begins with an upward acceleration of the bar with the lower body followed by a push of the body under the bar with the arms; the principle is the same—elevating and accelerating the bar as much as possible with the lower body before rapidly and actively relocating the body into a lower position in which to receive the weight with the arms.

The power jerk (or push jerk) is used by some weightlifters in competition, although its use is far less common than the split jerk because of its relative fore and aft instability and the limitations on possible depth. In order to be a successful power jerker, a lifter must be able to produce a very consistently precise dip, drive and bar path and be able to elevate the load relatively high.

Outside of a competitive jerking style, the power jerk is an excellent drill in the jerk learning progression (and training exercise for experienced lifters). The press has introduced the athlete to the movement pattern of the arms and the overhead position, and the push press has taught the athlete to generate the initial acceleration of the bar with the legs and the transition between leg and arm drive. The power jerk introduces the idea of moving the

Power Jerk Behind the Neck

Begin with the feet in the drive position and the bar racked on the shoulders behind the neck with a jerk-width grip.

The shoulder blades should begin fully retracted exactly as they should be in the correct overhead position.

Take in a big breath, tighten down the torso and ensure the weight is over the heels.

Dip smoothly to the position practiced previously, and drive back up aggressively with the legs.

As the legs finish their extension, begin transitioning the feet from the drive position to the power jerk receiving position.

As the bar leaves the back and the feet begin transitioning, drive aggressively with the arms against the bar, pushing the body down into a quarter squat.

Attempt to lock out the elbows at the same time the feet reconnect with the platform and secure the bar in the correct overhead position.

Power jerk behind the neck

body under the bar without the distraction of the dramatic foot placement transition of the split jerk.

The power jerk behind the neck will now simply be a combination of the push press behind the neck and the tall jerk behind the neck that the athlete has performed previously. The lifter will place the feet in the drive position, take in air and stabilize the torso, then dip and drive the bar up as in the push press. When the lifter has extended the legs and accelerated the bar as much as possible, he or she will rapidly change directions by transitioning the feet to the power jerk receiving position and pushing him- or herself under the bar to receive it with locked elbows in approximately a quarter squat depth.

Once the bar has left the lifter's back, the movement of the feet to the receiving position will begin. With the feet no longer driving against the platform, the continued effort to push against the bar will push the lifter down, although still continue elevating the bar to some degree. With light training weights, the bar's inertia will be very small relative to the lifter's body, so in order to receive the jerk at a quarter-squat depth, the force of the initial drive up on the bar must be controlled somewhat. However, this control of the force should not involve any limiting of leg extension.

Power Jerk

When the athlete has become comfortable with the basic movement of the jerk, the bar can be moved to the rack position in front. We're now combining the dip and drive element of the push press, the drive under of the tall jerk, and the arm movement and shift in torso and bar positions of the press.

With the bar now racked in the front, breathing becomes even more critical. The bar's increased distance from its primary supporting structure (the spine) results in a greater moment on the spine and hip, magnifying the tendency for the athlete to allow the upper back to round forward or to hinge at the hips,

Power jerk

particularly during the transition phase of the dip when the position must support a greater force. This demands the torso be stabilized with air pressure and muscular tension as much as possible.

The dip and drive phase of the lift is no different than that from behind the neck with the exception that the torso begins slightly behind vertical rather than already inclined slightly forward. Once the proper rack position is established, the athlete will draw in his or her breath, tighten down the musculature of the torso, and take a moment to settle and stabilize.

When the body is set, the lifter will initiate the dip. With the bar racked in the front, even more so than in the back, a smooth acceleration downward is necessary to prevent the bar from separating from the shoulders. Separation in the front will prove much more difficult to manage than in the back because of the bar's position farther from the spine.

Often athletes will maintain the initial standing posture with little quad activation, relying on a more passive lockout of the knees. In such cases, when initiating the dip, there is a brief moment during which the athlete is dropping with little muscular tension; because of this slack in the system, the drop can be too abrupt, creating the separation we're trying to avoid. To prevent this, the athlete should tighten the quads and unlock the knees before initiating the dip to ensure immediate tension and a controlled downward acceleration.

At the bottom of the dip, the tendency with the bar in front will be to shift forward. The lifter must fight this and will likely feel like he or she is leaning backward, which will be the case to a slight degree because of the need to keep the bar positioned correctly over the feet. Often the athlete will begin worrying about the drive with the arms prematurely, causing the grip on the bar to tighten, the elbows to drop and the shoulders to shift back, allowing the bar to slide down, this slide absorbing some of the force from the leg drive and pulling the athlete forward. The arms and shoulders must remain in the same position throughout the dip and drive to ensure the bar's security on the shoulders. Again, this can best be encouraged by keeping the grip relaxed and the hands slightly open until the bar leaves the shoulders. The bar can then remain settled into the shoulders and the force from the legs more completely transmitted to it.

It's important that the lifter attempt to keep his or her weight balanced over the heels. If the weight is too far forward, the dip and drive will be redirected forward, pushing the bar away from the lifter—from the side, the bar path in such a case will look like a V rather than an approximately vertical line as it should. Again, this does not mean the pressure on the foot will not at any time shift forward to the balls of the feet (which it will at the top of the drive)—simply that the center of mass will remain farther back as it does.

This balance of weight on the foot should be set or reset following the intake of air and tightening of the torso—taking such a large breath can actually shift the athlete forward even if he or she is balanced correctly prior to the breath. This shift back to the heels should be performed by pushing with the balls of the feet rather than rocking back and lifting the toes. A rocking motion is too unstable, and will often lead

Power Jerk

Begin with the feet in the drive position and the bar secured in the jerk rack position.

Take in a big breath, tighten down the torso and ensure the weight is over the heels.

Dip smoothly to the position practiced previously, and drive back up aggressively with the legs.

As the legs finish their extension, begin transitioning the feet from the drive position to the power jerk receiving position.

As the bar leaves the back and the feet begin transitioning, drive aggressively with the arms against the bar.

Pull the face back to clear a path for the bar, and push the bar slightly back as it rises, bringing the elbows out and under the bar.

Continue driving with the arms against the bar, pushing the body down into a quarter squat.

Attempt to lock out the elbows at the same time the feet reconnect with the platform and secure the bar in the correct overhead position.

to the athlete rocking back forward during the dip or immediately prior, shifting the weight even farther forward than it began. The balls of the feet should never lose contact with the platform even as the weight is shifted back to the heels.

After a quick and smooth transition at the bottom of the dip, the lifter will drive the bar vertically with as much force and speed as possible. When in the learning stages and using light weights, the force will need to be reduced somewhat to allow a jerk—if the force is too great, the light weight will be overhead before the athlete even has a chance to drive under the bar. However, it's important the athlete practice finishing the drive with the legs, even with reduced force, rather than stopping short.

As the bar leaves the shoulders, the lifter will quickly pull his or her head back straight back out of the way to allow the bar an uninterrupted line of travel past the face, after which it will be brought back into its final position and the torso will incline forward slightly. At the same time, the feet will need to be transitioned to the receiving position as quickly and powerfully as possible. An audible clap with the shoes' contact with the platform is desirable if the result of speed and aggressiveness, not excessive elevation; if this transition can be achieved by sliding the feet, this is completely acceptable. In the brief moment the feet are not actively driving against the platform, the athlete's effort to push the bar up will drive him or her down, again each object moving according to their relative masses and the magnitude of force applied to the bar, allowing the arms to be locked out as the body settles in the receiving position under the bar. It's important to understand that what drives the body down is the effort to lock the elbows—the drive against the bar with the arms. Just as in the snatch and clean, gravity cannot be relied on to relocate the body below the bar—a violent drive against the bar is necessary.

Once the bar and lifter are stable in the receiving position, the athlete can return to standing with the bar overhead. Only once the lifter is standing fully again and balanced is the lift complete.

Jerk Balance

The jerk balance is a drill that emphasizes the motion of driving the hips in under the bar during the split jerk. Typically used as more of a remediation exercise, it has great utility in a learning progression to prevent the bad habits it would otherwise be used to help correct.

Although it can be performed with the bar starting behind the neck, this is usually unnecessary and generally not helpful. The problem of not pushing the hips in under the weight really only occurs when jerking from the front; when starting with the bar behind the neck, the lack of need to change the torso position prevents the excessive push forward of the chest that is typically the cause of the hips failing to move in under the weight.

With the bar in the jerk rack position, the athlete will enter a partial split position—approximately two-thirds the length and depth of his or her actual split receiving position. The easiest way to find this position is to step out into the full split position first, and then bring the front foot back to the two-thirds length.

From this partial split position, the athlete will dip straight down and drive straight back up just as he or she would in the dip and drive of any other jerk. Once the

Jerk Balance

Begin with the feet in a split position two-thirds the length of normal and the bar secured in the jerk rack position.

Dip straight down and drive straight back up to accelerate the bar.

As the bar leaves the shoulders, keep the back foot planted and lift the front foot.

Continue driving against the bar with the arms and push the hips forward under the bar, reaching the front foot out into the full split length.

Attempt to lock out the elbows at the same time the front foot reconnects with the platform, and secure the bar in the correct overhead position.

Jerk balance

upward drive is complete, the athlete will lift the front foot, keeping the balls of the back foot planted, and drive the hips and lead foot forward into the full split position while driving the bar overhead.

The key to this drill—and the reason it's helpful—is to push the hips forward rather than simply diving the chest forward through the arms. This will also provide the feeling of keeping the weight back and ultimately balanced between the two feet rather than jumping too heavily onto the front foot. While the chest will need to push through the arms slightly to achieve the correct overhead position of the bar over the base of the neck, in reality this is a final movement that occurs after the feet have reconnected with the platform. If it is attempted prior to that, it will, as mentioned previously, push the hips back with the rear leg, prevent the lead foot from traveling far enough forward, and shift too much weight onto the lead leg.

Split Jerk Behind the Neck

The athlete at this point is capable of jerking, is familiar with the split receiving position, and understands the nuances of moving into that split position. We can now introduce the split jerk itself. As has been the pattern to this point, we'll begin with the bar behind the neck first to allow more focus on the new element of foot positioning.

Again, the mechanics of the dip and drive have not changed and all of the elements we looked for in the power jerk behind the neck should be in place here as well. With the bar starting in back, the torso is precisely where it will need to be in the receiving position, so no movement should occur. Likewise, the bar is already in the correct position and should simply move straight down during the dip and straight up during the drive, creating a vertical bar path when viewed from the side.

Following the completion of the leg drive, the athlete will quickly move the feet into the split position, keeping the rear foot close and reaching the lead foot forward without leaning into the movement with the chest, and attempting to lock out the elbows at the same time the lead foot reconnects with the platform. The weight upon securing the bar overhead should be evenly balanced between the

Split Jerk Behind the Neck

Begin with the feet in the drive position and the bar racked on the shoulders behind the neck with a jerk-width grip.

The shoulder blades should begin fully retracted exactly as they should be in the correct overhead position.

Take in a big breath, tighten down the torso and ensure the weight is over the heels.

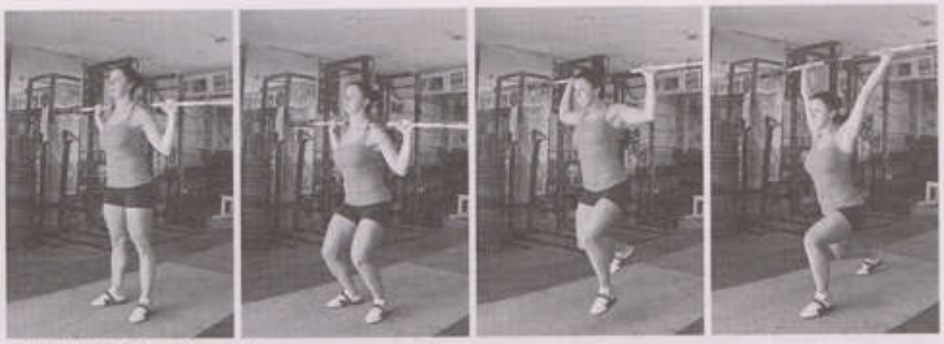
Dip smoothly to the position practiced previously, and drive back up aggressively with the legs.

Once the legs have finished their extension, begin transitioning the feet from the drive position to the split receiving position.

As the bar leaves the back and the feet begin transitioning, drive aggressively with the arms against the bar, keeping the hips under the weight and stepping the front foot out.

Attempt to lock out the elbows at the same time the feet reconnect with the platform and secure the bar in the correct overhead position.

front and back feet. Once stable, the athlete will recover by stepping back a third of the way with the front foot, and the remaining distance forward with the back foot.


Split jerk behind the neck

If the athlete is struggling to combine the jerk with the split, it can be introduced first with tall split jerks behind the neck and then from the front before proceeding to the complete split jerks.

Split Jerk

With the split jerk introduced from behind the neck and performed satisfactorily, we can now finalize the progression by performing the split jerk from the front. While the movement is in its essence the same, there are a few details specific to the jerk from the front that warrant attention.

Everything discussed with regard to the dip and drive of the power jerk applies to the dip and drive of the split jerk. The athlete will secure the bar in the jerk rack position, take in air, and settle back onto the heels with the legs tight and the knees unlocked. Again, the face can be pulled back partially at this point to prepare for its upcoming pull back completely out of the way of the bar. Once stabilized in this position, he or she will dip smoothly, keeping the hands loose, the rack position unchanged, and the torso upright, transitioning rapidly and driving straight back up violently with the legs.

Just as with the press and push press, it will be helpful for the athlete, as the bar leaves the shoulders, to think of driving it backward slightly as it moves up. The athlete will pull the face back to clear a path for the bar, and move it forward through the arms again as the bar passes.

As the bar leaves the shoulders, the feet will begin transitioning to the split position (In reality, the rear foot will begin moving backward before the front foot leaves the platform, but this is not something that needs to happen consciously). Again, the rear foot should be kept close to the platform—almost slid back into position, and in fact, the athlete may find it more effective to actually think of

Split Jerk

Begin with the feet in the drive position and the bar secured in the jerk rack position.

Take in a big breath, tighten down the torso and ensure the weight is over the heels.

Dip smoothly to the position practiced previously, and drive back up aggressively with the legs.

Once the legs have finished their extension, begin transitioning the feet from the drive position to the split receiving position.

As the bar leaves the back and the feet begin transitioning, drive aggressively with the arms against the bar.

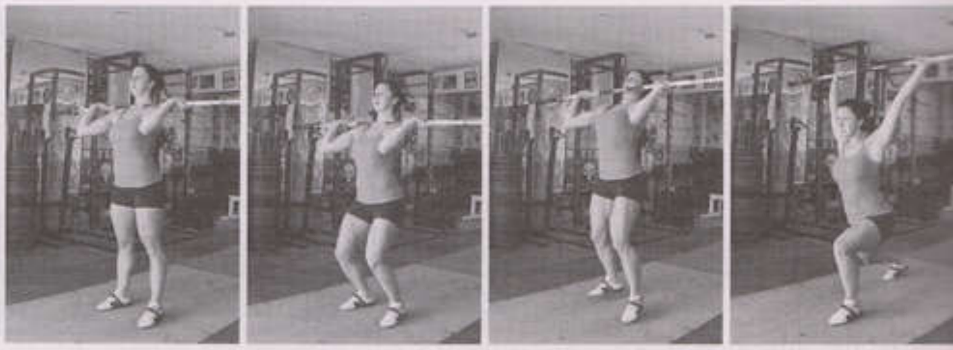
Pull the face back to clear a path for the bar, and push the bar slightly back as it rises, bringing the elbows out and under the bar.

Continue driving with the arms against the bar, pushing the hips forward under the weight and reaching the front foot out.

Attempt to lock out the elbows at the same time the front foot reconnects with the platform and secure the bar in the correct overhead position.

pushing the balls of the foot almost straight down rather than back.

The athlete will continue driving aggressively against the bar, forcing him- or herself down as the lead foot moves forward into position. Again, it's important that the athlete think of pushing the hips forward under the bar and keeping the chest up as part of the effort to move the front foot forward. The slight forward shift of the chest through the arms to move the torso into position under the bar should actually occur after the feet have already reconnected with the floor in the proper position. If the athlete, instead of pushing the hips in under the bar, thinks of driving the chest forward, it will more than likely cause the back leg to shoot far enough back to actually pull the hips back behind the bar, causing the lead foot to reconnect before the rear foot, and leaving the athlete in a position that places too much weight on the front foot and actually fails to place the structure to support the bar under the weight.



The split jerk

If the hips are pushed in correctly, and the weight remains balanced back over the heels during the dip and drive, the replacement of the feet on the platform in the split position will be slightly staggered—the back foot should hit an instant before the front. This brief moment will allow the athlete to drive off of the back foot, which helps the movement of the hips under the bar. If the rear foot is disconnected and front foot connected while the athlete drives the torso forward, the backward shift of the hips described above is inevitable. (This staggered reconnection should not be significant enough to be visible without watching video replay in slow motion; it is not something the athlete will likely be able to feel.)

The lead foot hitting first suggests that the athlete's weight was too far forward on the feet during the dip and/or drive, the bar has been pushed forward, the lead foot has not been placed far enough forward or not elevated enough to allow it to move far enough forward, the rear foot pushed too far back (and probably elevated too much), or a combination of these errors.

Athletes will tend to immediately lock the legs into position upon the reconnection of the feet with the platform much like they would when receiving a power snatch or power clean. Instead, athletes should allow the legs to bend somewhat as the weight is received to ensure complete lockout of the elbows—this will allow natural adjustments to be made to the split depth to correct for imperfect foot placement or timing as well as slight fore and aft movement to improve balance. Locking the knees immediately will eliminate this opportunity, and it will be extremely unusual for the elbows to actually be completely extended at the moment the feet reconnect with the platform.

If the back knee is not allowed to flex along with the front, it will drive the lifter forward as he or she settles under the weight, pushing the bar forward as well. At best this will force the athlete to recover forward to maintain balance, and at worst it will cause a miss with the bar too far forward of the center of the base to be supported adequately. Ensuring the back knee is allowed to flex in concert with the front will allow the athlete to drive and settle vertically down under the load and maintain the necessary balance.

The jerk demands a certain aggressiveness and confidence. It will be the most weight the lifter ever places overhead—with the exception perhaps of exercises such as jerk supports in which a bar is lifted from a rack a short distance—and consequently it has the tendency to instill potentially debilitating fear in the lifter as the attempts near maximal. Often an increase between attempts of a mere 2-3 kg will result in a dramatic change in technique due to the athlete's lack of confidence and unwillingness to commit to the attempt. Practicing missing with lighter weights, performing heavy jerk supports, and jerking from behind the neck with greater loads than from the front are all excellent ways to build the lifter's confidence and ensure more consistent technique with limit weights, but the most important element is to from the earliest stage encourage and demand from the athlete a great degree of viciousness with every jerk.

Just as in the snatch, once the weight has been received overhead, the priority is stabilization before recovery. Settling into the split position will allow adjustments to be made to bring the barbell and lifter into balance; immediate recovery attempts will typically just push the bar farther into whatever direction of imbalance it presently exists. Once the weight has been stabilized and the athlete feels secure, he or she will recover by stepping a third of the way back with the front foot and the remaining distance forward with the back foot.

During this recovery, it's recommended the athlete actually lightly slide the front foot back, or at least keep it extremely close to the platform. This minimizes bar and body movement to limit potential for losses of balance, and also keeps the foot prepared to reconnect with the platform immediately if the need to re-stabilize does arise.

Being forced to recover from the jerk by first stepping forward with the back foot indicates the athlete's weight is too far forward, the possible causes of which are the same as those listed previously with regard to the lead foot reconnecting with the platform before the rear foot.

THE CLEAN & JERK

The athlete is now familiar with both the clean and the jerk in isolation. The clean & jerk as a single lift is considerably different than either lift performed individually. While the clean is quite taxing physically and psychologically, the clean & jerk presents even more of a challenge because of the need for both great strength and commitment for each, and the often remarkable fatigue that follows a heavy clean effort.

A few points need to be clarified with regard to performing the two lifts together as the clean & jerk. There will be two basic transitions between the clean and the jerk—the foot position and the rack position.

As has been mentioned previously, there may be minimal or no difference in the foot placement for the squat and the jerk for certain athletes. In these cases, this transition will not exist. For most athletes, however, following the recovery from the clean, the feet will be moved back in to the drive position in preparation for the jerk. This can be done in whatever manner is most comfortable and stable for the athlete. Some will simply step in with one foot, while others will prefer alternating pressure between heel and toe to rotate both feet into position.

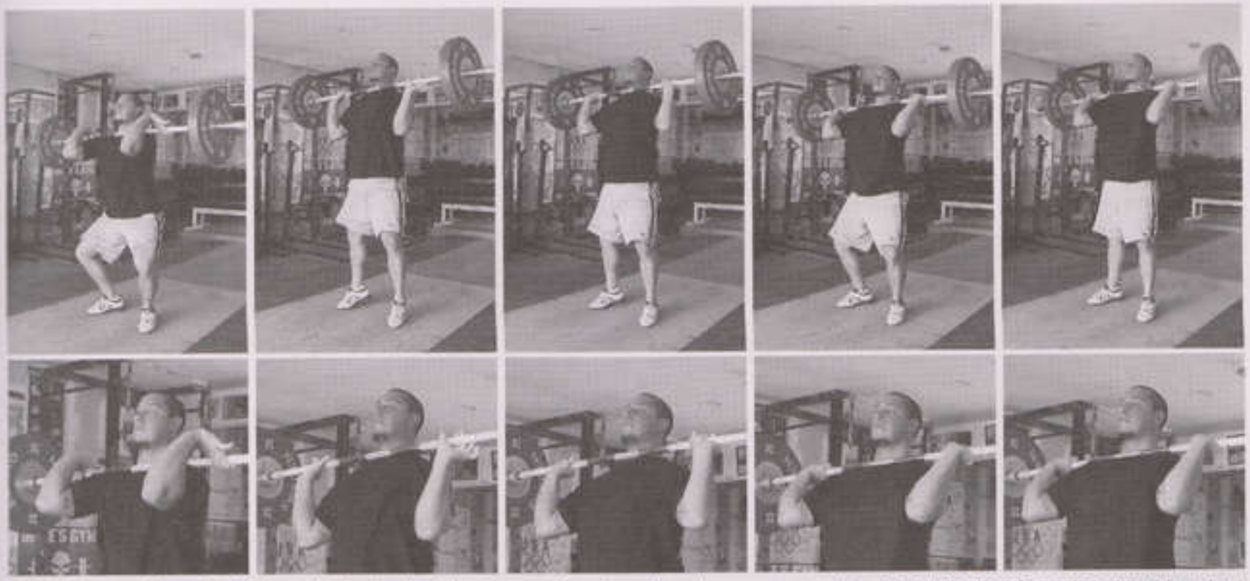
More dramatic, and more critical, will be the shift from the clean rack position to jerk rack position—sliding the hands in deeper under the bar and bringing the elbows down and out. This can be accomplished a few possible ways. Occasionally athletes will be able to reposition their hands in a standing position without any movement of the bar. This is unusual, however, with weight on the bar. Far more commonly, the athlete will need to unload the bar from the shoulders briefly in order to drive the hands farther under it.

Often athletes will stand from the clean, and then spend a great deal of time attempting to reposition the hands and arms in preparation for the jerk. This is an enormous waste of energy in an already fatigued state, and the more time spent in this position, the less likely a successful jerk becomes. Heavy weights in the clean rack position are crushing both physically and psychologically, and the more time the athlete feels the weight of the bar pushing him or her into the floor, the less confident he or she becomes in his or her ability to drive the bar overhead.

Once standing after a clean, the athlete can quickly dip and pop the legs to lift the bar slightly off the shoulders and create space to drive the hands in deeper under the bar and bring the elbows into position. Once the bar settles back on the shoulders in the jerk rack position, the athlete is ready to jerk. This technique works, and will be the fallback if our better option fails or the difficulty of the clean recovery is such that the athlete simply wants to stand up without worrying yet about the jerk, but it's an unnecessary expenditure of energy and time.

Instead, the athlete can use the momentum already being generated from the recovery of the clean to pop the bar up as he or she reaches a standing position. This is much quicker and uses less energy than the previous method.

There will be times when one or both of the athlete's hands slip out from under the bar during the clean recovery. This is still a legal lift as long as the bar remains racked in the same position on the



The rack position should be adjusted using the momentum from the clean recovery to unload the bar from the shoulders just enough to sink the hands deeper under the bar to enter the jerk rack position.

shoulders, and the athlete can make the attempt to re-grip the bar in preparation for the jerk. The method for doing so is the same for normally repositioning the hands—a quick pop with the legs to briefly unload the bar from the shoulders, although it may need to be more pronounced. In the case of both hands slipping from the bar, it's usually most prudent to re-grip one at a time to minimize the potential for dropping the bar. It's important that the athlete keep the arms raised high in this situation to ensure the bar remains securely racked deep on the shoulders—the bar cannot legally be allowed to slip down and then be readjusted back up.

Despite the desire to hold the bar for as little time as possible between the clean and the jerk, the athlete must be patient and adequately prepare for the jerk. This involves ensuring correct balance on the feet, the proper rack position, enough control of heavy breathing to bring in a sufficient breath to stabilize the torso, and the mental focus to perform the lift. The necessity of mental preparation is often underestimated. Clean recoveries will generally be very taxing both physically and mentally. No other lift will place as much weight over the lifter's head, and this demands a great deal of confidence and commitment. Far too often athletes miss jerks they're normally well capable of making because of a failure to adequately prepare mentally for the effort in the wake of a difficult and demoralizing clean.

In competition, the athlete must wait for any oscillation of the bar to cease before initiating the jerk. This is an issue only with very heavy loads. In addition, the athlete can make only a single attempt at the jerk. Once initiating the dip, the athlete must commit to the attempt.

ERROR CORRECTION

CORRECTION BASICS

Because the number of possible technique errors is essentially limitless, an exhaustive list of diagnostics and corrections isn't practical. Instead, this section will provide the guiding principles along with specifics regarding the most common technical errors. A thorough understanding of the principles of the lifts will guide error corrections well and allow the coach and athlete to effectively correct any conceivable problem even without previous experience with it. Of course, the more experience, the more opportunity for experimentation with and evaluation of different approaches, and consequently the quicker and more effective correction will generally be.

It's important to recognize that every athlete responds differently to coaching and drills—methods that work well for some may be ineffective for others. The art of coaching lies in finding ways to improve *any* athlete's performance, and this can be done only with principled experimentation.

Guiding the coach in error correction will always be his or her understanding of the principles of the movements. These fundamentals have been discussed in detail throughout the book. The learning progressions for the lifts are excellent resources in the context of error recognition and correction. The progressions outlined very clear guidelines for the performance of the lifts; familiarity with these progressions should make it easy to recognize deviations from these guidelines, and the guidelines themselves provide much of the potential drill work that can be used to help correct technique flaws. When in doubt, always return to the fundamentals.

Where to Start

It's unlikely an athlete will ever demonstrate a single technique flaw. While they may display a single error repeatedly and even consistently among attempts, it will invariably be accompanied by additional problems. This is due largely to the fact that errors in one part of the movement typically produce errors in other parts of the movement even with compensatory efforts (often other errors *are* compensatory efforts).

Early in an athlete's development, the list of errors on each attempt will be extensive and may even vary considerably among attempts. Despite any variation, typically these athletes will repeatedly display a core set of errors, present irrespective of the changing peripheral errors. These core errors are of course the priority and must be addressed and corrected before any significant effort and time can be invested in the peripheral errors. Often correction of these core errors will result in the attenuation if not elimination of the peripheral errors, which are generally products of the more fundamental errors. As the athlete progresses, the list of errors will diminish, as will the severity. However, the longer these errors have been performed, the more established they will be and consequently the more difficult to correct.

In addition to following the order of core to peripheral, efforts to correct technique errors should generally follow the order of their occurrence in the movement. Again, errors will nearly always produce subsequent errors; correction of the earlier faults often eliminates the cause of the later faults. For example, if an athlete's weight is too far forward on the feet at the initiation of the snatch or clean, it will typically cause the bar to swing forward away from the body. We can attempt to correct this bar path by encouraging the athlete to more actively pull the bar into the body, but this neglects the actual cause of the problem. That cause will continue to result in trouble with the lift even if the specific error of the barbell diverging from its intended proximity to the body is corrected through overcompensation. If we instead start with the earlier error—improper balance of weight immediately off the floor—we can correct it and in the process eliminate the second error as well.

Because this process can be extremely frustrating for both the athlete and the coach, it's recommended that only one or two specific errors be addressed at any given time—ideally that time being an entire training session, but more likely being a single lift or a series of lifts. Even if several errors are noticeable, the athlete can only focus on so much at once, and attempting to correct more than one or two errors at a time is typically overwhelming and counterproductive.

Observation

How the coach observes the athlete when attempting to evaluate a movement will depend on the movement and the element of the movement on which the coach is focusing. For general and initial observation of the movement as a whole, the coach is generally best positioned at an oblique angle and at a distance. This allows easy view of the entire athlete without significant shifting of the eyes, and provides the ability to judge the path of the bar fairly well without obstructing the view of the feet, hips and arms. This is the ideal position for a "whole picture" observation—that is, to get a basic impression of the movement in order to make larger-scale corrections or to determine a specific point in need of focus.

Once an element of focus is chosen, the coach's position may change to better evaluate it. For example, the best view of the bar path will be from directly to the lifter's side; if the coach is instead concerned with the athlete's overhead position in the snatch, a better position would be in front of the athlete (not directly, of course) to allow an unobstructed view of the arms and shoulders during the turnover and receipt of the bar.

How to Correct

There are two broad types of technique fault: conscious and unconscious. The former is a cognitive misunderstanding of the technique, such as an athlete not knowing how to position his or her feet for the squat. The latter is a physical failure to correctly perform a movement or achieve a position the athlete understands, such as an inability to reposition the feet from the pulling to receiving position accurately despite knowing and possibly even being able to demonstrate in isolation each position correctly. Depending on the nature of the fault, the approach to correction will vary.

Conscious technique errors are generally easy to correct because they're simply the product of incorrect or absent instruction. If an athlete has not been instructed regarding the correct foot positioning for his squat, he or she can't be expected to find it accurately. The solution is simply teaching the athlete the correct position. Using the learning progressions described in this book, this can be done in the most complete fashion possible, or only the necessary details may be invoked.

Unconscious technique errors are considerably more difficult to correct. These faults occur in spite of conscious understanding of correct technique, and are often well-established habits that must be broken. Essentially, they're any action performed without direct intention. As such, they usually require more involved corrective efforts in the form of drills rather than simply verbal cues or instruction.

The approach to correcting such errors is simple in principle: Isolate the problem; determine corrective exercises; drill corrective exercises; reintegrate the corrected movement into the whole. Isolation is often the most difficult part of the process—this is the diagnosis of the actual cause of the technical fault, such as the example of improper weight balance on the feet. These diagnoses are made based on the clear understanding of the principles of the movement and the consequent recognition of violations of these principles.

Staying with the example of weight balance on the feet, once this has been identified, the next step is to determine how to correct it. To do this, generally we reduce the movement as much as possible until we're able to genuinely focus on the problem at hand. In this case, we may reduce the snatch to a snatch deadlift. This will allow the athlete to find the correct balance in the start position and maintain it in a relatively slow movement with no distractions. Once the snatch deadlift is satisfactory, we may add the next layer of complexity by moving to a snatch pull. This introduces speed and a fuller extension at the top. Once this is satisfactory, we may move directly back to the complete snatch and reevaluate.

The previous is the most basic approach. To this we can add the use of movement complexes. For example, once the snatch deadlift and snatch pulls are being performed correctly, instead of simply snatching, we may create a drill from a combination of these movements. This may look like a snatch pull followed immediately by a snatch, or we may be even more thorough and perform a snatch deadlift, then a snatch pull, and then the snatch. This approach is often extremely effective because of the immediate proximity of the correct movement to the movement we're trying to correct—the athlete enters the latter movement with the feeling of the correct movement fresh in his or her body and mind. More often than not, this has a very positive influence on the movement being corrected.

The quality of repetition during error correction is critical. Frequently athletes and coaches will concern themselves with the quantity of work at the expense of the quality, believing that the greater the volume of practice, the better the effect. The problem with this approach is two-fold. First, a lack of quality is the very element we're attempting to correct. Practicing a motor skill poorly will improve the athlete's ability to perform that motor skill in that same poor manner—never will it magically create correct motor patterns. Second, as a product of the first, that large volume of sub-optimal practice establishes motor patterns very similar to the ones we're attempting to create yet still incorrect. These patterns compete with the correct ones and make learning and establishing the correct ones far more difficult when compared to establishing those correct patterns in the absence of the similar incorrect ones. In other words, this approach to practice is not simply ineffective—it's counterproductive. A small number of precisely performed drills is far more effective than any number of inaccurately performed drills. Quality practice will produce quality performance.

Another approach to error correction that is less direct, but often very effective, is the use of standalone exercises to strengthen and reinforce positions and movement patterns. These may or may not be indicated to the athlete as corrective work, and often the athlete not knowing that is the purpose helps. An example of this would be heavy sets of the jerk dip squat for an athlete who tends to shift forward or sit the hips back when jerking. This is a positional exercise that will strengthen the proper movement of the jerk dip and carry over into the lifter's execution of the dip when jerking without even thinking about it. Snatch and clean pull variations like segment or halting deadlifts or high-pulls have similar effects by strengthening desired positions and movements. Athletes will always return to the movements and positions in which they're strongest and most comfortable, so by designing a program to remodel that athlete to be strongest and most comfortable in the way we want, we can shape that athlete's technical performance of the classic lifts indirectly.

Whether working with conscious or unconscious technique faults, two more points need to be considered. The first is that there is a very real limit to how much an athlete can effectively work on in a single lift. While there may be several technical flaws needing correction, in a lift that will likely be over in little more than a single second, the capacity of the athlete will generally allow focus on only one or two faults at a time. The focus of each lift needs to be selected based on the prioritization discussed previously.

The second point is regarding the nature of cues or instruction. These should provide the athlete with what to do instead of what not to do. By telling the athlete to not do something, we provide no alternative to the incorrect action and leave the correction to the athlete, who we can confidently assume doesn't know it. Instead, we need to instruct the athlete in the positive—give them an action to perform. For example, if the bar is swinging away from the athlete's body during the snatch or clean, we can tell the athlete to not let the bar swing away. This is a marginally useful instruction at best, particularly considering many times the athlete will be aware of the problem but simply not know how to correct it. The athlete needs to know what to do instead of allowing the bar to swing. We can instruct the athlete to maintain a more upright posture, to actively pull the barbell in toward the body with the lats, or to direct the elbows up and to the sides during the third pull, as appropriate. This provides the athlete with a very clear action to attempt and will more often than not produce better results than the negative counterpart. (This being said, there will be times when a vague cue like keep it close is effective—these times are immediately prior to lifts when the coach and athlete have already established previously how exactly this is to be done. This cue is simply a reminder rather than an instruction.) Another example would be the athlete who allows the hips to rise before the shoulders during the first pull of the snatch or clean. Instead of instructing the athlete to keep the hips down, we can instruct him or her to keep the chest up. In this case, both cues told the athlete what to do, but the latter better aligned with the action being performed—that is, we gave a cue of upward lifting during an upward movement of the body.

Corrections

In the following three chapters are common technique errors for each of the lifts and suggested approaches for their correction. All of these corrections assume attempts at simply cueing the athlete have been unsuccessful and more active corrective work is necessary. Descriptions of all exercises can be found in the Supplemental Exercises section. Again, these are guidelines and starting points. Experimentation and creativity are encouraged.

under the power of the elbow flexors instead of the lats and shoulders. Similarly, if the athlete is too far forward, often because the hips have started or ended up too high relative to the shoulders, he or she will have to rush to get under the bar to restore balance, and this often manifests as an early scoop coupled with early arm bend. In such cases, the imbalance is of course what needs to be corrected first. If this doesn't fix the problem, the above corrections can be added.

Athletes will sometimes—particularly in the clean because of the bar's position against the upper thigh rather than the hips—bend the arms in attempt to pull the bar up into the hips to reduce forward movement from the forward travel of the thighs during the scoop. This needs to be corrected through ensuring the athlete's balance is correct, that the bar speed at the time of the scoop is adequate and the path is overwhelmingly vertical, and that the layback at the top of the second pull is sufficient to keep the bar over the base. The upper back can also be used to achieve a better bar position relative to the hips as described in the clean section of the book.

Arm bending may be a simple misunderstanding of how the bar is to be kept close to the body. To demonstrate the correct muscle action, the athlete can perform a stiff-legged deadlift with an empty bar, pausing at the bottom with the shoulders well forward of the bar. The athlete will then relax and allow the bar to hang directly down from the shoulders, then, keeping the arms relaxed, pull the bar back into the legs. This should help familiarize the athlete with the feeling of proper lat and shoulder activation independent of elbow activation.

Arm-bending during the second pull is often a response to the athlete being afraid of a heavy weight—many will unintentionally attempt to lift the bar up with the arms, being not yet confident in the legs' and hips' far better ability to accelerate the bar. This is something that must be learned over time; but to encourage the athlete to keep the arms relaxed, he or she can be instructed to think of lifting the shoulders (or the body as a whole) instead of the bar. If the athlete is focused on elevating the bar directly, its height will often become a concern irrespective of the current position of the body. If instead the athlete focuses on lifting the body, the bar is more likely to remain in the correct relative position and be better accelerated.

Finally, athletes will often cut the second pull short in a rush to get under the bar—the hips will not open fully and the shoulders will remain above or even slightly over the bar. This transforms the lift to something resembling an upright row with the bar considerably forward of the body. The athlete will need to focus on finalizing the extension of the body and allowing the bar to slide up the upper thighs and hips. Corrections for this are outlined in the Under-Pulling / Inadequate Layback section below.

Leading with the Hips

Often during the first pull of the snatch or clean, the athlete will elevate the hips faster than the shoulders, which places the athlete in a poor position upon entrance into the second pull, and tends to shift the system's balance too far forward on the feet, which in turn encourages the bar to swing forward and shift the weight even farther. Assuming the starting position is correct, there are a few possible causes of this problem, one of which is not actually a problem if the magnitude is small enough.

Longer-legged athletes may require a slight shift in back angle during the first couple inches off the floor to clear the knees. If this is intentional, and both the starting position and second pull position are sound, such a shift is not a problem.

Otherwise, the problem may be either the result of technique flaws or inadequate strength. The initial step for technical correction is starting with the simplest movement—the deadlift, either snatch or clean as appropriate. This eliminates distractions and allows the athlete to focus on the angle of the back. Slow, deliberate pulls from the floor and focus on keeping the chest up will typically eliminate the problem immediately. Once the deadlift is performed satisfactorily, the athlete can graduate to a snatch or

GENERAL ERRORS

Forward Weight Balance

This is a vague error—in this context, we're looking at forward weight balance during the first pull of the snatch or clean. Weight being too far forward during the first pull has two basic causes. The first to be considered is the starting position—the bar too far forward over the feet, the shoulders too far forward over the bar, and the hips too high are all possible causes for this. The athlete will need to adjust the starting position according to the descriptions in the snatch and clean sections of the book.

The other potential is an error in the initial phase of the first pull—if the athlete fails to shift back as the bar leaves the floor, it will remain over the balls of the feet, or likely shift even farther forward. In either case, this will keep or shift the balance of the system too far forward. This can be corrected with snatch or clean deadlifts and snatch or clean pulls (or halting/segment deadlift/pulls), allowing the athlete to focus on the backward shift onto the heels off the floor. Following this, complexes that combine snatch/clean deadlifts, and/or pulls, with the snatch/clean will be effective.

Premature Arm Bending

Extremely common among new lifters, particularly very strong ones, is the tendency to begin bending the arms before the legs and hips have been fully extended. As discussed previously, this greatly limits the potential acceleration of the bar through the absorption of a portion of the legs' and hips' power by forced extension of the elbows.

The goal is to encourage the athlete to maintain relaxed, passively-extended elbows until reaching the peak of leg and hip extension at the end of the second pull—to allow the weight of the bar to stretch the arms out. The first step is to simply reduce the movement as much as possible—this will become a snatch or clean pull, possibly even from the hang initially. With this reduction, the athlete can focus on maintaining extended arms until reaching peak leg and hip extension. After a few correct reps from the hang and from the floor, the athlete can perform a complex—snatch or clean pull + snatch or clean, possibly with 2-3 pulls before the lift.

As has been mentioned a few times previously in the book, arm-bending may be the result of an excessively tight grip on the bar. The athlete can simply attempt to relax the hands as much as possible without the bar slipping, or another option, taught to me by Don Weideman, is to have him or her use straps temporarily. This will allow a looser grip, which will encourage the remaining flexor muscles in the arms to relax. With straps, the same steps described above can be taken. This will allow the athlete to learn what the arms should feel like during the first and second pulls.

Occasionally premature arm bending is a natural response to poor positioning during the pull. For example, if the athlete's weight is too far forward on the feet during the first and second pull and the bar is consequently pulling him or her forward, the athlete may attempt to pull it back into the body, mistakenly clean pull—essentially adding speed to the basic movement. From correct pulls, the athlete can progress to the complete snatch or clean, or perform a complex—for example, snatch deadlift + snatch pull + snatch, or a simpler snatch deadlift + snatch pull. Of course, temporarily slowing down the first pull considerably during the complete snatch or clean will allow the athlete to focus on the movement and make adjustments.

If the problem is due to inadequate strength, the correction will require more time. Emphasis on position-specific strength work such as snatch/clean deadlifts, snatch/clean pulls, and the correct upright posture during squats will gradually improve the athlete's ability to maintain the correct pulling posture under heavier loading. Halting snatch or clean deadlifts are another beneficial exercise, particularly if the shift in back angle is occurring relatively late in the first pull. A 2-5 second pause at the top position can be used before returning the bar to the floor for further strengthening of the position. These of course can be combined with snatch/clean pulls or snatches/cleans in a complex if appropriate.

Leading with the Shoulders

Less common than leading with the hips is leading with the shoulders in the first pull—that is, extending the hips too soon. This is extremely uncommon due simply to the fact that it's essentially impossible with any significant weight because the movement pushes the knees forward of the bar and the shoulders behind it, interrupting the path of the bar, and forcing the athlete to lift the bar forward with the shoulders.

Occasionally this problem is in response to a starting position that places the shoulders too far over the bar and the hips too high. Although rare, some athletes from this position will naturally shift into a more upright posture during the first pull. While the goal of achieving a more upright pulling posture is correct, the starting position should be corrected to set the athlete up to pull correctly immediately.

Conveniently enough, the correction for this error is the same as for leading with the hips—deadlifts, halting deadlifts, and pulls, leading to complexes—the focus on position is just modified appropriately. Like leading with the hips is often the result of weak legs relative to the hips and back, leading with the shoulders is often the result of strong legs relative to the hips and back—the body attempts to shift the effort to the stronger muscles and relieve the weaker ones. Halting deadlifts in this instance will be even more effective because of their ability to strengthen the back and hip extensors. The critical point in this case is that the athlete remain positioned over the bar appropriately—that it, he or she does not allow the knees to slide forward as the bar rises to the mid-thigh level. Until the bar reaches approximately mid-thigh in the deadlift or pull, the shoulders should remain slightly in front of the bar.

Bar Hitting Knees or Shins

Collision of the bar against the knees or scraping of the shins by the bar indicates that the athlete's shoulder position relative to the bar is too far back at the moment of contact or that the athlete is pushing the bar into the body too much and/or at an inappropriate time. The first and most obvious correction is to ensure the starting position is correct—the bar over the balls of the feet, the arms approximately vertical when viewed from the side, and the knees flared to the sides as much as is allowed by the arms.

If the starting position is not the problem, it's most likely the manner in which the athlete leaves the floor. As was described in previous sections of the book, the pull from the floor must involve a backward shifting of the body as the bar leaves the floor. If we watch the knees as a lifter stands, they move back as the leg extends. However, because the athlete starts relatively far forward, unless the athlete is shifting back as a whole during the initial lift, this knee extension may be inadequate to get the knees back out of the way of the bar. It's important that the athlete not simply push the knees back out of the way—this shifts the hips up and the shoulders forward. They need to move back as a result of a correct first pull motion.

Another possible cause is leading with the shoulders, the corrections for which were discussed above. Finally, the athlete may be putting too much effort too soon into pulling the bar back into the body, causing it to drag rather than simply maintain immediate proximity.

If everything appears correct, the athlete may simply be of the particular proportions that require starting with the hips slightly higher and the shoulders slightly farther forward than we would otherwise prefer. Such an adjustment should be made in small increments, and additional care will need to be taken to prevent hip-leading and forward shifts in balance. The bar also may be able to be started slightly farther forward over the feet to create more space, which is preferable to changing the upright posture of the torso.

Early Scoop

As was discussed in the Double Knee Bend chapter, the scoop is an involuntary movement—the natural result of correct positioning and speed. Early scooping can be the result of a few different problems.

Occasionally athletes will scoop intentionally because they've been taught to do so. Invariably such an attempt will occur too early, resulting in inadequate hamstring tension and often a shift in weight too far forward. The solution is to re-educate the athlete regarding the double knee bend and introduce the correct feeling of the drive against the ground. A process for this is described in the Double Knee Bend chapter earlier in the book.

Following this, snatches and cleans can be performed with the attempt to put the new understanding into practice. Starting from the top is generally most effective—the athlete can perform snatches or cleans from the mid- to upper-thigh, the point at which the scoop should begin. From this position, the athlete needs to focus only on driving violently against the ground with the legs while simultaneously extending the hips slightly beyond neutral. This will begin the athlete in the correct position and allow him or her to become accustomed to allowing the scoop to occur naturally.

Next, the athlete can perform segment snatches or cleans. The simplest variation would be a controlled snatch or clean deadlift to the mid- to upper-thigh position, a pause, and then a snatch or clean from that hang position. These can be followed by or combined in a complex with regular snatches or cleans.

An early scoop can also be the result of a strength disparity—if an athlete's quads are considerably stronger than his or her posterior chain, the athlete may unintentionally bring the knees forward as early as is allowed by bar position in order to shift more of the work of accelerating the bar to the quads. If strength is determined to be the cause, halting deadlifts, stiff-legged or Romanian deadlifts, and good mornings are all options to improve hip extensor and back strength. Halting deadlifts should be taken to the highest possible position (upper-thigh in the clean and crease of the hips in the snatch), maintaining the correct back angle and preventing the knees from sliding forward, to strengthen the posture and build the athlete's confidence in such a position.

Finally, an early scoop can be a response to the athlete's balance being too far forward. Essentially the athlete is chasing after the barbell as it pulls him or her forward, and scooping the knees underneath it allows the athlete to continue pulling by bringing more bodyweight behind the bar. This can often be attributed to a high-hipped starting position—if the athlete starts and pulls with the correct posture, the bar simply doesn't have the tendency to pull the athlete forward so dramatically.

Bar Swinging Forward: First Pull

There are a few possible causes of the bar swinging forward during the first pull of the snatch or clean, but all fall into two categories: active and inactive. Inactive swings result from poor positioning and a failure to control the bar. If the athlete starts with the hips too high or leads with the hips, the shoulders will be or move too far forward, which will encourage the bar to shift forward as well. If the athlete doesn't actively pull the bar into the body with the lats, it will swing forward and likely pull the athlete with it—as described a few times previously in the book, even with an effort to pull the bar back, such positioning will typically keep the athlete's balance too far forward.

Active swings are the result of the athlete attempting, sometimes unconsciously, to avoid hitting the knees with the bar. This may be because the knees are actually obstructing the bar's path because the shoulders are too far back, or it may simply be an irrational fear of collision when the knees are actually safely out of the way.

In the case of inactive bar swings, the correction is a combination of the lat activation work described in the premature arm bending section and the positioning work described in the leading with the hips section, as well as throughout the book. In the case of active bar swings, the correction is the same as described in the leading with the shoulders and bar hitting knees or shins sections. The go-to exercise in both cases is a halting or segment snatch or clean deadlift.

Bar Swinging Forward: Second Pull

If the bar is swinging out during the second pull, there are a few possible reasons. One may be the athlete locking the elbows during the first and second pulls in a misguided attempt to keep the arms straight. If the arms are locked in extension, there will be a delay in the transition from extension to flexion as the athlete completes the second pull and initiates the pull under the bar. Because the bar possesses upward momentum, it must continue traveling upward somehow, and with the elbows locked, its only option is to swing forward at the ends of the arms. To correct this, the passive elbow extension described throughout the book, such as above with respect to early arm bending, needs to be taught or encouraged.

Interestingly enough, this forward swinging can also be the result of premature arm-bending. Although the arms are being tightened in the opposite direction as the previous example, in both cases the effort keeps the elbows tight and unable to transition fluidly into a pull under the bar. Further, this is often coupled with the shoulders rounding forward and remaining over the bar in somewhat of an upright rowing position rather than finishing behind the bar at the top of the extension. Again, the arms need to be encouraged to relax.

If the posture of the pull is improper, the shoulders will be farther forward of the bar than is ideal. This sets up a pendulum with the arm and barbell, creating a tendency for the bar to swing forward—the farther forward the shoulders are, the greater this tendency and the more difficult it is to resist it. Pulling posture will need to be corrected—the more upright this posture, the more the bar will naturally want to remain close to the body.

Some athletes will simply fail to bring the bar back as the bar passes the knees, and the bar will move straight up from the knees. In this case, the bar is not necessarily swinging forward—it's just not moving back into the body as is needed. This can be attributed to locked or tight arms, an incomplete extension, or the athlete's weight being too far forward. Corrections for these things can be found in this chapter.

Another possible cause is excessive forward hip movement pushing or banging the bar out. This can be a difficult habit to break if it's well established. Again, we need to reduce the movement as much as possible to focus on the problem: Deadlift to pull to complex with the complete lift, emphasizing the vertical movement of the legs coupled with the hip hyperextension and maintenance of the weight on the feet at approximately the front of the heel; lifts from mid-thigh and the knee can also be helpful. More information on this can be found in the snatch and clean sections of the book.

Finally, a forward swing of the bar in the second pull may be the result of an excessively vertical or incomplete extension of the body. As was described in the snatch and clean sections, the final position of the second pull needs to be one of slight rearward inclination and hyperextension of the hips in order to keep the system in balance and the bar moving correctly.

If the body extends completely vertically, the bar will be forward of the center of the base; if the weight is significant enough relative to the athlete's bodyweight, it will pull the athlete forward and this momentum will continue trying to carry the bar forward. This again can be prevented by attempting to focus the weight father back on the feet, which will only be possible with a rearward angle of the body at the top.

Additionally, such a vertical position, or a failure of the athlete to completely extend the hips, will mean that the shoulders are possibly forward of the bar at the top of the lift. Again, this creates a pendulum encouraging the bar to swing forward. At the peak of extension, the shoulders should be behind the bar and hips. Corrections for this can be found in the Under-Pulling / Inadequate Layback section below.

Cues to push the bar into the hips or upper thighs can help focus the athlete on keeping the bar close.

Bar Swinging Forward: Third Pull

The bar swinging forward during the third pull can be the result of a number of problems, many shared with swinging out during the second pull. Probably most obvious is a stiff-arm pull under continuing from a stiff-arm second pull. Often if the athlete's arms are locked or held too tightly in partial flexion during the second pull, they will fail to flex adequately during the pull under, and the bar will simply swing forward around the shoulders. This can be corrected in the same manner described previously for locked or bent arms.

Instead of originating during the second pull, this swing forward may be the result of the athlete either failing to adequately pull down with the arms, or orienting the arms incorrectly during the pull under. The athlete will need to ensure that his or her elbows are turned out to the sides (arms internally rotated) properly during the first and second pulls—if they don't begin oriented correctly, it's unlikely they'll become oriented correctly during the third pull. This will help keep the bar and body moving past each other in close proximity—they should be so close the athlete can smell the bar as it passes the face.

This initial pull under the bar should involve the effort to lift the elbows as high as possible and out to the sides before they move back and around the bar in the clean, or turnover and drive up in the snatch. Pulling the elbows back prematurely will also encourage the bar to swing forward as if being curled.

Although not technically the same thing as the bar swinging forward, a related problem is the athlete leaning the torso too far back during the pull under. While the bar may not stray forward from its intended path, the effect is similar because of the excessive space created between the bar and the lifter. This limits the ability of the athlete to be forceful in the initial pull down, and creates the potential for positioning problems during the remainder of the pull under and the receipt of the bar. For example, it encourages forward sliding of the hips and backward sweeping of the feet rather than a squatting motion under the bar, leading to a structurally unsound receiving position; the lifter's base being too far behind the bar to support it overhead in the snatch; or the bar crashing onto the shoulders in the clean.

There are a few possible ways to help correct the problem that work equally well for the snatch and the clean. First is of course checking and correcting the elbow orientation during the first and second pulls. If this fails to help, more involved approaches can be undertaken.

A complex of snatch/clean high-pull + snatch/clean is helpful for both preventing excessive backward lean and encouraging the athlete to focus on pulling the elbows high and to the sides. Muscle snatches and muscle cleans will allow the athlete to focus on the complete turnover movement of the arms with limited distractions, although for this to be effective, these exercises must be performed correctly. In both cases, performing a high-pull immediately prior to the muscle lift will further encourage correct elbow travel prior to the turnover. Finally, tall snatches and tall cleans, and eventually high-hang snatches and cleans, can provide the athlete a chance to focus on this detail, or serve as an initial opportunity to incorporate improved movement from previous drills into a more complete classic lift.

Hitching

Hitching is the momentary pause or reversal of the bar's direction during the transition from first to second pull—that is, the bar is pulled up to approximately the point at which the scoop will occur, then stops or drops slightly, and is then reaccelerated upward. This is illegal in competition and is an ineffective approach to lifting a bar outside of it.

Hitching can be the result of excessive speed in the first pull. If the bar speed is too great, the athlete will have insufficient time to apply adequate force in the second pull—either intentionally or not, the athlete will attempt to slow the bar down during the transition to reduce its momentum and allow more force application, and this deceleration may become a direction reversal if pronounced enough. Another possibility is that an athlete believes he or she can create more force on the bar because when hitching, he or she feels more tension—but this is a misinterpretation, of course, because that increased tension is the result of resisting an opposing force, not generating more in the desired direction.

If the athlete is jerking the bar off the floor or accelerating too quickly during the first pull, this can be corrected by forcing the athlete to complete the first pull to a 3-count or some similar way of consciously slowing down. Ripping the bar from the floor can also be helped by instructing the athlete to separate the bar silently—unless using extremely tight-fitting bumper plates and no change, the weight on the bar will rattle somewhat with a quick separation—a silent separation will have to be a controlled squeeze. This is a drill, not a lifting technique, however, and is accordingly exaggerated. While we do generally want the first pull to ultimately involve a relatively controlled separation and acceleration, it should not be as slow as we are forcing it to be here.

A progression from deadlift to pull to a complex with one or both and the complete lift, focusing on the control of the separation and first pull speed, can help further.

Finally, hitching can be the result of the lifter not applying continuous pressure against the platform with the legs. That is, as the lifter enters the second pull, he or she stops pushing against the floor or reduces the effort to do so because of a focus on the hips. If verbal cues to continue this push are not effective, pulls or high-pulls and complexes of pulls and the classic lift can help.

Under-Pulling

Inadequate extension of the hips and/or orientation of the legs forward of vertical at the top of the second pull will result in the system being imbalanced forward because of the weight of the bar being too far forward of the base and/or misdirection of the bar too vertically or even slightly forward rather than slightly backward. As described above, this can result in the bar swinging forward, the athlete losing the bar in front, or a forward jump to receive the bar. This may also be described as not finishing, or under-pulling. Aside from potential balance problems, this failure to finish extending in the second pull greatly limits possible acceleration of the bar.

Often inadequate extension is simply the product of the athlete not knowing what they should be feeling in the final position. The simplest way to provide a sense of this feeling is, with a bar in the hands, instruct the athlete to keep the knees extended straight, extend the hips slightly beyond neutral, and lean back onto the heels as far as possible without falling over. This will place the shoulders behind the bar and the hips with the hips somewhat hyperextended, imitating the position that should be seen at the top of the second pull. The legs should remain approximately vertical—if they move forward of vertical, the athlete is extending the hips too much.

A similar exercise can be performed by placing a heavily-loaded bar on blocks just below arms' reach in the athlete's tall position. The athlete will lift the bar in either a clean or snatch grip and keep the knees and hips extended; this will force a natural backward lean of some degree, depending on the weight, in order to remain balanced.

It's important that in either drill the athlete keep the body extended in a virtually straight line—leaning the torso back by hyperextending the hips and pushing them forward simply creates a new set of problems.

Snatch and clean deadlifts and pulls can also be used to simply provide an opportunity for the athlete to find the correct extended position—even more effective would be a deadlift + pull complex. In all cases, the athlete should focus on pushing the bar back into the hips or upper thighs. High- and mid-hang snatches and cleans can also encourage more complete extension by forcing the athlete to be more aggressive. However, the problem with pulls and deadlifts is that extension of the hips and layback will nearly always be slightly less than in the actual snatch or clean. This being the case, pulls should be used only to correct significant under-extension.

Finally, a trick that works well to encourage complete extension, as well as correct balance across the feet, is to instruct the athlete to jump quarter-inch backward during the snatch or clean. This works with surprising consistency without any need to explain what's happening or why. The athlete can also be instructed to push the hips through the bar as long as the correct orientation and vertical push of the legs is maintained.

Although it should be clear by this point, for the sake of thoroughness, it will be reiterated here that extending completely in the second pull in no way means prolonging the extended position. The lifter must extend completely and immediately transition under the bar.

Bar Bouncing off Hips

The hips banging into the bar will drive the bar forward and shift the athlete off balance, limit the upward acceleration of the bar, and is indicative of distance between the bar and body prior to the final extension. Such a collision between the hips and bar is the result of either the bar having swung forward previously and returning under a pendulum effect to the hips (think of a bar path that looks like a number 3), or the hips being extended horizontally too far forward.

At the beginning of a correct second pull, the bar is in immediate proximity to the thighs, and collision potential is eliminated. At this point—the bar at approximately mid- to upper-thigh level—the hips and knees are still back and the shoulders above or slightly ahead of the bar. The scoop drives the knees forward under the bar and the extending hips bring the torso upright, causing the bar to move up the thighs. The knees finalize their extension, driving the body and bar up, and the hips will hyperextend slightly to finish the second pull. The key is how the bar and hips move relative to each other—in the correct pull just described, the two move together without separation between the bar and the body, preventing collision, and the hips finalize extension as the knees finalize their extension, meaning the bar is being accelerated upward as the hips move into their farthest forward position. This prevents the bar from banging against the hips and keeps it moving vertically.

Quite often, the bounce off the hips is a result of the athlete focusing on hip extension and forgetting about the legs. As they forcefully extend the hips to complete the second pull, they give up on the legs' drive against the platform, causing them to remain soft and slide too far forward, and bringing the hips forward into the bar as well. These athletes simply need to focus on driving against the floor until the absolute last moment of the second pull and opening the hips behind the legs instead of through the bar.

Another cause is the athlete's weight being too far forward during the first and second pulls. In these cases, the bar begins pulling the athlete forward, and he or she must chase the bar with the hips, often causing this kind of over-reaching. Similarly, it may be a product of the athlete trying to maintain proximity by bringing the hips to the bar rather than bringing the bar to the hips. Technically the hips move forward more to the bar than the bar moves back to the hips, but thinking of the lift in this manner generally encourages reaching with the hips for the bar and allowing it to pull the athlete forward. More effective is attempting to pull the bar back into the hips while ensuring correct balance and correct hip extension.

A good starting drill is a high-hang snatch or clean pull. From the tall position, the athlete will bend at the hips and knees very slightly, bringing the bar only 2-3 inches down the thighs. The focus is on achieving the hyperextension of the hips while continuing to drive down against the ground, preventing the hips from sliding forward of the leg's vertical orientation. Next, we can take the bar down to a mid-thigh starting position and perform the mid-hang snatch or clean pull the athlete used in the initial learning progressions. Finally, we can take the bar down to above the knees and again perform a snatch or clean pull. In each case, the bar should be in immediate proximity to the thighs until it contacts at the proper moment (crease of the hips in the snatch and upper thigh in the clean), and the legs driven aggressively into the floor.

Once these pulls are performed correctly, the athlete can progress to snatching or cleaning first from the high-hang, then mid-hang, and the hang position. Finally, we can create complexes with these drills such as a high-hang snatch pull + hang snatch pull + high-hang snatch + hang snatch.

Finally, lifters should always be actively and forcefully pushing the bar back into the body during the second and third pulls. If this is being done, even an improper collision of the hips and bar in the second pull will not cause the bar to move forward excessively.

Long-Pulling / Pausing in Extension

As has been discussed in the snatch and clean sections, pausing in the extended position at the end of the second pull limits the opportunity for the athlete to pull under the bar and with significant loads will prevent successful lifts. First is ensuring the athlete understands the difference between reaching a position and maintaining it; that is, that the goal is to fully and aggressively extend the body as described in great detail throughout the book, but to retract from that extended position and move under the bar immediately, in essence all as a single action.

Delay in the extended position is often the result of the athlete attempting to complete a shrug at the top of the second pull, or intentionally extending the ankles. More details on this can be found in the Snatch section of the book. The athlete will need to be reminded that any ankle extension needs to be allowed to occur naturally, and that the shrug is not part of the attempt to elevate the bar, but part of the third pull. This can be helped by performing snatch or clean pulls with an emphasis on leg drive, keeping the feet flat, and removing the attempt to shrug actively at the top.

Hesitation at the top may also be caused by the athlete not transitioning the feet from the pulling to the receiving position at the correct time or with enough speed. This creates a situation in which the athlete is in effect "stuck" to the platform while trying to pull under the bar, slowing his or her descent. Interestingly enough, this can be caused by not completing the second pull extension, in particular, not finishing the leg drive. That is, there is not an abrupt and violent enough upward impetus on the bar at the top of the movement to create space and time for the athlete to move under the bar against its own inertia. Corrections for this can be found above.

Otherwise, this may be the result of the athlete continuing to push with the feet against the floor during the transition to the third pull, or simply not picking up the feet enough to allow them to move out into the receiving position. In either case, the basic foot transition drill from the beginning of the book can be used to drill speed and movement. Additionally, tall snatches or tall cleans will help force the athlete to move the feet more aggressively during the pull under, as well as to better time the two—again, the idea with the tall snatch or tall clean is to make an effort to move the feet first (although this will usually cause the feet to begin moving at the same time as the pull under, which is the idea). After this, high-hang snatches or cleans can add the new foot movement into a lift that includes the change of direction at the top, but limits distractions prior. This can be extended to 2- or 3-position lifts as appropriate.

Snatches and cleans from high hang or block positions will also encourage more rapid extension and transition under the bar, as well as help actually develop speed physically. Strengthening the arms for the initial pull under the bar with high-pulls may also help.

Finally, dragging the bar up the thighs during the second pull may delay the transition at the top of the lift. This slows the movement generally, but it also eliminates the phenomenon of an abrupt contact of the bar and body as the hips extend forcefully. This sensation of contact at the hips (or upper thigh in the clean) is a cue to the body to retract from the extension and begin moving under the bar. As described previously in the book, ideally the bar remains in immediate proximity to the body without actually touching until this final contact occurs.

Slow Second Pull

While not exactly a technical error, a slow second pull can be corrected fairly well—at least within the abilities of the given athlete. The first priority, of course, is to ensure the athlete's positioning upon entering the second pull is correct—if not, it's unreasonable to expect the quickest possible second pull. It's important the athlete enters the start of the second pull with the hamstrings tight from the knees being back and the shoulders at least slightly forward of the bar and the bar high on the thighs. As mentioned with regard to the problem of a prolonged extension, allowing the bar to drag up the thighs can slow the second pull.

If positioning is correct, a slow second pull may be a problem of limited speed ability of the athlete, insufficient effort, or timing errors. Obviously there is nothing dramatic that can be done with regard to the first problem. The capacity for speed is ultimately limited by genetic factors—we cannot change the relative density of fast-twitch fibers in an athlete's muscles and certain neurological factors. However, we can help the athlete develop as much speed and power as is allowable by his or her genetic makeup.

Performing the Olympic lifts in general will help an athlete improve the ability to generate force rapidly, assuming of course the lifts are being executed reasonably well. Further improvements can be made with classic lift variations that force more aggressive extension and/or more rapid rates of force development—these would be lifts from the hang or blocks, and power variations. Additionally, plyometric exercises can contribute to lift-specific focus. Box jumps, depth drops and depth jumps are the exercises that offer the most potential value for lifters. Combining jumps with lifts can also be an effective approach at times—a vertical jump immediately prior to a lift, or a short series of jumps immediately following a lift, including squats, can improve force development rates. Finally, simply emphasizing speed with every lift is arguably the best way to improve speed.

The more technically proficient a lifter is, the more focus can be directed to actually creating power during a given lift. This will naturally over time allow a lifter to become faster.

Occasionally a slow or delayed transition into the third pull is misinterpreted as a slow second pull. Be sure to properly identify the source of the problem before planning corrective efforts.

Slow Third Pull

As has been stressed repeatedly throughout the book, the third pull of both the snatch and clean requires the same speed and aggressiveness as the second pull—no amount of second pull acceleration will compensate adequately for a lack of third pull speed and precision with heavy weights. If a slow third pull is due to a conceptual shortcoming, the athlete can be instructed on correctly performing the pull under the bar with the arms immediately, rather than attempting to shrug and pull as separate actions. This alone can often make a dramatic difference.

The mechanics of the third pull will affect its speed considerably. The close the barbell and body remain to each other, the quicker the movement will be. This proximity needs to be reinforced through internal rotation of the arms during the pull, the active attempt to the pull the elbows up and out as the athlete moves down under the bar, and the active push of the bar back into the body.

There are a number of ways to improve the power of the third pull, and which is used will depend on what exactly the problem is. If the problem is a slow or weak initial pull under, snatch or clean high-pulls can help improve the athlete's strength and position in this phase. If the problem is the actual turnover, tall snatches or cleans, muscle snatches or cleans, high- and mid-hang snatches or cleans, and snatches or cleans from the blocks, can be helpful. Lifts from the hang or blocks will also improve overall speed, rate of force development and aggressiveness. Finally, if the finish of the third pull of the snatch is slow and weak, snatch balances will be helpful.

Jumping Forward

Jumping forward in order to receive a snatch or clean is really a symptom of a number of possible errors, all of which have shifted the balance of the system too far forward over the feet, or have sent the bar forward of its intended path. These possible causes include leading with the hips or starting with the hips too high; swinging the bar forward in either the first, second or third pull; incomplete extension in the second pull; early scooping; an incomplete or slow third pull; and simply beginning the lift with the weight too far forward on the feet.

The correction is of course resolving the underlying cause, corrections for which have been discussed previously. However, occasionally an indirect but simpler approach does work. Just as with inadequate extension, instructing the athlete to jump a quarter-inch backward will often lead to the necessary corrections and result in the athlete remaining in place rather than jumping forward or even backward.

Another option, used commonly by Mike Burgener, is having the athlete start the lift with his or her toes up to a chalk line or similar and instructing him or her to not allow the feet to cross the line; this will often lead to the athlete naturally correcting the imbalance leading to the forward jump. If not, it can be used in combination with further instruction and drills addressing the cause directly. Additionally, such a line will allow the coach to easily check the ending position of the feet after the lift, freeing him or her to observe other parts of the lift to determine the cause.

Jumping or Donkey Kick

The donkey kick or jump is a particularly frustrating error to correct, in part because it tends to be a difficult habit to break, but in greater part because the original cause is too often poor lift instruction. Many athletes have been taught to jump the feet up off the platform and stomp them back down, or have misinterpreted instruction to create noise with the replacement of the feet on the platform as a need to elevate the feet excessively. This may look like a direct vertical elevation of the feet, or may involve a backward kick of the feet before their replacement on the platform (the donkey kick).

The first priority here is re-education. The feet should be elevated only enough to move them laterally into the receiving position—any elevation beyond this is excessive and potentially problematic. If a lifter understands this and the habit is not yet ingrained, this may be enough to fix the problem. Unfortunately, this is rare.

There are a few drills that can discourage this kind of misguided foot movement. First, of course, is the basic foot transition drill use in the beginning of the book, with a focus on speed and replacing the feet flat on the floor rather than leading with the balls of the feet.

For the snatch, the snatch balance is very helpful in encouraging quick and aggressive foot movement without excessive elevation simply because it removes the opportunity for it. Tall snatches and tall cleans will also force more rapid foot transitions and limit the opportunity for kicking the feet back or lifting them excessively. A progression from these drills to high-hang snatches or cleans can help introduce newly developed footwork to the complete lift.

Any elevation of the feet during the transition under the bar should be achieved by lifting the thighs with the hip flexors rather than lifting the feet with the hamstrings. Understanding this will help prevent the feet from being lifted backward rather than up. The cue to drive the heels forward into the floor during the pull under may also help.

Finally, performing the snatch or clean while keeping the feet on the floor can help. This is a somewhat tricky option because of the potential it has to create other problems such as incomplete extension. However, with proper instruction and coaching, it can be very effective. The athlete will simply attempt to keep the feet flat against the floor throughout the lift; the heels may rise slightly despite this effort, but this is acceptable in most cases as long as the rest of the movement is performed properly. Ultimately, the feet can again be allowed to move from the platform naturally as long as the athlete doesn't return to the former habit of excessive elevation or donkey kicking.

Backward Foot Sweep

Backward sweeping of the feet during the pull under relocates the athlete's base too far behind the bar and body, and as weights increase, will prevent the athlete from creating the structure necessary to support the bar, particularly in the snatch.

This error is overwhelmingly a reactionary movement rather than anything having directly to do with the feet. It is most often caused by the lifter leaning too far backward during the second and/or third pull or having the weight too far back over the feet, which will naturally cause the feet to move backward as the lifter moves under the bar in an effort to place the base under the body; however, this adjustment is often an overcompensation, placing the feet too far back.

Corrections for the problem need to focus on the source, e.g. improper balance over the feet during the pull or improper third pull mechanics. Corrections for these possible sources have been discussed previously.

SNATCH ERRORS

Missing in Front

The overwhelming majority of unsuccessful snatch attempts will be missed in front of the lifter with numerous possible causes—assuming here the weight is not simply more than the athlete can snatch. When trying to diagnose the source of the problem, we always start at the beginning and work forward. A common cause of such a miss is the athlete's weight simply being too far forward from the very beginning of the lift, either due to a problem with the starting position, or a failure to shift back as the bar separates. Corrections for this are discussed in the General Errors chapter.

Other possible causes include the hips banging into the bar at the end of the second pull and forcing it forward; poor third pull mechanics that allow the bar to travel too far forward; a slow third pull that prevents the movement of the bar into position overhead to be completed; or a third pull finished too early, i.e. with the bar too far forward. Corrections for all of these possible causes have been discussed in the General Errors chapter.

Another common error is diving the chest through the arms during the turnover of the bar. Rather than completing the turnover with the arms and squatting under the bar, the athlete attempts to reach the body forward under the bar, usually in response to not elevating the bar high enough, or cutting the second pull short in an attempt to rush underneath it. Diving the chest forward is also a typical reaction to swinging the bar out and then back. Muscle snatches, tall snatches, high-hang snatches, snatch balances and overhead squats can all help, as well as simply cuing the athlete to squat under with the chest up and force the elbows out to the sides (along with ensuring the arms are fully internally rotated during the start and pull).

The athlete may be exaggerating the head and torso position when the bar is overhead; that is, he or she may be pushing the head too far forward, which will encourage the torso to lean farther forward, as the body tends to follow the head, and this can reach a degree that drives the weight too far forward of the base to remain supported. The overhead position can be evaluated during overhead squats and snatch balances initially and corrected there if necessary. Losses in front can also be caused by the athlete dropping the eyes to the floor, or keeping them there throughout the lift; keeping the eyes approximately straight ahead will help with balance.

Finally, something that tends to go overlooked to a large degree is the turnover of the wrists and the hand position overhead. This correct turnover and position was discussed in detail in the Snatch chapters. Often athletes will not release the hook grip, either because they haven't been instructed to or are having difficulty doing so, and this will prevent the wrist from extending and the hand relaxing properly. This means the bar will come to rest directly above the wrist rather than very slightly behind it and consequently be unstable fore and aft. Practice with the correct hand and wrist position during overhead squats, snatch balances and snatch push presses will help familiarize the athlete with the goal for the hands. Muscle snatches will allow the athlete slightly more time and reduce distractions for focusing on flipping the hands over and releasing the hook grip during the turnover. It will help to think of flipping the hand back and driving the heel of the palm up in front of the bar.

Missing Behind

Considerably less common than misses in front will be those behind the lifter. Just as with misses in front, misses behind are most directly the result of the bar being received outside of the narrow range of positioning in which it can be supported overhead; the causes for this, however, can range considerably.

Over-rotation of the bar during the third pull is an issue of incorrectly timing the transition between external rotation and the upward drive of the arms and shoulders. Just like under-rotation, this can be corrected through the use of muscle snatches and tall snatches to develop better timing and positioning, and overhead squats and snatch balances to develop strength, confidence and consistency with the overhead position. Snatch balances in particular will instill the feeling of driving up into the bar in the correct position rather than swinging it back into place.

Over-rotation can also be the final stage of a forward swing of the bar during the second and/or third pulls. Such a stiff-arm swing is often accompanied by excessive backward leaning of the torso—these two elements combine to create somewhat of a catapult, throwing the bar backward and the athlete forward, preventing a correctly timed drive up against the bar and a stable receiving position. Corrections for swinging can be found the General Errors chapter.

Another possible cause of misses behind is an attempt by the athlete to dive under the bar. This is often done after an inadequate extension in the second pull as an attempt to save the lift. Instead of squatting under the bar, the athlete leads with the head and chest down, driving too far forward under the bar and ending in a position in which the arms are inclined backward too greatly to support the weight, even if the bar is actually within range to be balanced over the feet.

Finally, if the athlete pushes the head and chest too far forward in the receiving position, in order to maintain balance, the bar will have to be rotated farther back—often such compensatory movement of the bar places it too far back for the athlete to support it. The overhead position has been described in great detail previously—returning to this basic instruction to reinforce the positioning of the torso, head, shoulders and arms will help.

Soft Elbows or Pressout

In order to be passable, a snatch must be received with the elbows fully locked out, and that lockout must be maintained until the athlete is standing again with the weight under control overhead. There are two possible scenarios in this category: receiving the weight with bent elbows and pressing it out, or receiving with the elbows locked out and allowing them to bend subsequently, possibly with a re-extension.

Receiving with the elbows bent most often indicates that the bar hasn't been elevated enough or the athlete hasn't moved under the bar enough—these two issues have been addressed in the General Errors chapter.

In the case of adequate bar height, another possibility is simply a failure to finalize the turnover with a punch up against the bar. This can be corrected with snatch balances, muscle snatches and tall snatches, each working on finishing with an aggressive upward drive. Complexes involving these three exercises along with the snatch will also be helpful. Similarly, if the timing of the push up against the bar is late, the effect will be the same. Athletes need to be more aggressive in finalizing the turnover with a vertical push: the cue to punch up against the bar at the same time the feet reconnect with the platform can help. Corrections for a slow or weak third pull as discussed in the General Errors chapter will also help.

Pressouts can also be caused by the athlete tightening the legs up too much too soon as he or she receives the bar—this prevents the athlete from settling in under the bar enough to achieve the final lockout. Snatch balances and tall snatches can usually help if the athlete focuses on receiving above bottom and riding the bar smoothly down.

Finally, this is often the result of the bar finishing too far forward rather than back in the slot. The athlete can practice finishing the turnover in a better position with muscle snatches and tall snatches. Overhead squats, snatch push presses, and snatch balances will help ingrain the correct overhead position if this is a contributing problem.

In the case of the elbows bending after an initial lockout, the cause may be inadequate overhead strength, poor timing or a failure to actively drive the bar up as it's received (The latter often appears to be a failure to receive with locked elbows. The difference is the initial height—in this case, the arms are able to extend fully under the bar, but are not kept extended as the bar settles).

Strength can be developed with snatch push presses, overhead squats and snatch balances. Snatch balances will also help develop timing and a quick, active receipt of the bar. Timing of the drive up following the rotation back can be improved with muscle snatches and tall snatches. Of course, complexes can be created with these exercises to address multiple elements or to more thoroughly correct a single element. Common complexes are muscle snatch + overhead squat, push press + overhead squat, power or muscle snatch + snatch balance, and snatch balance + overhead squat.

Dropping Bar During Recovery

One of the most frustrating ways to miss a snatch is during the recovery after a seemingly good lift. This can be caused by an unrecognized imbalance during the lift; that is despite the lift looking good, the bar or lifter was actually out of balance. These instances aside, this problem can come from either a rush to recover or improper mechanics during recovery.

Often a lifter rushing to stand after a snatch will mean the system is not balanced enough to maintain control of the bar during the return to standing. The solution to this is simply to have the lifter hold each snatch in the bottom position for 2-3 seconds before standing. This will also expose other problems that may exist.

If the lifter is in balance when receiving the lift but still loses it during the recovery, it's most likely due to him or her leading with the hips when rising from the squat. This will push the chest forward, and either push the bar forward or force a compensation of the bar moving backward, often to a point beyond which it can be controlled. The athlete should stand from the snatch by pushing up against the bar and following it with the body; this will encourage the lifter to lead with the bar and the chest and maintain not only the upright posture necessary for a stable structure, but also will help maintain focus on stabilizing the bar overhead.

the grip should be maintained until the forearms are coming around under the bar and the bar is at the shoulders—at this point the bar will be connecting with the shoulders and the lifter is no longer pulling against it.

With technique training and warm-up weights, athletes very often over-pull the clean—that is, they put an inappropriately great amount of force into the acceleration of the bar. The athlete needs to pull each lift according to how much weight is on the bar—40 kg requires less effort than 140 kg. In either case, however, the turnover itself needs to be accurate and quick. The difference is how much force is used to elevate the bar, and how high the bar is ultimately elevated before it is racked. With all cleans, the athlete should practice turning over the bar as quickly as possible and racking it as high as possible, and then riding it down to the bottom. This will ensure that no matter the height of the bar, its delivery to the shoulders will be smooth.

Bar Bouncing or Slipping out of Rack

Occasionally athletes will find the bar bouncing or slipping out of the rack upon receipt of the clean. Although the bar crashing down onto the shoulders can exacerbate the problem, the underlying cause is poor positioning or inadequate effort. If the position of the torso, shoulders and elbows is correct, the rack will be able to withstand a crashing bar to a surprising extent.

The bar bouncing or slipping forward out of the rack indicates that the torso is leaning too far forward, the shoulders are not pushed forward far enough under the bar to support it, the elbows are not high enough, the grip is too tight, the athlete is giving up on the lift, or a combination of more than one of these things. This problem will be most prevalent in athletes possessed of poor flexibility because of its prevention of proper positioning at the bottom of the clean. It may also be due to an inability of the athlete to maintain upper back extension under the load, which is addressed in the following section.

If the issue is one of flexibility, stretching will be necessary to improve the athlete's receiving position. If instead the problem is technical, the drills for a crashing bar and for poor turnover should be employed to improve the delivery of the bar to the rack. More work on front squats—both with pauses at the bottom to reinforce flexibility and positioning, and with rapid transitions out of the bottom—can also help. Finally, the athlete should ensure that he or she is actively driving the elbows up as he or she recovers from the bottom—this will help improve positioning of the elbows and upper back.

While we want to encourage an immediate recovery from the clean in order to harness the power of the bounce, sometimes early in a lifter's career, this attempt to recover quickly will actually become a rush out of the bottom without adequate stability and bar security. In these cases, the athlete can be instructed to pause in the bottom of the clean, recovering after a 2-count or similar, or waiting to stand when the coach instructs. Many times this will instantly resolve the problem, and after some time cleaning in this manner, the athlete can return to catching the bounce with the newfound understanding of the need to secure the bar.

Back Collapsing

With the receipt of heavy loads in the clean, athletes will often find their upper backs rounding forward and/or their lower backs rounding under. If not leading to a missed lift, this will result in unnecessarily difficult recoveries and exposes the athlete to potential flexion injuries of the back. Any flexion of the upper back lengthens the moment arm between the bar and the hips and consequently increases the tendency for the athlete to lean forward as well.

There are three components of this problem: technique, strength and activation, and often all three are present to some degree. An athlete with relatively weak back extensor musculature will find it difficult

CLEAN ERRORS

Bar Swinging Forward

After premature bending of the arms, the bar swinging forward during the pull under is likely the most common error in the clean. With the strength of the narrow grip, the ability and therefore the tendency for athletes to curl the bar is relatively great. Additionally, the heavier weights in the clean will tend to erode confidence and cause the athlete to abandon technique and attempt to muscle the bar up.

If caused by a lack of confidence, this problem will take time to correct—the athlete will need more experience to trust that his or her legs will elevate the bar not only adequately, but more than the arms ever can.

Otherwise, this problem is most likely due to incorrect elbow orientation and movement. If the arms are not internally rotated during the pull, the elbows will most naturally travel back right away, encouraging the hands to swing forward as the arms bend. To correct this problem, the athlete can return to early learning drills such as the muscle clean, emphasizing orientation of the elbows to the sides as the bar is pulled to the rack position. Clean high pulls may be used, again with emphasis on elbow movement high and to the sides, but caution should be used as this exercise can encourage novice lifters to incorrectly pull the bar up with their arms in the clean. A clean high-pull + muscle clean + clean, or clean high-pull + clean, complex can work well, particularly from the hang to further focus on the problem section. Of course, the athlete should be always making the effort to push the bar back into the body to maintain proximity.

Slow or Incomplete Turnover

The clean is largely dependent on the power of the third pull—because the greater weight can be elevated only a limited distance, the speed of the athlete under the bar is critical. The importance of this speed is paralleled by the importance of the security of the bar's placement in the rack position—these two elements are connected by the timing and precision of the elbows' turnover.

The position of the elbows and shoulders and the consequent integrity of the rack position is most important at the bottom of the clean—this is the point at which the bar will be in possession of the most momentum and the torso likely inclined forward slightly. If the elbows fail to turn over fast enough, the rack position at the point of receipt will be suboptimal; if they fail to turn over completely, the bar will likely be supported largely by the arms and, if not dropped, pull the lifter forward and increase the difficulty of the recovery.

Often a slow or incomplete turnover is the result of the athlete maintaining a tight grip on the bar for too long. The grip should be maintained until the forearms are approximately vertical, at which time the bar will be at the level of the upper chest or shoulders, and ideally in contact, and the grip can be loosened while the elbows continue to spin around the bar rapidly. A tight grip will limit the ability of the elbows to pivot around as necessary, even with excellent flexibility. However, it's important the grip not be loosened prematurely or the pull under will be weakened and the bar will be more likely to crash onto the athlete's shoulders.

The rack delivery drill used in the initial clean learning progression is an excellent exercise for improving the athlete's elbow speed and consistency with the final rack position, as well as timing of the grip release. The bar is lifted as high as possible with the elbows high and to the sides—approximately lower chest level—and the elbows rapidly spun around to deliver the bar smoothly to the shoulders. This will allow the athlete to focus entirely on positioning and timing of the turnover.

Once this drill is performed satisfactorily, the athlete can progress to a tall muscle clean, starting with the bar at arms' length, lifting it to the scarecrow position and racking it quickly—this can gradually become a hang muscle clean, adding leg and hip extension to the movement. Next, the tall clean will incorporate the actual pull under the bar and allow practice of the timing. Finally, a complex with a clean will help the athlete integrate the improved technique into the lift—for example, scarecrow rack delivery + muscle clean + tall clean + clean.

If technique with all of these drills appears sound, but with cleans fails to be demonstrated, it may simply be the result of the athlete not focusing adequately on this element of the lift. Reminders at the beginning of the clean to move the elbows quickly, or a quick yell for *elbows up* as the athlete receives the bar, may help.

Consideration of the earlier phases of the lifts is wise as well. If an athlete is not accelerating the bar adequately during the second pull, no amount of speed in the third pull will matter, and this needs to be addressed. Likewise, if the bar is pulling the athlete forward, a slow or incomplete turnover may actually a symptom of this rather than the problem itself.

Limited wrist and shoulder flexibility can greatly slow down the turnover and make settling into the rack position difficult. Stretching specifics are covered in the Flexibility section of the book.

Finally, the athlete must ensure that the initial change of direction and pull under with the arms is being performed immediately and powerfully. If the pull under is being initiated with an isolated shrug followed by a pull with the arms, or if it is simply not aggressive enough, the turnover will suffer because of the inadequate downward speed of the lifter.

Bar Crashing onto Shoulders

A smooth delivery of the bar to the shoulders is critical for successful cleans—failure to meet the bar well results in the load crashing onto the athlete, dramatically increasing the difficulty of maintaining torso positioning and back extension, as well as reducing the ability of the lifter to time the bounce out of the bottom of the squat.

Any crashing of the bar onto the shoulders is the result of the bar and body not being brought together correctly or losing their connection prior to this point. This is most often a product of the athlete dropping out from under the bar rather than pulling the shoulders to it. As was described in the Clean section of the book, the turnover must involve not simply a pull down, but a very targeted pull down under the bar, wherever it may be. If the bar has been pulled high, the athlete needs to be there to meet it, just as if the bar is elevated less, the athlete needs to get under it. The basic correction for this is direct work on the technique of the turnover in order to ensure the athlete is pulling the bar back into the shoulders and the shoulders into the bar before the elbows whip around, rather than simply throwing the bar up and dropping down underneath it. As the bar reaches the shoulders, they should be driven up into the bar and the chest lifted to meet the bar tightly.

Loosening the grip on the bar too early during the turnover can cause the lifter to lose the tight connection with the bar that is necessary for a smooth delivery to the shoulders. As mentioned previously, to support weights that he or she can move with the legs. Back training such as stiff-legged deadlifts, good mornings and weighted back extensions will help bring the strength of the back up to where it needs to be.

Even if the strength of these muscles appears to be present as demonstrated by performance in exercises like those listed above, this strength is only useful if it can be activated correctly. An effort to lift the chest and drive the shoulders up into the bar as it's received can help strengthen the receiving position with correct timing; further, the effort to drive the elbows up during the receipt and recovery will encourage maintained upper back extension, which encourages lower back extension.

Often collapsing is the result of something as simple as the athlete releasing some of his or her air at the bottom of the clean. This jarring movement can force air out if the lifter is not actively fighting to hold it.

The technique component of the problem has to do with the delivery of the bar to the rack position, the rack position itself, or the athlete's weight distribution upon receipt of the bar. If the athlete's weight is forward on the feet, or the bar is pulling the athlete forward, it will be more difficult for the athlete to resist the tendency to curl or hinge forward under its weight. Reasons and corrections for this forward imbalance can be found in the General Errors chapter.

The bar crashing onto the athlete's shoulders may also be enough to force flexion of the upper back, which can increase the moment on the hip enough to cause the athlete to lean forward at the hips, often enough to cause a dropped bar. However, strong athletes who receive the barbell deep enough on the shoulders should be able to withstand a reasonable degree of crashing because of the integrity of the structure.

More likely a cause than crashing is misplacement of the bar in the rack or a poor rack position. If the bar is delivered too far forward on the shoulders, or is supported by the hands and arms, the moment on the back and hip may be great enough to fold the athlete forward under the load.

The athlete having his or her weight too far back during the pull can also lead to this problem. This will cause the lifter to sit the hips too far back in the squat as he or she receives the bar to try to remain balanced under a bar that is moving behind the base, and this has the same effect on the trunk as the bar being too far forward: the torso leans forward and the structure is weakened.

In any case of technical causes, improvement of the athlete's rack delivery is in order. Corrections for turnover problems have been discussed previously, and the rack position itself has been discussed in great detail in the Clean section of the book.

Getting Stuck at the Bottom

As was discussed in detail in the Clean section, speed is critical to the success of the clean recovery. Athletes unable to catch the bounce in the bottom of the clean will often fail to recover, or expend far more energy than necessary, and produce enough fatigue in the legs (or mind) to prevent a successful jerk.

The most common reason for an athlete getting stuck at the bottom of a clean is an imbalanced receipt, most likely with the weight too far forward on the feet. Such an imbalance requires the athlete to compensate and stabilize, preventing an immediate recovery from the squat. Corrections for this can be found in the General Errors chapter.

Another possible cause is the athlete receiving the bar too low—without at least a small eccentric movement to load the bounce, the transition out of the bottom will be difficult. Most often, this isn't a product of not elevating the bar adequately, but of a slow pull under and turnover of the elbows. Corrections for a slow turnover are described above.

Finally, the athlete may not be tightening the receiving position enough—any relaxation will slow the transition out of the bottom and reduce the stretch reflex component of the bounce effect. The athlete needs to actively resist the downward force of the bar as it's received. Additionally, the trunk collapsing as described previously will prevent a proper bounce.

Front squats should be nearly always performed with a bounce out of the bottom to train the timing and power, as should cleans. One and a quarter squats may be helpful as well—the athlete will squat fully, recover to just above parallel, then return to the bottom before recovering fully. This will strengthen the bottom portion of the lift, as well as improve timing and accustom the athlete to transitioning from a short eccentric movement as will be done with the clean. Pause squats can also be used at times to force a drive out of the bottom from a dead stop.

Dizziness During Recovery

Dizziness or lightheadedness during the recovery of the clean can result from either pressure on the carotid arteries or the combination of holding the breath under exertion. The latter creates vagal stimulation and reduces heart rate and blood pressure, sometimes enough to create dizziness.

The solution, as was described in the Breathing chapter, is to release a small amount of air with noise during the recovery. The goal is to release only as much as is necessary to relieve the dizziness in order to maintain as much stability of the torso as possible. Making noise will help ensure that the athlete does not release so much air that the stability of the trunk is reduced.

Pressure on the carotids can shut off blood flow to the brain quickly and completely enough to cause blackouts in only a few seconds. This pressure can be relieved by ensuring the shoulders are not only pushed forward but also slightly elevated in the rack position, and that the neck is pulled back as much as possible.

Athletes should immediately bail out of a lift if dizziness or tunnel vision begins—blacking out under a clean or jerk is dangerous and the likelihood of reversing the process enough to complete the lift is extremely small.

JERK ERRORS

Forward Lean or Collapse During Dip

Possibly the most common problem with the jerk is the tendency for the athlete to lean the torso forward or allow the upper back to round forward during the dip. Most athletes will be accustomed to initiating movement with the hips instead of the knees and find the quad-dominant dip movement and position thoroughly awkward. This is something that will usually require time and experience to overcome.

If we imagine a vertical line drawn through the bar, hip and ankle from the athlete's side as he or she stands erect, this is the plane in which these points should remain throughout the dip and drive of the jerk. That is, the hips and bar simply move down and back up in a completely vertical path—only the knees break the plane by bending forward. The dip of the jerk can be practiced inside a power rack with the bar as close to the uprights as possible to force the lifter to move it in a straight vertical line (most squat racks can be raised high enough to use their uprights for this drill as well). This exercise can be loaded fairly heavily to add position strengthening to the skill practice.

The rack position of the bar for the jerk will also influence the athlete's position and movement. The farther forward the bar is on the shoulders, the longer the moment arm on the spine and hip, and consequently the greater the tendency for the weight to pull the torso forward. For this reason, the athlete should be sure to place the bar as far back into the throat as possible and securely on the shoulders. Along these same lines, if the athlete doesn't have the bar properly racked on the shoulders and is instead supporting it in the hands and arms, it will produce this same tendency to collapse forward.

Occasionally an athlete will begin with a solid rack position, but as they're dipping drop the elbows, allow the shoulders to slide back and grip the bar tightly in premature preparation for driving the bar with the arms. This will cause the bar to slide forward and down, pulling the lifter forward and usually softening the upper back, among other problems. The lifter needs to maintain the jerk rack position for the duration of the dip and drive, and only bring the arms into play as the bar is leaving the shoulders. This is often best encouraged by intentionally keeping the hands open slightly during the dip and drive, preventing an early tightening of the grip on the bar.

Another common cause of this problem is inadequate pressurization of the torso. Again, the bar's placement forward of the spine creates a moment on the joints and a tendency to drop forward. Because the only rigid support structure in the torso is behind the bar, we need to create support underneath it as well. This is done by pressurizing the torso with air to minimize its compressibility under load as described in the Breathing chapter of the book. The breath should be taken and held for a moment before the initiation of the dip to ensure the body has settled and is stable—often athletes will attempt to inhale as they dip, which produces very inconsistent results.

The speed of the dip can also cause the downward force of the bar to exceed what the athlete can support securely. The dip should be initiated slowly enough to prevent any separation between the bar and the body, and never reach a speed greater than what allows the athlete to maintain posture during the transition and return up. This control of dip speed can be improved by tightening the quads and making sure the knees are not locked prior to initiating the movement.

If torso or leg strength appears to be at the root of the problem, a number of exercises can help. Jerk dip squats and jerk rack supports in particular will help strengthen the torso and the upright posture of the dip and drive, as well as provide practice for more accurate positioning and movement.

Jerk dip squats can be combined in a complex with jerks as well; for example, 2-3 jerk dip squats + 1 jerk. Pause jerks can also help consistency of the dip position (the lifter will pause at the bottom of the dip for 2-3 seconds), although it's usually a good idea to follow any pause jerks with regular jerks to avoid creating a habit of pausing in the bottom of the dip.

Forward Slide at Bottom of Dip

Occasionally athletes who perform an initially correct vertical dip will find their knees and hips sliding forward at the bottom right before the transition to the drive. Most often this is a result of the dip being too deep and the athlete surpassing the point of reasonable mechanics. In these cases, the athlete should revise his or her dip depth.

In other cases, the athlete may be allowing the lower back to flex and the pelvis to roll under as he or she dips, weakening the posture and increasing the already difficult job of the legs to keep the body aligned. This is generally a result of the athlete attempting to maintain a vertical hip path and overcompensating. It should be made clear that the spine and pelvis remain in their neutral positions throughout the movement.

This problem may also be the result of the athlete allowing the knees to bend straight forward or even collapse in toward the midline while dipping. Just as in the squat, the knees should remain in line with the feet during the dip and drive of the jerk—the athlete will need to focus on pushing the knees out during the dip, helped by slowing the dip, at least initially. As mentioned previously, tightening the quads prior to initiating any movement will also help. For longer legged athletes in particular, a somewhat wider stance may help as well.

Finally, this forward slide may be a product of the athlete shifting his or her weight too far forward on the feet. Even when the heels are elevated, as they will be at the end of the drive extension, the athlete's center of mass needs to remain over the heels. Athletes will often visibly rock forward as they begin the dip of the jerk. To help correct this, the athlete should take a moment after pressurizing the torso to settle back onto the heels as much as possible prior to initiating the jerk.

Interestingly enough, attempting to keep the weight too far back can cause the same problem. If an athlete leans the torso too far back in an attempt to keep the weight over the heels, it may cause the hips to shift forward as he or she dips, pushing the knees forward with them.

Jerk dip squats can help reinforce correct position and movement, as well as improve the strength of both. Pause jerks will also be helpful.

Separation of Bar and Shoulders on Dip

As was discussed in the Jerk section, it's important the athlete avoid separation between the bar and shoulders during the dip of the jerk—such separation can both limit the potential acceleration of the bar as well as disrupt the delicate positioning required for a successful lift.

The initiation of the dip can be considered in a similar fashion to the initiation of the pull off the platform in the snatch or clean. A good dip requires a smooth acceleration from the top instead of an abrupt drop. This can be practiced with jerk dip squats and cued during jerk attempts.

The lifter needs to ensure tension in the quads prior to initiating the jerk. Occasionally the athlete will be supporting the weight with a relatively relaxed lockout of the knees. This will create slack in the system, leading to a brief moment of unsupported dropping as the dip is initiated before the quads tighten enough to catch up. By ensuring quad tension prior to unlocking the knees, the transition to movement will be much smoother and more controlled.

Additionally, this separation may be the result of an incorrect rack position. If the bar is not settled in securely on the shoulders and instead is heavy in the hands and arms, separation is likely, in addition to slipping. In the rack position, the hands should be opened slightly to prevent tightening of the grip—this will keep the bar settled in tightly to the shoulders, and keep it in contact as the body moves down.

Pushing Bar Forward

Likely the most common reason for missed jerks is a forward bar path instead of a vertical one. Most often this forward drive on the bar is the result of a forward shifting of weight during the dip and/or drive. Corrections for this are described above.

If the forward drive is a product of the arms directly, it's often due to a fear of the bar hitting the chin or incorrect pressing mechanics. In these cases, practicing the press and emphasizing a direct path with the necessary backward head movement can help create or restore confidence. Following the press the athlete can progress to push pressing and eventually back to jerking. A press + push press + jerk complex may also be beneficial.

The lifter should be sure the elbows are at least somewhat in front of the bar in the rack position rather than directly below. This will help ensure the bar moves back into place rather than forward. A cue that can be helpful is to tell the athlete to push the bar in the direction the forearms are pointing—that is, on a slight backward diagonal. Additionally, athletes may find they need to widen their grips in order to move the bar back properly; narrower grips limit overhead flexibility and can result in a forward position.

To help the athlete both feel the proper position and balance of the bar and body underneath it as well as create some strength, the split push press behind the neck can be helpful. With the bar racked like a back squat, the lifter will step into a full split position. From here, he or she will dip and drive straight down and up, then punch up against the bar to lock it out as the hips return back down into the split position.

Pushing Body Backward

Similar in effect to pushing the bar forward is the athlete pushing him- or herself backward from the bar during the drive under. This is generally less of a technical error than the result of a lack of confidence and commitment to getting under the bar.

However, it can also be the result of incorrect balance in the dip and drive, or incorrect splitting. An athlete may be able to shift the weight too far back over the feet during the dip and drive, directing the body backward, but not bringing the bar back with him or her. More likely is a problem with the movement into the split receiving position. Too much focus on reaching the rear foot back can pull the hips back as well, bringing the structure needed to support the bar too far behind it. Similarly, or as part of the rear foot problem, if the front foot is not reached far enough forward and hits before the rear foot, the tightening of the leg as it reconnects with the platform can push the athlete backward.

For problems with the split, jerks behind the neck and jerk balances can be effective. Jerks behind the neck tend to encourage better balance and keep the hips under the bar, providing an opportunity for the athlete to experience what a proper split should feel like. Jerk balances will help encourage the effort to keep weight on the back foot and drive the hips forward under the bar during the split. After these, tall jerks will allow the athlete to incorporate the corrected movements into a jerk from the front before moving to a complete split jerk. A complex like jerk balance + split jerk will also be helpful.

Short-Stepping

Short-stepping—failing to place the lead foot far enough forward in the split—can have a number of causes such as simply not reaching the foot forward far enough, not lifting the foot high enough, an incomplete drive and premature descent under the bar, forward weight balance, and excessive backward reach with the rear foot.

In the case of an athlete who simply appears to fail to reach the lead foot far enough forward, the basic split foot transition drill before jerks can help, as can tall jerks and jerk balances.

If the athlete is trying to reach the lead foot far enough forward, but fails to lift it adequately, the drive down under the bar will force the foot to re-contact the platform before it can reach its intended position. This will usually be accompanied by the lead foot reconnecting before the back foot. The basic correction is simply a conscious effort to lift the lead foot and push the heel forward, and to place more weight on the rear foot in the split.

Another common problem that will begin surfacing as jerk weights increase is a rush to get under the bar, just as is often seen the snatch or clean. As weights approach maximal for an athlete, he or she often becomes pre-occupied with getting under the bar, and fails to finish the upward drive against it with the legs. This of course limits the bar's elevation and the opportunity to get under it. A complex of push press and/or power jerk + split jerk can help encourage a more complete and aggressive drive with the legs. Additionally, cues to the athlete to finish the leg drive can help.

As was mentioned previously, an excessively long reach back with the rear foot can pull the hips backward and shift the torso forward, driving the lead foot into the platform too early (usually before the rear foot) and not far enough forward. Related is the effort to drive the chest forward through the arms in an effort to create the correct overhead position. This reaching with the chest will also push the hips and rear leg backward, and cause the front foot to reconnect prematurely.

These problems can be corrected with jerk balances and jerks behind the neck with a focus on keeping the torso upright and driving the hips forward instead of the front foot alone. It's important for the athlete to keep in mind that the finishing position of the torso should occur after the feet have reconnected with the platform and the athlete finalizes the lockout of the elbows; attempts to create this torso position as the feet are splitting can cause the hips to be driven backward rather than down under the bar where they need to be to support the weight.

Another consideration is inadequate unilateral leg strength. If an athlete is weak in a long and deep lunge position, the body will avoid placing itself in that position. The ability to drive under a heavy jerk is predicated on the knowledge, both conscious and unconscious, that the athlete will be able to safely support the weight in the receiving position. This same limiter appears in the snatch and clean with athletes who power snatch and power clean primarily and whose bottom position strength is comparatively limited. Many unilateral leg strength exercises can be employed to improve strength deficits, including barbell lunges, step-ups and split squats. Walking lunges to the split depth (i.e. the position for a jerk split, not a full lunge) with a heavy bar on the back will help strengthen the split position while also providing some balance between the legs and hips.

Bar Sliding Down on Dip

Any movement of the bar during the dip and drive of the jerk will disrupt the positioning and movement. The problem is typical of athletes unable to achieve a proper jerk rack position who are supporting the bar largely in their arms and with some contact on the upper chest. These athletes will of course need to continue working on their flexibility until they're capable of racking the weight securely on the shoulders.

For athletes who are capable of a correct jerk rack position, the problem is most likely the result of the athlete dropping the elbows or relaxing the forward push of the shoulders as he or she dips. As discussed previously, this is usually a result of the athlete thinking too early of pushing the bar with the arms. Again, ensuring a proper rack position and open and loose hands during the dip and drive will help prevent the problem.

Press-out

Common among new lifters is pressing jerks out with the elbows—failing to receive the bar with fully extended elbows. There are a number of possible reasons for this to occur. The simplest include a lack of aggressiveness or a reluctance to lock the elbows. Aggressiveness (as a mental state, at least) can't be taught, only encouraged. However, the speed of elbow extension and the forcefulness of the leg drive can be improved.

Technical causes of a press-out include any error that prevents the athlete from driving the bar high enough and him- or herself low enough, such as short-stepping, forward collapse, bar sliding or bar separation during the dip, a forward drive of the bar, or forward weight balance. Each of these problems has been addressed elsewhere.

One technical cause of a press-out that often goes overlooked is a stiff back knee in the split. As was mentioned in the jerk chapter, locking the back knee will drive the athlete forward rather than allowing him or her to sink down vertically under the bar in order to receive it at the correct depth. The split footwork drill can be practiced with an emphasis on allowing the knees to bend upon reconnection with the platform and the athlete sinking a few inches farther down. From here, the athlete can progress to a tall split jerk, again allowing him- or herself to sink straight down under the bar by bending both knees.

Occasionally an athlete will be distracted by the footwork of the split, or in a hurry to get under the bar, and simply fail to drive the bar completely or aggressively. Complexes such as push press and/or power jerk + split jerk can help instill the feeling of better leg drive and aggressive elbow extension, and encourage these things in the split jerk. Tall jerks can also be helpful by reducing the movement to nothing more than the final drive under the bar, and by removing any upward acceleration of the bar by the legs, force a more aggressive finish with the elbows.

A tight grip on the bar at any point of the jerk can slow and weaken the extension of the elbows. A tight grip during the leg drive will slow the bar down as it leaves the shoulders, and a tight grip during the drive under the bar can reduce the ability of the elbows to forcefully and rapidly extend. During the dip and drive, the hands should be kept open and relaxed, and the bar only gripped as much as necessary to maintain control on it during the remainder of the lift.

Widening the grip will also help if the reason for press-outs is that the athlete is tight overhead. By reducing the demands on overhead flexibility, speed and accuracy will improve during the punch under the bar.

Losing Behind

Losing jerks behind is uncommon due to the difficulty of positioning the bar too far back or the body too far forward from a starting position behind the bar. This usually occurs following a missed attempt in front because of the athlete's attempt to correct becomes overcompensation. Similarly, if an athlete is habitually pushing the jerk forward and finally performs the movement properly, he or she will often miss the bar behind because of its unexpected position overhead, despite being correct.

The above said, it's unlikely an athlete will need any corrective work for this problem. If corrections are desired, any reinforcement of bar path, overhead position, and body drive through the arms will help. This includes press, push press and jerk complexes, jerk balances and tall jerks.

Narrow Split Stance

One of the primary advantages of the split receiving position for the jerk is the stability it provides in all directions. This stability can be reduced considerably, however, if the feet are too narrow—ideally we want the feet approximately as wide as they would be in the squat stance.

One possible cause for a narrow stance is an attempt by the lifter to split too long—after a certain point, the only way to increase the length of the split is by keeping the feet close together. This is rare, and will usually correct itself as the athlete begins jerking more weight and doesn't have as much time to throw the feet as far out. If it doesn't correct itself, a chalk line or rolled towel can be placed down the center of the platform between the lifter's feet. This gives the athlete both a reference and, in the case of the towel, some very real encouragement to not place the feet too close to the centerline. A barbell or PVC pipe can also be used, but this offers real potential for injury if the athlete does happen to place a foot on it. Another option is placing the athlete in the correct split stance and placing chalk marks around the feet to give the athlete something to aim for when he or she jerks.

Another possible cause of a narrow split stance is a wide drive stance. When the athlete transitions to a split from a wide stance, the body will often overcompensate and draw the legs inward more than intended. The correction for this is of course to correct the drive stance.

In any case of narrow foot placement, the athlete can be cued to simply drive the feet out at an angle from the center of the body. In particular, the athlete can push the back heel out at an angle, which will both keep the split stance wide enough and help align the back foot with the leg correctly. This seems to be an obvious enough cue and a simple enough movement to perform that it often corrects the problem without the need for more involved methods.

Driving to the Side

Occasionally a lifter will push him- or herself sideways during the jerk, sometimes significantly. This is most often due to driving unequally between the two feet. Usually the athlete moves toward the side of the lead leg because he or she has pushed harder with the rear leg as part of the effort (generally unconscious) to get it off the platform and moving back into the split. Drawing a chalk line down the platform between the feet and cuing the athlete to drive through both feet, or to drive through the foot toward which he or she is moving, is typically adequate to correct the problem.

PROGRAMMING & TRAINING

PROGRAMMING BASICS

The purpose of all programming is to harness the body's biological ability and need to adapt to the stressors to which it's exposed. The stressors we intentionally apply to the body are the training exercises chosen to elicit certain responses. Training methodology is largely speculative and little can be considered irrefutable fact, although generations of coaches and athletes have certainly arrived at various dependable principles. It's for this reason—as well as the fact that responses to training vary widely among athletes—that standard or formulaic approaches don't exist and there continues to be a great deal of contention regarding programming and training. Excellent results have been produced in many very different ways. In short, there is no correct approach to programming—there is effective and ineffective, and no single approach will be either for every athlete at all times.

The coach is left to rely overwhelmingly on practical evidence, logic and judgment. Experimentation is encouraged with the understanding that it's carried out with respect to the fundamental principles about which we're largely certain. Haphazard experimentation with no regard to common sense is a waste of the athlete's time.

Progressive Overload

The principle upon which all physical training is predicated is progressive overload. The body adapts to stress in order to survive—this is as basic a biological function as it gets. The key is that once the body has adapted to a given type and magnitude of stress, it will maintain that accommodation for as long as it remains regularly exposed to that stress. In other words, a stressor that once forced adaptation will eventually fail to stimulate further adaptation because it's no longer unfamiliar and the body has already biologically adjusted to manage it. In order to stimulate further progress, we need to expose the body to further unfamiliar stress. This describes the notion of progressive overload—the magnitude of a specific training stimulus must continually be increased (or modified in certain other respects) over the long term to produce gains.

While unfamiliarity of stress can be manifested in a number of ways such as exercise selection and even the speed of execution of a given exercise, the unfamiliarity with which we're primarily concerned in strength sports is, of course, increases in loading. In order to lift more weight, an athlete must lift more weight. This principle cannot be neglected. Fortunately biological adaptation involves a margin—that is, the body will adapt somewhat beyond the actual imposed demands. This is how an athlete is able to eventually lift a weight he or she has not actually lifted previously. Without this natural overcompensation, progress would be impossible.

Models of Adaptation

There are three models of physical adaptation in common use to conceptualize the response of the body to training: The General Adaptation Syndrome, the Fitness-Fatigue Model, and the Supercompensation Model.

General Adaptation Syndrome

Although originally presented by Hans Selye merely as a general description of the body's response to stress of any type, the General Adaptation Syndrome has been adopted by coaches and exercise scientists as a vague guide for managing training stimuli and recovery. An exhaustive discussion of the GAS is unnecessary for our purposes here, but a clear picture of its essence can be helpful in guiding programming decisions in a general sense. Selye defined three stages of stress response: Alarm, Resistance, and Exhaustion.

Alarm: The alarm stage is the initial response to a stressor. In this context, this stressor would be an unfamiliar training stimulus. During this stage (immediately following a bout of training), performance will diminish to varying degrees depending on the type and dose of stress and the capabilities being measured. This stage includes muscle soreness, reduced speed and power, and reduced strength. Reductions in speed and power will be more pronounced than in absolute strength.

Resistance: The resistance stage can be considered the adaptation or recovery stage. During this stage, the body responds to the stress of the alarm stage with cellular, structural and neurological changes to prepare to better cope with similar stress in the future. This period will vary in duration based on the athlete's training history, how great and of what nature the stress is, the athlete's genetic recovery abilities, and the athlete's recovery efforts.

Exhaustion: The exhaustion stage is what we're trying to avoid through planned training and monitoring of the athlete. At this point of the GAS, accumulated stress has exceeded the body's capability to cope with it in a positive fashion. This state of overtraining can be brought about not only by excessive training, but by inadequate recovery efforts. That is, an athlete may reach this stage with training volume and intensity no greater than what he or she has been able to manage historically because of factors such as lack of sleep, additional unrelated stress, or inadequate nutrition.

The key principles to bear in mind are that training is stress and does not immediately or necessarily result in productive adaptation—adaptation requires time and recovery management. Additionally, there is a limit to how much stress an athlete can adapt to in a given period before reaching the point of overtraining.

Supercompensation Model

The Supercompensation Model in its most specific form describes the process of adaptation as a reduction in certain biochemical substances by training followed by their replenishment during recovery to a level greater than existed previously. While this precise notion of supercompensation has been dismissed as inaccurate because none of the substances have ever been identified (glycogen may be cited as one, but its depletion/replenishment can account for only one specific type of physical performance), the elemental idea implied by the term supercompensation holds fast as a basic rule of training: an unfamiliar stress will encourage the body, given adequate resources, to prepare to better manage such stress in the future by adapting in a manner specific to that stress and to a degree beyond the demand of the stimulating stress. This is, of course, the underlying principle of progressive overload.

Fitness-Fatigue Model

The Fitness-Fatigue Model avoids the detail that prevented the Supercompensation Model's acceptance by relying on more flexible terms. The important idea in this model is that training will simultaneously produce two basic responses: an improvement of physical capacity and fatigue (assuming the training is of an appropriate nature and magnitude). The nature of that physical capacity is specific to the training, as is the nature of the accompanying fatigue (e.g. heavy, low-rep strength training will produce much different fitness and fatigue responses than long distance running). This means that immediately following training, while the athlete's *potential* performance is improved, his or her actual performance is limited by fatigue.

Fortunately, and the reason training is effective, is that the improvements in physical capacity are more persistent than the fatigue (assuming appropriate training and that the athlete is not in an overtrained state). In other words, the fatigue of training will abate adequately in time to allow the athlete to train at necessary levels again before the greater capacity developed by prior training returns to the previous level. By correctly manipulating training variables, including rest, the athlete is able to make net gains in physical performance—training and recovery must be coupled appropriately to allow the use of improved potential performance in the absence of the fatigue that initially accompanied it. Further, subsequent training must be undertaken before the newly developed capacity diminishes in order to create long-term progress.

Specificity of Adaption

As described by the SAID principle (Specific Adaptation to Imposed Demands), the nature of an athlete's adaptation to training will be specific to that training. This should to a great extent be quite obvious, and is glaringly so in the most general sense—for example, few individuals would expect considerable strength gains as a result of marathon running. However, the obviousness diminishes as focus increases.

Few outside the weightlifting community recognize the magnitude of the need for specificity with regard to the Olympic lifts, and this is often the basis of ineffective programming and nonsensical opinions. To put it bluntly, in order to snatch and clean & jerk heavy weights, a lifter must snatch and clean & jerk heavy weights. No other manner of training will accomplish this goal with equivalent effectiveness. The snatch and clean & jerk are extremely nuanced combinations of strength, speed, precision, timing, focus and confidence; this combination cannot be replicated with any other exercise.

Having said this, there are of course circumstances that both warrant and require exercises other than the classic lifts themselves. First and foremost, front and back squats are considered by consensus to be the most appropriate supplementary exercises for the Olympic lifts, and it will be extremely rare for lifters to not perform any squatting for any significant period of time (although there may in fact be periods in which an athlete does not squat).

Numerous other exercises have their places in the training of the weightlifter at various times of his or her career. Supplemental exercise selection, however, must be made with specificity in mind in terms of elements such as movement, position, mechanics, and speed of execution. The more similar these elements of such exercises are to the classic lifts, the more effectively they will improve an athlete's performance of the snatch and clean & jerk. Even with regard to apparently non-specific training, such as a direct lower back work, we can achieve an appropriate degree of specificity; for example, a good morning is more specific to weightlifting than a back extension because it's performed standing and the maximal torque on the back occurs at corresponding hip angles.

Specificity must also be considered with regard to loading and metabolic factors. Because we are concerned with increasing the athlete's ability to snatch and clean & jerk extremely heavy weights for a single repetition, the programming of both the classic lifts and supplemental exercises must reflect this. In short, this means developing maximal strength and speed with little to no regard to local muscular stamina and related metabolic factors. Such elements are addressed in more detail in following chapters.

This demand for specificity can be considered in terms of both weightlifting training itself, and the inclusion or exclusion of additional non-specific training. That is, we must design training to optimally drive physiological adaptation for weightlifting performance, but we must also limit or eliminate physical activity that does not comply with such specificity. Such non-specific activity has the potential to limit the desired adaptation in multiple fashions. For example, the performance of stamina- or endurance-oriented training will limit the ability of the body to optimally configure muscle fibers and motor units for the kind of explosive force development in which we're interested for weightlifting. In addition to direct physiological competition for functional characteristics, non-specific training either limits the time available for specific training, or limits the athlete's capacity for recovery from specific training and consequently desired adaptation.

It is not impossible to improve performance in weightlifting or any other physical activity without complete specificity. However, the need for specificity increases along with the desired level of performance in a given activity, and all program design must reflect this. The more advanced an athlete desires to be in the sport of weightlifting, the more specialized his or her training must become.

Genetic Potential

There is no scientific contention regarding the role of genetic potential in an athlete's success in weightlifting or any other sport, yet opinion on the subject varies considerably. This variation in opinion arises largely from genetically blessed athletes' common reluctance to accept the notion that they have natural advantages over other individuals. While the idea of genetics playing a significant role in one's athletic success can understandably be unappealing to those athletes, as it appears to imply they do not or need not work as hard as others to achieve success, it should be understood that the recognition and acknowledgment of such genetic advantages is not intended to be insulting or belittling.

There is no argument that numerous physical traits (and their ultimate development) that allow excellent performance in a given sport are genetically determined. Such traits include natural anabolic hormone levels, body segment proportions, and ratios of muscle fiber types. These characteristics ultimately control muscle growth, strength development, speed, and leverage; none of these traits can be influenced in any meaningful way through training. Quite simply, this means that certain individuals are better suited than others for weightlifting, and with proper training, will be capable of reaching levels of performance not attainable by those whose physical makeup diverges.

Clearly there are elements of performance that can be affected to various extents through training—just because an athlete has extraordinary potential does not mean he or she will reach it without the proper training, motivation and discipline. Similarly, athletes with less than optimal potential can achieve considerable success with diligent training that exploits what strengths and advantages they do have and minimizes the limitations of their weaknesses. However, these individuals will still be working under a lower performance ceiling.

This of course does not mean that individuals not blessed with ideal genetic traits should give up on the pursuit of increasing weightlifting performance; it means simply that such individuals need to be realistic about both their potential rate of progress and their ultimate potential for development.

ASSESSMENT

When starting a new weightlifter, the coach must determine the present abilities and the potential of the athlete in order to plan his or her training. How formal such an assessment is will depend on the coach's preference and goals. For example, a coach whose intention is to produce elite weightlifters will need a much more comprehensive assessment protocol than a coach who simply trains recreational lifters with no real aspirations of competitive success. If the former coach is actively recruiting new weightlifters, assessment will need to be thorough to discover appropriate talent with the potential for success. The following characteristics should be evaluated in some fashion in potential weightlifters.

Bodyweight, body composition, height and proportions: How a new lifter is built can provide a good sense of his or her potential in the sport. Weightlifting favors shorter individuals, particularly short upper legs, simply because of leverage advantages over taller and longer-limbed athletes (a telling illustration of this is that, relative to bodyweight, smaller bodyweight classes lift considerably more weight than larger bodyweight classes). An athlete's height and proportions cannot be altered; bodyweight and body composition can. If we have a tall athlete at a low bodyweight, bodyweight will need to be increased in order to place him or her within a group of lifters of similar height if that athlete has any hope of being competitive in the sport.

Body composition can be telling of a few things, such as an athlete's natural anabolic hormonal levels and his or her present and former training and nutrition practices. An athlete who comes into the gym muscular and lean will likely have an advantage over one who is not muscular and has a larger percentage of body fat, all other things being equal. This being said, body composition varies broadly among even the best weightlifters in the world; this is certainly not the ultimate indicator of either potential or present ability.

Age: The athlete's age will affect the training program in a number of ways such as exercise selection, average intensity, volume, training frequency and the long term development plan. Biological age must be considered in addition to chronological age; individuals of the same age will be biologically mature to different degrees, and it's this physical maturity more than age itself that determines what is appropriate training.

Training Experience: A new weightlifter's training experience will affect the training approach primarily with regard to exercise selection and training volume. An individual coming to a coach who is already an experienced weightlifter will not begin training in the same manner as an individual who has never performed the snatch or clean & jerk. Likewise, an individual with an extensive strength training history will be able to train differently than an individual with little strength training experience. In essence, this element of the assessment will help the coach determine at what point to start within the general process of developing a lifter.

Injury History & Related Limitations: It's common for US weightlifters to arrive at the sport following training and competition for other sports. This means that often these athletes have experienced injuries due to which they may have limitations on range of motion of certain joints, consistent pain during certain movements or in certain positions, or even performance limitations due entirely to fear. It's necessary for the coach to design training to rehabilitate, strengthen, or accommodate such problems as much as possible. This can also be potential limitation on an athlete's ultimate lifting ability. For example, an athlete who has had a serious shoulder injury and now has limited range of motion that has not been correctable through rehabilitation may not be able to establish an ideal overhead position, and consequently be unable to snatch or jerk as much as would otherwise be possible with their strength and technical abilities.

Technical Proficiency & Motor Learning Ability: For athletes who have experience with weightlifting, it's simple to assess their technical ability: the coach simply needs to see them lift and consider their best performances. With athletes new to the sport, the initial training program will be an opportunity for the coach to see how the athletes move as well as how they respond to coaching and learn new motor patterns. Some athletes naturally learn skills more quickly than others, and this needs to be taken into account when designing the training program.

Strength, Speed & Power: In order to be successful in weightlifting, athletes need to be strong and explosive. Assessing these qualities can be done informally during the early stage of training as described above. Seeing an athlete squat in training will be a good indicator of strength even without actually testing a maximal lift; seeing an athlete perform a snatch, clean, jerk, or some variant during the learning stages, will make it obvious if an athlete is naturally explosive. More formal testing can be done, such as using a vertical or broad jump measurement to gauge explosiveness, and testing certain basic lifts to gauge strength.

Flexibility: Flexibility is a critical element of weightlifting and is considered by some coaches to be of primary importance when recruiting new lifters. Without adequate flexibility, learning and development of the lifts is delayed, and the process as a whole is slowed considerably. The most efficient method of testing an athlete's weightlifting-specific flexibility is the overhead squat. This will demonstrate ankle, hip, upper back and shoulder mobility. If an athlete can sit into a full-depth squat with a bar held properly over the back of the neck with locked elbows, he or she is likely to be able to achieve all positions required in the sport. A more comprehensive evaluation of flexibility can be done through testing the back squat, front squat, overhead squat, jerk rack position and split jerk overhead position. This will give a more detailed picture and allow the coach to focus on improving specific areas of flexibility as needed.

Competitiveness & Commitment: As with any competitive sport, success demands certain personality traits that lend themselves well to the demands of training and the stress of competition. How an athlete handles competition generally can be seen through previous performances in other sports, but this does not always translate perfectly into weightlifting. The nature of weightlifting competition is quite unique and an individual who does well in one sport mentally may not fare as well as a weightlifter. The coach will have to see the athlete in weightlifting competition to know how he or she will respond, although simulated competitions can be held in the gym to get an idea.

How competitive an athlete is will usually become fairly clear just through the observation of his or her daily training. Naturally competitive athletes will tend to keep an eye on what their teammates are doing and try to outdo them in the gym in one way or another, they will push themselves to beat their previous performances, and they will want to enter meets regularly.

An athlete's commitment to the sport and training is an important element of long term success. If an athlete is not enthusiastic about training, it will be obvious in his or her performance, and this will limit the effectiveness of the programming. Coaches need to be motivators, but to reach their true potential, athletes need to be driven, disciplined and goal-oriented on their own. If an athlete needs to be continually coerced into training and competing, it's very unlikely that athlete will be successful in reaching his or her physical potential.

Situation Assessment

Before a training program can be designed, the coach needs to take into consideration the circumstances in which the lifter will be training. If the coach is fortunate enough to be working with a full-time weightlifter with no obligations outside the sport, this step doesn't exist and training can be planned optimally. However, this is unusual, particularly in the US. More likely, coaches will be working with weightlifters who have jobs, are in school and/or who have families, and these obligations and responsibilities will place restrictions on their training schedules as well as recovery abilities. These practical limitations will alter the ideal training program to some degree.

Facility & Equipment: One of the primary limitations for coaches and athletes will be the facilities and equipment to which they have access. At best this may limit the number of athletes who can train at a single time, and at worst it will actually dictate exercise prescription irrespective of the determined needs of the athletes. For example, if a facility has only two platforms and two Olympic bars, but has twenty athletes and only two hours to train on a given day, there will certainly be a limit to how much work those athletes will be able to do with the classic lifts, and this will have to be taken into consideration when developing the training program. Here creativity in exercise selection and rotation among athletes will become critical.

Schedule: It's rare for an athlete to have unlimited time available for training. Nearly all will have obligations such as work, school and family that, while clearly not as important as training, will be given priority. Programming will vary greatly among athletes based on how often they'll be in the gym and knowing this beforehand is a lot easier than attempting to modify the perfect program to fit into a conflicting schedule.

With all of this information, the coach can build a training plan suitable for each athlete. Again, much of this assessment can, and will often need, to take place during the initial stages of training rather than as a standalone evaluation prior to the initiation of training. Coaches may find it helpful to create forms for both guiding their evaluation or athletes as well as recording the information collected.

TRAINING VARIABLES

There are a number of training variables to be manipulated in order to produce desired adaptations, including intensity, volume, set/rep prescription, and exercise selection. These few elements will provide all of the necessary control over training stimulus. Initially the potential variation is typically overwhelming for both athletes and coaches, but it should be kept in mind that the fundamental principles of training always apply, and these simple rules guide all decisions regarding training variables. As experience accumulates, many of the initially confusing elements of programming will become second nature.

Intensity

Intensity is a measurement of the degree of effort. In the context of weightlifting and strength training, the term is very precise—intensity is the percentage of maximal effort in the exercise in question. In more practical terms, it refers simply to the loading of an exercise—how much weight is being lifted.

Objective Intensity: In training prescriptions, intensity will normally be expressed as a percentage of the athlete's single repetition maximum. Typically this will mean the athlete's absolute maximum—that is, the greatest weight he or she has ever successfully used for the exercise—but occasionally it will mean the athlete's best lift in training only (excluding competition lifts), that day or even that training session. In these cases, this will of course need to be made clear by the coach.

Subjective Intensity: Subjective intensity is a valuable measurement when used in conjunction with its objective counterpart for evaluating progress, adjusting daily training, and even as a method of loading prescription in some cases. Instead of relying on the precision of numbers, subjective intensity describes the intended loading more vaguely. Basic examples of subjective intensity would be *heavy* or *light*. For instance, a training prescription for an exercise may read *5 x 5 heavy*. This provides guidance regarding the desired loading for the exercise without assigning any actual weights or percentages and allows the athlete to adjust the training according to how he or she is feeling that day while still meeting the objective of the exercise. This is particularly useful with novice lifters who don't have established maximum lifts, or whose maximum lifts, because of the athletes' rapid improvements, are increasing quickly. Such subjective prescriptions are best accompanied by the observation and guidance of a coach during training. Similarly, the coach and athlete can use subjective evaluations of intensity to gauge an athlete's recovery or the difficulty of a lift at a given percentage that has not been used previously.

Intensity can be either the cause or consequence of other training variables, such as the exercise itself and the set and repetition prescription. If the objective is a certain number of repetitions or volume, the reps and sets will be determined as the primary variables, and the intensity will need to be prescribed in response. If the objective is the performance of an exercise such as a 3-position snatch, loading is determined more by what is possible and effective in that lift. If the objective is to test or train a maximal lift, the intensity will be 100%, and this dictates a single set of a single repetition—if more reps or sets than this can be performed, the load is by definition not 100%.

An exception to this would be intensity prescriptions over the course of a training cycle that continue to refer to the maximum lifts from the start of the cycle. During the weeks of the cycle, the potential maximum lifts can increase significantly enough that it may be possible to perform more than one set of a single with what is still referred to as 100% (This is an issue largely specific to beginning lifters; more advanced athletes will rarely make such dramatic gains in such short periods of time, although it is quite possible; certain squat cycles are able to produce this in only several weeks.). This is not a problem, and is the common approach because we can't test max lifts as frequently as they may change. This is simply taken into account when planning the training cycle.

There will occasionally be instances with beginning lifters in which enough progress is made in a particular lift that the planned intensity prescriptions become inadequate. In these cases, the subjective intensity concept will allow the athlete and coach to make any alterations to the training plan deemed necessary. For example, if the athlete is front squatting for 10 sets of 3 reps at 80%, and is at a point in the training cycle at which he or she is expected to find this loading very difficult but is not feeling challenged by the weight, this subjective evaluation of intensity indicates that the athlete's potential maximum lift has increased enough that the prescriptions based on the existing measured max are too low. (Similarly, a cycle may be planned using max numbers that have not been tested recently and consequently may not be accurate.) The loading for the squats can then be increased until the reps are appropriately difficult. The ability of athletes and coaches to function effectively in such a subjective manner will improve as experience is accumulated.

Intensity needs to be varied during given training periods to allow both burdening and recovery. Generally we see 2-3 genuinely heavy days each week, with 2-3 somewhat lighter days. These days will alternate during the week to allow partial recovery between the heaviest training sessions. This does not mean that the lighter days are not challenging—in the athlete's current state of recovery following a heavy training day, these reduced intensity days can actually be very challenging.

While there will be a necessary fluctuation in intensity day to day, intensity on average will increase over the course of a given training cycle. This is the result of both continued adaptation of the athlete and the continual reduction on average of training volume.

Objective	Subjective	Application
60-70%	Light	Technique work, speed work, recuperative training, classic-lift related drills
70-80%	Light-Medium	Technique work, speed work, classic lift-related drills, hypertrophy, power development, strength development (higher reps)
80-85%	Medium	Power development, strength development (medium reps), hypertrophy
85-90%	Medium-Heavy	Strength development (lower reps), classic lift work
90-95%	Heavy	Strength development (low reps), classic lift work
95-100%	Maximal	Strength development (low reps), classic lift work, classic lift testing, competition

Table 8.1 Guidelines for Intensity

Repetitions

Repetition numbers will be a primary determinant of training effect. As mentioned above, however, repetition prescription cannot function independently of intensity. A set of three reps doesn't necessarily encourage a particular adaptation—three reps of a given exercise at 80% will produce a very different effect than three reps at 50%, for instance. Of course, when working with rep prescriptions, we assume certain things about the associated intensity—primarily that it will be appropriate for the desired effect. Three reps at 50% makes no sense for anything other than warm-up sets or certain technique drills. There will be intensities generally associated with given rep prescriptions, but there will also be some degree of flexibility for a given prescription that will be taken advantage of in order to stimulate the desired adaptations from a particular training cycle, session or exercise.

At the lower end of the repetition spectrum, adaptations will be the result of the allowable loading, force and speed; at the higher end, adaptations will instead be more a product of the actual repetition.

1-3 Reps

Repetition numbers in the 1-3 range can generally be considered ideal for training strength, speed and power. Strength gains are largely if not exclusively due to neurological adaptation (i.e. improved motor unit recruitment, intramuscular coordination, rate coding) through the heavy loading and high speed allowed with low reps. Maximal loads do not allow maximal speed or power; those qualities are trained in this rep range with somewhat lighter weights and the neurological freshness with which they can be performed when reps are kept low (maximal power levels are generally seen in the 70-85% range).

Rep numbers in this range will rely overwhelmingly on the phosphagen metabolic pathway—that is, they will use presently stored ATP and that replenished immediately from the breakdown of stored creatine phosphate. These stores are replenished primarily through oxidative metabolism during the period of rest following the effort.

While reps in the 1-3 range tend not to encourage significant muscular hypertrophy, this can be changed through manipulation of volume. 2-3 reps performed for 10-12 sets can in fact produce gains in functional muscle mass quite well, and for weightlifters, generally with more appropriate functional characteristics compared to hypertrophy derived from higher reps.

4-6 Reps

Repetition numbers in the 4-6 range will still encourage considerable strength gains—although not to the same degree as 1-3 reps—but will generally encourage more hypertrophy. This is the basis for the classic 5x5 and 6x6 programming—it's an attempt to balance strength and mass gains.

There are two types of muscular hypertrophy—myofibrillar and sarcoplasmic. Myofibrillar hypertrophy is the result of aggregation of contractile proteins within the muscle fiber—that is, it's an increase in the quantity of functional structures in the muscle, which is accompanied by increased contractile capacity. Sarcoplasmic hypertrophy is instead an increase of intracellular fluid and aggregation of non-contractile protein structures—that is, the force-generation potential of the muscle fiber doesn't increase concomitantly with its volume. For certain activities, this type of adaptation is of value, but for the weightlifter is of relatively little use and counterproductive in the sense that it increases bodyweight without adequate increases in strength. Reps in the 4-6 range will encourage more myofibrillar than sarcoplasmic hypertrophy, although more sarcoplasmic hypertrophy than the 1-3 rep range.

Reps	Application
1-3	Strength, Speed, Power, Technique, Myofibrillar Hypertrophy
4-6	Myofibrillar Hypertrophy, Strength, Beginner/Youth Strength Work
7-12	Sarcoplasmic Hypertrophy, Stamina, Joint Conditioning, Rehab, Beginner/Youth Strength Work

Table 8.2 General Repetition Applications

Reps in this range, while still largely dependent on the phosphagen system, will begin to tap more into the glycolytic metabolic pathway, using the anaerobic breakdown of muscle glycogen and blood glucose to replenish ATP stores. This rep range may for some athletes cross the threshold at which the burning sensation from lactic acid accumulation becomes noticeable, although it will not be dramatic.

It's often stated that this rep range is ideal for power training because the loading allows the correct relationship between force and velocity. However, with technically complex lifts such as the snatch and clean & jerk, or any speed-based movement, neurological freshness diminishes quickly and despite the typically corresponding loading being ideal, speed and technique will suffer during the final few reps. For this reason, skilled power and speed training should generally be kept to the 1-3 rep range as noted previously, but with appropriate loading.

7-15 Reps

Repetition numbers in the 7-15 range will most effectively produce local muscular stamina, sarcoplasmic hypertrophy and result in comparatively little strength gain, except in formerly sedentary individuals, who will respond positively to nearly any physical activity. This is the rep range used most commonly by bodybuilders to produce gains in size. This is often the reasoning behind training strength athletes with such reps during certain periods of the year, but this type of hypertrophy serves little function for weightlifters—greater glycolytic capacity of the muscle fails to be helpful for an athlete who relies almost entirely on phosphagen metabolism. If gains in size are needed, a combination of low reps and high sets or slightly higher reps, such as 5s, will generally produce more functional mass. However, this rep range is often appropriate for certain supplemental exercises, particularly abdominal and lower back training.

Some very successful coaches and athletes use reps as high as 10 during various cycles, typically in the early phase of preparation training cycles. Whether or not this actually produces better results than more training time with lower reps would is an ongoing point of contention, but such high reps are definitely unusual among weightlifters.

Because of the necessarily lower intensity primarily and the length of time required to complete the work secondarily, reps in this range will rely considerably more on the glycolytic pathway, producing the burning sensation in the muscles that results from the accumulation of lactic acid being produced by anaerobic glycolysis. Reps in this range are often used for anaerobic conditioning purposes by athletes for this reason.

Sets

The number of sets performed will be a product of the training goal and its relation to the number of reps being performed, as well as the requirements on volume. Just as with reps, set numbers will largely be a product of the desired training effect. For example, if the goal is to take an exercise up to a 1-rep maximum, clearly only a single set at this loading can be performed. If the goal is encouraging hypertrophy, we may see as many as 5-10 sets of a single exercise. If the goal is speed, power and/or technical training, we may see several sets of 1-3 reps at lighter weights than are actually possible at those rep numbers.

During a cycle, set numbers are typically reduced as intensity increases to help produce the necessary decrease in volume. How much set numbers decrease will depend on how high they started, as well as how much, if at all, rep numbers are decreasing. For example, if at the beginning of a cycle average reps are 1-2, set numbers will need to be reduced more to create a decrease in volume than if starting average rep numbers are 3-4.

In addition, set numbers will need to be manipulated to accommodate the athlete's training status—in general, as athletes advance toward their training peaks, more sets are required to elicit a given training effect because the athlete is adapting to be able to manage the training stress better. However, this greater volume will often need to be accomplished in other manners such as additional exercises or training sessions rather than more sets of the same exercise.

Compound sets are the combination of two or more exercises performed in sequence rather than completing all sets of one exercise before moving on to the next. For the weightlifter, this will generally be used only for abdominal and back work, and more as a time saver and a way to keep training sessions at a reasonable duration than anything else. We can prescribe compound sets by organizing the exercises with letters and numbers indicating grouping and order—the letter indicates the group, while the number indicates the order in which each exercise is performed. For example:

A1. Weighted Back Extension – 3 x 10; 30 sec rest
A2. Hanging Leg Raise – 3 x 15; 1 min rest

would describe a compound set of back extensions and hanging leg raises. After the first set of back extensions, the athlete would rest 30 seconds, then perform the first set of hanging leg raises, and the rest 1 minute before repeating this compound set two more times. If the rest intervals are not important, we can simply leave them out and allow the athlete to move between exercises freely.

If another compound set were to follow, we would restart the numbering with the letter B to describe the new group.

Volume & Training Load

Volume & training load (sometimes called tonnage or workload) are figures that represent the quantity of training in a given period of time. Volume refers simply to the total number of reps performed (for a single exercise, in a training session, over the course of a week, or during a cycle, for example), while training load combines volume with intensity. Within this book, the term *volume* will mean the specific definition of total reps, and represent a broader category that includes volume and training load.

Volume is calculated by multiplying the number of reps by the number of sets; training load would then multiply that by the intensity. For example, volume and training load for a workout of 5 sets of 3 squats at 150 kg would be calculated as:

Volume: 5 x 3 = 15 reps
Training Load: 5 x 3 x 150 kg = 2250 kg

When calculating volume and training load, we consider only work sets—that is, we ignore warm-up sets and factor in only the sets prescribed for the actual training work. Generally this will mean only sets at 60% and heavier, but the coach will need to use his or her judgment because some exercises may be prescribed in a manner that make the percentage lower yet it will be appropriate to count the reps in the volume total (an example might be good mornings at 40% of back squat max).

Subjective Volume	Daily	Weekly
Very Low	40-	150-
Low	40-55	150-250
Moderate	55-85	250-380
High	85-110	380-520
Very High	110+	520+

Table 8.3 General guidelines for volume.

Because training load considers the actual weights used in training, this figure is entirely individual, and in no way can training loads be prescribed in a general sense (because we don't know how much an athlete will lift for the prescribed exercises, reps and sets).

Volume can be prescribed more easily because it accounts only for reps and sets. The volume that an athlete can manage and is productive will increase gradually from the beginning of his or her training career, but not indefinitely. Without knowing the athlete's age, training age and other characteristics, we can't say when maximal volume capacity will occur, but we might estimate it at about 4-5 years into a career, or if the athlete begins very young, it will likely coincide with the peak of hormonal conditions, generally in the late teens or early twenties. Following this, volume capacity will begin decreasing somewhat. Again, this is very individualized. Athletes can nearly always be conditioned over time to manage enormous volumes of training.

The fundamental concept that needs to be kept in mind with regard to volume is that the greater the intensity, the less volume athletes will be able to handle. This is demonstrated in basic periodization, in which the cycle progresses from higher volume and lower intensity to lower volume and higher intensity. This should be intuitively obvious, and will be reflected quite naturally in most programming efforts without conscious consideration. For example, few coaches or athletes would expect to be able to perform as many reps and sets at 90% as they would at 75%.

Like intensity, volume needs to be modulated to some extent during a given training period. That is, as we would not expect an athlete to be capable of very high intensity for multiple consecutive days, we cannot expect an athlete to handle consecutive days of very high volume. Accordingly, we ensure that both intensity and volume fluctuate daily to an extent that allows adequate recovery from preceding high intensity or high volume workouts before the next. (Note that adequate recovery does not mean complete recovery; an athlete will not recover completely during a given training cycle, because that entire cycle is in a sense a single extended training stimulus.) Typically we will alternate days of higher volume with days of lower volume. We may also alternate weeks of higher and lower volume while creating an overall trend over the duration of the cycle of reducing volume; that is, we don't necessarily need to reduce the volume each week over the course of a cycle.

Because athletes respond so differently to training, even more so with regard to volume than most variables, it's difficult to prescribe actual volume figures without a particular athlete in mind. Some athletes thrive on high volume, while others are crushed by it. For this reason, subjective senses or flexible ranges of volume are preferable when considering unknown athletes, and controlling volume based on the response of an individual athlete is ideal.

We can categorize lifters in terms of their best performances and accordingly split them into ranges of yearly, monthly or weekly volume prescriptions. This can be done somewhat informally to ensure that less experienced lifters are training with appropriate volume and that training volume increases along with their experience and performance levels.

The Soviets created a formal classification system in order to plan parameters like volume, average intensity and the number of training sessions per week for athletes of various levels. These charts can be found in Soviet literature translations.

When planning training, we should be aware of the volume of each workout and each level of subcycle, at least in a reasonable subjective sense. Because all training aims ultimately to improve the weights being lifted in whatever exercises on which we're currently focused, there will always be a general trend of increasing intensity; to accommodate this, there must also be a general trend of decreasing volume. If we're not cognizant of the volume being prescribed, we may inadvertently restrict the progression of intensity during a cycle by preventing adequate recovery due to excessive volume. As was mentioned previously, such reductions in volume will largely occur naturally—it's extremely unlikely a coach would prescribe the same volume of heavy single classic lifts as squatting and pulling strength exercises.

Depending on the goals of a given cycle, volume may also increase during certain periods. For example, if we have an athlete who has just finished an extensive cycle of heavy, low volume classic lift training, and we intend to prescribe a cycle or series of cycles of higher volume strength oriented training, it will generally be necessary to create some kind of transitionary phase to prepare the athlete. Conditioning for such high volume work will need to be built up before such work can really be undertaken. Depending on the circumstances, this may require as little as 1-2 weeks of gradually increasing volume before the actual desired cycle can be started. Such a transitionary period can be built into the beginning of the actual cycle, or it can be a standalone phase. Without such a transition, we may mistakenly believe an athlete is unable to manage a given volume of training, when in reality, he or she is simply not prepared for it at present.

Volume should be tracked and prescribed over the long term with a given athlete to manipulate his or her workload to accumulate or reduce fatigue, or to gradually increase his or her average workload, until reaching what is determined optimal, over the course of a career or cycle.

Rest Periods

Rest periods between sets are often manipulated to elicit different training effects. Brief rest periods are typically employed for two basic reasons: to encourage sarcoplasmic hypertrophy and to improve stamina through metabolic and substrate storage improvements.

In general, rest periods should be kept relatively long to allow the fullest recovery possible between sets. This recuperation involves both the replenishment of ATP and creatine-phosphate stores refreshment of the neurological system. When training for strength and power, we typically want to be able to exert maximal effort in every set; similarly, when performing technique work, we want to encourage maximal freshness and focus for each set. This being the case, athletes can generally be left to rest as they feel appropriate between sets without watching a clock. However, rest should generally not exceed 4-5 minutes or so to prevent the body from cooling down and stiffening up; a good range is 2-3 minutes.

Occasionally, we may pay more attention to rest periods, particularly during preparation for a competition. In the case that a lifter must follow him- or herself on the competition platform, he or she will have a 2-minute clock. In addition, often the athlete's warm-up must be rushed due to unexpected changes in other lifter's attempts. This relatively brief rest may be problematic if an athlete's only experience is resting 4-5 minutes between heavy sets. As the athlete approaches a contest, it can be helpful to begin shortening rest periods to prepare the athlete for such circumstances.

When performing speed-oriented work, 1-2 minute rest periods are often more effective; likewise, there will be times that keeping the rest periods between classic lift attempts down to 1-2 minutes will improve technical consistency in a lifter.

In cases of supplementary exercises such as abdominal, back, rehab, and hypertrophy work, we may control rest periods to achieve certain effects, such as sarcoplasmic hypertrophy when desired for specific areas.

Repetition Tempo

In certain cases, it may be desirable to control the tempo of a lift to elicit certain responses. The most common reason for this is to encourage greater hypertrophy by slowing the eccentric portion of a movement in particular. Generally eccentric tempos for this purpose will be between 3-5 seconds.

Tempo prescriptions will primarily apply to auxiliary work like back and abdominal training, or in some cases of weight gain and the like, to certain squatting, pressing and pulling variations. For the weightlifter, slow tempos should generally be minimized with respect to these kinds of exercises for the sake of maintaining neurological speed; however, slow tempos on abdominal and back work should not be a concern. A simple way to reap the benefits of reduced rep speed for hypertrophy without risking a loss of speed is to slow the eccentric movement, but perform the concentric movement with maximal speed. For the classic lifts and their variations, tempo prescriptions of course do not apply.

Australian strength coach Ian King developed a simple notation system for tempos that used three digits to describe the speed of the eccentric and concentric portions and time between the two. More recently this has evolved to include a fourth digit to describe the pause between the end of one rep and the beginning of the next. Each digit prescribes the number of seconds the segment is to take, with an X indicating maximal speed. The numbers prescribe the eccentric-pause-concentric-pause. For example, a tempo prescription of 30X0 would indicate a 3-second eccentric, no pause, a maximal speed concentric, and no pause before the next rep. If the pause between reps is not important, the fourth digit can be left off.

Training Frequency

Training frequency in the real world will be a product more of scheduling than of what's optimal for training. Even if we decided the perfect training program would require training 4 times daily 7 days weekly, few athletes would be able to manage such a schedule. The training program must conform to the limitations imposed by scheduling but attempt to maximize effectiveness with the allowable time.

The training frequency that is possible will be largely dependent on the nature of the training. Heavy weightlifting can be performed very frequently with sufficiently low volume; higher volume training will force more recuperation time between sessions, or greater modulation of intensity among sessions.

Generally recovery from intense training will be reached 48-72 hours following the session. This can vary considerably among individuals, and is based on a multitude of factors, but can be useful as a starting point when initially planning training. Once the response by the athlete is better understood, timing can be adjusted more accurately. This does not mean that the athlete can only train once every 48-72 hours; it simply means that the athlete will not be capable of performing what he or she did in the previous session as heavily or quickly within that time period. In other words, the same exercises may be performed every day, and even multiple times in a day, but the loading and volume will need to be adjusted appropriately to serve different training purposes. For example, if an athlete snatches to a 1RM on Monday, it's extremely unlikely he or she will be able to snatch that weight again on Tuesday (with the exception of novice athletes whose maximal lifts are not actually maximal efforts and are consequently much less systemically taxing). However, that athlete can still snatch on Tuesday—likely performing lighter weight technique work, or commonly the power-variation of the lift.

What this means practically is that a typical program will involve 2-3 genuinely heavy training days in a week, with 2-3 days of somewhat lighter training, or 2-3 days of maximal volume with 2-3 days of somewhat lower volume. It should be noted that because of the state of recovery the athlete will be in on one of these lighter days, such workouts will not feel as easy as one would expect when considering the workout in isolation.

Exercise Selection

Exercises should be chosen for their ability to most effectively deliver the training results in question. The core barbell exercises such as the squat, deadlift, press, snatch and clean & jerk will be appropriate in at least some form for every athlete. For the weightlifter, very little divergence from the classic lifts, variations thereof, and specific strength exercises will occur.

A number of additional factors will influence exercise selection at times. Equipment availability—or lack thereof, more accurately—can prevent the use of certain exercises deemed desirable. The options are acquiring the equipment or determining a suitable substitute exercise. As was discussed previously, the athlete's ability may influence exercise choices as well. If both time and skill are limited, the coach may need to avoid the more complex exercises that would deliver the ideal effects and find simpler substitutes that can produce similar adaptation without requiring an extensive period of technical training prior to their effectiveness.

Among weightlifters, there will be a set of movements used universally and another set residing on the fringe of this core that are used with greater variation among athletes but with considerable overlap. The core movements are of course the snatch, clean, jerk, squat and their variants—regular use of these exercises is unavoidable if the athlete wishes to improve in the snatch and clean & jerk. More disparity is seen with the strength lifts such as the variations of pressing, pulling and squatting. For example, some athletes will never perform deadlifts, while others will regularly; both may perform pulls of some type. Some athletes may overhead squat, others snatch balance in addition or instead, and some may use neither exercise. Some athletes will use nothing but the classic lifts, their power variations, and the front and back squat. Much of this variation is a result of coaches' training styles, predicated on their beliefs regarding what works best.

More variation in exercise selection will be seen in the realm of technique practice. The exercises prescribed for each athlete will be specific to his or her needs; while many technical faults are common, approaches to their correction and how different athletes respond to given correction methods vary.

Variation is a notion with a great deal of popularity. There is a common push to introduce variation to an athlete's training in as many ways as possible with the intention of preventing accommodation to the training stimulus and encouraging continued progress, and one of the primary methods is changing exercises because this is both easy and dramatic. While certainly beneficial to bodybuilders and many other athletes, this nature of variation is inappropriate for weightlifters.

Throughout a lifter's career, the ultimate objective for which he or she is training will not change—always the goal is to snatch and clean & jerk more weight. This is an extremely narrow focus, and demands an accordingly specific approach to training. There are a limited number of exercises productive for this endeavor, and training beyond them is counterproductive. That's not to say that some degree of exercise variation is not beneficial—but this type of variation will be minimal and having more to do with variation of a lift itself as opposed to the entire exercise. More than enough variation is achievable through loading, reps, sets and volume, as well as peripheral exercises, to prevent stagnation of training. Ultimately, if an athlete is specializing in the snatch and clean & jerk, no better exercises exist than the snatch and clean & jerk.

PROGRAM DESIGN

While variations among technical styles of lifting exist, they're extremely few in number and minor in degree when compared to the variation among programming methods. Programming is a remarkably contentious subject, but based on performances, it's clear that no perfect method exists and that different approaches can all produce excellent results. What works for a given athlete at a given time can vary greatly, and much of programming is experimentation rather than simple implementation. The art of programming lies largely in predicting an athlete's response to training while having few facts on which to rely—to this end, experience is easily the coach's most valuable resource.

The purpose of program design is simply to manipulate training variables to elicit the desired response from the body—that is, to present the body with stressors specific to the desired physical qualities and provide the appropriate support for subsequent recovery and adaptation. How exactly this is done takes many forms, but all effective forms are founded on the same principles.

While we can predict on the gross level how athletes will respond to a given stressor—e.g. an athlete who trains the squat will become stronger in the squat; trying to lift maximal weights too frequently will cause retrograde performance; higher volume will take longer to recover from than lower volume—the finer details of response vary among athletes, sometimes dramatically. This will be seen largely in terms of how quickly an athlete recovers from given training intensities and volumes, and as a consequence the volumes and intensities of training that will be productive for the athlete. Additionally, athletes will respond differently to various types of training in terms of exercise type, such as the relative emphasis on the classic lifts versus strength lifts. And, of course, each athlete's response to these variables will not remain static throughout his or her career.

In the US, program design tends to be considered from the perspective of smaller timeframes than is common in other weightlifting countries. With systematic athlete selection and education in many other countries, athletes with pre-determined potential as weightlifters begin training at very young ages, and consequently, it's possible to plan training from the perspective of an entire career with ideal athlete age. In this country, weightlifters are more likely to arrive in the sport somewhat older, and very often following considerable training time in other sports. Related to this is the comparatively reduced likelihood that American athletes will remain in weightlifting for extended periods of time, both because that time is often not available due to starting ages, and because opportunity is relatively limited. These factors greatly limit the ability of coaches to take the long-term approach often possible in other countries' sports programs, and consequently, program design is often managed within smaller blocks of time in an effort to ensure athletes reach maximal potential for competition in the shorter term. This being said, however, it still behooves both the athlete and coach to consider the training plan in the context of the long term as well as the short, irrespective of when and how the athlete arrives in the sport.

This chapter will discuss more traditional approaches to programming for weightlifting, and the following chapter will discuss the Bulgarian style approach to programming. This section of the book is very intentionally kept more descriptive and suggestive than prescriptive and absolute because of the inherent inconsistency in athletes' responses to training. As well as possible, it will provide guidance for the creation of programming (the inclusion of sample programming also serving this end); unfortunately, short of actually prescribing programming, guidance of this nature is unavoidably vague.

Periodization

The term *periodization* in its simplest sense refers to partitioning training into blocks of time—this may be done either for the purpose of managing planned progress or focusing on different objectives. Within any given training block of whatever nature, periodization in the other sense is the intentional modulation of training variables—in particular intensity and volume—during the period in an attempt to maximize gains. This modulation most often follows an average trend from higher volume and lower intensity to lower volume and higher intensity, although it will involve fluctuations of both.

Periodization is classically organized in three levels: the macrocycle, mesocycle and microcycle. The microcycle is the shortest period—generally one week since the week is the most convenient and practical unit. The mesocycle is comprised of a series of microcycles—generally 4-12 weeks in length. Macrocycles are often cited as annual, although in reality, it often makes more sense to have multiple levels of macrocycles. For example, we may divide a year up into two macrocycles, each of which contains 2-4 mesocycles that emphasize certain components of the parent macrocycle's objectives. In any case, the macrocycle is the largest period of time and encompasses multiple mesocycles.

How periodization is approached will depend on the athlete and the circumstances. For competitive athletes for whom training must be carefully planned in order to prepare for specific dates of competition, and for whom longer term planning is necessary, starting from the macro scale and moving to the micro scale makes the most sense. For athletes without date restrictions, often macrocycles become largely incidental and the mesocycle—or even microcycle with certain beginners—is the starting point.

Always programming must consider the athlete's strengths and weaknesses and attempt to close the gap. For example, if an athlete has an excellent clean but a relatively weak jerk, it makes little sense to train the clean with as much time and effort as the jerk. Instead, a greater emphasis on the jerk in terms of strength or technique work would be employed whenever appropriate. Similarly, if an athlete is possessed of excellent strength, but is not equally capable of applying that strength to the classic lifts, it makes little sense to continue emphasizing strength development rather than emphasizing performance of the snatch and clean & jerk.

Once the timing is considered, cycles will be planned to achieve the required training objectives. The ultimate objective for the weightlifter is of course extremely simple—snatch and clean & jerk as much weight as possible. However, this is far too vague of a goal to allow rational programming; goals and the corresponding cycle must involve more precision based on individual need.

Different coaches and resources divide training into many different sets of phases. For example, some use as few as two phases, commonly referred to as preparation and competition. Of course, within each phase is some degree of variation. Such variation is, by other coaches, contained in distinct phases.

We will divide training into four phases: strength and power development, strength and power specification, contest preparation or peaking, and transition. These phases are distinct not because there are no overlapping elements, but because the general characteristics and goals are different—there will always be shared elements, particularly for a sport such as weightlifting whose competition performance involves such a specific focus. Further, transition and contest preparation phases may be built into the other two phases rather than be considered distinct phases themselves; this doesn't change the content or purpose of either, simply the definition. For the purpose of description, we have separated them here.

Two more possible phases are general physical preparedness and technique education and development.

These two phases will be the domain of only pre-specialists and beginning weightlifters, respectively, and will not be employed beyond an initial learning or basic development stage.

General Physical Preparation

GPP training is non-specific work intended primarily to prepare the athlete for managing future training stress. This consists largely of basic strength and mobility work, joint preparation, work capacity development and coordination development. Such training might include basic strength training, odd-object lifting, sprint work, plyometrics, basic gymnastic drills, carrying work, and more play-oriented training and games.

GPP training is most commonly employed with young or new athletes without established training specialties; it serves to prepare the athlete for specialization by ensuring existing weaknesses are resolved and improving general work capacity. Disagreement exists regarding the need for GPP work with established specialists. Some coaches insert GPP phases on a regular basis in off-season periods or briefly in between more specific weightlifting phases, although this is rare. Even in such cases, it usually makes more sense to consider these periods transition phases, as they are more accurately bridging time between specific training phases rather than actually preparing an athlete for future sport specialization.

Technique Education & Development

The initial emphasis on the training of new weightlifters will be technique instruction and practice. Without a foundation of technical proficiency, further weightlifting specific training cannot proceed. This technique education involves primarily the competition lifts, but also the major supplemental strength and technique exercises. Approaches to this phase of training vary widely, and this book has presented a thorough strategy. This strategy assumes that the athlete has already learned the basic strength lifts and is reasonably experienced and proficient. When this is not the case, the athlete will need to participate in a more fundamental technique education phase first.

With a long-term perspective, particularly with young athletes, it's wise to commit a significant period of time to technique instruction prior to using the competition lifts in particular in actual training—as much as 12-15 weeks. This will allow better ultimate proficiency and success. However, with the exception of young athletes, this will rarely be an option. Coaches will often have to shorten this instruction period dramatically with older athletes, introducing the competition lifts to training after as little as 1-3 weeks. In any case, no lift should be used in training without the proficiency to at least ensure safety.

How quickly an athlete develops technical mastery will depend on factors such as the quality of technique instruction, the athlete's natural learning abilities and athleticism, the athlete's commitment, the athlete's biological and training age, and the time and effort given to training. The need for technique improvement will of course decrease throughout a lifter's career, although it will never be ignored entirely.

A sample technique development training phase is included in the sample programs chapter.

Transition Phases

There will be times when we require some sort of transitionary phase between cycles of different emphases or to bridge other abrupt changes. The most common will be training following a major competition for which the athlete peaked. Typically after competitions of such importance, athletes will take a short time off completely, or training will be very infrequent, light, low in volume and possibly even non-specific—more along the lines of active recovery—because of the extremely physically and psychologically taxing nature of such competitions.

At other times, we may employ transition phases between cycles of very different compositions in order to ensure the athlete is adequately prepared for the demands of the upcoming phase. For example, if an athlete has been training with high volume and a greater percentage of strength exercises relative to classic lifts, an immediate jump into a very heavy, low volume classic lift emphasis cycle will mean that the athlete is unable to perform the prescribed training, experiences excessive systemic or local fatigue, or even incurs injuries or limiting pain or discomfort; transitions in the opposite direction offer the same potential problems.

These transition phases will simply be brief periods of gradually shifting emphasis to condition the athlete appropriately. For example, if transitioning from a high volume strength cycle to a low volume classic lift cycle, we may take two weeks to gradually reduce classic lift reps to singles, increase their weight and frequency, and simultaneously reduce the reps and volume of squatting, pulling and pressing, eventually dropping many of these exercises entirely. In this manner, we ensure the athlete is able to perform the training we desire.

Such transition phases can also act as unloading periods following particularly demanding training cycles if the following cycle does not contain an adequate preparatory lead-in.

Often the beginnings of an actual training cycle will perform any necessary transitionary function, and a dedicated transition period will not be necessary. In reality, whether or not a transition phase exists between cycles is simply a matter of how one delineates said cycles.

An example of a transition phase is included in the Sample Programs section. This phase would be used between the sample strength and power development and strength and power specification phases that correspond to the year training plan discussed later in this chapter.

Strength & Power Development (Preparation)

The need for strength and power increases is infinite, as this is overwhelmingly what improvement in weightlifting will consist of once technical proficiency has been achieved. It's often said that there's no such thing as too strong. This statement does require qualification in this case, however. Greater strength and power are always needed, but disparity between general strength and specific application needs to be considered when planning an athlete's training. That is, a lifter with excellent strength and power but a relative inability to apply these qualities to the snatch and clean & jerk possesses a disparity in ability that needs to be addressed. In such a case, emphasis on strength development with inadequate development of specific strength and power application is a misuse of training time.

This type of training will be built around basic strength exercises such as squats, deadlifts and pulls, and presses with planned variation of loading and volume to produce gains over the term of the cycle. It will nearly always involve exercises to address technical problems as well, or at least exercises that continue to improve the athlete's technical execution of the competition lifts. The competition lifts themselves should not be excluded except for infrequent and brief periods (e.g. a week) because of the need to maintain technique, speed, consistency and confidence, but in this phase they will account for only a small portion of the total training volume, and loading on average will remain relatively low.

An example of a strength and power development phase is included in the Sample Programs section, and corresponds to the year training plan discussed later in this chapter. This period of training is often called the preparation mesocycle.

Strength & Power Specification (Competition)

The need for improving specific strength and power application will, like strength development, be ongoing. Training for these two objectives will comprise the overwhelming bulk of the athlete's time in the long term. This type of training will involve primarily the classic lifts performed with heavy loading. Depending on the athlete's abilities and needs, this phase may involve nothing more than snatching, clean & jerking and squatting (and sometimes not even squatting). In any case, it will consist of low volume, few exercises, and heavy loading, and may or may not involve precise planning in terms of loading and volume. This type of training—an overwhelming reliance on the classic lifts at heavy loads—is arguably the ideal approach for established weightlifters, and can to a great extent be employed to achieve both the development of strength and power, as well as the specification of that strength and power, because the nature of the contest lifts is a blend of strength, power and skill. This is discussed in more detail in the following chapter regarding Bulgarian training.

An overview of a training year for most athletes will appear essentially as alternation between strength and power development phases and strength and power specification phases, punctuated by contest preparation phases and any necessary transition phases. Which is dominant in terms of total time will vary according to the needs of the athlete, competition schedules, and coaching styles.

An example of a strength and power specification phase is included in the Sample Programs section, and corresponds to the year training plan discussed later in this chapter. This period of training is often called the competition mesocycle (and will include the following period).

Contest Preparation / Peaking

Finally, contest preparation is a relatively brief block of training that will essentially attempt to maintain the athlete's strength, power and technique while stripping as much accumulated fatigue as possible to allow complete expression of those qualities in competition. In other words, it's not developing more strength or power or improving technique—it's simply eliminating the factors that prevent the athlete from accessing to the fullest degree his or her current capabilities. To what degree this peaking is performed will vary among competitions based on their importance—an athlete will often genuinely peak only for one or two meets each year, while lifting in several others with little or no specific preparation. This training phase will consist primarily of the classic lifts and involve the lowest volume of any period.

Depending on the needs and training experience of the athlete, such a period may consist only of the final week before a meet, although consideration of an upcoming meet will be made with regard to prior training. Some coaches will reduce both volume and intensity as this final week progresses, and other coaches will reduce volume while keeping intensity relatively high. Again, this depends entirely on how the athlete is training and what protocol produces the best results.

Like the transition phase, the contest preparation phase may simply be considered part of a larger training cycle. Again, this is just a matter of how one chooses to define cycles rather than a genuine difference in protocol.

An example of contest preparation can be found at the end of the sample strength and power specification phase in the Sample Programs chapter.

Loading & Volume Prescriptions

There is unfortunately no simple formula to assist in determinations of loading and volume, and the interaction of a multitude of factors needs to be considered. Much prescription will be based on experience and the results produced by various program templates with different athletes. That is, coaches will tend to rely on certain templates or basic protocols that they have created and that have been demonstrated effective and make adjustments as necessary to fit the needs of the athlete. The reality of programming is that much of it is guesswork—however, the guessing involved can and should be reasonable in terms of principle and experience.

Generally an athlete will be able to perform more reps at a given intensity with strength lifts versus classic lifts; more reps with exercises using more muscle mass (e.g. squatting versus pressing), and women will be able to perform more reps than their male counterparts at a given intensity. Possibly most important is the athlete's conditioning at the time in question. Athletes who have been training with higher rep numbers will be able to lift a greater number of reps at a given intensity than athletes who have been training with fewer reps and heavier loading. Similarly, athletes who have been training at high intensities will be capable of hitting such heavy weights more consistently than athletes who have been training with lower intensities and higher volumes.

Beginning lifters will have neither established 1RMs nor the technical proficiency to make them completely useful in terms of programming. For these athletes, a more intuitive approach to intensity is desirable and even necessary. Athletes will feel out appropriate weights, ideally with the guidance of a coach, in the initial stage of a training program, and make incremental increases as possible. As the athlete progresses in experience, the 1RM and percentage prescriptions will become possible and valuable, and that athlete and coach will have better ideas of the athlete's abilities and appropriate loading for various exercises and set-rep couplets.

Basic Loading Guidelines

One of the most difficult aspects of programming is determining the optimal loading for a given exercise with respect to the chosen rep and set numbers. These decisions are typically made based on experience rather than formula, and more experienced coaches will know offhand approximately what kind of loading is not only ideal, but possible, in various cases, with consideration of not only the reps and sets for the exercise in question, but also of the surrounding training and its effects on fatigue, the athlete's current conditioning, and the unique abilities of the athlete.

Coaches are encouraged to keep detailed notes of their athletes' performances with various exercises at given intensities and volumes. As these notes accumulate, they will become an invaluable reference for prescribing loading and volume when creating future programs.

Following are some guidelines for loading with as much detail as possible to facilitate the creation of new programs. Keep in mind this loading is conservative—athletes will invariably be able to perform the given exercises, reps and sets with more weight than what is listed—because it's meant to describe starting weights in two senses. First, these guidelines are points from which the athlete or coach can start experimenting to find out what works best for them. Second, they're below maximal capacity because we want to intentionally begin a cycle in this manner to allow for building momentum with weight increases. Starting with maximal loads for a given rep and set scheme is a practically guaranteed way to prevent progress.

How much starting percentages can be increased each exposure to an exercise will depend on the accompanying training, the frequency of exposure, the experience of the athlete, and a number of other factors. A very general rule of thumb is 2-3% per week for 3-4 weeks with an approximately static volume prescription, after which continued increases will likely both need to be reduced in rate and accompanied by volume reductions. With adequate volume reductions and conservative enough starting intensities, we may be able to increase loading by as much as 5% per week for a short period of time.

Of course, the starting percentages and amount of increase between exposures will need to be adjusted in consideration of other training—the less total work the athlete is doing and the lower the starting intensity, the larger increases he or she will be capable of between exposures of a given exercise. Similarly, the larger the accompanying reduction in volume of a given exercise between exposures, the greater the possible rate of intensity increases. The reader is encouraged to consider the sample programs included in the book for examples of loading and volume manipulations within cycles, as this is the easiest way to communicate the ideas and protocols involved.

Squats

Squatting is the exercise that appears to allow for the greatest variation in loading and volume within a range that could be considered "heavy", likely because of the great volume of muscle mass involved. During strength-emphasis cycles when squatting is made a priority, volume and loading can be quite high. Table 8.4 contains some basic set/rep and loading relationships, which indicate conservative starting percentages.

Sets/Reps	Intensity
10 x 3	75-78%
10 x 2	80-83%
5 x 5	70-75%
5 x 3	75-80%
3 x 3	80-85%
2 x 2	85-90%

Table 8.4 Squat Loading Guidelines

Of course not all squatting prescriptions will use the same weight for the same reps across a series of sets. In some cases we may use a reducing number of reps and increasing weight with each set, or with groups of multiple sets; in others we may use reducing reps at a single weight across sets. Such setups will rely even more on experience and the judgment of the coach with consideration of an athlete's abilities. The previous numbers can still be used to provide a basic idea of where to start.

Classic Lifts

The classic lifts will likely see the greatest ranges of loading because of the extensive array of possible objectives in various phases of training. This section will aim more to provide as many reasonable examples of implementations rather than attempt to give some kind of formula.

Total Sets	Intensity
4-10	80%
3-8	85%
2-5	90%
1-3	95%

Table 8.5 Classic Lift Singles Volume Guidelines

During heavy classic-lift-emphasis phases, like with a Bulgarian training-style approach, we will be often able to have the athlete snatch and clean & jerk at 80% and higher on a daily basis—that is, singles at 80% would be considered light training. Heavier training days will see percentages for singles from 85-100%. With single reps, we obviously have the ability to load up to 100%, and even attempt beyond it. When this is possible will depend on the structure of the training phase and the athlete's response to it. Table 8.5 is a very vague set of guidelines for the number of sets of singles that can be done at a given percentage.

Again, how closely an athlete is able to adhere to these guidelines will vary greatly with his or her other training, his or her present conditioning, and his or her experience—novice athletes will generally be capable of much more volume at a given percentage of max than their more advanced counterparts because that max is limited more by technique than absolute strength and power.

During periods of training when strength development is being prioritized and the classic lifts are consequently being used more for speed and technique development and maintenance, loading will look quite different. We'll often also see more work with doubles and triples rather than primarily if not exclusively singles. Some basic examples are shown in Table 8.6.

Exercise	Intensity
3-Position Snatch/Clean	65-70%
2-Position Snatch/Clean	70-75%
Snatch/Clean/Jerk Triples	70-75%
Snatch/Clean/Jerk Doubles	75-80%
Hang/Block Snatch/Clean	65-80%

Table 8.6 Class Lift & Variant Intensity Guidelines

As is obvious from the above numbers, it can be assumed fairly accurately that a great deal of technique or rep work with the classic lifts will fall into the 65-80% range. When in doubt, 65-70% will nearly always be entirely possible, but still challenging enough to not be a complete waste of time if it does become clear after an exposure that the loading could be greater. Again, these are conservative starting numbers; athletes will generally be capable of performing such exercises and reps at higher intensities with proper conditioning and/or progression.

Press & Push Press

Pressing and push pressing loading is similar to that of squatting, although often athletes won't be capable of quite as heavy loading at a given number of reps with press variations than with squats. Some basic conservative starting percentages are listed in Table 8.7.

Again, like squatting, we may not perform consistent reps and loading across a given number of sets, but instead vary both reps and weight as sets progress. In any case, the previous numbers will serve as a good starting point.

Sets/Reps	Intensity
5 x 5	70-75%
4 x 4	77-82%
5 x 3	75-80%
3 x 3	80-85%

Table 8.7 Press Intensity Guidelines

Pulls & Deadlifts

Programming loading for pulling exercises is considerably different than for other exercises. Much of the time this is largely because what is possible and what is desirable are quite different numbers. That is, athletes will nearly always be capable of pulling much more than we prescribe, because a pull is a speed-dependent exercise and consequently absolute strength doesn't play the same role it would in a more strength-dependent exercise like a deadlift.

The basic premise of snatch and clean pulls is to allow us to overload that pulling movement to a degree, but without sacrificing speed and positioning to a significant extent. This being the case, it's rare that we'll ever exceed 100% of an athlete's max in the associated classic lift. Because of this important association, and because there is really no way (or reason) to perform a maximal effort snatch or clean pull, loading for snatch and clean pulls will nearly always be prescribed as percentages of the associated classic lift.

Exercise	Reps	Intensity
Snatch/Clean High-Pull	4-5	65-75%
	2-3	70-80%
Snatch/Clean Pull	4-5	80-90%
	2-3	90-100%
Snatch/Clean Deadlift	4-5	90-100%
	2-3	100-110%

Table 8.8 Pull & Deadlift Intensity Guidelines *(Intensity is of the associated classic lift maximum)*

Similarly, snatch and clean deadlifts will often be prescribed as percentages of the associated classic lifts, and kept within close range of those max lifts. This keeps programming consistent and understandable, keeps training in perspective by always associating the exercise with the classic lift it's intended to improve, helps prevent excessive increases in the strength lifts without commensurate improvements in the classic lifts, and better ensures the exercises can be and are performed with the intended pulling postures rather than as sloppy movements with decreased transferability.

Table 8.8 contains conservative starting loads for pulling exercises for different reps. These assume set numbers between 2 and 5.

Other Supplemental Exercises

The loading of other supplemental exercises is not something that can be covered in any detail here, both because of the extensive list of possible exercises, as well as the great variation in capabilities. However, following are some vague guidelines for three primary supplemental back exercises. This loading is particularly variable among lifters, largely dependent on how much such exercises are used by a given athlete. An additional difficulty is on what to base the intensity, as none of the following exercises can really be performed for a maximal single. While we may at times prescribe loading based on the athlete's best clean, here we will instead use the athlete's best back squat as it tends to be a little more consistently related. Table 8.9 lists general loading guidelines for the stiff-legged deadlift, Romanian deadlift and good morning (this assumes a full range of motion, bent-knee good morning).

Exercise	Reps	Intensity
Stiff-Legged Deadlift	3-5	60-70% of back squat
	6-10	50-60% of back squat
Romanian Deadlift	3-5	60-70% of back squat
	6-10	50-60% of back squat
Good Morning	5-8	35-45% of back squat
	8-12	25-35% of back squat

Table 8.9 Supplemental Back Exercise Intensity Guidelines

Lift Relationships

A common question is how one lift should be expected to compare to another in terms of weight. This information is of limited utility because of the potential for great variation without necessarily being problematic, but for the sake of thoroughness, we'll list some general guidelines. Again, these are not hard and fast rules, and divergence from these numbers is not necessarily indicative of a problem—often, it's simply descriptive of an individual's relative strengths and weaknesses. These should not be considered prescriptive, and not relied upon for planning or evaluating training in anything other than the broadest sense.

Lift	Of Lift	Percentage
Snatch	Clean & Jerk	80-85%
Power Snatch	Snatch	80-85%
Power Clean	Clean	80-90%
Clean	Deadlift	70-75%
Muscle Snatch	Snatch	60-65%
Press	Push Press	70-75%
Front Squat	Back Squat	85-90%
Overhead Squat	Back Squat	65-70%
Snatch	Overhead Squat	90-100%

Table 8.10 Maximal Lift Relationships

Prilepin's Table

Intensity	Reps/Set	Total Reps	Optimal Reps
70% -	3-6	18-30	24
70-79%	3-6	12-24	18
80-89%	2-4	10-20	15
90% +	1-2	4-10	7

Table 8.11 Prilepin's Table

Soviet sports scientist A.S. Prilepin, using data from the training regimens of high-caliber weightlifters in the 60s and 70s, developed a table of intensity and volume relationships intended to describe what was assumed to represent optimal training. This chart can be used to help determine sets and reps at given intensities, but because it is both descriptive and vague rather than prescriptive and precise, its utility is marginal. Nevertheless, it can be consulted as a broad check of the basic validity of certain training prescriptions or as a simple starting point for prescribing reps and sets for certain intensities.

Planning

All planning intends to increase the weight the athlete can lift over time. How this is accomplished and how rapid the increase is will depend on numerous factors, but the most significant is the athlete's training experience. Novice athletes can make rapid gains over relatively long periods of time with very simplistic manipulation of training variables. In fact, it's typically not only unnecessary but counterproductive to plan in great detail a beginner's training in terms of loading in particular. Such planning will often prevent the athlete from making the sudden dramatic gains that are possible only with a more flexible and intuitive approach to training. A more basic plan with respect to what exercises will be performed day to day, coupled with the coach's observation of the athlete and consequent instructions for loading, will generally serve the athlete better. As the athlete's training experience increases, and consequently the gap between present ability and ultimate potential closes, progress will slow and planning will require more detail.

The basic idea behind planning progress is for the athlete to begin relatively comfortably within his or her abilities and increase the burdening (a measure of the collective strain of intensity and volume) with increments consistent with factors such as the athlete's training experience, the nature of the exercise, and the demands of the rest of the training in the period in question. In a sense, the goal is to build momentum to push adaptation by the end of the cycle to a point beyond the athlete's present abilities. The more advanced the athlete, the more momentum must be gained and the smaller the ultimate increase will be. These increases do not necessarily refer to each exposure to an exercise—they may involve fluctuations of intensity and volume to create a trend of increase over a period of time.

Every training cycle planned should have a goal of measurable improvements in at least one specific exercise. Without such goals, evaluations of an athlete's progress and the effectiveness of a given cycle are impossible. This does not mean that every training cycle will be successful at achieving a given goal. In some cases, chosen goals may be unrealistic; in other cases, an untested training cycle may simply have not worked as expected. In both situations, the coach and athlete must reconsider the approach and correct as necessary, noting the mistakes to prevent repeating them.

Training should be kept as simple as possible for as long as possible, both for the sake of producing the greatest possible progress and preserving the sanity of the coach and athlete. Within any type of cycle of any level of complexity, there will need to exist some degree of modulation of volume and intensity. Generally there will be 2-3 days each week of genuinely heavy training, with 2-3 more involving lower-intensity and/or volume. While the heavy days will need, for the sake of progress, to be fairly consistent in terms of exercises for a reasonable period of time—these are the core movements in a given cycle—the lighter days may be varied greatly. These are the days that more technique-oriented work can be performed as needed, and we can vary the focus of each session to account for the needs of the athlete without compromising the effectiveness of the program's core lifts.

All planning involves attempts at predicting an athlete's response to training, and by nature, predictions are fallible. Additionally, there exist no absolutes in regard to training—there are patterns whose accuracy invariably decreases as the focus narrows. The coach is left to rely on his or her own experience and that of others for guidance when designing programs, and to develop a continually greater degree of familiarity with his or her athletes in order to better predict their responses to various training stimuli.

For these reasons, programming may be considered equal parts science and art. Perfection is impossible, and no amount of care and calculation can change this or account for unexpected factors that disrupt recovery and possibly training. This being the case, flexibility in prescriptions is important to absorb not only misjudgments of an athlete's ability to progress, but also for unexpected factors that negatively influence recovery and limit adaptation. That is, while numbers will generally be prescribed, there will be times at which those numbers will need to be adjusted without prior notice based on an athlete's performance at the time in question. This kind of flexibility is critical for preserving progress in the long term—attempts at strict adherence to prescription irrespective of present circumstances will often result in stalled progress, injury or overtraining, resulting in retrograde performance.

The longer a given cycle, the more fluctuation in loading and volume will need to be planned. Unless dealing with rank novices with little or no training experience, we cannot simply increase loading and/or volume in a linear fashion over any significant period of time. Instead, we increase the demand for a period of time, and then decrease it somewhat for a shorter period of time, allowing a degree of recovery without sacrificing the gains made in the previous period. Typically we will need to plan some kind of unloading week every 2-3 weeks of a cycle.

These unloading periods do not necessarily eliminate all fatigue produced by the previous loading period. Over a longer cycle, fatigue will persist across unloading periods, although each of these unloading periods will reduce the level of accumulating fatigue somewhat. This is not necessarily problematic (only if not planned or managed properly to an extent that allows overtraining rather than progress), and in fact is the intention. That is, the entire cycle is essentially acting as overload of the athlete's abilities to encourage the consequent supercompensation—we simply manage the fitness-fatigue response from a broader perspective.

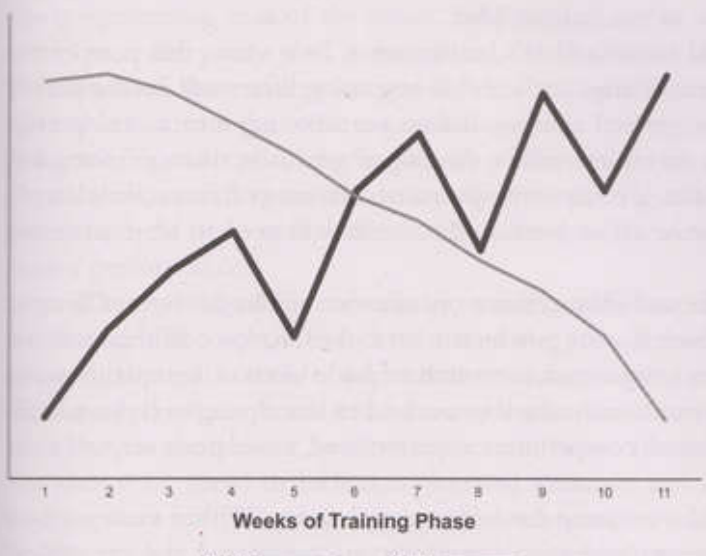


Figure 8.1 Sample Intensity & Volume Fluctuation *This graph represents an example of modulation of average weekly intensity and volume over the course of a cycle. (Graph is not necessarily to scale and is not intended to represent any particular intensity or volume figures.)*

The Sample Intensity & Volume Fluctuation graph (Figure 8.1) represents this for easier comprehension. We can see that, after a brief increase between the first and second week, over the course of the cycle, volume decreases weekly, to greater extents when intensity increases more dramatically or during unloading weeks, and to lesser extents when intensity increases less dramatically; in the final weeks, volume drops most dramatically, particularly in the final week, which would represent preparation for competition or maximal lift testing.

Intensity increases for 1-3 weeks at a time, at a slower rate each progressive week, followed by a week of significantly lower intensity; each unloading week is higher in intensity than the previous to account for the progressing condition of the athlete. As the cycle progresses, loading weeks become more demanding, necessitating more frequent unloading weeks. Finally, we reach a week of maximal intensity (maximal for the cycle, or maximal for the athlete), likely associated with a final day of maximal lifting, such as competition or testing.

While the details of intensity and volume fluctuation can differ considerably with various cycles, this demonstrates the principles of training variable manipulation and can serve as a starting point for developing different training cycles. For example, we may be able to continue increasing intensity for more than 3 weeks before unloading, depending on the rate of increase, the associated volume and the type of exercises being used. We may even see a period of decreasing intensity and increasing volume, likely during the beginning of a cycle or during a transition phase, to condition an athlete for higher volume training to come. However, over the period of an entire cycle (not considering transition phases and the like), we can be assured that the overall trend will be decreasing volume and increasing intensity.

Planning for the Competition Schedule

As was discussed previously, for non-competitive weightlifters, a long-term plan is generally not necessary, and planning can largely be confined to individual mesocycles, considering work in 4-12 week periods that each emphasize the necessary capabilities. Progress can be evaluated with each period, and the following cycle planned according to the athlete's new condition and needs.

However, for the competitive athlete, the timing of maximal performance and the certainty of progress is imperative, and for this reason, it's necessary to organize training from a longer-term perspective before planning the details of individual cycles. What these terms actually are will depend on the athlete—age, experience and potential will all shape the view of the training plan.

The longest term we can consider would be an athlete's entire career. In a sense, this perspective is unavoidable because we know intuitively many things such as that beginning lifters will need a period of dedicated technique instruction and more general training before transitioning into more specific weightlifting training, and that following this, the athlete will be developed gradually, through increasing specificity and work load, to reach his or her ultimate competitive potential. Planning on this scale is simple and really doesn't require a great deal of time or effort because the details will need to be determined during the course of the athlete's career.

The largest long-term view that will require and allow genuine organization will be the 4-year Olympic cycle. This doesn't necessarily mean that the athlete has the potential to lift in the Olympics. Within national programs, it's a simple way to keep an entire team organized, even with multiple levels of competitiveness; with other athletes, 4 years is a reasonable timeframe with which to work when attempting to create a basic plan for the lifting career. Within this 4-year period, competitions are prioritized, broad goals set, and then general ideas of training set accordingly.

The yearly schedule is the most practical timeframe for long-term planning. Within each year, an athlete will generally participate in several meets; these meets, however, are prioritized and the athlete will train specifically and accordingly peak for only 1-3 each year. Even among these meets for which the athlete trains and peaks there will be an order of priority (e.g. qualifying for a world championship team and competing at the world championships). Legitimately peaking for more meets than this in a year will limit progress over the long term, and is also extremely stressful psychologically. Other meets will be used simply for competition experience, which is invaluable for making the athlete comfortable with the competition environment and protocols, ensuring better performance when it matters; for such meets, the athlete may simply attend without any changes to the training leading up to the event, or training volume and/or weight may be reduced very slightly a few days prior to provide a small degree of preparation.

A year may at first consideration seem like an extremely long period of time, but it suddenly becomes much briefer if we think in terms of training cycles. Four 9-12 week cycles with transition periods will comprise an entire year, for example. It is for this reason that planning becomes so important—it can be very easy to suddenly find there is not enough time to prepare a lifter as intended.

The first step in planning the competitive year is prioritizing competitions in order to determine which will be trained for specifically. Obviously the greatest priority would be given to the competitions of the highest level accessible to a given athlete—for example, a national level athlete will peak for the national championships, but not for a local meet. Exceptions to this would be athletes who need to make the qualifying total for a national meet, and for whom this total represents a maximal or record performance. In these cases, the athlete will need to peak, at least to some extent, for the qualifying meet as well as the national meet if the total is made successfully.

For weightlifters who are not yet at this level of competition, training can still be planned around these events. This is a great way to keep a team of lifters on the same training schedule, despite individual differences in actual training and competiveness, and creates a sense of solidarity and camaraderie. These lifters can peak for these same competition dates, but simply lift in the gym rather than on the competition platform, attempting record lifts. Informal competitions can even be held in the gym for members of the team. This is usually best done the day before or after the actual competition to allow the coach to be present.

From these chosen priority competition dates, we can work backwards in terms of planning. Clearly preceding each competition will be a competition or peaking phase, preceded by a specification phase involving emphasis on the competition lifts. Prior to this specification phase will most likely be a strength and power development phase of some extent.

How long each of these phases lasts will depend on a few factors, such as the strengths and weaknesses of a given athlete, the type of training each athlete responds to best, the timing of the competitions, and the programming style of the coach. Table 8.12 shows an example yearly plan.

Once the yearly plan is completed, the individual mesocycles will need to be organized. When the details of these cycles are actually determined will vary among coaches and athletes. It is generally advisable to create the basic organization of the cycles along with the yearly plan, which would include the goals for each cycle, selection of the primary exercises, and broad volume and loading guidelines. The final details, as well as any necessary adjustments of goals, of each cycle can then be determined as the previous cycle nears completion to allow for consideration of the athlete's present condition and most recent performances.

When creating these mesocycles, it will be ideal to predetermine the content and all details of each week-long microcycle, at least in terms of the primary exercises and the associated variables. This is the planning that will actually manipulate the primary training variables to elicit the desired performance gains. If desired, the finer details of the secondary exercises can be determined or modified week by week, or even daily in some cases, to allow adjustment for an athlete's response to the training. This might involve the choice of speed or technique-oriented exercises and relatively minor modifications of the volume and intensity for lighter training days. However, even if such an approach is chosen, an idea of what will be occurring is necessary, particularly with regard to training volume and average intensity on these days. Without a set of guidelines, there is too much potential for diverging from what would otherwise be a sound plan.

In a similar manner, training can be individualized for multiple athletes on the same competition schedule. Because all athletes will have the same fundamental needs throughout the year—i.e. developing more strength and power, and improving their ability to apply this new strength and power to the

Competitions													
Calendar Week (Mon)	21-Dec	28-Dec	5-Jan	12-Jan	19-Jan	26-Jan	2-Feb	9-Feb	16-Feb	23-Feb	2-Mar	9-Mar	16-Mar
Cycle	Strength Cycle 1												Transition 1
Cycle Week	1	2	3	4	5	6	7	8	9	10	11	12	

Competitions											Nationals - 13-Jun	
Calendar Week (Mon)	23-Mar	30-Mar	6-Apr	13-Apr	20-Apr	27-Apr	4-May	11-May	18-May	25-May	1-Jun	8-Jun
Cycle	Specification Cycle 1											
Cycle Week	1	2	3	4	5	6	7	8	9	10	11	12

Competitions										
Calendar Week (Mon)	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug
Cycle	Active Rest	Strength Cycle 2								
Cycle Week		1	2	3	4	5	6	7	8	9

Competitions								
Calendar Week (Mon)	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct
Cycle	Strength Cycle 3							Transition 2
Cycle Week	1	2	3	4	5	6	7	

Competitions								Americans - 12-Dec	
Calendar Week (Mon)	19-Oct	26-Oct	2-Nov	9-Nov	16-Nov	23-Nov	30-Nov	7-Dec	14-Dec
Cycle	Specification Cycle 2								Active Rest
Cycle Week	1	2	3	4	5	6	7	8	

Table 8.12 Example yearly plan. This year contains two major competitions. Sample cycles have been created in the sample programs section for the first strength, specialization and transition periods in this plan.

competition lifts—the yearly plan and mesocycles can remain largely the same, and function as a template. Using this template for the foundation of each athlete's training, the daily and weekly details can be modified for individual need. This will primarily involve actions such as adjusting volume and selecting different technical exercises to address individual weaknesses. More significant modifications or completely different cycles may be required at times, such as during injuries or when weight gain is required.

Within this training schedule, there should be dates that plan for testing of new records in the competition lifts primarily, and in certain strength lifts—primarily the front and back squat—as needed. This is necessary both for programming, and to support the motivation of the athlete. While advanced athletes will see new records comparatively infrequently, not allowing opportunity for records can be frustrating and disheartening for any athlete. Such testing dates will generally fall at the end of a mesocycle, or during a transitionary phase between mesocycles—any testing needs to be done when the athlete is reasonably recovered and actually has the potential to make new records. The only thing worse for an athlete's motivation than not being allowed opportunities for new records is failing to make new records that are expected.

The Process of Planning

Clearly there are a multitude of considerations to make when planning an athlete's training. In order to navigate this information, it will be helpful for the coach to have a simple protocol to guide program design. This can be viewed simply as a standard order of operations to facilitate the process: Athlete Assessment, Cycle Scheduling, Goal Setting, Exercise Selection, Exercise Scheduling, Volume & Intensity Determination.

Athlete Assessment While athlete assessment is in a sense continuous, it's important at the culmination of each training phase to perform a more formal, or at least more thorough, assessment of the athlete. This involves both objective and subjective measurements of performance. We can use the athlete's actual lift numbers along with an evaluation of the athlete's strengths, weaknesses, and according needs. This evaluation should pertain to both strength and technique, and cover the spectrum of general to specific. For example, we may decide that the athlete is in need of improved leg strength; is in need of improvements in clean technique and strength; and specifically in need of correcting a sloppy turnover of the clean that allows the bar to crash onto his or her shoulders.

Cycle Scheduling Before we can build a training cycle, we of course need to know what its duration can be or needs to be. For competitive lifters, this will involve matching the training phases to the competition calendar (with the exception described below with regard to goal setting); for recreational lifters with no need to conform to outside schedules, this can be a product of other determinations like exercise selection and volume and intensity determinations. Generally we will be working with durations of 4-12 weeks.

Goal Setting No planning can occur without goals in mind. Longer-term planning and related goals have been discussed previously; this goal setting is limited to shorter time frames. We need goals for the entire cycle as well as goals for periods of time within the cycle all the way down to single training sessions.

Goals for a training cycle will be based primarily on the athlete assessment, within the framework of the fundamental goals of the sport, i.e. snatching and clean & jerking more weight, as well as the competition calendar to ensure training phases align correctly with meets. The latter can be considered from either end—we may determine the type of training phase based on the competition calendar, or we may determine the type of training phase based on the athlete's needs. To clarify, if an athlete is in great need of improved strength, we are going to minimize the proportion of specification cycles and focus on strength development cycles, even if it means we spend less time preparing specifically for a competition. In such a case, there simply isn't enough of a strength foundation for specification to be very productive. In the case of a more well-rounded athlete, we will determine the training phase based on the competition calendar to ensure optimal preparation for meets.

Once the general and specific goals for the entire cycle have been determined, more focused goals can be set. This may involve goals for individual weeks, training sessions, or even specific exercises. For example, in one week, we may emphasize snatch technique work, and in the next, jerk technique work. A given training session's goals may be strength work, speed work, or technique work. This doesn't mean a given session is comprised exclusively of training for one of these goals, but simply that a certain goal is being emphasized.

Exercise Selection With the previous two steps completed, we will be able to make informed decisions regarding what exercises will be most beneficial for the training cycle. Again, this will involve both a general and specific perspective. Generally we need to consider the type of training phase—obviously a strength development phase will involve a greater proportion of strength exercises, while a specification cycle will involve a greater proportion of classic lifts and their variants. Specifically we will need to address the athlete's needs as determined by the assessment and goal setting steps. This will involve both decisions regarding what lifts on which to focus, as well as what technical aspects of various lifts will be emphasized. To use our earlier athlete example, a strength cycle would need to involve an emphasis on squatting and cleaning; more specifically, we would need to include exercises that address the turnover of the clean, such as clean high-pulls, tall cleans, muscle cleans, etc.

Part of exercise selection is prioritization. In order to know where to start when constructing the actual program, we need to know what will constitute the foundation. This will generally be squatting and/or pulling in strength cycles, and obviously the classic lifts in specification cycles; in a broader sense, we will consider the most demanding exercises (such as squatting, pulling, snatching and clean & jerking) as foundational and build on and around them.

Exercise Scheduling With these foundational exercises, we can lay down the framework of the cycle. This will simply involve the weekly schedule of these exercises—for example, we may back squat on Monday and Friday, and front squat on Wednesday. Around this, we may schedule clean pulls on Monday to coincide with the most demanding squat session and snatch pulls on Wednesday to coincide with a somewhat less demanding squat session. On Friday we might include snatch or clean deadlifts with a lighter squat session because we have a rest day following; or we might want to reduce the workload and drop the pulls entirely, or use partial pulls or shrugs instead. With these three days becoming our most demanding, we may add in a couple more strength-oriented exercises, determining the days in between to consist of more technique and/or classic lift related training.

In this manner, we can continue layering on exercises until we fill out the schedule appropriately with the exercises we've chosen. How many exercises are used each training day or session will depend on factors such as how much volume it's determined an athlete needs or can tolerate, the type of exercises selected, and the volume and intensity of each exercise. A general rule of thumb is 3-4 exercises per training session, excluding less demanding supplementary exercises like core training. Of course, the weekly schedule doesn't necessarily need to remain the same for the duration of the cycle; often it will change somewhat as the cycle progresses for reasons such as accommodating reductions in volume and increases of intensity, or to shift emphasis among the cycle's goals.

Another detail that should be kept in mind when laying out the exercises in a program is how each flows with the following and preceding exercises with regard to time. For example, moving from snatches to snatch pulls will be quick because the lifter is already warm for that movement and will be able to start at a significant weight. In contrast, moving from jerks to squats will typically take longer because the dissimilar movements will require warming up for both. When trying to incorporate maximal training in a fixed period of time, taking this into account can allow much more effective planning.

Volume & Intensity Determination Finally, to the exercise schedule we need to assign volume and intensity prescriptions. This will be done according to the guidelines discussed previously in this chapter, creating a progression that will drive the adaptation we want, but that the athlete can tolerate.

This process, while certainly involving chronologically distinguishable steps, is unavoidably nebulous to a degree. That is, each step cannot necessarily be completed before advancing to the next, and each new step may require adjustments to previous ones. It should be considered a progression from general to specific, with continual revision in light of graduating specificity. Over time, each coach will develop a better sense of how to begin and progress through program design. Additionally, he or she will accumulate training cycles that can be used as templates for future cycles, making the process far easier and quicker.

Intuitive Training

In some circumstances, numerical prescriptions, at least for certain variables, will be unnecessary or undesirable, such as at times during the training of certain beginners, as mentioned previously. The coach may instead simply prescribe exercises and with a general idea of what he or she wants accomplished, determine daily how heavy the athlete lifts, possibly also altering rep and set numbers. With such an approach, the athlete will be able to train according to his or her present condition in terms of recovery, energy and psychological preparedness. On days the athlete is tired and under-recovered, his or her training can consist of a small volume of lightweight technique work; on days when it becomes clear during his or her warm-up lifts that he or she is in a condition to perform well, the coach can take the athlete up to possibly personal record attempts. This approach is effective for newer lifters whose abilities are changing rapidly and for whom rigid weight prescriptions will often limit progress more than encourage it. This is also a chance with new lifters to feel out their tolerance for training volume to establish a baseline that can be then used later for more detailed planning.

This type of training is not appropriate at all times because of the difficulty in ensuring progression over the long term, or preparation for performance on a certain date, without planned workload variation. The spirit of the approach can be applied to all training. As was mentioned previously, there will be times at which prescriptions will need to be adjusted without prior notice based on an athlete's condition. The principle of the prescription can remain without the numbers. For example, if a session calls for a heavy snatch, but the athlete is clearly not capable that day of the prescribed weight, he or she may lift up to a weight that is certainly heavy for that day. This allows the programming to still function, but prevents overworking the athlete counterproductively when it's clear his or her recovery is not keeping pace with the training.

Non-Specific Training

Often questions arise regarding the addition of other types of training in conjunction with weightlifting, whether in terms of their necessity or viability. As with all physical disciplines, specificity in training is required for optimal development. Any training other than that which specifically prepares the athlete to snatch and clean & jerk as much weight as possible a single time has the potential to limit the athlete's ability to do so. How this other training interrupts the specific weightlifting abilities will vary depending on the nature of the training; for example, it may be as simple as requiring a portion of the athlete's recovery capacity needed for weightlifting-specific training, or it may be a problem with competing physiological adaptations such as functional fiber-type conversion of higher-threshold motor units that limits their potential rate and magnitude of force production.

This is not to say that the athlete must avoid any other training to be at all successful—merely that the more the athlete wishes to use of his or her genetic potential for weightlifting, the more specific his or her training must be.

Non-specific training will occur in two basic cases: The preparation of younger and/or beginner athletes for future sport specialization, and the correction in more advanced athletes of particular weaknesses or problems. In any case, however, if weightlifting is the chosen sport, even such work, while being classified as non-specific, can be approached with weightlifting in mind to ensure its suitability in the long term. For example, a GPP program for a future weightlifter need not contain long duration endurance work—this will not improve the athlete's health, fitness, or preparation for the rigors of future weightlifting training.

THE BULGARIAN METHOD

The Bulgarian training method, created and practiced very successfully by former Bulgarian national coach Ivan Abajiev, is a unique approach to weightlifting that appears to be extremely effective with proper implementation with the appropriate athletes. In short, this type of training consists of frequent, heavy, low-volume training limited exclusively or nearly so to the classic lifts and the front and back squat. Ideally, training is spread out among multiple sessions throughout the day, often each limited to only one or two exercises. This approach allows athletes to perform multiple times daily at very high average intensities. The philosophy recognizes the unique ability of the competition lifts themselves to serve as the ideal training exercises.

To greatly simplify, Abajiev explains that every lift signals genes to produce proteins in the muscles specific to that performance. For example, a snatch at 60% will create different gene signaling than a snatch at 95%. The athlete's training actually causes the body to reconstruct itself to be best suited for that exact nature and magnitude of performance. Abajiev states that lifts above 95%, and especially 97%, are what's necessary to produce the adaptations required for optimal weightlifting performance (These are percentages of maximal effort at any given time, not percentages of a lifter's current best lifts). Further, the specificity of adaptation is critical, and for this reason all training must resemble competition as much as possible, from exercises, the reps, the rest between sets, to the psychological arousal. In short, Abajiev's training protocol involves only the snatch, clean, jerk and front and back squats, for singles and possibly doubles at times in the squat, for daily maximal efforts. He expects that each day following lifts that actually reach maximal, very near it, or over it, the lifter will have reduced results; although, with conditioning, these results will still remain very close to maximal (for example, he claims that in the period that Naim Suleymanoglu was clean & jerking 190kg, he never lifted less than 180kg in training). But despite the small and expected fluctuations in actual weights, every training day remains a maximal effort.

It can be argued that this represents the optimal approach to the training of weightlifters. Weightlifting is very unique in the sense that the competition events are themselves training exercises—this allows a specificity of training not commonly possible. The snatch and clean & jerk develop the physical traits of strength and power upon which the sport is based, and no exercise provides more specific adaptation for these lifts than the lifts themselves. There are without a doubt traits that cannot be maximally developed and refined without training the competition lifts extremely heavily—no amount of strength work and comparatively light classic lift work will allow the optimal development of an athlete's ability to snatch and clean & jerk maximal weights.

In addition to the obvious advantages of such an approach to training described above, this method has the additional benefit of greatly simplifying programming. As can be seen in this section of the book—which is by no means an exhaustive study of programming—programming of the more traditional nature entails expansive volumes of detail, which can be paralyzing for many, and often disruptive to progress. The Bulgarian method, and iterations thereof, reduce the involved planning to a remarkable degree, while possibly improving training response. It's hard to imagine a coach or athlete who wouldn't appreciate this savings in time and energy.

Even if it were agreed that the Bulgarian method is the ideal approach for the development of weightlifters, some qualifications warrant mention here. First, it should be clarified further (although it seems obvious) that this method is very specifically intended for weightlifters—that is, athletes whose only intentions are to become better at snatching and clean & jerking, whether competitively or not. While the methods described below can still be applied in a sense to the actual training of the snatch and clean & jerk within a program for a non-weightlifter athlete, the overall approach to training is not appropriate.

In certain circumstances, the Bulgarian method in its purest form will not be appropriate even for weightlifters. Most notably is for beginning weightlifters who do not have an established strength or technique base, and on this particular exception, Abajiev himself agrees. The effectiveness of this type of training is predicated on the ability of the athlete to snatch and clean & jerk at a level of skill and loading that makes the lifts demanding of the athlete's capacity. If an athlete is, due to technique deficiencies, unable to perform the lifts at such loading, this approach will not be as effective because it will fail to elicit great enough gains in strength and power. Similarly, if an athlete is not possessed of a reasonable level of basic strength, the snatch and clean & jerk will be considerably limited in loading, again failing to elicit adequate gains. In fact, it appears that the Bulgarian method may only be effective (and even possible in the long term) for lifters with excellent strength levels, i.e. very high squat numbers. In these cases, the athletes are snatching and clean & jerking weights that are not such large percentages of their absolute strength, despite being large percentages of their classic lift maximums, and consequently the training is not as taxing systemically. A lifter who clean & jerks 80% of his best back squat will have a very different experience from one who clean & jerks 70% of his best back squat.

Beginning lifters are better off with programs that involve more basic strength lifts such as squatting, pulling and pressing variations while continuing to refine classic lift technique and increase its loading. As the athlete improves over time, emphasis can shift gradually to the classic lifts until a more Bulgarian approach is being used.

Finally, it will often be beneficial for even more advanced lifters to spend at least occasional periods of time emphasizing strength lifts and volume over the classic lifts. For some, this variation will be necessary simply to combat mental stagnation and maintain motivation. More importantly, it's unusual for athletes to develop and improve in perfect balance. Invariably, athletes will develop relative weaknesses, which will begin to limit lift performance if not corrected. Minor weaknesses, particularly of a technical nature, can be addressed within a Bulgarian type program, but more significant weaknesses will require a more dramatic change in programming.

For many lifters, an effective approach will be essentially an alternation between Bulgarian-style cycles and strength-emphasis cycles. The relative durations of each will vary according to each athlete's needs, but this approach can help prevent the development of weaknesses as discussed previously as well as avoid potential psychological stagnation before it strikes. This not much different than the basic yearly approach to training discussed in the previous chapter—that is, laying a foundation of strength and power, and then gradually improving the athlete's ability to apply that strength and power to the competition lifts. In fact, the sample specification phase provided in the book is very much a Bulgarian-style program.

How well an athlete responds to this type of training varies somewhat, although it's difficult to find an athlete who will not be successful with appropriate implementation. Like any training, an athlete will need to become conditioned to this approach. Those switching from a more traditional training style may take a number of weeks to begin feeling comfortable and successful. For this reason, it's suggested that transition phases are used to allow athletes to more gradually adjust rather than simply dropping them right into a full-scale Bulgarian-style program.

Basic Principles

There are a number of ways to program in the spirit of the Bulgarian method without following Abajiev's pure model. Following are a few examples to provide a sense of what is possible. No single approach is ideal for all athletes at all times, and the following is provided as description of what has worked rather than prescription of what will work. Shifting among iterations is a simple way to achieve variation in a system of limited variables. All of the following examples are presented as single daily training sessions because this is what will be most common. In any case, these training days may be broken up into multiple sessions without changing the total amount of work if the athlete desires and is able; if an athlete is able to train twice daily and would like to experiment with actually increasing the total workload by adding more training sessions to the week, a progression is described below.

Bulgarian Models

There are a number of ways to program in the spirit of the Bulgarian method. Following are a few examples to provide a sense of what is possible. No single approach is ideal for all athletes at all times, and the following is provided as description of what has worked rather than prescription of what will work. Shifting among iterations is a simple way to achieve variation in a system of limited variables. All of the following examples are presented as single daily training sessions because this is what will be most common. In any case, these training days may be broken up into multiple sessions without changing the total amount of work if the athlete desires and is able; if an athlete is able to train twice daily and would like to experiment with actually increasing the total workload by adding more training sessions to the week, a progression is described below.

Heavy Days

Most commonly there will be 3 heavy days each week consisting of the snatch, clean & jerk, and probably the front or back squat. There are a few different ways to make this happen.

Arguably the most effective is to take each classic lift up to the heaviest single possible that day—establishing a maximum lift for the day. There are two basic ways to do this. The first is to work up to the heaviest lift of the day as one would normally, or as one would when warming up for competition attempts. In this case, the goal is simply establishing a maximum for the day while spending as little time as possible on sub-maximal lifts.

Occasionally, the maximal single itself will be deemed adequate for the workout depending on the determined volume parameters and the actual loading achieved. However, following this daily maximum, the athlete can drop down to a given percentage of that single—typically 85-90%—and perform some number of additional singles at that weight. These back-off sets can number between 1 and 10. Generally, the more advanced the lifter, the fewer back-off sets will be employed because the heavy single will have been more taxing, and volume will consequently need to be controlled. A safe starting point is 3 sets at 85-90% of the heavy single, or something like 1 set at 90% and 1-2 sets at 85%. The intensity and volume of these back-off sets can also be intentionally modulated during a 2-3 week cycle to allow more recovery as the cycle proceeds, or to build up volume as the cycle increases to help improve an athlete's capacity.

Another possibility is intentionally slowing the increase to the maximum by taking a longer series of smaller weight jumps than would normally be employed. This has a similar effect to performing the above-described back-off sets following a heavy single. This approach is often better for less technically proficient lifters, however, because it will often make such lifters more consistent from set to set, and result in both a greater number of productive lifts, as well as a higher maximum lift. This may look like anywhere from 8-20 total singles. It may also be decided to stop at a certain weight near the athlete's maximum and repeat it for a few singles. The basic idea of this approach is to have the athlete make as many quality lifts as possible at the heaviest weights possible on a given day.

With either approach, it is both typical and advised to use slightly fewer total sets for the clean & jerk than the snatch because of its greater loading and more taxing nature.

Finally, loading and volume can actually be prescribed for the classic lifts if the coach has a plan to peak the athlete at a certain date, or simply wants to attempt to maintain more control. This might look like a certain percentage each week with an undulating progression over 3 or more weeks, or used as a way to maximize intensity on 1 or 2 days of the week and limit intensity 1-2 other days in an effort to manage recovery. Volume should also be controlled in these cases to maximize progress. For example, intensity can be increased with static or decreasing volume, and then the volume increased at that intensity range, and such a stair-step progression used (obviously with periodic unloading, primarily or exclusively of volume) over the course of a cycle to build up the athlete's work capacity. This kind of planned manipulation is demonstrated in the sample specification cycle provided in the Sample Programs chapter.

When lifting the daily maximum snatch or clean & jerk, opinions vary regarding how many attempts should be allowed at a given weight before abandoning it and moving on. This should be determined with consideration of a few factors. First is the training experience and abilities of the athlete. The more advanced the athlete and the better conditioned to this type of training he or she is, the more maximal attempts he or she will be able to manage productively. However, less experienced athletes will also be able to manage a large number of maximal attempts because their lifts are limited more by technique than strength, and consequently the attempts are not as systemically taxing.

In any case, the decision to allow continued attempts at a given daily maximum requires confidence that a good lift is possible. This will mean that the lift is actually within the athlete's abilities in terms of strength and power, and that the preceding misses were a result of technical imprecision or mistakes. If an athlete is attempting a maximal lift and it is clear the necessary strength and power are simply not there—either in terms of the athlete's absolute abilities or present abilities as limited by training fatigue—there is no benefit in repeating the lift, and there is risk of injury.

In general, 3-4 can be considered a maximum number of attempts to allow at a given weight. In some cases, it will be clear that the lift is not going to happen that day after a single attempt. In other cases, the attempts will get progressively better as the athlete continues—in such cases, further attempts can be allowed until the lift is made or this trend reverses.

Following snatches and clean & jerks, the athlete may front or back squat. Squats can be loaded independently of the snatch and clean & jerk, or loaded correspondingly. They too can be taken to a heavy single, with or without back-off sets. Loading can be prescribed as a percentage of the athlete's maximum squat in cases of prescribed snatch and clean & jerk loading as described above; this can also function to control the athlete's workload and steer classic lift performance when using daily maximums. For example, the more work the athlete does with the squat, the less likely he or she is to snatch and clean & jerk as heavily in whatever period of time is affected by the fatiguing effects of that squatting. If we want an athlete to snatch and clean & jerk heavier on a certain day, we can back off squatting somewhat in the 2-3 days leading up to it.

Squat loading with this kind of programming is sometimes based simply off the day's clean & jerk weight. For example, if the athlete clean & jerks to a heavy single, he or she may then front squat the weight used in that heavy single for 2-3 sets of 1-2. The problem with this approach is that it assumes a very particular relationship between the athlete's classic lifts and squat. Athletes who clean & jerk large percentages of their squats will find this kind of loading too demanding and even impossible in some cases, while others in possession of a larger margin of strength will find it too easy.

We can still use the snatch and clean & jerk performance of the day to determine the weight to be used in the squats by using the same percentage of maximum. That is, if the athlete's heavy single clean & jerk for the day turns out to be 90% of his or her maximum, we can squat at 90% of the athlete's maximum squat. Reps and sets can be adjusted appropriately for both the percentage and the pre-determined volume parameters. For example, 80-85% may be 2-3 sets of 2 reps; 85-90% may be 1-2 sets of 2 reps; and over 90% may be 1-3 singles.

Light Days

The light days between heavy days can be constructed in a number of ways. In any case, they need to be light enough to allow the athlete to recover adequately for the next heavy day, but heavy enough to not only keep technique consistent, but to help maintain neurological preparedness. In a sense the idea is to make snatching and clean & jerking up to a certain threshold a routine activity, and this threshold will be used on these light days to keep the athlete functioning at a high level without overtaxing his or her recovery capacity.

Conventional programming on these days uses lighter snatches and clean & jerks, power snatches and power clean & jerks, or a combination thereof. Loading for these exercises can be based on a number of things, such as the previous day's classic lift heavy singles, the previous week's best, a targeted range to keep loading and volume of the week to a planned quantity, or based on percentage of maximum. In any case, 80% of maximum should be considered the threshold mentioned previously—that is, 80% of maximum for a series of singles should be the heaviest the athlete lifts on a light day.

For example, a light day may consist of 4-8 snatch singles at 80% and 3-6 clean & jerk singles at 80%; or it may be a similar number (or slightly greater number) of power snatches and power clean & jerks at 80% of the athlete's maximum power lifts. How many sets are performed will depend on the needs and capacity of the athlete, as well as what kind of volume is appropriate at the time.

The weight of the lifts on the light days can instead be determined relative to the previous day's or even previous week's best lift. For example, rather than lifting 80% of maximum, the athlete may lift 80% of the previous day's heavy single. The advantage of this is of course more accurately associating the training with the athlete's current performance; the drawback is that we are not able to maintain the bottom threshold discussed earlier to the same precision, although it will achieve a similar effect.

A bigger problem arises if we are basing the weights of power snatches and power clean & jerks on previous heavy single weights, similar to the problem we see when basing squat weights on the classic lift weights. We will usually see athletes with power lifts of about 80-85% of their best full lifts, so we can create a percentage guideline in consideration of this. However, when these don't align as expected, we run into lifts being either too heavy or too light. Obviously this can be corrected fairly easy on an individual basis, just not globally.

We can adjust the loading and volume daily to stay within pre-determined average intensity and volume parameters for a given week, if they exist. Adjusting weights and sets up and down will balance out the loading of the week's heavy days.

The simplest approach is to prescribe the power lifts at 75-80% like we would program the full lifts on light days. This again is an effort to maintain a performance threshold.

These light days are also an opportunity for technique work. The day can be comprised of whatever classic lift variations and drills are deemed appropriate, or can be a combination of one classic or power lift, and technique work for the other classic lift. For example, an athlete who needs work on the aggressiveness of the second and third pulls of the snatch might perform a few sets of muscle snatches, then a few sets of snatch high-pull + power snatch, and finally a few sets of power snatch + snatch. All of this would be done with relatively light weights to maintain the primary goal of the day, which is allowing recovery for the next. Following this, the athlete might do a few sets of clean & jerks or power clean & jerks at 75-80%.

Some athletes may find it effective to squat on these light days as well. This again would serve a similar purpose to the lighter classic lifts—that is, maintaining a neurological performance threshold. This needs to be implemented cautiously, however, as squatting will be more taxing than the classic lifts. Volume should be kept relatively low—as little as one single with the day's heaviest weight—and the weight likely between 75-85%. When adding squats in this manner, an athlete will most likely experience an initial reduction in classic lift performance until he or she becomes accustomed to the additional workload. For lifters for whom this is obviously too much, but who need focus work on front squats in particular (for example, an athlete who has difficulty maintaining posture in the front squat and/or clean), squatting can still be done on these light days by keeping the weight even lighter—as little as 60%—for doubles or even triples and two-three sets. This will then serve more as movement and posture training than strength training, the value of which is not to be underestimated.

Auxiliary Work

Additional exercises may be used throughout the week to address core and direct lower back work in particular. As will be discussed in greater detail in its own chapter, core training can be performed each training day. Volume and intensity of core work can be varied to correspond with the rest of the day's training.

Direct back work such as good mornings and stiff-legged deadlifts may also be used by athletes in need of improved erector strength. Such exercises are best performed at the end of heavy days because heavy direct back work on light days can interfere with lift performance on the following heavy day. Less intense back work can be added to light days if the athlete finds it isn't disruptive.

Other exercises such as pull-ups can be performed on light days as well, again assuming that this doesn't interfere with the following heavy day's lifting. In any case, auxiliary work needs to be kept to an absolute minimum to not exceed the necessarily limited volume of this type of training.

All Heavy All the Time

As described previously, Abajiev's actual training protocol was very simple and involved taking each lift in singles to a maximal effort. These max attempts of course will not always be at the athlete's absolute best, and at times may be quite far from it. But over time as the athlete becomes conditioned to the training, the intensities of his or her lifts will become more consistently near and above max.

Within this framework, variations in training can still be created in order to modulate volume or even focus on weaknesses. If we have a system of maximal singles every day, we can adjust the volume by adjusting the number of training sessions in a day. This can mean actual separate sessions, such as a morning and afternoon session, or it can mean returning multiple times to a lift in a single session. For example, if the snatch is a lifter's weakness, a session may be snatch, clean & jerk, squat, and snatch again. For lifters with weak legs, all sessions may start and end with squats, and squats can even be performed in between the snatch and clean & jerk. In this manner, the training is not changed with regard to intensity and repetitions, but the volume of a given exercise is increased.

Generally no unloading periods are used with this approach, as the idea is to force the body to adapt to the training rather than force the training to adapt to the athlete. The athlete will still of course encounter

SPECIFIC POPULATIONS

Women

The subject of women and athletic training is one that attracts a considerable spectrum of opinions. Until this point, there has been no distinction within this book between men and women, and intentionally so. Overwhelmingly, the training of men and women need not differ, as both are in essence working with the same pertinent anatomy and physiology. In terms of psychology, there are arguably some general differences that can be effectively addressed with respect to coaching, but ultimately an athlete is an athlete, regardless of gender, and should be treated with the according individual attention and respect.

The most significant difference between men and women is the respective levels of anabolic hormones. Men on average produce much higher levels of testosterone, allowing greater extents of hypertrophy and strength. There are of course exceptions to this, and some women possess hormonal levels that allow degrees of muscularity and strength beyond what are achievable by some men.

It has also been posited that the neurological elements of strength, speed and power in women have a somewhat lower ceiling than in men, and this accounts for performance differences not attributable to disparities in actual muscle mass. Essentially this notion claims that the typical woman is slightly less capable of reaching the ultimate morphological potential of the muscle. This would affect top-end strength and power, and would also mean that somewhat higher volumes of training at a given percentage are possible for women because of the slightly lower reach toward actual maximal effort. Again, however, there is considerable variation among individuals, and there are plenty of women whose abilities in this respect exceed those of many men.

Testosterone levels in women are elevated maximally two-three days following the onset of menses. For women using birth control, the pill schedule can be altered so that this testosterone peak coincides with major competitions. However, it is advisable to stagger the schedule so the competition date falls after menses and the cessation of any associated bloating and cramping; the performance-limiting effects of these elements can be more than enough to offset any benefits of elevated testosterone levels. Whether or not this kind of manipulation makes a noticeable difference will vary among athletes, and it is suggested that women experiment with it outside of competition first.

These minor issues notwithstanding, men and women respond and adapt to training in the same manner, and consequently no universal differences are required in program design. As is always the case, athletes must be trained as individuals, and their particular responses to training used as the ultimate guide to program design.

With regard to coaching specifically, it has been claimed (by female lifters; this author would never be so presumptuous) that the manner of communicating needs to differ somewhat between men and women. Because women tend to be more emotional where men tend to be more rationale, the same kind of repetitive technical coaching that men seem to respond well to can sometimes become extremely the problems that encourage back-off periods traditionally—he or she will reach a point, usually after 2-4 weeks, at which lifting heavy seems impossible and motivation dwindles. For this training approach to be successful, however, the athlete must work through this period without backing off. Loading may fall considerably below absolute maximum, but the athlete's effort must remain maximal—intensity is entirely relative. If the athlete can continue pushing through this period, which may last as much as a few weeks, the body should adapt and the level of training recover and once again begin improving. Caution must be taken with regard to joint injuries particularly during this period as athletes will be less precise and more likely to find themselves in structurally unsound positions. The athlete must monitor this carefully and be active in recovery efforts.

Increasing Training Frequency

The above models describe single daily training sessions 5-6 days each week, or the total work of these sessions broken up into more than one session per day. Often we can further improve the effectiveness of Bulgarian-style training by increasing the number of weekly training sessions. This will necessitate more than one session in a day on at least some days of the week. Increases of training frequency should be done incrementally with each athlete to allow proper accommodation rather than overtraining. Following is a possible protocol for increasing training frequency. This continues 6 training days each week. Some have been successful training 7 days each week, but the ability to do this from a practical standpoint is so limited that we will continue assuming 6 days to be maximal. It should be clear enough from the previous model descriptions and the following progression how to incorporate a seventh weekly (light) training day if desired.

How long an athlete needs to remain at each stage will vary. This is something that should be determined individually based on how an athlete responds. While such increases in weekly training sessions offers the potential for improved results, in no way does it guarantee it. There will without a doubt be athletes who are unable to handle such training, due to reasons such as genetic capacity for recovery and adaptation, the burdens of work, family and other responsibilities, or poor sleep and nutrition habits.

With all stages, there should be a gradual increase of intensity and volume to their ultimate levels for each added day. This will encourage adaptation rather than overtraining, as well as provide more opportunity for the evaluation of progress and recognition of poor response before overtraining becomes serious. For example, when progressing to Stage 2, the morning session power lifts may be as little as 65-70% for 3-5 singles initially, progressing as tolerated to 75-80% for 5-8 singles. Progressions to each new stage should be made similarly, with 80% of the athlete's maximum power or full lift generally considered the heaviest allowable weight for a light training session. Ultimately on light days the power lifts might be done for 3-8 singles and the full lifts for 1-6 singles.

Power / Light This describes a training session involving the power variations of the classic lifts up to 80% of maximum, and may involve light squatting, also at a maximum of 80%.

Full / Light This describes a training session involving the classic lifts at up to 80% of maximum, and may involve light squatting, also at a maximum of 80%.

Full / Heavy This describes a training session with the week's heaviest classic lifts, whether with prescribed loads or daily maximums. This session will, except in rare cases, also involve heavy squatting.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Stage 1						
PM	Full / Heavy	Power / Light	Full / Heavy	Power / Light	Full / Heavy	Power / Light
Stage 2						
PM	Full / Heavy	Full / Light	Full / Heavy	Full / Light	Full / Heavy	Full / Light
Stage 3						
AM	Power / Light		Power / Light		Power / Light	
PM	Full / Heavy	Power / Light	Full / Heavy	Power / Light	Full / Heavy	Power / Light
Stage 4						
AM	Power / Light	Power / Light	Power / Light	Power / Light	Power / Light	Power / Light
PM	Full / Heavy	Power / Light	Full / Heavy	Power / Light	Full / Heavy	Power / Light
Stage 5						
AM	Full / Light	Power / Light	Full / Light	Power / Light	Full / Light	Power / Light
PM	Full / Heavy	Power / Light	Full / Heavy	Power / Light	Full / Heavy	Power / Light
Stage 6						
AM	Full / Light	Power / Light	Full / Light	Power / Light	Full / Light	Power / Light
PM	Full / Heavy	Full / Light	Full / Heavy	Full / Light	Full / Heavy	Full / Light

Table 8.13 Example Weekly Session Increase Progression

frustrating to women because they may feel the coach is disappointed or upset, when in reality he or she is more likely simply emphasizing a certain technical element in need of improvement.

While this may be true in general, it is a great disservice to female athletes to assume they require any special treatment, and divergence from what is necessary to help improve their lifting is in a sense crippling them, both in terms of performance in the lifts, and in future coaching and performance situations. The coach simply needs to pay close attention—as he or she does with any athlete, male or female—to how a particular athlete responds to coaching of various manners, and adjust accordingly. Adjustment, however, does not mean coddling of fragile athletes—such athletes are responsible for doing their part to toughen up and meet the coach halfway in the effort.

Such adjustment for certain female lifters is often as simple as providing more encouragement and positive reinforcement along with any technical coaching. That is, where men are less likely to be upset by, or even notice, a lack of frequent outright praise and tend to be more receptive to continual technical correction without associating it with emotion, women tend to respond better to such technical correction when accompanied by consistent praise. There will never be a lift that is entirely wrong, no matter how many elements the coach may want to correct—it's not hard to find one good point to emphasize before making a correction.

Masters

Because the master categories in weightlifting begin at age 35, there is a very large range of ages falling into this classification, and consequently any discussion on training as a master lifter is necessarily vague. Fortunately, there is little that actually needs to be discussed.

The single most important issue with regard to master lifters is a decreased (and decreasing) ability to recover from and adapt to training. Testosterone and growth hormone levels are significantly lower (often to the point of encouraging medical intervention) than during earlier training years, and this unavoidably limits maximal strength, speed and recuperation from training.

There are options for improving hormone levels such as bio-identical hormone replacement for testosterone, as well as growth hormone or growth hormone secretagogues. This is a touchy subject, because use of these substances is not legal for competitive lifters, although is perfectly legal otherwise, and is in fact becoming quite common. It should be kept in mind that such hormone intervention does not elevate anabolic hormone levels above what is considered the medically normal range, and consequently should not be equated with anabolic steroid use or abuse, which provides an advantage surpassing, often dramatically, what could ever be achieved naturally. Ultimately, the decision of whether or not to engage in such hormonal intervention is one for each athlete and his or her physician.

In addition to less than optimal hormone levels, the master will often be dealing with decreased flexibility, decreased mobility due to past injuries and general wear, and increased time for recovery from inflammation and other aggravations. The treatment of injuries is best left to medical professionals with experience treating athletes. Flexibility will need to become and remain an emphasis. While arguments exist regarding whether or not aged individuals can genuinely increase flexibility, there is no arguing that it's far easier to maintain flexibility than to re-establish it. Anecdotal evidence suggests compellingly that older athletes can certainly improve their flexibility, particularly if recovering former levels—in any case, stretching certainly can't hurt. The same approach to flexibility discussed later in this book applies to the master; there may simply be a need for greater volume and frequency of stretching. In cases of extreme reductions of flexibility, or particularly limiting injuries or joint conditions, athletes can consider the split variations of the snatch and clean, or employ only the power variations.

Arguably the most difficult element of training as a master is the psychological aspect of accepting a reduction in training and performance capacity. Failure to accept it is often at the root of injury and retrograde performance as athletes attempt to continue training with the same kind of intensity, volume and frequency they did as younger athletes.

Depending on age and experience, master athletes may find that they can only manage 1-2 relatively heavy training days each week, with 1-2 more light training days each week; some may find that they perform best training as little as 2 total days each week. In other cases, lifters may stay in the 80-85% range for the overwhelming majority of their "heavy" training, only exceeding this occasionally to prepare for a meet or test a max. Most will also find that it will be necessary or beneficial to place more emphasis to strength work than classic lift work.

In any event, volume will certainly need to be kept lower than for younger athletes. What works will vary greatly among athletes, so each will need to evaluate his or her own training and make adjustments as needed. The training journal is invaluable for such a process. Notes should not only include the details of each training session, but also comments regarding nutrition, sleep, bodyweight, fatigue, and enthusiasm for training. With this data, the athlete can make modifications to training appropriately to improve recovery and adaptation.

At a certain point, the goal of training will necessarily shift from increasing performance, to maintaining it, and eventually to simply trying to slow regression.

Youth

Starting weightlifters at a young age is ideal for producing elite athletes in the long term. Such early starts are one element of the great success of many national sports programs. In the US, however, it's comparatively unusual to see legitimate athletic training at young ages, particularly in the sport of weightlifting—in part because of the sport's obscurity, and in part because of the popular notion that training with weights is dangerous for youths.

The primary concerns with regard to the sport's safety are joint damage and limitations on ultimate bone growth. Damage to growth plates and relatively immature cartilage can in fact create problems, but such damage results from poor programming and improper training—neither is inherent to training with weights. In fact, proper training will improve bone density (among other characteristics like motor control, balance, mobility, etc.), and it's not difficult to find examples of athletes who began weightlifting at very young ages who, as adults, have not only not had any joint development problems, but have grown to heights greater than either parent, often significantly.

Part of the myth that weightlifting stunts growth can be attributed to flawed logic, similar to that which persists with regard to gymnastics. Because elite gymnasts and weightlifters in lighter weight classes tend to be smaller in stature, many people assume that their training has limited their growth. This is a classic logical fallacy—*post hoc ergo propter hoc* (after this, therefore because of this). In other words, because following sport training these athletes remain short, it is assumed (somewhat understandably) that this training was causative of the athletes' stature. This chronology, however, in no way demonstrates causation.

Quite simply, sports such as weightlifting and gymnastics are very dependent on the leverage systems of the body. Because shorter athletes have the advantage of better mechanics, they excel in these sports. In other words, the demands of the sports naturally select for shorter athletes. It's not that the sport has kept the athletes short; it's simply that taller athletes are unable to continue to elite levels because their mechanics don't allow for the necessary performance. (Interestingly enough, no one has ever argued that playing basketball causes athletes to grow to greater than average height, even though the reasoning is identical.)

While in gymnastics stature is always a factor both because the events are all based on movement of the body alone and there are no weight classes, in weightlifting, heights vary dramatically because of the separation of athletes by their bodyweights. While shorter athletes lift less weight in absolute terms, they lift considerably more than their taller counterparts relative to bodyweight because of the aforementioned leverage advantage. The heavier weight classes of weightlifting at the elite levels are certainly not lacking in men and women of above average height. While this does not prove weightlifting does not stunt growth, it does at least suggest compellingly that any potential negative effects are not guaranteed.

All of this being said, there is undoubtedly a need to approach the training of young athletes in a manner different from their fully physically mature counterparts.

Pre-adolescents have not yet developed the necessary hormonal status to build significant muscle mass, so this particular goal can be de-emphasized at this stage. As these athletes reach puberty, their hormonal status will begin shifting, and responses to training will improve considerably. The late high school and early college years are typically the most productive for hypertrophy because of the high levels of testosterone, and this can be taken advantage of with proper planning. Bear in mind that chronological age is not the ideal indicator of an athlete's status—biological age, based on growth and maturation, is what must be considered.

The primary theme of youth weightlifting training should be conservatism. It is not necessary, not beneficial, and somewhat risky to push young lifters to extreme performance in terms of specialization, loading, volume and training frequency. In short, all training of young athletes should be approached with an increased sense of caution and care.

The development of technical proficiency should be the first priority for young weightlifters. This is the ideal time for such training, as it will prevent athletes from developing poor habits that will be extremely difficult to correct as the athlete ages due to the volume of repetition that will have occurred by later in their careers. Because training for physical characteristics like hypertrophy and strength will be limited in effectiveness early on, there will be more time available for technique work. Of course, emphasizing proper and consistent technique and establishing proficiency as early as possible will also greatly reduce the risk of injury. Technique instruction and practice (of general and specific strength lifts in addition to the competition lifts) can be extended to several months in duration with little loading while the athlete also engages in non-specific physical activity.

Another consideration to be made with respect to training young athletes is that it will be extremely rare to find athletes of this age who are focused and dedicated to the same degree as the coach. With national sports programs, coaches are working with youths who are training consistently and with dedication due to both cultural and practical reasons, allowing detailed long-term planning for athletic development. In the US, coaches simply don't have the luxury of a steady supply of dedicated young athletes, and accordingly, programming and training will need to remain relatively flexible. The majority of US weightlifters enter the sport at older ages and with backgrounds in other sports.

All young athletes should be closely monitored and supervised by qualified coaches to ensure safety on a daily basis, as well as in the long term.

Specialization

Sport specialization is not necessary or beneficial at too early of an age. In fact, it can be problematic by limiting or skewing physical development. National weightlifting programs will typically begin specialization for athletes between about 10-14 years of age. Prior to this, more generalized training is undergone to establish a breadth of physical capacities and ensure no particular weaknesses develop. This general training would be similar to any GPP program, but simply adjusted appropriately in terms of intensity, volume and frequency. Ideally, such training will also include recreational sports as vehicles for developing traits such as motor control and joint conditioning, as well as competitive spirit and team dynamic.

As an athlete approaches the age of 12-14, more specificity can be brought into the program and general training reduced accordingly (again, this decision should be based more on biological age than chronological age, as well as the athlete's training experience at the time in question). This will involve an increase in basic strength training and technique development with the snatch and clean & jerk. How quickly an athlete moves into and through such a phase will depend on his or her physical maturity, skill level and training experience. The athlete may remain in this transitionary phase for as much as a year or more before beginning to legitimately specialize in weightlifting.

Loading

The loading of exercises for young lifters should generally be kept somewhat lower than their adult counterparts. These athletes are able to progress in terms of strength with training of lower intensity, and lower intensity offers less risk for injury and other potential problems. This is not to say that maximal lifts should never be performed—but they should be performed relatively infrequently, under close supervision, and only if the athlete has demonstrated his or her preparedness. As is the case with untrained individuals, maximal efforts for most young athletes at this time will not actually be maximal in the same sense as with adult athletes, and consequently we cannot base an assessment of the practice's risk entirely on the nature of maximal efforts of mature lifters.

During this period of training, loading can and should be determined more intuitively by the coach, rather than based on percentages of maximal lifts. This will both allow for training to keep pace with what are often remarkably rapid gains in ability, as well as avoid the need for frequent (if any) testing of maximal efforts. Whether actually measured or simply approximated, loading should primarily be in the 70-85% range.

Volume

Like loading, the volume of training for young athletes should be lower than their fully matured counterparts. As should be fairly obvious, developing children are using a great deal of energy and material simply to grow and mature—inordinate training loads can rob resources needed for such growth. As youngsters tend to eat and sleep inconsistently, this can become even more of a problem.

A full range of reps can be used just as with any athlete. Singles may be employed for technical and speed-oriented work at lighter weights rather than maximal efforts, while reps upwards of 7-12 may be used for conditioning or hypertrophy efforts. There is no limit to sets for technical work using light or no weight; for non-technical work, sets can generally be kept between 1-3.

Frequency

There is no reason that children of any age shouldn't engage in some manner of physical activity every day—in fact, they should be encouraged to. This doesn't necessarily mean high levels of exertion, but certainly legitimate durations of movement and play.

As young athletes begin transitioning into weightlifting specialization, weight training may increase from 1-2 days to 3-4 days per week, with either rest or non-specific activities on other days. The frequency of training will be determined by the athlete's biological age, training experience and level of specialization. By their mid-late teens, there should be few athletes who cannot be training 3-5 days per week as weightlifting specialists.

CORE TRAINING

While the term *core* is often used to imply the abdominal musculature, it actually refers to all of the structures of the lower torso and pelvic region and accordingly includes the posterior aspect. From a broader anatomical perspective, we might include the hip musculature, but from a training standpoint, we'll limit our definition to include the musculature of the mid to lower trunk that stabilizes and moves the spine.

Because the classic lifts and common supplemental exercises such as squats and pulls naturally provide a considerable workload for the muscles of the lower and middle back, generally this area will require somewhat less specific training than the anterior and lateral aspects of the torso. Heavy full-body training such as occurs with weightlifting will also naturally involve a great deal of torso stabilization, and in this sense provide some degree of abdominal training. However, additional direct abdominal training is necessary to maximize development and balance the strength of the back.

For convenience, we can classify core work in terms of body regions, type of muscle activation, and type of movement, and do so in a manner that facilitates effective training. The two broadest categories are the back and the abdominals (to include all anterior and lateral musculature). The two categories of muscle activation are static and dynamic, the former comprised of isometric stabilization of the torso, and the latter of concentric and eccentric movement. Of course, many effective exercises will involve both types of activation, but generally we can classify even these based on the dominant

Back Training	Abdominal Training	
Static	**Static**	**Dynamic** (cont)
Good Morning	Plank (Front & Side)	Later Spinal Flexion
Stiff-Legged Deadlifts	Clean/Jerk Rack Support	Sidebend
Romanian Deadlift	Ab Rollout	Plank Lift (Front & Side)
Kettlebell Swing		
Clean/Jerk Rack Support	**Dynamic**	
Back Extension Holds	*Spinal Flexion*	*Rotation*
GHB Hip Extension	Crunch	Standing Twist
	Lying Leg Raise	Windshield Wipers
Dynamic	Reverse GHB Crunch	Cross-Chops
GHB Back Extension		Halfmoon
Straight-Legged Deadlift		Russian Twist
Reverse Hyperextension	*Hip & Spinal Flexion*	
Glute-Ham Raise	Hanging Leg Raise	**Hybrid**
	Knees to Elbows	Turkish Get-up Sit-up
	Sit-up	Halfmoon
	GHB (Roman Chair) Sit-up	Windmill
	V-Ups	Turkish Get-up

Table 8.14 Core Exercises

type.

For the back, we have the movement types of spinal extension, hip extension, combinations of the two, as well as combinations of static activation of one and dynamic activation of the other. For the abdominals, we have spinal flexion, lateral spinal flexion, spinal rotation, and combinations similar to those described for the back, as well as combinations with hip flexion. In addition, we have exercises that involve stabilization of the torso as a whole, in which no distinction can or needs to be made between the back and the abdominal musculature.

Within each of these categories, it's possible to execute a broad range of loading and volume. Complete torso stabilization exercises will allow the greatest possible loading; back exercises will allow a broad range of loading, including quite heavy; and abdominal exercises will allow the least loading.

Because in the execution of the Olympic lifts the role of the trunk is to simply act as a rigid support structure, we can prioritize the function of static strength, within the context of both force transmission and the resistance of compression and torque. The remaining categories of core exercises function more to support the balance of strength development than to directly improve weightlifting performance.

Table 8.13 is a basic list of the better core exercises available and the categories into which they fall. Note that most exercises overlap with other categories to some extent, and many will involve extension or flexion of the hip in addition to trunk movement.

Programming

Back Training

How much specific back training is necessary and desirable will vary according to the needs of each athlete. Those with relatively weak backs may perform some type of fairly intense back work 2-3 days each week; lighter work may also be included on other days. Heavy training such as stiff-legged deadlifts, RDLs and good mornings are best performed at the end of heavy training sessions to allow recovery before the next heavy session in which the back will need to function optimally. Lighter work such as back extensions or reverse hyperextensions can be performed more frequently and in between heavy training sessions because it won't have so dramatic an effect on the back's function the following day; in fact, such light work in reasonable volume often proves recuperative for many lifters. Heavy back work is generally best performed in the 5-8 rep range; lighter work is generally best performed with reps between 8-15.

When an athlete requires back training, but is already performing a high volume of work and consequently has little additional recovery capacity, exercises such as good mornings and weighted back or hip extensions are ideal options. Such exercises allow intense work by the spinal erectors to extend or maintain extension of the spine without requiring systemically taxing heavy loads like RDLs and stiff-legged deadlifts.

The lower back is typically one of the slowest regions of the body to recover from training. The volume of lower back work should be controlled to ensure adequate recovery for the primary training exercises—some athletes will be able to manage quite high volumes of training, while others will require back training be kept quite low in volume and infrequent.

Back training should generally be consistent in terms of exercise selection for a period of time that includes a series of 2-5 exposures. That is, such exercises should be treated like most strength exercises and their performance over time involve an increase in work via loading and/or volume. For example, we may use the good morning for a period of 3-4 weeks, increasing the load slightly with consistent or decreasing reps and volume with each exposure. In a following period, we may instead use the RDL, again increasing the loading with each exposure. Like any other exercise, progressive overload during a period of persistent capacity levels is effective for improvements.

If performing additional (or exclusively) light back work, the athlete can use a less structured selection of exercises on such light days, and attempt to simply achieve variety. For example, he or she might on a series of light training days alternate between unweighted back extensions and reverse hypers, either gradually increasing rep numbers (although not too aggressively since these are not the primary back exercises), or stimulate instead through variation of reps, sets, tempos and other minor variables.

Abdominal Training

Abdominal training can be included on every training day provided the type of work is sufficiently varied among sessions. That is, it's generally best to alternate heavy and light emphasis training to provide recovery time for each. Like back work, more taxing abdominal training is best performed at the end of heavy lifting sessions to allow recovery and prevent reduced trunk stability in the next heavy session. Higher volume and lighter weight dynamic work or static work can be included on lighter training days.

Like back work, abdominal training will be most effective if primary exercise selection is consistent for a period of time involving a series of a few exposures. For example, if we have three heavy training days per week, we can include three heavy abdominal training sessions per week (session in this case does not necessarily imply more than one exercise). We may perform weighted sit-ups on the first and last of these days (with the second day possibly being somewhat lighter than the first), and a Turkish get-up sit-up on the second day. Over a period of time, we would increase the weight and/or reps being used with each exposure before switching to different exercises for another period of time.

Again like back work, and more probable than with back work, will be additional abdominal work in between these heavy sessions, and possibly following the primary exercise on one or more of the heavy days. As was described with regard to back work, stimulation from this light training can be approached from a progressive overload perspective, involving a gradual increase of reps and/or resistance, or from a perspective of variation. That is, the athlete can simply work through a list of desirable exercises, hitting one or two with each session, either randomly or by choosing light exercises that address specific need or seem to complement the associated heavy training.

Sample Back Training Program				
Exercise	**Sets**	**Reps**	**Tempo**	**Rest**
Week 1				
Day 1				
Stiff-legged deadlift	3	6-8	3020	3 min
Reverse hyperextension	2	15-20	1010	1 min
Day 2				
Back Extension	3	6-8	2022	90 sec
Day 3				
Good morning	3	10-12	3020	3 min
Reverse hyperextension	2	10-15	1010	45 sec
Week 2				
Day 1				
Stiff-legged deadlift	3	4-6	3020	3 min
Reverse hyperextension	2	22-25	1010	1 min
Day 2				
Back Extension	3	8-10	2022	90 sec
Day 3				
Good morning	3	8-10	3020	3 min
Reverse hyperextension	2	15-20	1010	45 sec
Week 3				
Day 1				
Stiff-legged deadlift	3	3-4	3020	3 min
Reverse hyperextension	2	25-30	1010	1 min
Day 2				
Back Extension	3	10-12	2022	90 sec
Day 3				
Good morning	3	6-8	3020	3 min
Reverse hyperextension	2	20-25	1010	45 sec

Table 8.15 Example Back Training Program

Sample Programs

Tables 8.15 and 8.16 are sample back and abdominal programs that can be integrated with

Sample Ab Training Program				
Exercise	**Sets**	**Reps**	**Tempo**	**Rest**
Week 1				
Day 1				
Weighted sit-up	3	10-12	3010	2 min
A1. GHB sit-up	3	12-14	3020	30 sec
A2. Reverse GHB crunch	3	6-10	2010	2 min
Day 2				
A1. KB cross-chop (reps per side)	3	10	X0X0	20 sec
A2. Plank - front/side	2	max		60 sec
Day 3				
A1. HLR	3	10-12	1010	20 sec
A2. Side bend	3	12-14	2020	90 sec
Week 2				
Day 1				
Weighted sit-up	3	8-10	3010	2 min
A1. GHB sit-up	3	15-18	3020	20 sec
A2. Reverse GHB crunch	3	8-12	2010	100 sec
Day 2				
A1. KB cross-chop (reps per side)	3	12	X0X0	15 sec
A2. Plank - front/side	2	max		1 min
Day 3				
A1. HLR	3	13-15	1010	20 sec
A2. Side bend	3	10-12	2020	90 sec
Week 3				
Day 1				
Weighted sit-up	3	6-8	3010	2 min
A1. GHB sit-up	3	18-20	3020	10 sec
A2. Reverse GHB crunch	3	10-14	2010	80 sec
Day 2				
A1. KB cross-chop (reps per side)	3	15	X0X0	10 sec
A2. Plank - front/side	2	max		1 min
Day 3				
A1. HLR	3	16-18	1010	20 sec
A2. Side bend	3	8-10	2020	90 sec

Table 8.16 Example Abdominal Training Program

a lifting program. Both are three-week cycles that demonstrate a short series of exposures to given exercises with simple overload in terms of weight or volume. In this program, weights are not assigned. Instead, set and rep-ranges are prescribed with the expectation that the athlete will feel out an appropriate weight for the exercise. This means that if on a given set, the athlete is able to complete the top end of the rep range, he or she needs to use more weight.

After three weeks, the program can be used again with a change of exercises, or even simply a change of tempo, sets, reps, and/or rest periods for some variety. For example, we may repeat an identical cycle, but allow the athlete to use a completely natural tempo for all exercises, which will automatically allow increased loading and provide a considerably different stimulus.

PLYOMETRIC & JUMP TRAINING

Arguments exist regarding the actual origins of what is now referred to as plyometrics, but while jump training was being used prior in some sense, most sources credit sports scientists such as Verkoshansky of the Soviet Union during the 1960s and early 1970s for the pioneering research and successful implementation that allowed such training to evolve into systematic and effective protocols.

Plyometrics as a class of training now encompasses an enormous array of exercises and drills, some of which do not technically conform to the defining properties of the training, but have similar enough goals and characteristics to warrant their inclusion. Despite this now great volume of drills, the original exercises employed by the Soviets (at least those employed with notable success) were primarily and possibly exclusively depth jumps and depth drops (or shock jumps).

This chapter of the book is by no means intended to be a comprehensive discussion of plyometrics and jump training—it will be limited to only the few exercises that have direct and considerable value for the training of weightlifters. In addition to the original depth jumps and depth drops, we will consider the application of certain box jump and bounding variations.

With respect to weightlifting specifically, the two goals of jump training are increasing the athlete's ability to more rapidly generate higher magnitudes of force with the legs against the ground, and improving the athlete's ability to absorb force in an eccentric movement and apply it to a following concentric muscular contraction to increase that contraction's power—rate of force development and reactive power, respectively.

These are the same two goals of jump training for any sport, but their application for weightlifting is slightly different. Olympic weightlifting involves no reaction to transient ground contact following disconnection from the ground (such as is seen in sprinting, jumping, etc. in sports like football and basketball). The lifter begins and remains in continuous contact with the ground while generating force against it to accelerate the barbell upward—reactive power is not involved in this action, which is improved through increased rate of force development in the legs and hips.

Reactive power comes into play during the double knee bend of the snatch and clean, the dip and drive of the jerk, and the recovery from the squat, which involve loaded stretching of leg musculature followed by immediate concentric contraction. Consequently these elements of the lifts can be improved by increased reactive power.

Integrating Jump Training with Weightlifting

There are two primary considerations when adding jump training to a weightlifter's program. First is that such training is very taxing both neurologically and in terms of stress to joints and connective tissue; second is that weightlifting already naturally and unavoidably trains rate of force development, and to a lesser degree, reactive power. This means that both the need for jump training is relatively limited, and that the volume of jump training manageable by the weightlifter is comparatively low.

Depth jumps and depth drops are the most taxing exercises, and should be performed in the lowest volume and frequency; box jumps are considerably less taxing and can be performed in greater volume and frequency. Bounding variations fall somewhere in between.

Depth jumps and depth drops are best performed during strength emphasis training cycles in which loading in general and the frequency and intensity of the classic lifts in particular is relatively low. During heavy classic lift emphasis cycles, depth jumps and depth drops may prove too taxing neurologically and with respect to joint stress on top of the already demanding weightlifting training; however, in small volume and limited frequency, they should be manageable by most lifters.

Box jumps can be used with less concern during training cycles of virtually any composition. During strength emphasis cycles in which there are comparatively fewer speed-oriented exercises, box jumps can be employed to maintain (and develop to a lesser extent) explosiveness. An excellent approach for this is coupling squats with box jumps: immediately following a set of squats with a set of box jumps. Athletes can also perform brief sets of box jumps immediately prior to certain exercises, including the classic lifts, to encourage greater speed in that exercise.

Generally any jump training used should be confined primarily to periods of a cycle with the lowest volume or intensity (depending on which of these variables is the primarily taxing element of the cycle). For example, we may introduce jump training toward the latter part of a higher volume strength emphasis cycle as total weekly volume decreases; or we may eliminate jump training as a classic lift emphasis cycle progresses and intensity increases. An exception to this might be using very low volume box jumps during a contest preparation or similar phase to keep an athlete neurologically prepared for maximal speed.

The daily and weekly volume of depth jumps, depth drops and bounding in particular should be kept very low. These exercises should be performed only 1-2 times weekly, with total reps for each exercise between 10-30, and these reps broken up into multiple sets—generally 2-4 reps each—to ensure maximal freshness.

Box jumps can be performed with reps up to 5, but with the emphasis entirely on maximal explosiveness with each rep rather than more volume. These can be performed 1-3 times weekly, with session volume between 10 and 30 reps.

Introducing Jump Training

All jump training should be introduced to athletes progressively and conservatively; however, the concern with weightlifters is less their preparedness for such training than its potential disruptive effects on more important training elements. Experienced weightlifters will already possess high levels of strength and joint conditioning, and consequently be capable of relatively high level plyometric exercises (at least of the bilateral category) with little specific preparation. Beginning lifters are of course less prepared, and the progression of jump training should correspond to their experience levels.

Box jumps can be introduced and the volume increased to maximal relatively quickly. However, a progression should still be used over the course of 1-2 weeks when first adding box jumps to a weightlifter's training.

Depth jumps and depth drops should be introduced more cautiously. Depth jumps should not be performed until an athlete has gained some experience with depth drops to ensure adequate force-absorption capacity. Both box height and volume should begin very low and increased gradually, with attention paid to the athlete's recovery and performance in other training. It's best to slowly increase volume to the greatest it will be at a given box height, then increase box height, and start again progressing from lowest to highest volume at this new height.

Exercises

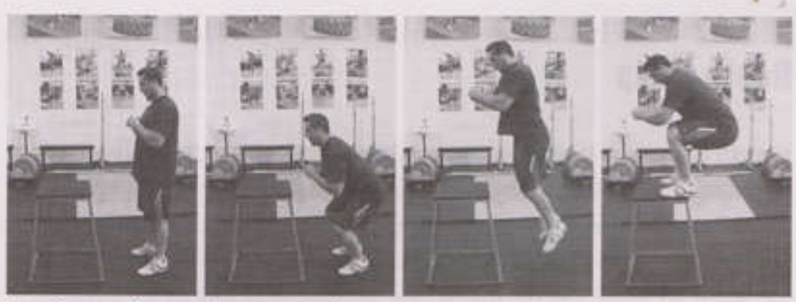
Rate of Force Development Exercises These exercises will serve to help improve the speed of force generation of the legs without involvement of any reactivity. In other words, the goal is to create explosiveness with no preceding eccentric action of the muscles in question.

Reactive Power Exercises These exercises will serve to improve the ability of the leg musculature and connective tissue to absorb and store the force of an eccentric action and apply it to an immediately subsequent concentric action.

Box Jump with & without Countermovement

There are numerous box jump variations, each of which has applications for various athletes. The two variations most applicable for weightlifting are jumps onto the box with and without a preceding countermovement. Both variations encourage improved rate of force development; countermovement jumps also improve reactive power.

When jumping, the feet should be placed in the pulling or drive position to ensure transferability to the lifts. In most cases, box heights should be well within an athlete's ability. As heights approach maximal, athletes tend to cut the drive of the legs short in order to begin lifting the feet (much like as weights get heavier in the snatch and clean, athletes tend to rush into the pull under), which defeats the purpose of the exercise. A somewhat lower box should be used, and the complete and violent extension of the legs and hips emphasized over everything else. This should create a degree of floating onto the box rather than an aggressive reach up with the feet.



Box jump with countermovement

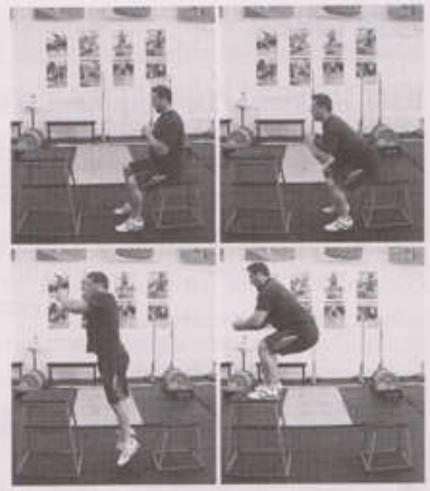
As much as is possible, the athlete should attempt to jump vertically and push the feet forward onto the box instead of jumping directly forward onto it to prevent any bad habits from appearing in the lifts. This is easier done with a non-countermovement jump because the athlete can begin in close proximity to the box without concern for hitting the hands on the box during the upswing of the countermovement. Countermovement jumps will either need to be started slightly farther away from the box, or the arms kept in tighter during their swing.

To perform non-countermovement jumps, the athlete will dip into the starting position and pause for 2-3 seconds before initiating the drive against the ground. Additionally, the athlete must drive from this position immediately and directly—it will be very tempting to sneak in a quick bounce of the legs as the jump begins. The hands can be held at the chest to keep them out of the way and contributing less to the jump effort, as well as keeping them immediately available to help in the case of a missed jump or stumble.

Box jump without countermovement

The starting position for non-countermovement box jumps can be changed depending on the goals for the exercise. If trying to improve the speed of the second pull of the snatch or clean, a start resembling the mid-hang position should be employed; if trying to improve the speed of the jerk drive, a start resembling the bottom of the jerk dip should be employed; if trying to improve the drive out of the bottom of the squat, the athlete can start in the bottom of a squat.

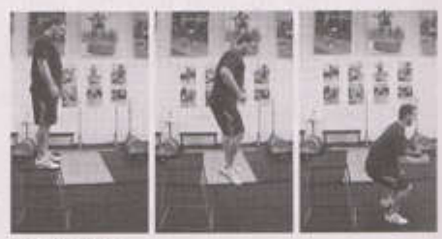
Another version of the non-countermovement box jump is the box squat box jump (or sitting box jump). In this variation, the athlete will begin in a seated position on one box, and without rocking or any other assisting movement, jump onto another box (some forward lean will be necessary to actually get off the box). The seated box jump can also be initiated by a lift of the feet while seated with a jump immediately upon their aggressive reconnection with the ground.


Box squat box jump

Dropping back to the ground following each jump to absorb the impact in a partial squat can serve as convenient depth drops. However, if the athlete is not yet prepared for depth drops, or should be not performing them at the time, he or she should step back off the box, or post the hands on the box to help lower him- or herself back down.

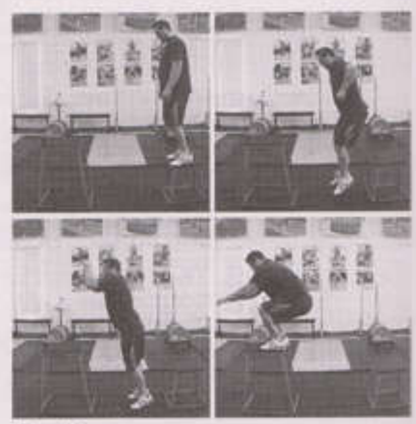
Depth Drop

Depth drops are one of the simplest and most effective plyometric exercises. The drill involves simply stepping off a box and absorbing the force of the landing in some degree of squat—the greater the box height, the greater the impact force. Generally we want to limit the depth of the receiving position to a quarter squat; if ankle elasticity and strengthening is specifically desired, we can also absorb the impact while remaining on the balls of the feet. The general recommendation is to land a distance away from the box equal to the box's height, although this is not imperative. Depth jumps are extremely taxing neurologically, even though they will rarely feel fatiguing during their performance.


Depth drop

Depth Jump

The depth jump is simply a depth drop followed immediately with a jump onto a second box, or simply a maximal vertical jump. This adds to the force absorption training of the depth jump the improvement of reactive power—the ability of the body to absorb, temporarily store, and transfer energy from eccentric movement into a following muscular contraction. The goal is to minimize ground contact time—to rebound as quickly as possible into the following jump. Like depth drops, this is a very neurologically taxing exercise and should be performed in limited volume and frequency.


Depth jump

Bounding

There are a number of activities that fall under the category of bounding, including many single and double leg variations. The basic defining characteristic is a series of ground contacts and immediate rebounds; the most basic example is the forward bound, which is simply a series of two-legged forward jumps with minimal ground contact time.

This basic bounding variation has potential benefit for the weightlifter by increasing knee and hip extension explosiveness, and can be experimented with using the same protocols described for other jump training above. More appropriate for the lifter, however, are vertical bounding variations because of the possibility of complete knee and hip extension and unlimited knee flexion. Vertically oriented bounds can be performed in a number of manners to address the positions of specific lifts. For example, the jerk drive can be emphasized by jumping in the same vertical-torso, knee-flexion-only jerk posture; the second pull of the snatch and clean can be mimicked with slight knee flexion and more hip flexion; and the drive from the bottom of the clean can be emphasized by dropping into full-depth squats.

Each of these variations would be performed by initiating a series with the first jump, and upon ground contact, immediately repeating until the prescribed repetitions are performed. Again, the key is the speed of transition in the chosen bottom position and the viciousness of the upward acceleration. It must be kept in mind as well that these exercises are not intended for conditioning purposes, but for speed development—this means reps should be kept low (2-5) and the athlete allowed sufficient rest between sets.

TRAINING MISCELLANAEA

Gym Etiquette

Most gym etiquette is simply common sense and courtesy. However, since both seem disappointingly rare, we'll address some of the basics here in addition to more weightlifting specific practices.

Care of equipment and the facility should be a priority. Gear should be used appropriately and abuse should be limited to the expected stress of normal training use. Equipment should be returned to its correct storage location after its use, whether or not the athlete found it there. Athletes should help keep the facility clean and orderly as much as is reasonable. This means primarily not leaving behind empty water bottles, used tape, or other trash, and controlling chalk use to prevent unnecessary spilling.

Respect of other athletes should be exercised during training at all times. Athletes should always be given an uninterrupted view forward while lifting, direct eye contact with a lifting athlete should be avoided, and noise should be kept to an absolute minimum during heavy attempts to allow the athlete to focus.

Record Keeping

The importance of a training journal cannot be exaggerated. Irrespective of what shape it takes, this reference allows the athlete and coach access to invaluable information to help guide programming and recovery efforts, as well as simply to evaluate progress over the long term. Memory is limited and unreliable and in no way adequate. A simple spiral-bound notebook from the drugstore is all that's necessary. Inside the athlete can, under each date, record the performed exercises, sets, reps and loading, as well as notes regarding how specific parts of the training felt, the status of injuries or other pain, energy levels, bodyweight, and other relevant data.

As a coach, tracking the training data for a team of lifters gets more complicated. In this case, keeping electronic records like Excel documents or similar will make tracking each athlete's training and subsequent planning far easier. Each cycle should at minimum show the actual training along with weights and percentages when appropriate. It's helpful to also note each athlete's relevant metrics at the start and end of each cycle, e.g. best lifts and any other markers the coach is interested in (vertical jump and flexibility metrics are two examples). Some coaches prefer to note lifts as they occur in training for each athlete; others prefer to collect athlete's records periodically to update their own records.

Grip Training

For some athletes, grip will be or become a limiting factor in the snatch, and less frequently the clean.

As with most other elements, the classic lifts themselves are generally the best exercise for training grip strength for the lifts. The athlete should also ensure he or she is gripping the bar correctly before worrying about additional grip work. However, supplemental grip work can be necessary and helpful at times.

Strap use should be cut down as the first step to simply get more grip strength work out of the exercises already being performed. Warm-up snatches and cleans can also be done without the hook grip.

If further grip work is needed, specific grip exercises can be used—they should be employed enough to elicit gains, but not disrupt remaining training. The quickest, easiest, least disruptive and often most effective is the use of spring grippers. These can even be used in between sets of other non-grip-intensive exercises such as squats to save training time. The athlete should use a gripper weight that he or she is able to close completely for at least 5 reps and do 3-5 sets of maximal reps on each hand, starting with the weaker side. Once 3 sets of 10 reps at a given weight gripper can be done for a few workouts, the next heaviest gripper can be used as long as it can be closed completely for at least 3 reps. If the athlete is able to do only 3-5 reps with this heavier weight, he or she can do 1-3 sets there and then finish with 1-3 sets of up to 10 reps with the next lighter weight. The athlete can alternate between simply performing the reps and doing some or all reps with a hold in the closed position. This can be done 2-3 times per week.

Two other exercises that can be effective for snatch-specific grip strength are snatch grip hangs and snatch shrugs without straps.

Snatch Grip Hangs The classic hang from a pull-up bar for developing grip strength is a reasonable exercise, but is not specific enough for a couple of basic reasons. First, because of the possible durations for most athletes, it's far more of a stamina exercise than a strength exercise. Second, and more importantly, the bar is rarely of the same or similar diameter to a barbell, and the athlete is unable to hook grip or in any other way set a grip similar to the snatch. To make this hang exercise more specific and consequently more effective, we can place a barbell in a squat rack at maximum height and width; on this bar, the athlete will set a snatch-width grip (or as close as the squat rack will allow) with the hook grip, and bend the knees so he or she can hang under the bar. If a pull-up bar is used, the athlete can still use a snatch-width grip to better simulate the reach of the fingers around the bar and the angle of the hands during the snatch. A side benefit of this exercise is that it provides decompression for the spine after heavy lifting.

Snatch Shrugs without Straps The athlete will load a bar on pulling stands or blocks at mid- to upper-thigh level with a snatch-width grip. Setting position with the weights on the blocks, the athlete will perform a set of snatch shrugs, using the hook grip and no straps, resetting on the blocks for each rep. The focus should be a tight grip on the bar and maximal acceleration.

Lowering the Bar

Typically after the successful completion of a snatch, clean or jerk, the barbell is dropped to the platform. The consistency of this practice evolved with the advent of rubberized bumper plates, which allow such dropping without damage to the plates, bar or facility. Formerly, most lifts were returned to the platform under some semblance of control, although by no means an accurate reversal of the previous movement.

Some have made the argument that dropping the bar after a lift is eliminating any eccentric work, which is a valuable element of strength training. What this argument fails to take into account is that the purpose of the Olympic lifts outside of competition is power development, not strength; strength is better developed with other exercises. Additionally, the Olympic lifts are by nature unidirectional. That is, there is no eccentric component to the lift itself—lowering the bar is not the second half of the lift, but an entirely distinct exercise.

With sub-maximal weights, it is possible in many cases to bring the bar back down under control. Doing this when the athlete is able can help reduce wear to the equipment and facility, and increase strength work to a degree, but this should never be reason enough to expose the lifter to potential injury. In this instance, and in all others, if a choice exists between damaging equipment and facility or damaging the lifter, the equipment and facility should always be sacrificed—it's much easier to replace a barbell than an athlete's body part.

Realistically, the only times lifters will lower weights under control is in order to reset for consecutive reps that are beginning from the hang or shoulders, or when straps are being used. This will naturally involve less than maximal weights that allow lowering with a reasonable degree of safety, but this doesn't mean lowering them will necessarily be easy. Just as raising the weights requires a concerted effort of the entire body, so will lowering them.

When lowering the bar from overhead after a snatch, the athlete will begin by slowly bending the arms under control to bring the bar down as low as can be managed in this position. At this point, he or she will quickly flip the elbows from under to over the bar, keeping it as close to the body as possible. The clean will begin with this flipping of the elbows from under to over the bar. As the elbows flip over, he or she will pop up onto the toes or jump slightly to meet the bar with the thighs, absorbing the force by dropping back to the heels and bending the knees. The thighs will also create somewhat of a shelf to catch the weight and reduce the strain on the grip. From here, the weight can be lowered in the same manner as a deadlift. To further reduce the height from which the bar must drop, the athlete may choose to dip slightly at the knees while bending the elbows prior to jumping up to meet the bar.

In some cases of multiple-rep snatches from the floor when using straps, the lifter may choose to lower the bar before standing until the final rep. This can be done by, from the bottom of the squat, guiding the bar forward and down as the athlete begins standing in order to bring the hips and bar together. From this point, the rest of the movement is like lowering the bar from overhead; that is, the athlete will absorb the bar with a bend of the knees, and then drop the bar to the floor under control.

With the jerk, the bar will be brought back to the rack position on the shoulders by the athlete first lowering it by bending the arms, then popping up onto the toes to bring the shoulders up to meet the falling bar, and absorbing the load by dropping to the heels and bending the knees as he or she would when lowering a snatch or clean, keeping the torso upright. From here the bar can be lowered to the floor

Lighter snatches, cleans and jerks can be lowered under control if the athlete wishes.

as the clean is, or it can be replaced in a rack.

Overhead lifts can also be lowered to the shoulders behind the neck. This will be most common with snatch push presses or snatch balances, but may also be the preferred location for athletes after finishing a set of jerks, push presses or presses. The process is the same as for bringing the bar down in the front—the athlete simply needs to keep the head out of the way, keep the shoulders shrugged up to ensure a muscular landing pad rather than a bony one, and to prevent dropping the chest as the weight of the bar is absorbed.

Dropping the bar after a successful lift should not be a careless action. The lifter should maintain contact with the bar until it passes his or her waist, guiding it down safely away from him- or herself. Failing to do so in competition is a technical rules violation and can result in a no-lift call; in the gym, the practice is an effort to maintain safety and prepare for competition. Different types of bumper plates will bounce to varying heights when dropped—some quite high, particularly in combination with the springier rubber tiles of some platforms—so the lifter should be careful to continue watching the bar as it drops and bounces and to keep his or her hands clear to avoid jamming fingers or a wrist against a rebounding bar. It's important as well to make sure the platform is clear of any spare plates off of which the bar could bounce in an unexpected direction and collide with the lifter or another nearby. Along the same lines, before the athlete drops the bar, he or she should make sure no other lifter has wandered into the area and inadvertently placed him or herself in the path of the bar.

RECOVERY

Training cannot be effective in the absence of adequate recovery. Too many coaches and athletes invest epic amounts of time and energy planning and executing training programs while ignoring the issue of recovery and consequently make little progress. Interestingly enough, the recent increase in focus on recovery and recuperative modalities has pushed some coaches and athletes too far in the other direction. Recovery is important, but an athlete needs something to recover from. No lifter is going to rest his or her way to heavier lifts.

The foundation of all athletic training is the notion that by delivering the proper stimuli to the body, we can cause it to adapt in a manner fitting our objectives. This adaptation is neither immediate nor guaranteed—the body requires certain elements such as sleep and nutrition to allow it to make the physiological changes being requested of it.

Overtraining is the result of continued training beyond the limits of recovery ability. In other words, it's the accumulation of stress at a rate or to a degree greater than what the body can respond to productively. Care must always be taken to balance training with recovery in order to maximize the adaptation potential of each athlete. Clearly it's more effective to improve recovery as much as possible rather than limit training unnecessarily. Much of a given athlete's recovery ability will be a product of genetics (e.g. natural hormonal levels); the remaining capacity can be improved and managed in a number of ways, discussed below.

Sleep

The importance of sleep is commonly underestimated, often greatly. As a period of genuine physical and mental recuperation, sleep has a profound effect on both individual training sessions and progress over the long term.

The requirements of nightly sleep duration vary widely among individuals, but invariably those who claim a need for extraordinarily little sleep have simply conditioned themselves over long periods of time to function adequately (or what appears to be adequately) on their limited hours. This is not necessarily indicative of a legitimate need for little sleep, but of the remarkable ability of the body to adapt to the demands of life. With a period of behavior modification, these individuals can successfully increase the duration of their nightly sleep, and with little exception will find they operate much better on more hours. There will always be, however, the occasional athlete who sincerely functions better with less sleep than seems necessary. In these cases it will be counterproductive to force unnatural patterns.

Possibly the most effective behavior for encouraging better sleep is maintaining a consistent schedule. If the body sleeps and rises at the same time every day, it will be more inclined to continue doing so. This of course can be very difficult with the obligations of work, family and friends, but some reasonable attempt should be made to at least minimize the variation.

The bedroom should be cool and as dark as possible—so dark a hand in front of the face can't be seen, if possible. This means blackout shades and covering or getting rid of any electronics with LEDs or similar lights that remain on all night. Research has demonstrated hormonal disruption during sleep with as little as a pinpoint of light on the skin.

Blue light should be avoided within the last hour or so before trying to sleep—this includes television and computers. This light spectrum encourages the hormonal process of waking up and can make falling asleep more difficult. Electronics, including cell phones, should be kept as far away as possible during sleep.

Like going to sleep and waking at the same time every day, developing pre-sleep rituals will encourage falling asleep more quickly and consistently. A ritual can be as simple as stretching and foam-rolling, taking the night's supplements, and reading. The specific activities are not important—just the consistency. Of course this is assuming the activities are not in violation of the above rules.

A notepad or journal can be kept alongside the bed in order to collect notes prior to sleep. Often this can help relieve the stress of a mind racing with necessary tasks and ideas and promote greater relaxation in less time.

Finally, it can be helpful to make notes on sleep in the training journal—over time this will likely demonstrate a clear association of the quality and quantity of sleep with subsequent training.

Nutrition

The importance of nutrition's role in supporting recovery cannot be overstated. As direct support of physical activities and the processes in response as well as indirect support through the maintenance of basic health and body function, nutrition is a critical component of all athletic training. Weightlifting-specific nutrition is covered in full detail in its own chapter.

Therapeutic Modalities

There are a number of therapeutic modalities athletes can use to improve recovery, improve performance, and help treat and prevent injury. All are effective, but some are more accessible than others.

Hydrotherapy

Hydrotherapy is likely the most effective cost-free or low-cost modality available. This can be in the form of cold plunges, hot plunges, or cold-hot contrast plunges. Hot plunges—hot tubs or hot baths—can be used to relax muscles in preparation for flexibility work and increase blood flow and nutrient transport, but should be used with caution since heat also promotes inflammation. If inflammation in particular joints is a concern, local icing should follow hot plunges and any subsequent stretching.

Cold plunges—ice baths or cold pools—are excellent for minimizing inflammation and appear to noticeably improve most athletes' recovery times and degrees. In addition, research suggests possible increases in testosterone levels following cold plunges. Plunge times should be kept in the 5-15 minute range.

Finally, contrast hydrotherapy is in most cases the ideal water modality, although often difficult due to facility requirements. A less effective alternative is alternating hot and cold showers. The contrasting temperatures tend to improve blood flow through tissues better than heat alone, and the cold minimizes the potential inflammation arising from the heat. Unless flexibility work is to follow, contrast hydrotherapy should generally begin and end with cold.

Massage

Massage can be an effective addition to an athlete's recovery work, although due to its expense, is largely inaccessible. Regular soft tissue work—such as once weekly—can keep muscles free of adhesions and gliding smoothly, as well as release any spasms to help prevent injuries arising from restricted or altered motion. This type of regular work can generally be relatively light because the frequency prevents accumulation of more severe issues. Athletes for whom this type of regular work is not possible can still benefit from occasional massage. In this case, deep tissue work will typically be necessary to break up more dramatic tightness accumulated over time. Deep tissue work will affect the athlete's training for at least a day and should not be placed immediately prior to heavy training days and certainly not too close to competition. Generally deep tissue massage should be kept at least a week away from a meet. If done during a normal training week, massage is best placed after the last training session before a rest day. Foam rolling (discussed in the Flexibility section of the book) is the best no-cost alternative to massage available.

Cryotherapy

Regular cryotherapy to locations of chronic low-grade pain can both improve training and help prevent minor chronic conditions from becoming more severe injuries. The knees, elbows and wrists endure considerable abuse and the more care they receive, the better they'll be able to continue performing as needed. Icing can be performed as a preventative measure following particularly demanding training, and should certainly be performed at the first sign of joint discomfort to avoid the progression to more severe pain or injury. Icing protocols are described below under the Injuries heading.

Monitoring Recovery

With such an emphasis on recovery and the need to plan training around it, the question of how to monitor recovery status in some fashion naturally arises. The classic monitoring of resting heart rate and blood pressure are simple and convenient methods, but appear to have less value for the strength athlete than the endurance athlete. Heart rate variability (HRV) is becoming more prevalent and appears to be more accurate than orthostatic heart rate measurements. The practical objective measures that seem to have the best correlation with present condition are the athlete's vertical jump height and grip strength. That is, negative deviations from the athlete's baseline jump or grip strength appear to indicate most accurately under-recovery.

In any case, objective measurements, while being interesting, are typically unnecessary. Further, despite any level of accurate correlation between test results and the state of recovery, the actual implementation of the tests creates opportunity for inaccuracy. Jump testing, for example, requires some level of skill irrespective of how it's administered, and results can vary based on how well an athlete reaches a vane, how accurately he or she places a magnet, Velcro loop, or a chalk mark on a wall, how well he or she keeps the legs extended following a jump on a timing mat—all of which can vary day to day. Additionally, unmotivated athletes have been known to intentionally throw such tests in order to receive lighter training prescriptions; in other cases, this may not be entirely intentional, but due simply to a lack of psychological commitment to the activity.

In addition, an athlete's jumping ability will vary considerably during different phases of training emphasis. For example, jumps will tend to be much higher during lower-volume classic lift emphasis phases than during higher-volume strength-emphasis phases. This being the case, for jump testing to work, we would need to test a new baseline jump at the beginning of every training phase, creating even more opportunity for inaccuracy.

For objective metrics like resting heart rate or HRV that are not influenced by athlete performance, the challenge is determining how to appropriately adjust training in response to these measurements.

A collection of subjective measures can be considered when trying to determine an athlete's condition. For most coaches, under-recovery will be quite obvious, often even before an athlete touches a barbell. Likewise, most athletes will not have trouble figuring out on what days they feel ready to train hard and heavy, and on what days they need to back off their planned training to some degree. Of course, there will be many days on which athletes would prefer not to train as hard as is planned, but need to push through it, and this is where the coach's observations and judgment play an important role. Depending on a particular athlete's disposition, he or she may be prone to undertraining without consistent pressure from the coach to work at full capacity. There are often times as well when an athlete appears and feels worn down, but has excellent and even record performance.

The coach and athlete can use more subjective indicators to monitor the athlete's present state. These things will of course fluctuate within training cycles, often daily, so determinations will need to be based on a broader view of a given time period. That is, no athlete will be completely fresh every training day—if he or she is, the training is not demanding enough to elicit adaptation. However, under-recovery can only be maintained for so long before it crosses a threshold into overtraining and requires serious changes, often resulting in detraining, to bring the athlete back to normal. Training must take this into account and attempt to cause the fatigue necessary for an adaptation response, but balance it adequately with recovery.

Signs of overtraining include:

- Chronic fatigue
- Insomnia or restless sleep
- Elevated resting heart rate and blood pressure
- Reduced speed of movement
- Reduced manual dexterity
- Reduced grip strength
- Reduced jumping ability
- Increased joint soreness and stiffness
- Reduced enthusiasm for training
- Changes in personality or mood
- Irritability, frustration, anxiety
- Gastrointestinal distress, diarrhea
- Retrograde performance (other than that expected as the result of normal training fatigue), including inability to perform prescribed training (assuming this training doesn't make unreasonable demands)

Diagnosing legitimate overtraining is not a simple task, as there is unfortunately no real measure of this condition, only a spectrum of physical states. Additionally, an athlete's condition will vary from day to day, making it difficult to distinguish between normal and expected training-induced fatigue and signs of overtraining. Essentially we need to see indicators of overtraining consistently for a period of several days at least to consider it actually overtraining rather than simply a temporary bout of fatigue that may simply be the result of work or family stress or similar non-training related elements.

If an athlete is determined to be overtrained, the solution is significantly reducing intensity and volume in particular, and often forcing complete rest for a period of a week or more as needed. The deeper the state of overtraining and the longer the duration of this state, the more time it will take for the athlete to recover. After any complete rest that is taken, training can be resumed with very light weights (40-60%) and very low volume, and incrementally increased as tolerated, with closer monitoring of the athlete's recovery.

Again, this is a delicate issue, as athletes should be expected to be fatigued and challenged by their training. Ultimately, much is left to the coach's and athlete's collective judgment.

Hand Care

Being covered in chalk and rubbing against knurled metal for hours every week will not exactly prepare hands for a modeling career—calluses will be commonplace, and blisters and tears will occur occasionally, or more often with inadequate preventative effort. As the connection of the body to the bar, the hands need to be taken care of well to prevent the disruption of training and competition. Seemingly minor wounds can prove painful enough to directly prevent a successful lift.

Hand care can be divided into two parts: prevention and correction. The greater and more consistent prevention efforts are, the less the need for correction will be, and the more consistent training can remain. Corrections are never perfect—the best strategy is to avoid needing them as much as possible.

Prevention

The two keys of preventative hand care, which overlap considerably, are keeping the palms smooth and free of any hard, sharp edges, and keeping them adequately moisturized. Athletes will generally develop calluses near the bases of the fingers and possibly near the joints of some fingers depending on how the bar sits in the hands. If these calluses aren't maintained well, their edges can catch on the bar and be torn. If the tear is confined to the dead, callused skin, it will have no detrimental effect; but more likely, the tear will continue into the living skin and create a painful open wound that will be susceptible to further tearing and aggravation.

These calluses can be kept smooth by regularly sanding them down with fine-grit sandpaper. Small squares of sandpaper should be kept in the athlete's training bag for use during training if necessary. If this practice is consistent, rarely if ever will a callus develop to a degree that can cause problems. A simple way to make sure it's consistent is creating a habit of sanding the hands before each training session.

Blister prior to tearing; Lancing blister at edge nearest fingers; Draining fluid; Injecting with adhesive; Finished.

If a callus is large enough or is beginning to separate from the hand, fingernail clippers can be used to trim any loose skin away, and the edge then sanded down to be smooth with the rest of the surrounding skin. Again, any palpable edges are potential locations for tears.

To keep the hands moisturized, they should be treated at night with Cornhuskers Lotion. This is a non-greasy lotion created to help toughen the skin on the hands while keeping it healthy. It works better in this capacity than any other moisturizer. A single application before going to bed each night should prove adequate for most athletes. For more severely damaged or more sensitive hands, it can be applied multiple times throughout the day, particularly following training and before bed. Additionally, larger quantities of lotion can be applied and then the hands covered in gloves to allow the hands to continue absorbing the lotion overnight.

Correction

If prevention fails—or has not be duly performed—callus tears and blisters may appear. These will need to be managed properly in order to allow continued training.

Torn calluses should be trimmed with fingernail clippers and the rough edges smoothed with sandpaper. If the tear has left an open wound, the exposed area should be covered with a topical adhesive such as NexCare or Benzoin Tincture. A small piece of athletic tape can then be placed over the area, held better in place by the adhesive. This tape will likely not last an entire training session and may need to be replaced several times.

If a blister occurs, it should be taken care of before it rips on its own—this will allow more control of the outcome. Once a tear occurs, the athlete is at the mercy of chance. The blister should first be lanced and drained—this can be done by clipping its edge with fingernail clippers or using the sharp point to puncture it. In either case, the hole should be placed on the edge of the blister nearest to the fingers—this will reduce the likelihood of the bar's movement in the hands from tearing the skin away.

Once the fluid is squeezed out and cleaned away, liquid adhesive such as NexCare can be injected into the empty blister through the hole. This will allow the dead skin to serve as a protective layer while the wound heals from the inside out. The blister should be smoothed out as much as possible as the adhesive is drying. Once dry, sandpaper should be used to further smooth out any rough edges and help prevent any further tearing. Athletic tape can be used to cover the area with the added adhesive of Benzoin or similar if desired. If a blister has already torn open, the remaining dead skin should be removed and the underlying skin treated in the same way described for a torn callus above.

If necessary or desired, topical lidocaine gel can be applied to any hand wounds to reduce the pain.

Injuries

Despite the generally unrecognized low incidence of injury in even Olympic-level weightlifting competition, as with all sports and training modalities, injuries are inevitable. Most can be avoided through smart training, programming and recovery methods, but once an injury does occur, its treatment is critical for the athlete's timely and full recovery and return to training.

The first issue is that of recognition. Competitive athletes are accustomed to training with pain and discomfort and often pride themselves on their abnormally high tolerances. However admirable in general this may be, there is in fact a threshold after which continued training is no longer respectable, but simply stupid. Many times an athlete's refusal to back off at appropriate times transforms minor problems into potentially career-ending injuries.

The distinction between the type and degree of pain the athlete can train through and a legitimate injury that requires treatment and rest is critical. Most athletes' first reaction is to deny the severity of an injury. Equally problematic is the genuine ignorance of the condition in question. Unfortunately, the recognition of a legitimate injury is often not as straightforward as we'd like it to be. That being the case, it's wise to err on the side of caution, and when in doubt seek the opinion of a professional familiar with the treatment of athletes.

It's important to always keep in mind the big picture when considering responses to an injury. Most athletes have a sense of urgency and a consequent refusal to miss any training. However, this failure to back off when appropriate often leads to exacerbation of the condition to a point at which rest is forced. If left to this, invariably a minor injury that may have required a brief time off will demand far more time off and more involved treatment. In other words, caring for an injury sooner will nearly always reduce the total amount of missed training.

Self-Treatment

Minor injuries can typically be successfully treated by the athlete with simple care practices. This assumes the athlete is sure that the injury is indeed minor and is not in need of more formal care by a medical professional. Again, when in doubt, the athlete is advised to err on the side of caution.

The first step, of course, is to cease any training that causes pain in the injured area. Often training can continue with relatively little disruption and only minor alterations. In nearly every case, training of some type can be continued to maintain a baseline of capabilities and to minimize frustration.

If the injury is determined to be caused by limited flexibility, the next step is to improve that flexibility. If the injury is of a tight muscle itself, stretching should be very gentle initially and only be performed when the muscles are adequately warm, such as after a hot shower or non-aggravating training. The intensity of stretching can be gradually increased over time as tolerated, never exceeding a reasonable level of discomfort and becoming painful.

If a flexibility-related injury is of a joint, it's important to stretch appropriately to address the actual cause rather than simply stretching indiscriminately around the joint. For example, for lower back injuries, it's most likely stretching will need to be confined to the hips and legs—more often than not, stretching the back itself will exacerbate the problem, as it's quite common for lower back injuries to be the result of tight hips and hypermobile lumbar spines. There should never be an effort to stretch the connective tissues of a joint—any work directly on the joint capsule should be done exclusively by medical professionals.

For connective tissue problems such as tendinitis, local icing should accompany any other treatment. Most effective for small affected areas will be ice massage. For larger areas, ice packs will be necessary. Small paper or Styrofoam cups can be filled with water and frozen for ice massage. Once frozen, the top of the cup can be peeled away to create a piece of ice with an insulated handle. The athlete can then massage the injured area for 5 minutes, maintaining constant slow motion with the ice to prevent burning the skin and cover the entire area. Ice packs should be left on approximately 15-20 minutes with at least 60-90 minutes between applications to allow the return of normal blood flow through the affected area, which is an important part of the process. During the first few days after an acute injury, icing should be done a minimum of 2-3 times daily. Once the initial inflammation is reduced, icing should still be continued at least once daily.


Ice massage

Often cross-friction massage (massaging against the "grain" of the tendon or surrounding musculature) with the thumb, fist or elbow prior to icing can be helpful.

Contradictory opinions exist regarding the application of ice to muscle strains; some therapists and doctors are now recommending heat to encourage blood and nutrient turnover. The most prudent approach would be to use contrast, alternating between cold and heat, starting and ending with ice. This will encourage increased blood flow, but not promote additional inflammation.

Over-the-counter anti-inflammatories should be used conservatively, and limited to times of genuine need. The advice of a doctor regarding their use is suggested.

SAMPLE PROGRAMS

The following programs are included to provide examples of program design for athletes at different stages of development and with different goals. These can be used as-is, or as templates on which to build programs modified appropriately for the athlete based on his or her particular strengths and weaknesses. They should also be used to provide further clarification of the principles of program design described in preceding chapters.

The first programs are independent training cycles that can be used as standalone programs or modified to fit into a longer-term plan. These are:

The final three programs are sample cycles that correspond to the yearly training plan described in the Program Design chapter—a strength development phase, a competition phase, and a transition phase that connects the two. These programs would represent Strength Cycle 1, Specification Cycle 1, and Transition 1, respectively, from the training calendar:

Notation

Exercises are followed by the prescribed loading, reps and sets in that order. For example, Snatch – 75% x 2 x 5 would indicate snatching 75% of the athlete's 1RM for 2 reps for 5 sets. If a loading prescription is absent, the sets and reps will be in the reverse order. For example, Box jumps – 4 x 5 would indicate 4 sets of 5 reps.

The prescription heavy single indicates that the athlete should take the weight up to the heaviest he or she can manage for a single rep without any misses, unless due to obvious technical mistakes. Max would indicate instead a genuine attempt at a 1RM, with an allowance for as many as 3 attempts to achieve it.

Percentages for snatch/clean pulls and deadlifts refer to the associated classic lift maximum. For example, Snatch Pull – 90% x 3 x 3 would mean 90% of the athlete's best snatch.

Percentages that follow a daily max refer to that max rather than the athlete's all-time best.

Implementation

As mentioned above, the following programs can be used exactly as written, but most likely they will need to be modified in some respects to best serve each athlete. This may involve reducing or increasing volume, or changing certain exercises to better address the technical or strength needs of a lifter.

Additionally, a transition or preparation phase of some type may be necessary prior to implementing a program if the athlete is not presently conditioned for the prescribed volume or intensity. Generally no more than a week or two will be needed to graduate intensity or volume to a level similar to the beginning week of the program.

Supplemental Work

Abdominal and lower back work should be included regularly in all of the following programs if not prescribed. Other training such as light bodybuilding-type work can be included as needed or desired.

Basic Beginner Program

The following program is a very basic approach to beginner training with low volume and 4 training days per week. Initially, beginning athletes will not have established 1RMs on which to base the prescribed percentages. For the first cycle of this program, the athlete will simply feel out a comfortable weight for the prescribed sets and reps—this weight should be somewhat challenging but well within the athlete's ability.

The snatch and clean & jerk have no prescribed loads. Each should be taken up gradually to the heaviest weight with which the athlete is comfortable that day for a single rep. Small weight increases and relatively short rest periods (1-2 minutes) are recommended to improve consistency among sets. Athletes should aim to get about 15 total reps above approximately 60% of max. If this number of reps has not been achieved while working up to the heavy single, back-off singles at a somewhat reduced weight should be done after the heavy single to make up the difference. Making successful lifts is the priority over weight.

Snatch and clean halting deadlifts and pulls do not have prescribed weights. The athlete will need to feel out appropriate weights on the first week and then try to increase weights as described below. It's important that position and speed not be sacrificed for weight—the exercises are intended to strengthen the correct positions.

Each week the athlete will attempt to add a little weight to the lifts—likely around 2-3%. This should be adjusted according to how the athlete feels, and a longer series of smaller weight increases is preferable to a shorter series of larger ones. The programs for weeks 1 and 2 should be alternated until the athlete reaches a week during which he or she is unable to add any weight. Here a back-off week should be inserted. A 10-15% reduction of the previous week's weight should be adequate; if necessary, the number of sets can be reduced as well. Following this week, the athlete can resume the process, starting again with the weights used in the week prior to the back-off.

Basic Beginner Program

	Week 1	Week 2
MON	• Clean & Jerk - Heavy single; 15 reps • Snatch - Heavy single; 15 reps • Pull-ups – 3 x max reps	• Snatch - Heavy single; 15 reps • Clean & Jerk - Heavy single; 15 reps • Pull-ups – 3 x max reps
TUE	• Halting Snatch Deadlift (hip) – 5 x 2 • Back Squat – 5 x 3 • Push Press – 5 x 5	• Halting Clean Deadlift (upper thigh) – 5 x 2 • Front Squat – 80% x 3 x 5 • Snatch Push Press – 5 x 5
WED	Rest	Rest
THUR	• Snatch - Heavy single; 15 reps • Clean & Jerk - Heavy single; 15 reps • Pull-ups – 3 x max reps	• Clean & Jerk - Heavy single; 15 reps • Snatch - Heavy single; 15 reps • Pull-ups – 3 x max reps
FRI	• Overhead Squat – 5 x 3 • Front Squat – 5 x 3 • Clean Pull – 5 x 3	• Snatch Balance – 5 x 3 • Back Squat – 5 x 3 • Snatch Pull – 5 x 3

Beginner Template

The following template is intended for beginning lifters, but provides more technical work and more total volume, as well as guidelines for a basic progression over three stages of training. This is a more preferable program if the athlete can tolerate the volume. Most should be able to if the weights are chosen appropriately.

Each stage is somewhat more technically demanding than the previous. For example, the first stage uses snatches and cleans from the hang and jerks from behind the neck and progresses to the regular classic lifts. Positions and mechanics are emphasized early on to build a foundation for the lifter to progress with the classic lifts and assistance exercises.

Each training day has a technical primer exercise for the classic lift (snatch, clean or jerk) that will be the focus of that day; Saturday's will be a primer of the athlete or coach's choice. This exercise should be chosen for each athlete to address individual need and encourage better execution of the classic lift to follow. These exercises can be changed each time if desired, or can be kept the same for as long as is needed or effective. These are lightweight, technique exercises and should not cause significant fatigue. Examples of these technique primers are light snatch balances for an athlete who is not aggressive overhead in the snatch; muscle cleans for an athlete who needs to improve the mechanics of the clean turnover; or jerk dip squats for an athlete who fails to maintain the proper balance and position during the dip and drive of the jerk.

Weights must be determined by feel. In the first week of each stage, weights should be challenging, but comfortably within the athlete's limits. Each week, the goal will be to add weight. After 3-4 weeks of each stage, the athlete will proceed to the next stage, again starting with conservative weights for the prescribed sets and reps and building up the weight over the course of 3-4 weeks. This will provide a progression of reduced volume and increased weight on average over the 9-12 weeks of the cycle.

On Saturdays, the snatch and clean & jerk will be taken up gradually to the heaviest weight with which the athlete is comfortable that day for a single rep. Small weight increases and relatively short rest periods (1-2 minutes) are recommended to improve consistency among sets. Athletes should aim to get about 15 total reps above approximately 60% of max. If this number of reps has not been achieved while working up to the heavy single, back-off singles at a somewhat reduced weight should be done after the heavy single to make up the difference. Making successful lifts is the priority over weight.

Beginner Template

	Stage 1	Stage 2	Stage 3
MON	• Snatch Technique Primer • Mid-Hang Snatch - 5 x 3 • Halting Snatch Deadlift + finish (hip) - 5 x 3 • Back Squat - 3 x 8	• Snatch Technique Primer • Snatch - 5 x 2 • Halting Snatch Deadlift (hip) + Snatch Pull - 5 x (1+2) • Back Squat - 3 x 6	• Snatch Technique Primer • Snatch - 8 x 1 • Snatch Pull - 5 x 3 • Back Squat - 3 x 5
TUE	• Jerk Technique Primer • Jerk behind neck - 5 x 3 • Front Squat - 3 x 5 • Press - 3 x 10 • DB row - 3 x 10	• Jerk Technique Primer • Jerk - 5 x 2 • Front Squat - 3 x 3 • Push Press - 3 x 6 • DB row or Pull-up - 3 x 10	• Jerk Technique Primer • Jerk - 8 x 1 • Front Squat - 3 x 2 • Push Press - 3 x 4 • DB row or Pull-up- 3 x 10
WED	Rest	Rest	Rest
THU	• Clean Technique Primer • Mid-Hang Clean - 5 x 3 • Halting Clean Deadlift + Finish (upper thigh) - 5 x 3 • Back Squat - 3 x 6 (lighter than Monday)	• Clean Technique Primer • Clean - 5 x 2 • Halting Clean Deadlift (upper thigh) + Snatch Pull - 5 x (1+2) • Back Squat - 3 x 5 (lighter than Monday)	• Clean Technique Primer • Clean - 8 x 1 • Clean Pull - 5 x 3 • Back Squat - 3 x 3 (lighter than Monday)
FRI	Rest	Rest	Rest
SAT	• Choice Technique Primer • Snatch - heavy single; 15 reps • Clean & Jerk - Heavy single; 15 reps • Front Squat - 3 x 3	• Choice Technique Primer • Snatch - heavy single; 15 reps • Clean & Jerk - Heavy single; 15 reps • Front Squat - 3 x 2	• Choice Technique Primer • Snatch - heavy single; 15 reps • Clean & Jerk - Heavy single; 15 reps • Front Squat - 3 x 1

Intermediate Program 1

Like the beginner program, the intermediate program will alternate weeks A and B with a 2-3% weekly increase in weights until a back-off week is necessary. The athlete can attempt to continue this sequence until he or she feels a back-off is needed due to an inability to increase loading any more, or he or she can plan to insert an unloading week every fourth or fifth week.

Prescribed weights are generally light to allow a progression from a conservative starting point. Athletes should adjust weights as needed if given exercises feel too easy or too difficult initially.

On Fridays, the snatch and clean & jerk will be taken up gradually to the heaviest weight with which the athlete is comfortable that day for a single rep. Small weight increases and relatively short rest periods (1-2 minutes) are recommended to improve consistency among sets. Athletes should aim to get about 15 total reps above approximately 60% of max. If this number of reps has not been achieved while working up to the heavy single, back-off singles at a somewhat reduced weight should be done after the heavy single to make up the difference. Making successful lifts is the priority over weight.

Intermediate Program 1

	Week A	Week B	Unloading Week
MON	• Snatch – 70% x 2 x 3 • Back squat - 80% x 3 x 5 • Clean deadlift – 110% (of clean) x 5 x 3 • Push press – 75% x 5 x 5 • Pull-ups - 3 x max	• Clean & jerk – 70% x 1 x 3 • Front squat - 83% x 3 x 5 • Snatch deadlift – 113% (of snatch) x 2 x 2 • Snatch push press – 75% x 5 x 5 • Pull-ups - 3 x max	• Squat – 90% of last week x 2 x 3 • Deadlift – 90% of last week x 3 x 3 • Push press – 90% of last week x 3 x 3
TUE	• Muscle snatch – Heavy single • Snatch – 60% x 2 x 5 • Clean – 60% x 2 x 5 • Jerk – 60% x 2 x 5	• Muscle snatch – 80% x 2 x 3 • 2-position snatch (floor, hang) – 65% x 5 sets • 2-position clean (floor, hang) – 65% x 5 sets • Push jerk + jerk - 75% (of jerk) x 5 sets	• Snatch – 90% of last week x 1 x 5 • Clean – 90% of last week x 1 x 5 • Jerk – 90% of last week x 1 x 5
WED	• Clean & jerk – 65% x 3 x 3 • Snatch pull – 100% x 3 x 3 • Overhead squat – 75% x 3 x 3 • Front squat - 85% x 2 x 3 • Pull-ups - 3 x max	• Snatch – 65% x 2 x 3 • Clean pull – 103% x 2 x 3 • Snatch balance – 75% x 3 x 3 • Back squat - 87% x 2 x 3 • Pull-ups – 3 x max	• Snatch/Clean Pull – 90% of last week x 1 x 3 • OHS / Snatch Balance – 90% of last week x 1 x 3 • Squat – 90% of last week x 1 x 3 • Pull-ups – 90% of last week's reps x 3 sets
THU	Rest	Rest	Rest
FRI	• Snatch – Heavy single; 15 reps • Clean & jerk – Heavy single; 15 reps • Back squat – Heavy single • Box jumps – 3 x 5	• Snatch – Heavy single; 15 reps • Clean & jerk – Heavy single; 15 reps • Front squat – Heavy single • Box jumps – 3 x 5	• Snatch – Heavy single • Clean & jerk – Heavy single • Squat – Heavy single
SAT	• Muscle snatch – 75% x 3 x 3 • Power snatch - 75% x 2 x 4 • Power clean + push jerk – 75% x 2 x 4 • Pull-ups – 3 x max	• Muscle snatch – Heavy single • Mid-hang snatch – 70% x 2 x 4 • Mid-hang clean + push jerk – 70% x 4 sets • Pull-ups – 3 x max	• Power snatch –60% x 1 x 3 • Power clean + push jerk – 60% x 1 x 3 • Pull-ups - 80% of last week's reps

Intermediate Program 2

The following program is an example of a short macrocycle demonstrating a progression from higher volume to higher intensity with a concurrent transition from a greater emphasis on strength and power development to emphasis on strength and power specification, tapering at its culmination for a contest or 1RM testing. This is a fairly demanding program and attention to recovery if not some reduction in volume may be necessary.

Intermediate Program 2

	Week 1	Week 2
MON	• Snatch - 75% x 1 x 3 • Clean & Jerk - 70% x 1 x 3 • Snatch Pull - 90% x 3 x 3 • Snatch Deadlift - 100% x 3 x 3 • Front Squat - 75% x 3 x 5 / Follow each set immediately with 3 box jumps	• Snatch - 76% x 1 x 3 • Clean & Jerk - 71% x 1 x 3 • Snatch Pull - 95% x 3 x 3 • Snatch Deadlift - 103% x 3 x 3 • Front Squat - 78% x 3 x 5 / Follow each set with 3 box jumps
TUE	• Muscle Snatch - Max for day • Power Snatch - 80% x 1 x 4 • Power Clean & Power Jerk - 80% x 1 x 4 • Overhead Squat - 80% (of snatch) x 1; 65% x 2 x 2 • Pull-ups - 3 x max	• Muscle Snatch - Max for day • Power Snatch - 82% x 1 x 4 • Power Clean & Power Jerk - 80% x 1 x 4 • Overhead Squat - 85% (of snatch) x 1; 70% x 1 x 2 • Pull-ups - 3 x max
WED	• Snatch - 70% x 1 x 4 • Clean & Jerk - 75% x 1 x 3 • Clean Pull - 90% x 3 x 3 • Clean Deadlift - 100% x 3 x 3 • Back Squat - 75% x 3 x 5 / Follow each set with 3 box jumps	• Clean & Jerk - 76% x 1 x 3 • Snatch - 71% x 1 x 3 • Clean Pull - 95% x 3 x 3 • Clean Deadlift - 103% x 3 x 3 • Back Squat - 78% x 3 x 5 / Follow each set with 3 box jumps
THU	• Jerk - Max for day; 80% x 1 x 3 • Muscle Snatch - 70% x 2 x 3 • 2-position Snatch (floor, mid-thigh) - 60% x 3 sets • 2-position Clean (floor, mid-thigh) - 60% x 3 sets • Push Press - 75% x 5 x 4	• Jerk off Blocks - Max for day; 80% x 2 x 3 • Muscle Snatch off Blocks (mid-thigh) - 65% x 3 x 3 • Snatch off Blocks (mid-thigh) - 60% x 3 x 2 • Clean off Blocks (mid-thigh) - 60% x 3 x 2
FRI	Rest	Rest
SAT	• Snatch - Max for day • Clean & Jerk - Max for day • Front Squat - Max for day • Pull-ups - 3 x max • Good Morning - 3 x 10	• Snatch - Max for day • Clean & Jerk - Max for day • Front Squat - Max for day • Pull-ups - 3 x max • Stiff-legged Deadlift - 3 x 5

Intermediate Program 2

	Week 3	Week 4
MON	• Snatch - 77% x 1 x 3 • Clean & Jerk - 72% x 1 x 3 • Snatch Pull - 97% x 3 x 3 • Snatch Deadlift - 105% x 3 x 3 • Front Squat - 81% x 3 x 5 / Follow each set with 3 box jumps	• Snatch - 78% x 1 x 3 • Clean & Jerk - 75% x 1 x 3 • Snatch Pull off Riser - 90% x 3 x 3 • Front Squat - 84% x 2 x 4 • Pull-ups - 3 x max
TUE	• Muscle Snatch - Max for day • Power Snatch - 75% x 2 x 3 • Jerk off Blocks - Max for day; 80% x 2 x 2 • Pull-ups - 3 x max	• Mid-Hang Muscle Snatch - 50% x 3; 55% x 3; 60% x 3, 65% x 3 • Power Snatch + Snatch off Blocks (mid-thigh) - 50%; 55%; 60%; 65% x 3 sets • Jerk off Blocks - 75% x 3 x 3
WED	• Power Snatch + Snatch - 50% x 2 sets; 60% x 3 sets; 70% x 2 sets • Clean Pull - 97% x 3 x 3 • Clean Deadlift - 105% x 2 x 3 • Back Squat - 81% x 2 x 5 / Follow each set with 3 box jumps	• Clean & Jerk - 78% x 1 x 3 • Snatch - 73% x 1 x 3 • Clean Pull off Riser - 90% x 3 x 3 • Back Squat - 84% x 2 x 3 / Follow each set with 2 box jumps
THU	• Jerk off Blocks - 80% x 2 x 2; 85% x 2 x 2 • Jerk Dip Squat - 90% x 3; 95% x 3; 100% x 3 • Snatch Push Press - 70% x 5; 75% x 5, 80% x 5 x 2 • Pull-ups - 3 x max	• Jerk - Max for day; 80% x 1 x 3 • Power Snatch - 70% x 3 x 3 • Power Clean - 70% x 2 x 3 • • Push Press - 82% x 4 x 4
FRI	Rest	Rest
SAT	• Snatch - Max for day • Clean & Jerk - Max for day • Back Squat - Max for day • Good Morning - 3 x 10	• Snatch - Max for day • Clean & Jerk - Max for day • Front Squat - Max for day • Pull-ups - 3 x max • Stiff-legged Deadlift - 3 x 5

Intermediate Program 2

	Week 5	Week 6
MON	• Snatch - 80% x 1 x 3 • Clean & Jerk - 75% x 1 x 3 • Snatch Pull - 100% x 2 x 3 • Front Squat - 87% x 1 x 5 / Follow each set with 2 box jumps	• Snatch - 70% x 1 x 3 • Clean & Jerk - 70% x 1 x 3 • Front Squat - 80% x 2 x 2 / Follow each set with 3 box jumps
TUE	• Jerk - Max for day; 80% of single x 1 x 3 • Muscle Snatch - Max for day • Power Snatch - 80% x 1 x 4 • Pull-ups - 3 x max • Push press - 84% x 3 x 3	• Power Snatch - Max for day • Power Clean & Jerk - Max for day • Pull-ups - 2 x max
WED	• Clean & Jerk - 80% x 1 x 3 • Snatch - 75% x 1 x 3 • Clean Deadlift - 109% x 2 x 3 • Back Squat - 87% x 1 x 5	• Snatch - 65% x 2 x 4 • Clean & Jerk - 65% x 2 x 4 • Snatch Push Press + Overhead Squat - 65% (of snatch) x 3 + 3 x 4
THU	• Jerk off Blocks - 75% x 3 x 3 • Snatch Balance - Max for day; 80% x 1 x 3 • Muscle Snatch - 75% x 2 x 3 • Snatch off Blocks (mid-thigh) - 70% x 2 x 3; 65% x 3 x 2	• Box Jumps 3 x 3 • Snatch - 70% x 1 x 3 • Clean & Jerk - 70% x 1 x 3 • Pull-ups - 2 x max
FRI	Rest	Rest
SAT	• Snatch - Max for day • Clean & Jerk - Max for day • Front Squat - Max for day • Pull-ups - 3 x max • Good Morning - 3 x 10	• Snatch - Max for day • Clean & Jerk - Max for day • Front Squat - Max for day

Intermediate Program 2

	Week 7	Week 8
MON	• Snatch - Max for day; 85% x 1 x 3 • Clean & Jerk - Max for day; 85% of single x 1 x 2 • Front Squat - 80% x 3 x 3	• Snatch - Max for day; 80% x 1 x 5 • Clean & Jerk - Max for day; 80% of single x 1 x 4 • Front Squat - 90% x 1 x 3
TUE	• Muscle Snatch - Max for day • Power Snatch - 75% of Monday's Snatch x 1 x 5 • Power Clean & Jerk - 75% of Monday's CJ x 1 x 5 • Pull-ups - 3 x max	• Muscle Snatch - Max for day • Power Snatch - 75% of Monday's Snatch x 1 x 6 • Power Clean & Jerk - 75% of Monday's CJ x 1 x 6 • Pull-ups - 3 x max
WED	• Snatch - Max for day; 90% x 1 x 2 • Clean & Jerk - Max for day; 90% of single x 1 x 2 • Back Squat - 80% x 2 x 3	• Snatch - Max for day; 85% x 1 x 5 • Clean & Jerk - Max for day; 85% of single x 1 x 4 • Back Squat - 85% x 1 x 3
THU	• Muscle Snatch - 75% x 3 x 3 • Snatch - 80% of Wednesday's Snatch x 1 x 5 • Clean & Jerk - 80% of Wednesday's CJ x 1 x 5 • Pull-ups - 3 x max	• Muscle Snatch - 75% x 3 x 3 • Snatch - 80% of Wednesday's Snatch x 1 x 6 • Clean & Jerk - 80% of Wednesday's CJ x 1 x 5 • Pull-ups - 3 x max
FRI	Rest	Rest
SAT	• Snatch - Max for day; 85% x 1 x 5 • Clean & Jerk - Max for day; 85% x 1 x 4 • Front Squat - Max for day	• Snatch - Max for day • Clean & Jerk - Max for day • Front Squat - Max for day

Intermediate Program 2

	Week 9	Week 10
MON	• Snatch - 80% of last wk's best x 1 x 6 • Clean & Jerk - 80% of last wk's best x 1 x 5 • FS - 80% x 2 x 3	• Snatch - 90% (of opener) x 1 • Clean & Jerk - 90% (of opener) x 1 • Front Squat - 85% x 1
TUE	• Power Snatch - 80% of Monday's Snatch x 1 x 10 • Power Clean & Jerk - 80% of Monday's CJ x 1 x 8 • Pull-ups - 2 x 80% of max reps	• Snatch - 85% (of opener) x 1 • Clean & Jerk - 85% (of opener) x 1
WED	• Snatch - 80% of last wk's best x 1 x 8 • Clean & Jerk - 80% of last wk's best x 1 x 6	• Snatch - 80% (of opener) x 1 x 2 • Clean & Jerk - 80% (of opener) x 1 x 2
THU	• Power Snatch - 75% of Wednesday's Snatch x 1 x 8 • Power Clean & Jerk - 75% of Wednesday's CJ x 1 x 6	• Snatch - 70% x 1 x 3 • Clean & Jerk - 70% x 1 x 3
FRI	Rest	Rest
SAT	• Snatch - Opener x 1 • Clean & Jerk - Opener x 1 • Front Squat - 90% x 1	• Competition or 1RM Testing

Simple Template

The following is a 3-day per week training template that keeps programming very simple and flexible. This can be used by master lifters or other individuals who have limited recovery, limited time or are trying to balance other training with weightlifting. It can also be used simply as a starting point for building more extensive programming.

The snatch, clean and jerk can be the classic lifts as written, or any variation of your choosing based on how you're feeling on a particular day, or based on what you need to address certain technical problems. This includes variations like powers, hangs, complexes, etc.

Snatch and clean pulls can be done as pulls as written, or you can substitute any pulling-related exercise such as halting deadlifts, partial pulls, segment pulls and pull complexes. Again, choose exercises that address your own needs with regard to technique and strength.

The push press on day 2 can be any kind of upper body press exercise that you decide is most effective: push press behind the neck, press, incline bench press, etc. Similarly, the overhead squat on day 2 can be replaced with a snatch balance variation, complex of snatch balance and overhead squat, snatch push press and overhead squat, etc.

Front squats and back squats on days 1 and 3 can be done with whatever sets and reps you choose. A gpood starting point would be 3 reps for the front squat and 5 reps for the back squat, 3-5 sets for each.

Start the first week with fairly conservative weights and spend 3-4 weeks building the weights up, decreasing the reps or sets somewhat as you go if necessary. For example, you might do triples in the snatch, clean and jerk on week 1, doubles on week 2 and singles on week 3, increasing the weight by 5-10% each week. On the last week of a given block, you can test max lifts as desired.

Simple Template	
DAY 1	• Snatch • Snatch Pull • Front Squat
DAY 2	• Jerk • Push Press • Overhead Squat
DAY 3	• Clean & Jerk • Clean Pull • Back Squat

Master Program

This program is a very general idea of what master lifters may find productive, created with a forty-something athlete with average recovery ability and training experience in mind. Athletes with extensive weightlifting backgrounds will likely be capable of and even require more work; those with minimal or no weightlifting backgrounds may need to reduce the volume somewhat.

There is a simple rotation in terms of intensity and volume among staple exercises to attempt to achieve balance, with two days of heavier training and two days of lighter training each week. This basic template can be used with gradually increasing intensity for a 2-4 weeks, followed by a light week; after this, some change to the exercises can be made to focus on an athlete's present needs.

Masters lifters may also find variations of the Simple Template effective.

Master Program

	Week 1	Week 2
MON	• Back Squat - 5 x 3 • Clean Pull - 4 x 3 • Snatch Push Press - 4 x 5	• Front Squat - 5 x 3 • Snatch Pull - 4 x 3 • Overhead Squat - 3 x 2 • Push Press - 5 x 5
TUE	• Snatch - 75% x 1 x 5 • Power Clean & Power Jerk - 75% x 2 x 4	• Clean & Jerk - 80% x 1 x 3 • Power Snatch - 75% x 2 x 4
WED	Rest	Rest
THUR	• Front Squat - 3 x 2 • Snatch Pull - 3 x 3 • Overhead Squat - 4 x 3 • Push Press - 3 x 5	• Back Squat - 3 x 2 • Clean Pull - 3 x 3 • Snatch Push Press - 3 x 5
FRI	• Clean & Jerk - 80% x 1 x 3 • Power Snatch - 75% x 2 x 4	• Snatch - 75% x 1 x 5 • Power Clean & Power Jerk - 75% x 2 x 4

Weight Gain

The following program intends to help the athlete gain functional weight. For this it uses greater volume per session in the core exercises, but a lower frequency and overall lower volume to allow the greatest possible recovery. The loading will be increased 2-3% per week for 4 weeks, then backed off for a week, the increases resumed for 2-3 more weeks as tolerated (starting at the weight used the week prior to the back-off), and the cycle finished with a taper week to allow 1RM testing of any exercises the athlete wishes.

Some higher rep accessory exercises can be added for the upper body if desired—pulling exercises on Tuesday and pressing exercises on Friday. These should follow the listed exercises. Three to five sets of 8-12 reps for 1-3 exercises, staying clear of any failed reps, will help some individuals gain a bit more size. Suggested exercises are dumbbell presses, dumbbell rows, barbell bent rows, dumbbell curl and press, kettlebell presses, incline dumbbell bench press (if the individual has healthy, flexible shoulders and is diligent about maintaining this flexibility). These exercises can be changed weekly or a single exercise can be used for an entire cycle with the goal of progressing through weights and reps.

Additional higher-volume leg work can be done after squatting as well. The easiest way to do this is to drop the weight following the main sets of squats and perform 3-5 sets of 8-12 the same squat (i.e front or back). Another alternative is adding in unilateral work like lunge or split squat variations.

It should be kept in mind that in order for weight to be gained on any program, the athlete's nutrition must be in order. Details are covered in the Nutrition section of the book.

Weight Gain Program

	Weeks 1-4 & 6-8	Back-off Week	Final Week
MON	• Back Squat – 75% x 3 x 10 • Lower body accessory* • Clean & Jerk – Max for day • Push Press – 75% x 5 x 5	• Back Squat – 85% of last week x 3 x 6 • Clean & Jerk – 85% of last week x 1 x 1 • Push press – 85% of last week x 5 x 3	• Back Squat – 85% x 1 x 2 • Clean & Jerk – 75% x 1 x 3 • Push Press – 85% x 1 x 2
TUE	• Power Snatch – 60% (of snatch) x 2 x 3 • Power Clean & Jerk – 60% (of CJ) x 2 x 3 • Pull-ups – 3 x max • Upper body pulling accessory*	• Power Snatch – 60% (of snatch) x 1 x 3 • Power Clean & jerk – 60% (of CJ) x 1 x 3 • Pull-ups – 3 x 85% of last week's reps	• Snatch – 75% x 1 x 3 • Bench Press – 75% x 2 x 2
WED	• Deadlift – 80% x 3 x 3 • Bench Press – 75% x 5 x 5 • Pull-ups – 3 x 75% of Tuesday	• Deadlift – 85% of last week x 3 x 1 • Bench Press – 85% of last week x 5 x 3 • Pull-ups – 3 x 75% of Tuesday	• Power Snatch – 60% x 1 x 3 • Power Clean & Jerk – 60% x 1 x 3
THU	Rest	Rest	Rest
FRI	• Front Squat – 75% x 3 x 5 • Lower body accessory* • Snatch – Max for day • Press – 75% x 3 x 5 • Upper body pressing accessory*	• Front Squat – 85% of last week x 3 x 3 • Snatch – 85% of last week x 1 x 1 • Press – 85% of last week x 3 x 3	Rest
SAT	• 2-position Snatch – 60% x 4 sets • 2-position Clean – 60% x 4 sets • Push jerk + Jerk – 60% (of jerk) x 4 sets • Pull-ups – 3 x max	• 2-position Snatch – 60% x 2 sets • 2-position Clean – 60% x 2 sets • Push jerk + Jerk – 60% (of jerk) x 2 sets • Pull-ups – 3 x 85% of last week's reps	• Test 1RMs

*Optional. See description to left for suggested exercises and sets/reps.

Bulgarian Program

This is a basic 3-week Bulgarian-style program that would be repeated for as long as desired. It uses daily maxes for the classic lifts on the heavy days, but controls the loading of the squats. This assumes excellent technical proficiency; for less proficient lifters, the Tuesday and Thursday workouts can involve more technique-oriented exercises instead of the classic and power lifts. Similarly, each time the three-week cycle is repeated, minor changes can be made for the sake of variety.

This basic template can be adjusted in numerous ways to influence the results. Some of the possible adjustments, and the principles governing them, are discussed in the Bulgarian Method chapter. The most common changes necessary will be a reduction in volume by limiting the number of back-off reps following the snatch and clean & jerk on heavy days. Friday can also be made a training day by using Saturday's workout, and on Saturday, using Tuesday's workout with percentage's based on Friday's lifts.

In this program, percentages following a "max for day" are of that day's best lift, not of the athlete's absolute maximum.

Bulgarian Program

	Week 1	Week 2	Week 3
MON	• Snatch - Max for day; 85% x 1 x 8 • Clean & Jerk - Max for day; 85% x 1 x 6 • Front Squat - 85% x 2 x 2	• Snatch - Max for day; 90% x 1 x 6 • Clean & Jerk - Max for day; 90% x 1 x 4 • Back Squat - 90% x 2 x 2	• Snatch - 80% of last week's best x 1 x 6 • Clean & jerk - 80% of last week's best x 1 x 5 • Front squat - 80% x 2 x 3
TUE	• Power snatch - 75% of Moday's Snatch x 1 x 6 • Clean & jerk - 75% of Monday's CJ x 1 x 4	• Power snatch - 80% of Moday's Snatch* x 1 x 10 • Clean & jerk - 80% of Monday's CJ x 1 x 8	• Power Snatch - 80% of Monday x 1 x 8 • Power Clean & Jerk - 80% of Monday x 1 x 6
WED	• Snatch - Max for day; 90% x 1 x 6 • Clean & Jerk - Max for day; 90% x 1 x 4 • Back Squat - 85% x 2 x 3	• Snatch - Max for day; 85% x 1 x 8 • Clean & Jerk - Max for day; 85% x 1 x 6 • Front Squat - 90% x 1 x 3	• Snatch - 80% of last week's best x 1 x 6 • Clean & jerk - 80% of last week's best x 1 x 5 • Back squat - 80% x 2 x 3
THU	• Snatch - 80% of Wednesday's Snatch x 1 x 8 • Power Clean & Jerk - 80% of Wednesday's CJ x 1 x 6 • SLDL - 75% (of clean) x 5 x 3	• Snatch - 80% of Wednesday's Snatch x 1 x 8 • Power Clean & Jerk* - 80% of Wednesday's CJ x 1 x 6 • Good Morning - 40% (of clean) x 3 x 10	• Power Snatch - 80% of Monday x 1 x 8 • Power Clean & Jerk - 80% of Monday x 1 x 6 • Good Morning - 80% of last week x 8 x 3
FRI	Rest	Rest	Rest
SAT	• Snatch - Max for day; 85% x 1 x 8 • Clean & Jerk - Max for day; 85% x 1 x 6 • Front Squat - Max for day	• Snatch - Max for day; 90% x 1 x 6 • Clean & Jerk - Max for day; 90% x 1 x 4 • Back Squat - Max for day	• Snatch - 80% of last week's best x 1 x 8 • Clean & jerk - 80% of last week's best x 1 x 6 • Front squat - 80% x 3 x 3

*Up to a maximum of 80% of the athlete's best power snatch/clean

Bulgarian Peaking Cycle

This is a peaking cycle intended to be used in the final three weeks before a competition (or max lift testing). It follows a basic Bulgarian style model with some planned modulation of variables to maximize performance on the final day. This exact cycle produced a PR snatch, PR clean & jerk, PR total and a 5 for 6 performance for one of my lifters at the American Open.

The power snatches and power clean & jerks on Mondays and Wednesdays are to be done with 1 minute rest in between sets; the back-off snatches and clean & jerks after the daily maxes and the snatches and clean & jerks on the final Thursday before the competition should also be done with 1 minute rest periods. The light front squats on Mondays and Wednesdays must be performed with a focus on maximal speed. Percentage prescriptions for back-off sets following a daily max are of that max rather than the athlete's all-time best.

Bulgarian Peaking Cycle

	Week 1	Week 2	Week 3
MON	• Power Snatch - 75% x 1 x 10 • Power Clean & Jerk - 75% x 1 x 10 • Front Squat - 75% x 1	• Power Snatch - 75% x 1 x 10 • Power Clean & Jerk - 75% x 1 x 10 • Front Squat - 75% x 1	• Snatch - Max for day; 85% x 1 x 2 • Clean & jerk - Max for day; 85% x 1 x 2 • Front squat - Max for day; 90% x 1 x 2
TUE	• Snatch - Max for day; 80% x 1 x 5 • Clean & jerk - Max for day; 80% x 1 x 5 • Front squat - Max for day; 80% x 2 x 2	• Snatch - Max for day; 80% x 1 x 3 • Clean & jerk - Max for day; 80% x 1 x 3 • Front squat - Max for day; 85% x 2 x 2	• Power Snatch - 75% x 1 x 10 • Power Clean & Jerk - 75% x 1 x 10 • Front Squat - 75% x 1
WED	• Power Snatch - 75% x 1 x 10 • Power Clean & Jerk - 75% x 1 x 10 • Front Squat - 75% x 1	• Power Snatch - 75% x 1 x 10 • Power Clean & Jerk - 75% x 1 x 10 • Front Squat - 75% x 1	• Clean & jerk - Max for day; 85% x 1 x 3 • Snatch - Max for day; 85% x 1 x 3 • Back squat - Near max for day; 80% x 2 x 2
THU	• Clean & jerk - Max for day; 80% x 1 x 5 • Snatch - Max for day; 80% x 1 x 5 • Pause back squat - 3 x 3 (finish with 3RM for day)	• Clean & jerk - Max for day; 80% x 1 x 3 • Snatch - Max for day; 80% x 1 x 3 • Pause back squat - 3 x 3 (finish with 3RM for day)	• Snatch - 75% x 1 x 5 • Clean & jerk - 75% x 1 x 5 • Front squat - 75% x 1
FRI	Rest	Rest	Rest
SAT	• Snatch - Max for day; 75% x 1 x 5 • Clean & Jerk - Max for day; 75% x 1 x 5 • Front Squat - Max for day; 85% x 2 x 2	• Snatch - Max for day; 75% x 1 x 3 • Clean & Jerk - Max for day; 75% x 1 x 3 • Front Squat - Max for day; 85% x 2 x 2	• Competition or Max Testing

Classic Lift Position/Technique Cycle

This program emphasizes classic lift performance technique by focusing on positions and movement drills. This would be appropriate for late beginner and intermediate lifters who are able to lift reasonable weights but who are not well-developed technically.

Most exercises do not have weights prescribed because it will be necessary to adjust weights appropriately for each lifter. Loading will be increased by feel weeks 1-3 and weeks 5-7. When selecting weights, the lifter should choose them in the first weeks of these blocks with the knowledge that they will need to increase for 2 more weeks; in other words, the weights the first week should not be maximal efforts for the given sets and reps. By the final weeks of the blocks, the lifter should be aiming to use the heaviest possible weights with proper execution.

"Jump squat" in this case refers to a full depth back squat with a controlled descent, no bounce in the bottom, and a maximal vertical jump from the bottom.

This cycle finishes with a test of max snatch and clean & jerk.

Classic Lift Position/Technique Cycle

	Week 1	Week 2
MON	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split • Jerk dip squat - 5 x 3 • Jump squat - 25% (of back squat) x 3 x 3	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split • Jerk dip squat - 5 x 3 • Jump squat - 25% (of back squat) x 3 x 3
TUE	• Snatch segment pull (1", knee, hip, finish) + snatch pull - 3(1+1) x 4 sets • Snatch - 60% x 3 x 5 • Snatch Push Press + OHS - 3+1 x 5 sets	• Snatch segment pull (1", knee, hip, finish) + snatch pull - 2(1+1) x 4 sets • Snatch - 65% x 3 x 5 • Snatch Push Press + OHS - 3+1 x 5 sets
WED	• Power Clean + Front Squat + Clean + Jerk - 5 sets; 3 sec pause in split • Hang snatch high-pull, flat-footed - 4 x 4 • Front Squat - 75% x 4 x 4	• Power Clean + Front Squat + Clean + Jerk - 5 sets; 3 sec pause in split • Hang snatch high-pull, flat-footed - 4 x 4 • Front Squat - 77% x 4 x 6
THU	• Clean Segment Pull (1", knee, hip, finish) + clean pull - 3(1+1) x 4 sets • Clean & Jerk - 60% x 3+1 x 5 • Snatch Balance - 5 x 3	• Clean Segment Pull (1", knee, hip, finish) + clean pull - 2(1+1) x 4 sets • Clean & Jerk - 65% x 3+1 x 5 • Snatch Balance - 5 x 3
FRI	• Rest	• Rest
SAT	• Snatch - After 60%, singles up to heaviest for day with 3-5% increases per set • Clean & Jerk - After 60%, singles up to heaviest for day with 3-5% increases per set • Pause Back Squat - 3 x 3 • Back Squat - 75% (of Pause BS wt) x 5 x 3 • SLDL - 4 x 5	• Snatch - After 60%, singles up to heaviest for day with 3-5% increases per set • Clean & Jerk - After 60%, singles up to heaviest for day with 3-5% increases per set • Pause Back Squat - 3 x 3 • Back Squat - 80% (of Pause BS wt) x 5 x 3 • SLDL - 4 x 5

Classic Lift Position/Technique Cycle

	Week 3	Week 4
MON	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split • Jerk dip squat - 5 x 3 • Jump squat - 25% (of back squat) x 3 x 3	• Power snatch + OHS + snatch - 4 sets; 2 sec pause in bottom* • Push press + jerk behind neck + jerk - 4 sets; 5 sec hold in split* • Jerk dip squat - 4 x 3* • Jump squat - 25% (of back squat) x 3 x 3
TUE	• Snatch segment pull (1", knee, hip, finish) + snatch pull - (1+1) x 4 sets • Snatch - 70% x 3 x 5 • Snatch Push Press + OHS - 3+1 x 5 sets	• Snatch Pull - 75% x 3 x 3 • Snatch - 65% x 3 x 4 • Snatch Push Press + OHS - 2+1 x 4 sets*
WED	• Power Clean + Front Squat + Clean + Jerk - 5 sets; 3 sec pause in split • Hang snatch high-pull, flat-footed - 4 x 4 • Front Squat - 78% x 4 x 8	• Power Clean + Front Squat + Clean + Jerk - 4 sets; 3 sec pause in split* • Hang snatch high-pull, flat-footed - 4 x 4* • Front Squat - 78% x 3 x 4
THU	• Clean Segment Pull (1", knee, hip, finish) + clean pull - (1+1) x 4 sets • Clean & Jerk - 70% x 3+1 x 5 • Snatch Balance - 5 x 3	• Clean Pull - 75% x 3 x 3 • Clean & Jerk - 65% x 3+1 x 4 • Snatch Balance - 4 x 2*
FRI	• Rest	• Rest
SAT	• Snatch - After 60%, singles up to heaviest for day with 3-5% increases per set • Clean & Jerk - After 60%, singles up to heaviest for day with 3-5% increases per set • Pause Back Squat - 3 x 3 • Back Squat - 85% (of Pause BS wt) x 5 x 3 • SLDL - 4 x 5	• Snatch - 80% x 1 x 3 • Clean & Jerk - 80% x 1 x 3 • Pause Back Squat - 3 x 2* • SLDL - 3 x 5*

* Reduce weight by 10% from last week

Classic Lift Position/Technique Cycle

	Week 5	Week 6
MON	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split • Jerk dip squat - 5 x 3 • Jump squat - 25% (of back squat) x 3 x 3	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split • Jerk dip squat - 5 x 3 • Jump squat - 25% (of back squat) x 3 x 3
TUE	• Snatch segment pull (1", knee, hip, finish) + snatch - 2+1 x 4 sets • Snatch - 70% x 3 x 5 • Snatch Pull - 80% x 3, 85% x 3, 90% x 3 • Snatch Push Press + OHS - 2+1 x 5 sets	• Snatch segment pull (1", knee, hip, finish) + snatch - 1+1 x 4 sets • Snatch - 75% x 2 x 5 • Snatch Pull - 85% x 3, 90% x 3, 95% x 3 • Snatch Push Press + OHS - 2+1 x 5 sets
WED	• Power Clean + Front Squat + Clean + Jerk - 5 sets; 3 sec pause in split • Hang snatch high-pull, flat-footed - 4 x 4 • Front Squat - 80% x 3 x 5	• Power Clean + Front Squat + Clean + Jerk - 5 sets; 3 sec pause in split • Hang snatch high-pull, flat-footed - 4 x 4 • Front Squat - 83%x 3 x 5
THU	• Clean Segment Pull (1", knee, hip, finish) + clean - 2+1 x 4 sets • Clean & Jerk - 70% x 3+1 x 5 • Clean Pull - 80% x 3, 85% x 3, 90% x 3 • Snatch Balance - 5 x 2	• Clean Segment Pull (1", knee, hip, finish) + clean 1+1 x 4 sets • Clean & Jerk - 75% x 2+1 x 5 • Clean Pull - 85% x 3, 90% x 3, 95% x 3 • Snatch Balance - 5 x 2
FRI	• Rest	• Rest
SAT	• Snatch - After 60%, singles up to heaviest for day with 3-5% increases per set • Clean & Jerk - After 60%, singles up to heaviest for day with 3-5% increases per set • Pause Back Squat - 3 x 2 • SLDL - 4 x 5	• Snatch - After 60%, singles up to heaviest for day with 3-5% increases per set • Clean & Jerk - After 60%, singles up to heaviest for day with 3-5% increases per set • Pause Back Squat - 3 x 2 • SLDL - 4 x 5

Classic Lift Position/Technique Cycle

	Week 7	Week 8
MON	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split • Jerk dip squat - 5 x 3 • Jump squat - 25% (of back squat) x 3 x 3	• Power snatch + OHS + snatch - 5 sets; 2 sec pause in bottom* • Push press + jerk behind neck + jerk - 5 sets; 5 sec hold in split* • Jerk dip squat - 5 x 3* • Jump squat - 25% (of back squat) x 3 x 3
TUE	• Snatch - 80% x 2 x 5 • Snatch Pull - 90% x 3, 95% x 3, 100% x 3 • Snatch Push Press + OHS - 2+1 x 5 sets	• Snatch - 70% x 2 x 5 • Snatch Pull - 85% x 3 x 3 • Snatch Push Press + OHS - 1+1 x 4 sets*
WED	• Power Clean + Front Squat + Clean + Jerk - 5 sets; 3 sec pause in split • Hang snatch high-pull, flat-footed - 4 x 4 • Front Squat - 85% x 3 x 5	• Power Clean + Front Squat + Clean + Jerk - 4 sets; 3 sec pause in split* • Hang snatch high-pull, flat-footed - 3 x 4* • Front Squat - 80% x 2 x 4
THU	• Clean & Jerk - 80% x 2+1 x 5 • Clean Pull - 90% x 3, 95% x 3, 100% x 3 • Snatch Balance - 5 x 2	• Clean & Jerk - 70% x 2+1 x 5 • Clean Pull - 85% x 3 x 3 • Snatch Balance - 4 x 1*
FRI	• Rest	• Rest
SAT	• Snatch - After 60%, singles up to heaviest for day with 3-5% increases per set • Clean & Jerk - After 60%, singles up to heaviest for day with 3-5% increases per set • Pause Back Squat - 3 x 2 • SLDL - 4 x 5	• Snatch - 85% x 1 x 3 • Clean & Jerk - 85% x 1 x 3 • Back Squat - last week's Pause BS weight x 2 x 3 • SLDL - 4 x 5*

* Reduce weight by 10% from last week

Classic Lift Position/Technique Cycle

	Week 9	Week 10
MON	• Snatch - heavy single • Clean & Jerk - heavy single • Snatch Pull - 90% x 3 x 3 • Front Squat - 90% x 1	• Snatch - heavy single • Clean & Jerk - heavy single • Snatch Pull - 95% x 2 x 3 • Front Squat - heavy single
TUE	• Snatch - 80% x 1 x 5 • Clean & Jerk - 80% x 1 x 5 • Hang Snatch High-Pull - 70% x 3 x 3	• Snatch - 85% x 1 x 3 • Clean & Jerk - 85% x 1 x 3 • Hang Snatch High-Pull - 75% x 2 x 3
WED	• Power Snatch - heavy single • Power Clean & Jerk - heavy single • Clean Pull - 90% x 3 x 3 • Back Squat - 95% x 1	• Power Snatch - heavy single • Power Clean & Jerk - heavy single • Clean Pull - 95% x 2 x 3 • Back Squat - 85% x 1 x 3
THU	• Snatch - 80% x 1 x 5 • Clean & Jerk - 80% x 1 x 5 • Hang Clean High-Pull - 70% x 3 x 3	• Snatch - 85% x 1 x 3 • Clean & Jerk - 85% x 1 x 3 • Hang Clean High-Pull - 75% x 2 x 3
FRI	• Rest	• Rest
SAT	• Snatch - heavy single • Clean & Jerk - heavy single • Front Squat - heavy single • SLDL - 3 x 5	• Snatch - 90% x 1 • Clean & Jerk - 90% x 1 • Front Squat - 90% x 1 x 2 • SLDL - 2 x 5

Classic Lift Position/Technique Cycle

	Week 11
MON	• Snatch - 85% x 1 • Clean & Jerk - 85% x 1
TUE	• Power Snatch - 70% x 1; 60% x 1 x 3 • Power Clean & Jerk - 70% x 1; 60% x 1 x 3
WED	• Snatch - 70% x 1; 50% x 1 x 3 • Clean & Jerk - 70% x 1; 50% x 1 x 3
THU	• Snatch - 30-50% x 1 x 3-5 • Clean & Jerk - 30-50% x 1 x 3-5
FRI	• Rest
SAT	• Snatch - Max • Clean & Jerk - Max

Volume/Frequency Squat Cycle

This is a 10-week squatting program for increasing both leg strength and size, as well as work capacity. Included is "Week 0" which can be used as an introductory week. If the individual is accustomed to fairly high-volume squatting already, this week isn't necessary.

Accompanying training should be conservative in terms of intensity and volume to allow the necessary recovery capacity to be used for the squatting. How much can be managed in addition to this program varies significantly among individuals. The volume of additional work can be kept relative to that of the squatting, i.e. increasing gradually to week 4 and the tapering off. Week 9 volume should be very low, and week 10 should involve very little work to allow the athlete to recover as much as possible for the front squat max attempt on Saturday—dropping all work other than squatting is one option.

This front squat max will not be 100% accurate because of the timing. The cycle can also be used with back and front squats switched if the athlete needs to prioritize the front squat.

Volume/Frequency Squat Cycle

Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0	BS - 50%x4x3	BS - 50%x2x3	FS - 50%x5x3	BS - 50%x2x3	FS - 50%x2x3	BS - 50%x2x3
1	BS - 65%x6x4	BS - 60%x2x3	FS - 65%x5x4	BS - 60%x2x3	FS - 60%x2x3	BS - 65%x2x3
2	BS - 70%x6x6	BS - 60%x2x3	FS - 70%x5x6	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
3	BS - 70%x6x8	BS - 60%x2x3	FS - 70%x5x8	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
4	BS - 70%x6x10	BS - 60%x2x3	FS - 70%x5x10	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
5	BS - 75%x6x8	BS - 60%x2x3	FS - 75%x4x8	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
6	BS - 80%x5x6	BS - 60%x2x3	FS - 78%x4x6	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
7	BS - 85%x4x4	BS - 60%x2x3	FS - 81%x4x4	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
8	BS - 90%x3x3	BS - 60%x2x3	FS - 84%x3x3	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
9	BS - 95%x2x2	BS - 60%x2x3	FS - 87%x2x2	BS - 60%x2x3	FS - 60%x2x3	BS - 70%x2x3
10	BS - Max	FS - 50%x2x2	BS - 60%x2x2	FS - 60%x1x2	FS - 50%x1x3	FS - Max

Technique Development Program

The following program is intended to serve as an example of an extended technique development phase, most likely to be employed with young athletes who intend to specialize as weightlifters. This assumes an individual is largely prepared already to begin specializing in weightlifting; that is, he or she has been playing sports or exercising in some sense for a period of time, has developed a reasonable level of work capacity, joint mobility and coordination, and is approximately 12 years of age or older (with biological age to be a more important criterion than chronological age).

This program describes the exercises or drills to be used and the sets and reps for each. Although it is not described specifically, this of course assumes proper instruction for each new exercise as it appears in the progression. Instruction for these exercises and drills can of course be found throughout the book.

There is no weight prescribed for any of the exercises. None are intended at this stage to be performed with any significant loading—this is strictly technique instruction and practice. The coach can determine loading on an individual basis each day, keeping in mind that the overwhelming priority is optimal execution of each lift, not developing strength or power.

The snatch progression drills should initially be taught with a PVC bar and then eventually practiced with a light technique or empty barbell as appropriate; the clean and jerk progressions can be taught with a light technique bar and practiced if appropriate with an empty barbell. Once the athlete has practiced a given exercise enough to be proficient, weight can be added as deemed appropriate—at the most, exercises should be loaded with what is estimated to be approximately 60% of maximal effort. For most young athletes, this will mean empty barbells or light technique bars and technique plates on the classic lifts themselves, and light technique bars or even PVC bars on some or all of the teaching drills.

Sessions are only four days per week and are kept relatively short. This learning stage is very taxing mentally—keeping sessions brief and relatively infrequent will encourage better focus and quality of performance.

Again, this program is intended for young individuals beginning to specialize in weightlifting. Older athletes with more training experience will likely progress more quickly through this learning stage, although this protocol will remain a sound template on which to base modifications. In any case, this should demonstrate the desirability to extend the learning stage to a relatively long period of time rather than attempting to confine it to a brief series of training sessions. A more gradual progression with greater emphasis on quality practice of each element will produce far better results.

Technique Development Program

	Week 1	Week 2
MON	• Snatch and Clean & Jerk Demos and Introduction • Back Squat - 10 x 3 • Press - 10 x 3	• Overhead Squat - 10 x 3 • Pressing Snatch Balance - 10 x 3 • Front Squat - 3 x 6 • Clean Deadlift - 3 x 3
TUE	• Clean Deadlift - 8 x 3 • Back Squat - 3 x 8 • Press - 3 x 10	• Overhead Squat - 5 x 3 • Pressing Snatch Balance - 5 x 3 • Heaving Snatch Balance - 10 x 3 • Snatch Deadlift - 5 x 5
THU	• Front Squat - 8 x 3 • Back Squat - 4 x 6 • Clean Deadlift - 5 x 5	• Pressing Snatch Balance - 5 x 3 • Heaving Snatch balance - 5 x 3 • Snatch Balance - 10 x 3 • Snatch Deadlift - 4 x 5 • Press - 3 x 5
FRI	• Front Squat - 3 x 8 • Back Squat - 3 x 8 • Clean Deadlift - 3 x 5 • Press - 3 x 10	• Overhead Squat - 5 x 5 • Pressing Snatch Balance - 4 x 3 • Heaving Snatcn Balance - 4 x 3 • Snatch Balance - 8 x 3 • Snatch Deadlift - 5 x 5 • Back Squat - 3 x 5

Technique Development Program

	Week 3	Week 4
MON	• Mid-hang Snatch Pull - 10 x 3 • Overhead Squat - 5 x 3 • Snatch Balance - 5 x 3 • Snatch Deadlift - 3 x 3 • Press - 3 x 8	• Mid-hang Snatch Pull - 10 x 3 • Mid-hang Muscle Snatch - 5 x 3 • Scarecrow Snatch - 10 x 3 • Back Squat - 3 x 8
TUE	• Mid-hang Snatch Pull - 10 x 3 • Snatch Balance - 5 x 3 • Snatch Deadlift - 5 x 3 • Front Squat - 3 x 5	• Mid-hang Snatch Pull - 10 x 3 • Tall Muscle Snatch - 5 x 3 • Tall Snatch - 10 x 3 • Snatch Deadlift - 3 x 5
THU	• Mid-hang Snatch Pull - 10 x 3 • Tall Muscle Snatch - 10 x 3 • Mid-hang Muscle Snatch - 10 x 3 • Overhead Squat - 3 x 5 • Press - 3 x 5	• Mid-hang Snatch Pull - 6 x 3 • Tall Snatch - 8 x 3 • Mid-hang Snatch - 6 x 3 • Front Squat - 3 x 5
FRI	• Mid-hang Snatch Pull - 10 x 3 • Mid-hang Muscle Snatch - 10 x 3 • Snatch Balance - 3 x 5 • Back Squat - 3 x 8 • Snatch Deadlift - 3 x 5	• Mid-hang Snatch Pull - 4 x 3 • Tall Snatch - 4 x 3 • Mid-hang Snatch - 10 x 3 • Snatch Balance - 3 x 5

Technique Development Program

	Week 5	Week 6
MON	• Mid-hang Snatch - 5 x 3 • Snatch Deadlift - 5 x 3 • Snatch - 10 x 3	• Active Rest or limited practice of weak points
TUE	• Mid-hang Snatch - 3 x 3 • Snatch - 10 x 3 • Power Snatch - 5 x 3 • Back Squat - 3 x 5	• Active Rest or limited practice of weak points
THU	• Snatch - 10 x 3 • Power Snatch - 10 x 3 • Snatch Balance - 3 x 5	• Active Rest or limited practice of weak points
FRI	• Snatch - 10 x 3 • Power Snatch - 10 x 3 • Front Ssquat - 3 x 5 • Press - 3 x 8	• Active Rest or limited practice of weak points

Technique Development Program

	Week 7	Week 8
MON	• Mid-hang Snatch - 4 x 3 • Snatch - 8 x 3 • Power Snatch - 4 x 3 • Front Squat - 3 x 5	• Mid-hang Clean Pull - 4 x 3 • Mid-hang Muscle Clean - 4 x 3 • Scarecrow Clean - 10 x 3 • Snatch - 3 x 3 • Press - 3 x 8
TUE	• Mid-hang Clean Pull - 10 x 3 • Rack Delivery - 10 x 3 • Tall Muscle Clean - 5 x 3 • Clean Deadlift - 5 x 5 • Snatch - 3 x 3	• Mid-hang Clean Pull - 4 x 3 • Scarecrow Clean - 6 x 3 • Tall Clean - 10 x 3 • Power Snatch - 3 x 3 • Front Squat - 3 x 5
THU	• Mid-hang Clean Pull - 5 x 3 • Rack Delivery - 5 x 3 • Tall Muscle Clean - 5 x 3 • Mid-hang Muscle Clean - 8 x 3 • Back Squat - 3 x 6	• Mid-hang Clean Pull - 3 x 3 • Tall Clean - 5 x 3 • Mid-hang Clean - 10 x 3 • Clean Deadlift - 4 x 5 • Snatch - 3 x 3
FRI	• Mid-hang Clean Pull - 6 x 3 • Mid-hang Muscle Clean - 6 x 3 • Front Squat - 3 x 5 • Clean Deadlift - 5 x 5 • Snatch - 5 x 3	• Mid-hang Clean Pull - 3 x 3 • Tall Clean - 3 x 3 • Mid-hang Clean - 10 x 3 • Clean Deadlift - 4 x 5 • Power Snatch - 3 x 3 • Back Squat - 3 x 5

Technique Development Program

	Week 9	Week 10
MON	• Mid-hang Clean - 5 x 3 • Clean Deadlift - 5 x 3 • Clean - 10 x 3 • Snatch - 3 x 3	• Clean - 5 x 3 • Power Clean - 5 x 3 • Press - 3 x 8 • Push Press Behind the Neck - 5 x 5 • Back Squat - 3 x 5
TUE	• Mid-hang Clean - 3 x 3 • Clean - 10 x 3 • Power Clean - 5 x 3 • Power Snatch - 3 x 3	• Press - 3 x 5 • Push Press Behind the Neck - 3 x 5 • Push Press - 10 x 5 • Tall Power Jerk Behind the Neck - 5 x 3 • Snatch - 3 x 3
THU	• Clean - 10 x 3 • Power Clean - 10 x 3 • Snatch Balance - 3 x 3 • Back Squat - 3 x 6	• Push Press - 3 x 5 • Tall Power Jerk Behind the Neck - 3 x 3 • Tall Power Jerk - 10 x 3 • Power Jerk Behind the Neck - 5 x 3 • Clean - 3 x 3
FRI	• Clean - 10 x 3 • Power Clean - 10 x 3 • Snatch - 5 x 3 • Press - 3 x 8	• Tall Power Jerk - 3 x 3 • Power Jerk Behind the Neck - 3 x 3 • Power Jerk - 10 x 3 • Lunge - 3 x 10 • Overhead Squat - 3 x 5

Technique Development Program

	Week 11	Week 12
MON	• Push Press - 4 x 5 • Power Jerk - 5 x 3 • Jerk Balance - 10 x 3 • Snatch - 3 x 2 • Power Clean - 3 x 2 • Back Squat - 3 x 5	• Clean & Jerk - 10 x 3 • Snatch - 10 x 3 • Power Clean - 3 x 2 • Front Squat - 3 x 5
TUE	• Power Jerk - 4 x 3 • Jerk Balance - 4 x 3 • Split Jerk Behind the Neck - 10 x 3 • Clean - 3 x 2 • Power Snatch - 3 x 2	• Snatch - 10 x 3 • Clean & Jerk - 10 x 3 • Power Snatch - 3 x 2 • Clean Deadlift - 3 x 5
THU	• Power Jerk - 3 x 3 • Split Jerk Behind the Neck - 5 x 3 • Split Jerk - 10 x 3 • Snatch Deadlift - 3 x 5 • Front Squat - 3 x 5	• Clean & Jerk - 10 x 3 • Snatch - 10 x 3 • Power Clean - 3 x 2 • Back Squat - 3 x 5
FRI	• Power Jerk - 5 x 3 • Split Jerk Behind the Neck - 5 x 3 • Jerk Balance - 3 x 3 • Split Jerk - 10 x 3 • Snatch - 3 x 2 • Clean - 3 x 2	• Snatch - 10 x 3 • Clean & Jerk - 10 x 3 • Power Snatch - 3 x 2 • Snatch Deadlift - 3 x 5

Strength & Power Development Phase

This is a sample strength and power development phase that would fit into the yearly plan shown in the Program Design chapter (Strength Phase 1). It begins with a high-volume emphasis on squatting, pulling and pressing exercises with higher-volume work on classic lift variations, and progresses into much lower volume, classic lift emphasis, tapering for either a non-priority meet or max lift testing at its culmination. This program is an adaptation of one written by Mike Burgener.

Strength & Power Development Phase

	Week 1	Week 2
MON	• Power Snatch + 2 Snatch - 65% x 2 sets; 70% x 3 sets • Jerk off Blocks - 70% x 3 x 2; 75% x 3 x 3 • Clean Pull - 90% x 7 x 2; 90% x 5 x 3 • Back Squat - 60% x 8; 65% x 8; 70% x 6; 75% x 6 x 2	• Power Snatch + 2 Snatch - 70% x 2 sets; 75% x 3 sets • Jerk off Blocks - 75% x 3 x 5 • Clean Pull - 93% x 5 x 5 • Back Squat - 65% x 6; 70% x 6; 75% x 6; 80% x 5 x 2
TUE	• Power Clean + 2 Clean - 65% x 3 x 2; 70% x 3 x 3 • Clean High-Pull - 70% x 5 x 3; 75% x 5 x 2 • Snatch Balance - 60% x 3 x 2; 65% x 3; 70% x 3 x 2 • Push Press - 75% x 5 x 5	• Power Clean + 2 Clean - 70% x 2 sets; 75% x 3 sets • Snatch High-Pull - 73% x 5 x 3; 78% x 5 x 2 • Snatch Balance - 65% x 3 x 2; 70% x 3; 75% x 3 x 2 • Push Press - 78% x 5 x 5
WED	• Muscle Snatch - 60% x 5; 65% x 4; 70% x 3 x 2 • 3-Position Clean (floor, knee, mid-thigh) - 65% x 2 sets; 70% x 3 sets • Clean Deadlift - 100% x 7 x 2; 100% x 5 x 3 • Front Squat - 60% x 8; 65% x 6; 70% x 5; 75% x 3; 70% x 5	• Muscle Snatch - 65% x 5; 70% x 4; 75% x 3 x 2 • 3-Position Clean (floor, knee, mid-thigh) - 70% x 2 sets; 75% x 3 sets • Snatch Deadlift - 100% x 7 x 2; 100% x 5 x 3 • Front Squat - 65% x 6; 70% x 5; 75% x 5; 80% x 3 x 2
THU	• Rest	• Rest
FRI	• 3-Position Snatch (floor, knee, mid-thigh) - 65% x 2 sets; 70% x 3 sets • Snatch Pull - 90% x 7 x 2; 90% x 5 x 3 • Snatch Push Press - 70% x 5 x 3; 75% x 5 x 2 • Back Squat - 60% x 6; 65% x 6; 70% x 6; 75% x 4 x 4	• 3-Position Snatch(floor, knee, mid-thigh) - 70% x 3 x 2; 75% x 3 x 3 • Snatch Pull - 93% x 5 x 5 • Snatch Push Press - 75% x 5 x 5 • Back Squat - 65% x 5; 70% x 5; 75% x 4; 80% x 3 x 2
SAT	• Snatch - 70% x 3; 75% x 2; 80% x 1 x 2; 75% x 1; 80% x 1 • Clean & Jerk - 70% x 3; 75% x 2; 80% x 1 x 2; 75% x 1; 80% x 1 • Snatch Shrug - 105% x 8 x 5 • RDL - 65% (of clean) x 8 x 5	• Snatch - 70% x 3; 75% x 2; 80% x 1; 85% x 1; 80% x 1; 75% x 1 • Clean & Jerk - 70% x 3; 75% x 2; 80% x 1; 85% x 1; 80% x 1; 75% x 1 • Clean Shrug - 110% x 6 x 5 • RDL - 68% (of clean) x 8 x 5

Strength & Power Development Phase

	Week 3	Week 4
MON	• Power Snatch + Snatch - 75% x 4 sets • Jerk off Blocks - 78% x 3 x 5 • Clean Pull - 96% x 5 x 5 • Back Squat - 75% x 5; 80% x 5 x 3; 83% x 3	• Snatch - 78% x 2 x 4 • Jerk off Blocks - 80% x 2 x 5 • Clean Pull - 98% x 4 x 4 • Back Squat - 80% x 5 x 2; 85% x 4 x 3
TUE	• Power Clean + Clean - 75% x 4 sets • Clean High-Pull - 78% x 5 x 2; 78% x 4 x 3 • Snatch Balance - 70% x 3 x 2; 75% x 3 x 2; 80% x 3 • Push Press - 80% x 5 x 5	• Clean - 78% x 2 x 4 • Snatch High-Pull - 80% x 4 x 2; 80% x 3 x 3 • Snatch Balance - 70% x 3; 75% x 3 x 2; 80% x 3 x 2 • Push Press - 82% x 4 x 5
WED	• Muscle Snatch - 65% x 5; 70% x 4; 75% x 3 x 2 • 2-Position Clean (floor, mid-thigh) - 75% x 2 sets; 80% x 3 sets • Clean Deadlift - 105% x 5 x 5 • Front Squat - 75% x 5;80% x 4 x 2; 85% x 3 x 2	• Muscle Snatch - 70% x 4; 75% x 3 x 2; 78% x 3 • 2-Position Clean (floor, mid-thigh) - 77% x 2 x 2; 81% x 2 x 3 • Snatch Deadlift - 105% x 5 x 5 • Front Squat - 80% x 4 x 3; 85% x 4 x 3
THU	• Rest	• Rest
FRI	• 2-Position Snatch (floor, mid-thigh) - 75% x 2 sets; 80% x 3 sets • Snatch Pull - 96% x 5 x 5 • Snatch Push Press - 78% x 5 x 5 • Back Squat - 75% x 5 x 2; 80% x 5 x 3	• 2-Position Snatch (floor, mid-thigh) - 77% x 2 sets; 81% x 3 sets • Snatch Pull - 98% x 3 x 5 • Snatch Push Press - 81% x 5 x 5 • Back Squat - 85% x 4 x 5
SAT	• Snatch - 75% x 2; 80% x 1; 83% x 1; 85% x 1; 83% x 1; 80% x 1 • Clean & Jerk - 75% x 2; 80% x 1; 83% x 1; 85% x 1; 83% x 1; 80% x 1 • Snatch Shrug - 113% x 6 x 5 • RDL - 70% (of clean) x 7 x 5	• Snatch - 80% x 1; 82% x 1; 84% x 1; 87% x 1; 84% x1; 82% x 1 • Clean & Jerk - 80% x 1; 82% x 1; 84% x 1; 87% x 1; 84% x1; 82% x 1 • Clean Shrug - 113% x 6 x 5 • RDL - 72% (of clean) x 6 x 5

Strength & Power Development Phase

	Week 5	Week 6
MON	• Power Snatch - 70% x 3 x 5 • Block Jerk - 73% x 3 x 4 • Clean Pull - 88% x 3 x 3 • Back Squat - 70% x 3 x 2; 75% x 2 x 3	• Snatch off Blocks (mid-thigh) - 70% x 3 x 4 • Jerk off Blocks - 78% x 3 x 3; 81% x 3 x 2 • Clean Pull - 100% x 3 x 5 • Back Squat - 86% x 4 x 5
TUE	• Power Clean - 70% x 3 x 5 • Snatch High-Pull - 70% x 3 x 5 • Snatch Balance - 65% x 3 x 5 • Push Press - 72% x 3 x 5	• Clean off Blocks (above knee) - 70% x 3 x 4 • Clean High-Pull - 84% x 3 x 5 • Snatch Balance - 75% x 3 x 2; 80% x 3 x 3 • Push Press - 85% x 4 x 4
WED	• 2-Position Clean - 70% x 2 x 5 • Muscle Snatch - 65% x 4 x 4 • Snatch Deadlift - 95% x 3 x 4 • Front Squat - 70% x 3 x 3; 75% x 3 x 2	• Muscle Snatch - 70% x 5; 75% x 3 x 2; 78% x 3 • Clean & Jerk - 70% x 3 x 3; 75% x 2 x 3 • Clean Deadlift - 108% x 4 x 5 • Front Squat - 85% x 4 x 5
THU	• Rest	• Rest
FRI	• 2-Position Snatch - 70% x 2 x 5 • Snatch Pull - 86% x 3 x 5 • Snatch Push Press - 71% x 5 x 5 • Back Squat - 75% x 3 x 3; 75% x 2 x 2	• Snatch - 70% x 3 x 2; 75% x 2 x 3 • Snatch Pull - 100% x 3 x 5 • Snatch Push Press - 83% x 4 x 5 • Back Squat - 85% x 4 x 5
SAT	• Snatch - 70% x 2; 75% x 2; 77% x 1 x 2 • Clean & Jerk - 70% x 2; 75% x 2; 77% x 1 x 2 • Snatch Shrug - 105% x 6 x 5 • RDL - 60% (of clean) x 6 x 5	• Snatch - 80% x 1; 82% x 1; 84% x 1; 87%; 84%; 82% • Clean & Jerk - 80% x 1; 82% x 1; 84% x 1; 87%; 84%; 82% • Clean Shrug - 116% x 6 x 5 • RDL - 72% x 6 x 5

Strength & Power Development Phase

	Week 7	Week 8
MON	• Snatch off Blocks - 73% x 3 x 2; 73% x 2 x 2 • Jerk off Blocks - 82% x 2 x 4 • Clean Pull off Riser (3") - 90% x 5 x 5 • Back Squat - 88% x 3 x 5	• Snatch off Blocks (mid-thigh) - 75% x 2 x 4 • Jerk off Blocks - 84% x 2 x 4 • Clean Pull off Riser (3") - 93% x 4 x 5 • Back Squat - 87% x 4; 87% x 3 x 2; 90% x 2 x 2
TUE	• Clean off Blocks (above knee) - 73% x 3 x 2; 73% x 2 x 2 • Snatch High Pull - 86% x 3 x 5 • Snatch Balance - 78% x 3 x 3; 82% x 2 x 2 • Push Press - 87% x 4 x 2; 87% x 3 x 3	• Clean off Blocks (above knee) - 75% x 2 x 4 • Clean High-Pull - 88% x 2 x 5 • Snatch Balance - 80% x 3 x 2; 84% x 2 x 2 • Push Press - 89% x 3 x 4
WED	• Muscle Snatch - 75% x 3 x 2; 78% x 3 x 2 • Clean & Jerk - 75% x 2 x 2; 80% x 1 x 3 • Snatch Deadlift - 110% x 4 x 5 • Front Squat - 87% x 3 x 5	• Muscle Snatch - 76% x 3 x 2; 79% x 2 x 2 • Clean & Jerk - 75% x 2; 80% x 1 x 4 • Clean Deadlift - 113% x 4 x 5 • Front Squat - 89% x 2 x 5
THU	• Rest	• Rest
FRI	• Snatch - 75% x 2 x 2; 80% x 1 x 3 • Snatch Pull off Riser (3") - 90% x 5 x 5 • Snatch Push Press - 85% x 4 x 3; 85% x 3 x 2 • Back Squat - 85% x 4 x 5	• Snatch - 75% x 2; 80% x 1 x 4 • Snatch Pull off Riser (3") - 93% x 4 x 5 • Snatch Push Press - 87% x 4 x 2; 87% x 3 x 2 • Back Squat - 87% x 3 x 5
SAT	• Snatch - 80% x 1; 82% x 1; 84% x 1; 87% x 1 x 2; 84% x 1; 82% x 1 • Clean & Jerk - 80% x 1; 82% x 1; 84% x 1; 87% x 1 x 2; 84% x 1; 82% x 1 • Clean Shrug - 119% x 5 x 5 • RDL - 74% (of clean) x 5 x 5	• Snatch - 80% x 1; 82% x 1; 84% x 1; 87% x 1 x 3 • Clean & Jerk - 80% x 1; 82% x 1; 84% x 1; 87% x 1 x 3 • Snatch Shrug - 122% x 5 x 3; 4 x 2 • RDL - 76% (of clean) x 5 x 4

Strength & Power Development Phase

	Week 9	Week 10
MON	• Mid-Hang Snatch - 65% x 2 x 4 • Jerk off Blocks - 75% x 2 x 4 • Clean Pull off Riser (3") - 83% x 3 x 3 • Back Squat - 80% x 2 x 5	• Snatch - 75% x 2 x 4 • Jerk off Blocks - 84% x 3 x 2; 84% x 2 x 2 • Clean Pull off Riser (3") - 95% x 3 x 3 • Back Squat - 90% x 2 x 4
TUE	• Mid-Hang Clean - 65% x 2 x 4 • Clean High-Pull - 78% x 3 x 4 • Snatch Balance - 70% x 3 x 4 • Push Press - 79% x 3 x 4	• Clean - 75% x 2 x 4 • Snatch Balance - 85% x 3 x 4 • Push Press - 90% x 3 x 3
WED	• Muscle Snatch - 65% x 3 x 4 • Clean & Jerk - 65% x 2 x 2; 70% x 1 x 3 • Snatch Deadlift - 103% x 3 x 3 • Front Squat - 80% x 2 x 3	• Muscle Snatch - 80% x 2 x 3 • Clean & Jerk - 80% x 1 x 3 • Clean Deadlift - 115% x 3 x 3 • Front Squat - 90% x 2 x 4
THU	• Rest	• Rest
FRI	• Snatch - 65% x 2 x 2; 70% x 1 x 3 • Snatch Pull off Riser - 83% x 3 x 3 • Snatch Push Press - 77% x 4 x 4 • Back Squat - 77% x 2 x 4	• Snatch - 80% x 1 x 3 • Snatch Pull off Riser (3") - 95% x 3 x 3 • Snatch Push Press - 89% x 3 x 3 • Back Squat - 87% x 2 x 4
SAT	• Snatch - 60% x 2; 65% x 2; 70% x 1 x 2; 75% x 1 x 2 • Clean & Jerk - 60% x 2; 65% x 2; 70% x 1 x 2; 75% x 1 x 2 • Clean Shrug - 112% x 5 x 3 • RDL - 66% x 5 x 4	• Snatch - 80% x 1; 82% x 1; 84% x 1; 87% x 1 x 2; 82% x 1; 80% x 1 • Clean & Jerk - 80% x 1; 82% x 1; 84% x 1; 87% x 1 x 2; 82% x 1; 80% x 1 • Snatch Shrug - 122% x 5 x 3; 122% x 4 x 2

Strength & Power Development Phase

	Week 11	Week 12
MON	• Snatch - 70% x 2 x 3; 70% x 1 • Clean & Jerk - 70% x 2 x 3; 70% x 1 • Back Squat - 80% x 2 x 4	• Snatch - 75% x 1 x 5 • Clean & Jerk 75% x 1 x 5 • Back Squat - 90% x 1; 93% x 1; 95% x 1
TUE	• Snatch - 65% x 2 x 4 • Clean & Jerk - 65% x 2 x 4 • Snatch Balance - 75% x 3 x 4	• Snatch - 70% x 1 x 2; 75% x 1 x 2; 80% x 1 x 2 • Clean & Jerk - 70% x 1 x 2; 75% x 1 x 2; 80% x 1 x 2
WED	• Snatch - 70% x 2 x 3 • Clean & Jerk - 70% x 2 x 3 • Front squat - 80% x 2 x 4	• Rest
THU	• Rest	• Snatch - 70% x 1 x 2; 75% x 1 x 4 • Clean & Jerk - 70% x 1 x 2; 75% x 1 x 4 • Front Squat - 90% x 1
FRI	• Snatch - 70% x 1 x 6 • Clean & Jerk - 70% x 1 x 6 • Back Squat - 77% x 2 x 4	• Rest
SAT	• Snatch - 70% x 1; 72% x 1; 74$ x 1; 77% x 1; 74% x 1; 72% x 1 • Clean & Jerk - 70% x 1; 72% x 1; 74$ x 1; 77% x 1; 74% x 1; 72% x 1 • Clean Pull - 90% x 2 x 4	• Snatch - Max • Clean & Jerk - Max • Back Squat - Max

Transition Phase

This is a sample transition phase that might be used to bridge the previous strength and power development and strength and power specification phases. It will more gradually introduce the athlete to the heavy single classic lift work that is to come and better prepare him or her for optimal performance. Additionally, it will serve as an unloading week to provide some rest following a long and demanding cycle.

Transition Phase

	Week 1
MON	• Rest
TUE	• Power Snatch - 75% x 1 x 6 • Power Clean & Jerk - 75% x 1 x 6
WED	• Snatch - 75% x 1 x 5 • Clean & Jerk - 75% x 1 x 5 • Back Squat - 80% x 2 x 3
THU	• Power Snatch - 80% x 1 x 8 • Power Clean & Jerk - 80% x 1 x 8
FRI	• Snatch - 85% x 1 x 3 • Clean & Jerk - 85% x 1 x 2 • Front Squat - 85% x 2 x 3
SAT	• Snatch - 80% x 1 x 4 • Clean & Jerk - 80% x 1 x 3

Strength & Power Specification Phase

This is a sample strength and power specification phase that would fit into the yearly plan shown in the Program Design chapter (Specification Phase 1). It would follow the above strength and power development phase after a one-week transition phase. The cycle uses a Bulgarian-style approach with manipulation of the squat loading and volume and back-off set loading and volume to influence the max lifts as desired. It tapers in the last weeks to prepare the athlete for a priority competition.

Strength & Power Specification Phase

	Week 1	Week 2
MON	• Snatch - Max for day; 85% x 1 x 4 • Clean & Jerk - Max for day; 85% x 1 x 3 • Front Squat - 80% x 3 x 3	• Snatch - Max for day; 85% x 1 x 6 • Clean & Jerk - Max for day; 85% x 1 x 4 • Front Squat - 85% x 3 x 3
TUE	• Power Snatch - 75% of Monday's snatch x 1 x 6 • Clean & Jerk - 75% of Monday's CJ x 1 x 4	• Power Snatch - 75% of Monday's snatch x 1 x 8 • Clean & Jerk - 75% of Monday's CJ x 1 x 6
WED	• Snatch - Max for day; 85% x 1 x 6 • Clean & Jerk - Max for day; 85% x 1 x 4 • Back Squat - 80% x 2 x 3	• Snatch - Max for day; 90% x 1 x 6 • Clean & Jerk - Max for day; 90% x 1 x 4 • Back Squat - 85% x 2 x 3
THU	• Rest	• Rest
FRI	• Snatch - Max for day; 85% x 1 x 5 • Clean & Jerk - Max for day; 85% x 1 x 4 • Front Squat - 80% x 3 x 3	• Snatch - Max for day; 85% x 1 x 7 • Clean & Jerk - Max for day - 85% x 1 x 6 • Front Squat - 85% x 3 x 3
SAT	• Snatch - 80% of Friday's snatch x 1 x 6 • Power Clean & Jerk - 80% of Friday's CJ x 1 x 8 • Stiff-Legged Deadlift - 3 x 8	• Snatch - 80% of Friday's snatch x 1 x 6 • Power Clean & Jerk - 80% of Friday's CJ x 1 x 8 • Stiff-Legged Deadlift - 3 x 8

Strength & Power Specification Phase

	Week 3	Week 4
MON	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4	• Snatch - Max for day; 85% x 1 x 6 • Clean & Jerk - Max for day; 85% x 1 x 4 • Front Squat - 88% x 2 x 3
TUE	• Power Snatch - 70% of Monday's snatch x 1 x 5 • Power Clean & Jerk - 70% of Monday's CJ x 1 x 5	• Power Snatch - 80% x 1 x 7 • Clean & Jerk - 80% x 1 x 5
WED	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4 • Back Squat - 80% x 1 x 2	• Snatch - Max for day; 90% x 1 x 8 • Clean & Jerk - Max for day; 90% x 1 x 6 • Back Squat - 85% x 2 x 3
THU	• Rest	• Rest
FRI	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4	• Snatch - Max for dayt; 85% x 1 x 7 • Clean & Jerk - Max for day; 85% x 1 x 6 • Front Squat - 88% x 2 x 3
SAT	• Snatch - 70% of Friday's snatch x 1 x 6 • Clean & Jerk - 70% of Friday's CJ x 1 x 6 • Front Squat - 80% x 1 x 2	• Snatch - 80% x 1 x 5 • Power Clean & Jerk - 80% x 1 x 7 • Romanian Deadlift - 3 x 8

Strength & Power Specification Phase

	Week 5	Week 6
MON	• Snatch - Max for day; 85% x 1 x 6 • Clean & Jerk - Max for day; 85% x 1 x 4 • Front Squat - 90% x 2 x 3	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4
TUE	• Power Snatch - 80% x 1 x 7 • Clean & Jerk - 80% x 1x 5	• Power Snatch - 70% of Monday's snatch x 1 x 5 • Power Clean & Jerk - 70% of Wednesday's CJ x 1 x 5
WED	• Snatch - Max for day; 90% x 1 x 8 • Clean & Jerk - Max for day; 90% x 1 x 6 • Back Squat - 88% x 2 x 2	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4 • Back Squat - 80% x 1 x 2
THU	• Rest	• Rest
FRI	• Snatch - Max for day; 85% x 1 x 7 • Clean & Jerk - Max for day; 85% x 1x 6 • Front Squat - 90% x 2 x 2	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4
SAT	• Snatch - 80% x 1 x 5 • Power Clean & Jerk - 80% x 1 x 7 • Romanian Deadlift - 3 x 8	• Snatch - 70% of Friday's snatch x 1 x 6 • Clean & Jerk - 70% of Friday's snatch x 1 x 6 • Front Squat - 80% x 1 x 2

Strength & Power Specification Phase

	Week 7	Week 8
MON	• Snatch - Max for day; 90% x 1 x 6 • Clean & Jerk - Max for day; 90% x 1 x 4 • Front Squat - Max for day	• Snatch - Max for day; 90% x 1 x 6 • Clean & Jerk - Max for day; 90% x 1 x 4 • Front Squat - 85% x 1 x 2
TUE	• Power Snatch - 80% x 1 x 7 • Clean & Jerk - 80% x 1 x 5	• Power Snatch - 80% x 1 x 7 • Clean & Jerk - 80% x 1 x 5
WED	• Snatch - Max for day; 85% x 1 x 8 • Clean & Jerk - Max for day; 85% x 1 x 6 • Back Squat - 85% x 1 x 4	• Snatch - Max for day; 85% x 1 x 8 • Clean & Jerk - Max for day; 85% x 1 x 6 • Back Squat - 80% x 2 x 2
THU	• Rest	• Rest
FRI	• Snatch - Max for day; 90% x 1 x 7 • Clean & Jerk - Max for day; 90% x 1 x 6 • Front Squat - Max for day	• Snatch - Max for day; 90% x 1 x 7 • Clean & Jerk - Max for day; 90% x 1 x 6 • Front Squat - 85% x 1 x 2
SAT	• Snatch - 80% x 1x 5 • Clean & Jerk - 80% x 1 x 7 • Good Morning - 3 x 10	• Snatch - 80% x 1 x 5 • Power Clean & Jerk - 80% x 1 x 7 • Good Morning - 3 x 10

Strength & Power Specification Phase

	Week 9	Week 10
MON	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4	• Snatch - Max for day; 80% x 1 x 4 • Clean & Jerk - Max for day; 80% x 1 x 3 • Front Squat - 80% x 1
TUE	• Power Snatch - 70% of Monday's snatch x 1 x 5 • Power Clean & Jerk - 70% of Monday's CJ x 1 x 5	• Snatch - 75% x 1 x 5 • Clean & Jerk - 75% x 1 x 4
WED	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4 • Back Squat - 80% x 1 x 2	• Snatch - Max for day; 75% x 1 x 5 • Clean & Jerk - Max for day; 75% x 1 x 4 • Back Squat - 80% x 1
THU	• Rest	• Rest
FRI	• Snatch - 80% of last week's best x 1 x 4 • Clean & Jerk - 80% of last week's best x 1 x 4 • Back Squat - 80% x 1 x 2	• Snatch - Max for day; 80% x 1 x 4 • Clean & Jerk - Max for day; 80% x 1 x 3 • Front Squat - 85% x 1 x 2
SAT	• Snatch - 70% of Friday's snatch x 1 x 6 • Clean & Jerk - 70% of Friday's CJ x 1 x 6 • Front Squat - 80% x 1 x 2	• Snatch - 80% x 1 x 6 • Clean & Jerk - 80% x 1 x 4

Strength & Power Specification Phase

	Week 11	Week 12
MON	• Snatch - Max for day; 90% x 1; 85% x 1 • Clean & Jerk - Max for day; 90% x 1; 85% x 1	• Snatch - 90% of opener (or 84%) x 1 • Clean & Jerk - 90% of opener (or 84%) x 1 • Front Squat - 85% x 1
TUE	• Snatch - 75% x 1 x 5 • Clean & Jerk - 80% x 1 x 4	• Snatch - 85% of opener (or 79%) x 1 x 2 • Clean & Jerk - 85% of opener (or 79%) x 1
WED	• Snatch - Max for day; 75% x 1 x 4 • Clean & Jerk - Max for day; 75% x 1 x 3	• Snatch - 80% of opener (or 75%) x 1 x 1-3* • Clean & Jerk - 80% of opener (or 75%) x 1 x 1-2*
THU	• Snatch - 80% x 1 x 6 • Clean & Jerk - 75% x 1 x 4	• Snatch - 70% of opener (or 65%) x 1 x 1-4* • Clean & Jerk - 70% of opener (or 65%) x 1 x 1-3*
FRI	• Rest	• Rest
SAT	• Snatch - Contest opener (or 93%) x 1 • Clean & Jerk - Contest opener (or 93%) x 1	• Snatch - Competition or max test • Clean & Jerk - Competition or max test • Optional - Back or Front Squat max test

* Number of sets to be determined based on how the athlete is feeling

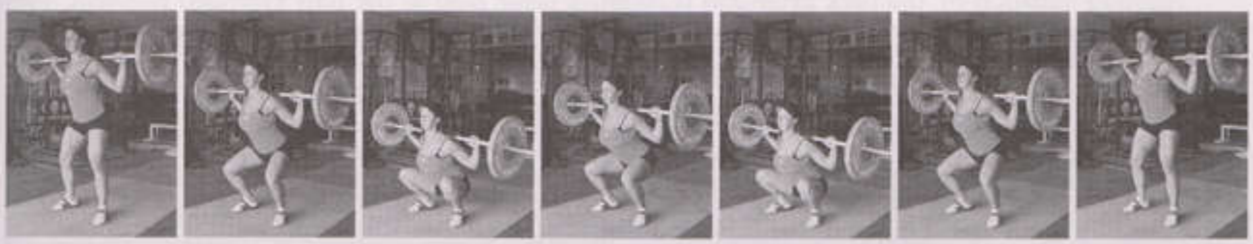
SUPPLEMENTAL EXERCISES

SUPPLEMENTAL EXERCISES

The following are some of the more valuable exercises for the weightlifter. In some cases of less common exercises, the precise performance prescription is contended by different sources. While the most significant of these have explanations regarding such contention, the descriptions of the exercises that follow are the preference of the author. Exercises exist to achieve certain training goals—their names are material only insofar as allowing communication. Arguing over terminology is a waste of time better spent training.

1¼ Squat

The 1¼ squat is great for developing strength in the bottom of the clean as well as timing and the ability to recover after a limited eccentric movement. It also emphasizes development of the VMO, which can help better stabilize the knee, particularly in female athletes. The athlete will either front or back squat to the bottom, recover to just above parallel, return to the bottom, and recover fully. These can be performed at a normal tempo, or with a bounce depending on the objective.



1 1/4 Squat

2/3-Position Clean/Snatch

Two- and three-position snatches or cleans are extraordinarily flexible and effective exercises. As the name suggests, the snatch or clean will be initiated from two or three different positions consecutively. The lift is performed from each prescribed position in immediate succession. An example of a common series would be a snatch from the floor, the knee, and mid-thigh.

Which positions are selected and the direction the athlete progresses through them will depend on the needs of the athlete and the objective for the exercise in a given training session. Generally speaking, if improvement of an athlete's power is the objective, he or she will start low and move higher; if technique improvement is the objective, he or she will start high and move lower.

As an example of a 3-position snatch for the former case, the athlete may first snatch from the floor, lower the bar to the hang position and snatch, and finally lower the bar to the mid-hang and snatch. Each successive sub-rep begins from a higher position and with greater accumulated fatigue, forcing the athlete to be extremely aggressive in order to successfully perform the final snatch.

For the athlete needing to improve snatch technique, the order will likely be reversed. Athletes will typically demonstrate better technique from high positions because they're able to set the correct positions directly. By performing the first snatch from the mid-hang, the next from the hang, and the last from the floor, the athlete is able to perform first from a comfortable position and feel the correct movement, then incrementally add layers of complexity and range of motion while the feeling is fresh.

This exercise can be altered numerous other ways to best serve the needs of a given athlete in a given session, and more than three positions can be used if appropriate.

Back Extension

Also known as hyperextensions, and often confused or combined with hip extensions. This is a supplemental back exercise that can help strengthen the spinal erectors and improve spinal mobility. Back extensions are performed on a glute-ham bench or similar piece of equipment and can be performed with or without additional weight, which can be held against the chest in the form of a plate or medicine ball or, better, racked behind the neck on a barbell. The fulcrum of the glute-ham bench should rest under the pelvis. Once in position, the athlete will lock the pelvis in place with glute, hamstring and quad activation. The pelvis does not move during the exercise—the movement consists exclusively of spinal flexion and extension and accordingly the range of motion will be somewhat limited in comparison to a combined hip and back extension. Generally an isometric pause at the top of each rep is a good idea to reinforce isometric spine extension strength, which is how the erectors will need to function for weightlifting.

Back extensions are also a good option for restorative back work at higher reps and without weight. They can also be effective for helping athletes learn and feel the correct and forceful back extension that needs to be used in squatting and pulling.

Another variation of the back extension is simply a static hold in the fully extended position, with or without weight.

Back extension

Back Squat

The back squat is a squat with the barbell racked on the shoulders behind the neck. A number of back squat styles exist, but the most valuable (and only necessary) variation outside of powerlifting is the high-bar Olympic style. This places the bar on top of the traps, the torso as upright as possible, and finishes at full depth—all details of the back squat have been addressed in the Squat chapter of the book.

Barski Clean/Snatch

Named for Bob Bednarski by Bill Starr, the Barski clean/snatch is a series of three consecutive high-hang cleans or snatches without using straps or dropping the bar. This exercise not only forces aggressive extension and turnover, but is a serious grip workout.

Bench Press

While comparatively obscure among weightlifters since the elimination of the press in competition, the bench press and variations do have value in certain phases of training for certain athletes. Typically the incline bench press is a better option, both because it's slightly more specific to weightlifting in terms of the line of action and range of motion, and also because it tends to be less stressful on athletes' shoulders. Benching can be used during phases of general strength and particularly mass gain. Any time the bench press is employed, work for maintaining shoulder girdle flexibility should be emphasized.

After unracking the bar, the athlete will fix it with the arms extended and vertical (with heavy weights, this will be the only option). The athlete will then lower the bar under control, keeping the forearms vertical, until it contacts the chest and drive it back up to the starting point. The transition at the bottom can (and typically should) be abrupt, but not as a result of bouncing the bar off the chest. Where the bar contacts the chest will depend on the angle of the upper arms. Because the forearms need to remain vertical to allow optimal pressing mechanics (and to simply support heavy weights), the closer the elbows are to the body, the lower on the chest the bar will contact.

The orientation of the upper arms should be about 40-60 degrees from the centerline of the body. This will prevent undue stress to the structures of the shoulder, maximize range of motion, and keep pectoral contribution comparatively limited to allow more work for the shoulders and arms, which is what we're primarily concerned with. If the weight and shape of the bench allows it, the shoulder blades should begin protracted at the top of the movement, and retracted as the bar reaches the chest. With perfectly flat benches, this is sometimes not possible. In such cases, the shoulder blades should be kept retracted throughout the rep.

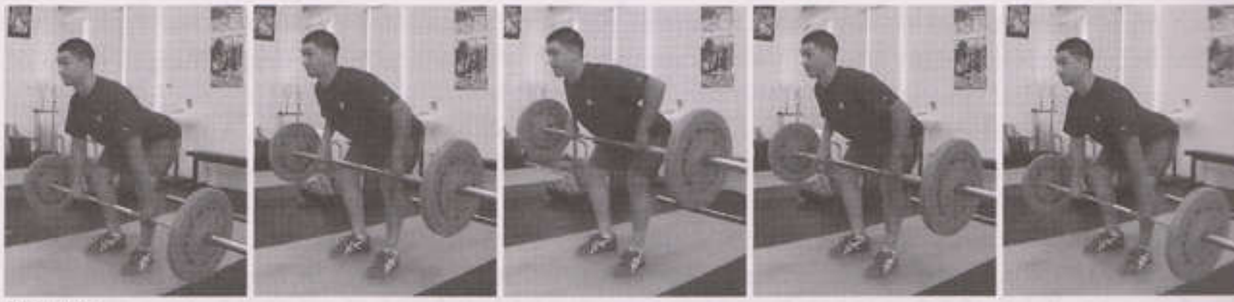
Incline bench press

Bent Row / Pendlay Row

The bent row can be performed in a number of ways, with a barbell or dumbbells most commonly. Dumbbell bent rows are generally performed unilaterally with the free hand supported on either a bench or the knee.

Barbell bent rows can be performed in a few ways, differing primarily in the manner in which the back is held, and in the bottom position of the bar. The basic bent row involves the back set in complete extension and held strictly approximately horizontal with bent knees throughout the lift, the starting position of the bar being off the floor. This is an excellent back exercise, both for horizontal pulling strength as well as isometric back extension strength.

A version of the bent row that will allow more weight to be lifted and adds some interesting elements is the Pendlay row, named after Glenn Pendlay. In this variation, the bar begins on the floor for each rep. The lower back begins in extension, but the upper back begins slightly rounded. The pull is finished with complete extension of the upper and lower back and in the same position as a standard bent row. Other than the change in upper back extension, the overall angle of the back should remain approximately the same throughout the movement.



Bent row

Box Jump

There are numerous box jump variations, each of which has applications for various athletes. The two variations most applicable for weightlifting are jumps onto the box with and without a preceding countermovement. Both variations encourage improved rate of force development; countermovement jumps also improve reactive power.

When jumping, the feet should be placed in the pulling or drive position to ensure transferability to the lifts. In most cases, box heights should be well within an athlete's ability. As heights approach maximal, athletes tend to cut the drive of the legs short in order to begin lifting the feet (much like as weights get heavier in the snatch and clean, athletes tend to rush into the pull under), which defeats the purpose of the exercise. A somewhat lower box should be used, and the complete and violent extension of the legs emphasized over everything else. This should create a degree of floating onto the box rather than an aggressive reach up with the feet.

As much as is possible, the athlete should attempt to jump vertically and push the feet forward onto the box instead of jumping directly forward onto it to prevent any bad habits from appearing in the lifts. This is easier done with a non-countermovement jump because the athlete can begin in close proximity to the box without concern for hitting the hands on the box during the upswing of the countermovement. Countermovement jumps will either need to be started slightly farther away from the box, or the arms kept in tighter during their swing.

To perform non-countermovement jumps, the athlete will dip into the starting position and pause for a moment before initiating the drive against the ground. This pause needs to be significant to ensure no elasticity is being employed. Additionally, the athlete must drive from this position immediately and directly—it will be very tempting to sneak in a quick bounce of the legs as the jump begins.

The starting position for non-countermovement box jumps can be changed depending on the goals for the exercise. If trying to improve the speed of the second pull of the snatch or clean, a start resembling the mid-hang position should be employed; if trying to improve the speed of the jerk drive, a start resembling the bottom of the jerk dip should be employed; if trying to improve the drive out of the bottom of the squat, the athlete can start in the bottom of a squat.

Dropping back to the ground following each jump to absorb the impact in a partial squat will also help condition the joints, muscles and connective tissue for the stress imposed by weightlifting, as well

Bulgarian split squat

as develop the neurological elements of absorbing force for following contractions. However, if being performed during particularly heavy or high-volume training cycles, the athlete may want to assist the return to the floor with the hands on the box to cut back somewhat on joint stress and the surprisingly taxing effects of depth drops.

More information regarding box jumps and jump training in general can be found in the Plyometrics & Jump Training chapter of the book.

Bulgarian Split Squat

The Bulgarian split squat is simply a split squat performed with the back foot elevated on a bench or box rather than on the floor (the top of the foot resting on the top surface). The bar can be racked on the back or on the shoulders in the front. This exercise provides tough unilateral leg training with a somewhat greater balance component than a conventional split squat or lunge. The lead leg should be positioned so that the lead shin is approximately vertical in the bottom of each rep.

Clean Rack Support

The clean rack support is a simple exercise that helps strengthen the torso and improve an athlete's confidence under weight. It can be performed in a squat rack, but preferably on jerk blocks or in a power rack for safety. The bar should be set at a height just below its height on the standing athlete's shoulders, and loaded near the athlete's best clean or front squat weight or more. The athlete will set the clean rack position and lift the bar straight up from the rack and hold the torso position tightly for 3-5 seconds—longer holds will work, but are often impossible because the athlete will tend to become dizzy.

Clean/Snatch Deadlift

The clean and snatch deadlifts are simply deadlifts performed with the same starting position and posture as the associated classic lift. The exercises are performed at a speed comparable to a conventional deadlift and no shrug or drive onto the balls of the feet will occur. The bar should be returned under control to the floor to maximize the opportunity to develop positional strength—this is an excellent time to focus on forceful back extension. For athletes with weaker backs or difficultly maintaining back extension, even slower returns to the floor can be used, as these athletes will invariably be able to set and maintain better back extension from the top than from the bottom.

The purpose of the clean and snatch deadlifts is simply to overload the basic movement and positions of the pull in order to allow the athlete to handle heavier loads in the snatch and clean. Like the back squat, deadlifts are also excellent basic strength and mass builders due to large overload, the use of so much of the body, and hormonal response. Straps should be used to ensure grip doesn't limit loading.

Clean/Snatch Deadlift off Riser

Clean and snatch deadlifts can be performed with the athlete standing on a riser to increase the depth of the bottom position. Typical riser heights are 2-4 inches. These will require good flexibility, and should not be performed—at least with heavy weights—if proper back extension cannot be achieved in the starting position. It's important that the athlete start the bar over the same place over the feet rather than rolling it farther back than normal as most will naturally do in response to the greater space created between the bar and shins in this position.

Clean deadlift off riser

Clean/Snatch Long Pull

The long pull is a muscle snatch or muscle clean done without allowing the barbell to contact the body, staying flat-footed, and not using the hook grip. This forces more work by the upper body, which makes it more of an upper body strength exercise for the turnovers of the snatch or clean.

Clean/Snatch off Blocks

Cleans and snatches, as well as the power variations of each, can be performed off of blocks that set the bar at the same starting heights as any hang variation. This is effective for improving speed in the lifts by limiting the opportunity to accelerate the bar. The hang lifts offer similar benefits, but lifts from the blocks are arguably slightly more effective because with the blocks supporting the weight rather than the body prior to the lift, far less tension is present before the start, and consequently the contraction necessary to lift the weight is somewhat more difficult. An added benefit is the ability of the athlete to drop the weight back to the blocks after each lift rather than having to lower it under control. Lifts from the blocks can be performed with or without straps.

Clean/Snatch Pull (High Pull)

There are a few variations of the clean or snatch pull, the differences being in how the exercise is finished at the top. The more traditional pull finishes with the athlete completely extended on the balls of the feet and shrugging fully. Other variations involved the athlete essentially high-pulling the bar, but as a part of that action, lowering either just the torso or the entire body to bring the bar and body together, the latter generally done with a jump of the feet out to the receiving position.

Snatch High-Pull finish position

These latter variations add to the exercise the movement of the athlete's pull down after leg and hip extension, as would occur in the actual lift, but in neither case is the movement precisely the same in terms of position to the third pull of a snatch or clean. This being the case, there is still the potential drawback, as with any type of clean or snatch pull, of training confusing motor patterns that disrupt classic lift technique. However, this variation does allow the athlete to reap some of the upper body strengthening benefits of a high-pull with heavier weights. Choices on what variations to use (if any at all) should be made with individual athletes in mind in order to serve each of them best.

The snatch or clean high-pull is a traditional pull performed with a weight light enough for the athlete, after completing leg and hip extension, to shrug and continue pulling the elbows high and to the sides to elevate the upper arms to approximately horizontal. The athlete should continue pushing into the floor through the balls of the feet, remaining on extended ankles, until the bar reaches its highest point.

Pulls should not be loaded beyond weights that allow the athlete to complete a reasonably quick extension. This will usually mean between about 90-100% of the athlete's best for the associate classic lift, or 70-85% for high-pulls (This of course assumes the athlete's best is limited by strength and power, not technique—in the latter case, an athlete will be able to (and generally should) perform pulls with considerably more weight than he or she can snatch or clean).

Pulls can also be performed from any hang or block position to work particular ranges of motion through which the athlete has trouble, or to improve speed.

Straps should be used to prevent grip security from limiting load or speed, and to spare the hands unnecessary damage.

Snatch pull

Clean/Snatch Pull- (High Pull-) Down

The pull-down or high-pull-down is a variation of the pull or high-pull in which the athlete, after fully extending the legs and hips, transitions the feet to the receiving position and pulls his or her body down toward the bar. This is a technically difficult exercise and even many lifters who are proficient in the snatch and clean will have trouble performing these correctly. The key is maintaining an upright torso and forcing the elbows to the sides and up, maintaining proximity of the barbell and the body without reaching the body toward the bar. The transition between extension and pulling down must be extremely aggressive and have the same speed we would see in the actual classic lift.

Snatch high-pull-down finish position

Clean/Snatch Pull (High Pull) off Riser

Clean and snatch pulls and high-pulls can be performed with the athlete standing on a riser to increase the depth of the bottom position. Typical riser heights are 2-4 inches. These will require good flexibility, and should not be performed with heavy weights if proper back extension cannot be achieved in the starting position. It's important that the athlete start the bar over the same place over the feet rather than rolling it farther back than normal as most will naturally do in response to the greater space created between the bar and shins in this position.

Clean/Snatch Segment Pull/Deadlift

Also called pause pulls. In the segment pull or deadlift, the lifter will perform a snatch or clean pull or deadlift but will stop and hold at prescribed positions for 1-5 seconds before continuing to the next pause position or the finish position. The only difference between the pull and deadlift is the finish, which will be explosive to the top like a snatch or clean pull, or in the case of a deadlift, a controlled speed to the finish position. Common pause points are 1" off the floor (essentially the starting position with the bar completely supported by the lifter), the knee, and in the crease of the hip for the snatch or upper thigh for the clean. At these upper positions, it's important that the lifter engage the back forcefully and pull the bar back and up into the hips. This exercise is excellent for reinforcing and strengthening proper positioning in the pulls, in particular the active pull of the bar up into the hips during the second pull.

Clean/Snatch Shrug


Clean shrug

The clean or snatch shrug can start at either the high-hang or mid-hang. In either case, the point of the exercise is to perform an aggressive vertical extension with the legs and hips and finish with a shrug. Particularly from the mid-hang, athletes will be able to load this movement very heavily. However, like snatch or clean pulls, excessive loading should be avoided. If the speed is not great enough to execute a complete and snappy shrug with the traps and complete ankle extension, the weight is too heavy. This will usually mean loads between 105-125% of the athlete's best in the associate classic lift; clean shrugs can typically be done with slightly higher percentages than snatch shrugs. Straps should be used to ensure grip doesn't limit loading or speed, and to spare the hands.

Deadlift

The deadlift is a basic strength lift that offers great potential for overload. The potential differences between the deadlift and the snatch or clean deadlift are the starting position and pulling posture, both in terms back extension and relative hip and shoulder heights. Positioning and posture will shift unavoidably from what would be ideal for the pull of a snatch or clean as weights increase toward maximal. Straps can be used to prevent grip strength from limiting the possible loading of the exercise.

Depth Drops

Depth drops are one of the simplest and most effective plyometric exercises. The drill involves simply stepping off a box and absorbing the force of the landing in some degree of squat—the greater the box height, the greater the impact force. Depth jumps are very taxing both physically and neurologically—even though they will rarely feel fatiguing during their performance—and should be used in limited volume and frequency. Depending on the goals for the exercise, the athlete may remain on the balls of the feet or drop to flat-footed during the absorption phase. More information regarding depth drops and jump training in general can be found in the Plyometrics & Jump Training chapter of the book.

Depth Jumps

The depth jump is simply a depth drop followed immediately with a jump onto a second box. This adds to the force absorption training of the depth jump the improvement of reactive power—the ability of the body to absorb, temporarily store, and transfer energy from eccentric loading into a following concentric muscular contraction. Like depth drops, this is a very taxing exercise and should be performed in limited volume and frequency. The goal is to minimize ground contact time—to rebound as quickly as possible into the jump onto the box. More information regarding depth jumps and jump training in general can be found in the Plyometrics & Jump Training chapter of the book.

Drop Snatch

The drop snatch is a snatch balance variation in which the lifter transitions the feet from the pulling to receiving position while punching him- or herself down under the bar into the snatch receiving position. In other words, this is a snatch balance without any initial upward drive of the bar. The absence of any upward drive significantly limits the weight that can be used in this exercise, but it does force maximal speed and aggressiveness.

Floating Clean/Snatch Pull/Deadlift

The floating clean or snatch deadlift or pull is a deadlift or pull done without allowing the bar to touch the platform between reps. This is ideally done with the lifter standing on a riser to allow full range of motion while preventing the bar from touching the floor, but can also be done by stopping short between each rep with the plates as close to the floor as possible.

Front Squat

The front squat has been described in great detail in the Clean section of the book. Compared to the back squat, the front squat, with the bar racked on the shoulders in the front, will bring the torso nearly vertical, reducing the contribution of the hamstrings and relying more on the quads, glutes and adductors, as well as involving a potent torso stability component.

Glute-Ham Raise

While there are variations in terms of back extension (or the absence thereof), the glute-ham raise is essentially a hip extension on a glute-ham bench finished with knee flexion. The back can be held in extension throughout the movement, or it can be flexed and extended during each rep along with the hips. The fulcrum of the glute-ham bench will need to be placed at approximately the mid-point of the quads

Glute-Ham Raise

to allow both pelvic rotation and leg flexion. Additional weight can be held against the chest or racked across the back of the shoulders, or an elastic band secured to the base of the bench and looped over the back of the neck. The movement can be performed slowly to maximize leg flexion demand, or with speed to make the leg flexion more of a finishing movement with less tension.

Glute-Ham Bench / Roman Chair Sit-up

Traditionally performed on a Roman chair and therefore called a Roman chair sit-up, the glute-ham sit-up is a uniquely challenging abdominal and hip flexor exercise that offers an extensive range of motion and both dynamic and isometric abdominal work.

This exercise should be introduced to training very conservatively as it has been known to wreak serious havoc on the abdominal muscles to the point of inspiring emergency room visits. It can also be wise to stand alongside the athlete during their first reps to help him or her up if the range of the sit-up unintentionally exceeds what he or she can recover from.

The fulcrum should be placed under the hamstrings so the glutes are not on the pad. The athlete will lean back under control to the farthest extent possible, then reverse the movement, attempting to initiate the return to the top with contraction of the abs to flex the back, following through with hip flexion. The quads should be contracted and the knees fully extended powerfully on the way up to ensure rectus femoris engagment, which will contribute to help flexion with a connection between the femurs and the pelvis; otherwise too much of the work will be done by the psoas, which pull directly on the lumbar spine, creating unwanted hyperextension, particularly in the absence of adequate abdominal contraction.

The athlete should hold the arms across the chest or in another manner that removes their involvement from the effort. Weight can be held on the chest in the form of a medicine ball or dumbbell, but a better alternative is holding a dumbbell behind the neck.

Caution should be used with hip-flexor-intensive exercises like the glute-ham bench sit-up for athletes in possession of unusually tight hip-flexors. Any work with the exercise should be book-ended by hip flexor stretches to avoid exacerbating the problem. If the inflexibility is particularly bad, GHB crunches (back flexion/extension only) with the fulcrum under the lumbar spine are a better temporary alternative until the athlete can loosen up sufficiently.

This exercise will occasionally cause pain in the lower back for some athletes from compression during the peak of lumbar extension due to the tension of the hip flexors pulling both on the pelvis and directly on the lumbar spine. This can be caused by the fulcrum being placed too far back (under the glutes instead of under the hamstrings), inadequate trunk flexion on the way up, inadequate quad activation, or tight hip flexors. If the setup on the bench is correct, and technique is correct, but the problem persists, hip flexor stretches can be added prior to the exercise to help relieve the problem—if the discomfort is great enough, GHB sit-ups should be performed only with the fulcrum under the lumbar spine until the athlete's hip flexors can be adequately loosened.

Glute-ham bench sit-up

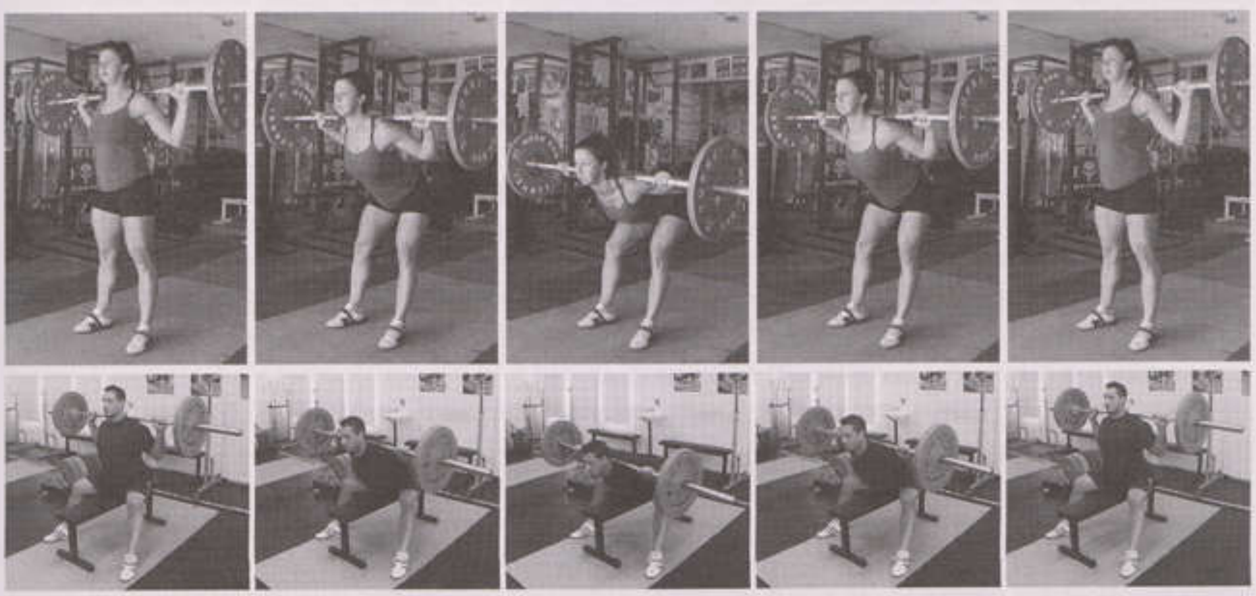
Good Morning

The good morning is an excellent exercise for developing the isometric strength of the back extensors and the hip extension strength of the hamstrings. There are a number of variations, all of which have their place. Good mornings can be performed with the feet in the pulling position or the squat position; with the knees partially bent or fully extended; and even with the athlete seated while straddling a bench. Any of the standing variations can be performed at a controlled speed, or with a controlled movement down and explosive return to the top. The exercise can also be kept lighter and performed with more hip flexion, or loaded more heavily and performed through a shortened range of hip flexion more closely resembling what would be seen during the pulls of the snatch and clean.

In any case, the bar will be placed on the back as it would be for a back squat, and the back set in complete and forceful extension. The range of motion should be never exceed what flexibility will allow with the spine set in this complete extension—attempting to flex the hip further with a softening back arch defeats the purpose of the exercise. The bent-knee version is most common, and will allow a greater range of motion with correct back extension.

The placement of the bar on the shoulders and the consequently great distance between the bar and the hip as the torso nears its lowest position results in a high degree of torque on the hips and back. This allows strength work to be accomplished with lighter loads than would be necessary with stiff-legged, Romanian or conventional deadlifts, and good mornings can therefore be used with far less demand on the athlete's recovery ability—for this reason, good mornings are an excellent choice for additional back work during higher volume training phases when recovery capacity is already stretched thin. Further, this bar placement makes it easier for most athletes to forcefully contract the spinal erectors, improving their training.

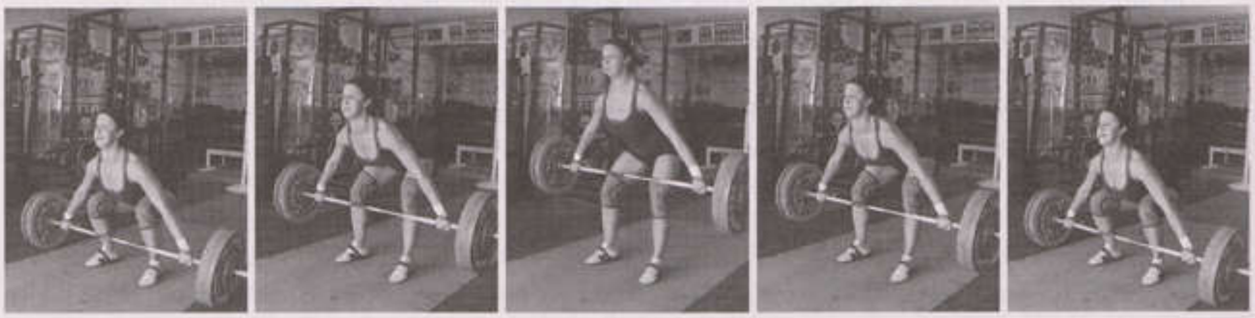
There is a round-backed good morning variation, although the usefulness of this exercise is questionable. A flexible enough athlete will be able to lean the torso well beyond the point at which the barbell is at all supported by the shoulders, and consequently the greater struggle will be to simply keep the bar from rolling off the back over the head. Straight-legged deadlifts are a much better option for round-back lifting.



Good morning (top); seated good morning (bottom)

Halting Clean/Snatch Deadlift

The halting deadlift is an excellent positional strength drill. The athlete will snatch or clean deadlift the bar to mid-thigh and hold this position for 2-5 seconds before returning to the floor. This position approximates the completion of the initial leg extension of the snatch and clean, stopping at the point the scoop would begin. This top position will be the same as the mid-hang position described throughout the book—the shins approximately vertical and the shoulders slightly forward of the bar. This is a helpful exercise for athletes who have a tendency to scoop prematurely or whose backs are weak relative to their legs. A set of halting deadlifts can be completed with a snatch or clean pull, or even a snatch or clean, following the pause in the mid-thigh position of the last rep.



Halting snatch deadlift

Hang Clean/Snatch

A hang snatch or clean is simply the lift begun with the barbell at some point above the platform. A range of starting positions is possible and each has its uses. In general, *hang* without any qualifier refers to a position in which the barbell is just above the knees. High-hang involves a bar position just a few inches below the tall position (depending on the coach, it may or may not involve any hip flexion with the knee flexion); mid-hang will place the barbell at mid-thigh level, hang-knee will place the bar right in front of the knees, and hang-shin will place the barbell just off the floor but below the knee.

Some coaches want these hang lifts, or some of them, to involve a countermovement, i.e. the athlete begins standing tall, lowers the bar to the prescribed position, and immediately initiates the lift. Others want the athlete to set the start position momentarily prior to initiating the lift. If the goal of the exercise is simply a reduced range of motion, a countermovement is acceptable. If the goal is to also force a more rapid acceleration of the bar, no countermovement should be used (which would be similar to a lift from the blocks). Further, if one of the goals is improving an athlete's position, the hang needs to be set momentarily.

There is little consistency among coaches, athletes and the literature regarding details on hang position names and countermovements. While obnoxious, this is not really problematic as long as the communication between each coach and athlete is clear.

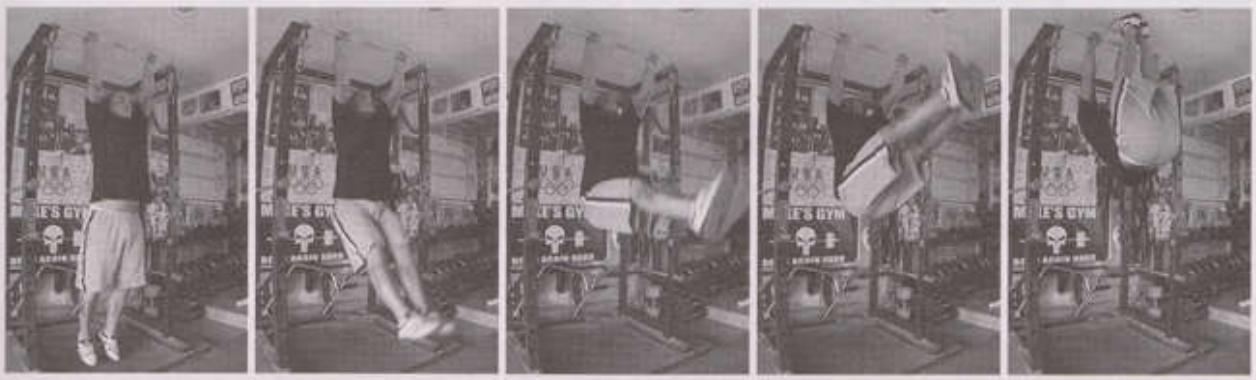
A hang starting position has no effect on the receiving position of the lift. That is, the snatch or clean is still received at a full squat depth unless otherwise noted as a power lift, such as a *mid-hang power snatch*.

There are a number of possible reasons for the use of hang snatches or cleans. First, because they eliminate the first pull, which is commonly difficult for athletes to learn and coaches to teach correctly, they have use as part of a teaching progression. For many non-weightlifter athletes, all Olympic lifting is performed from the hang or off blocks. Largely this is because of the aforementioned difficulty in learning and teaching the first pull, but also in part because the training effects being sought are overwhelmingly a product of the second pull and to a lesser degree the third pull. This is the phase in which the athlete produces the hip and leg power that best translates to other athletic movements. Finally, for many athletes who are exceptionally tall due to the nature of their sports, such as basketball players, performing the lifts from the hang may be in fact the only reasonable way because of the impossibility of sound starting positions and pulls from the floor.

Hanging Leg Raise

The hanging leg raise can be a great abdominal exercise, although because of its intensive hip-flexor demands, it may not be appropriate for all athletes, as discussed previously with respect to the glute-ham bench sit-up. Hanging from a pull-up bar or stall bars, the athlete will flex the hip to bring the toes to their hands with the legs remaining straight. The athlete should flex the lower back to curl the pelvis forward during the movement to involve the abs dynamically as well as isometrically.

The exercise can be modified in a number of ways to accommodate the needs of each athlete. Most common will be the need to reduce the strain on the rectus femoris in the cases of tight hip flexors or limited hip extensor flexibility—this can be done by keeping the knees bent slightly throughout the movement. To modify for athletes not yet strong enough for the full movement, the knees can be bent completely to reduce the difficulty. No matter how much the movement is reduced in range of motion or leg extension, the focus needs to be on flexing the back to curl the pelvis up.



Hanging Leg Raise

Heaving Snatch Balance

The heaving snatch balance is a less common but still valuable snatch balance variation. Unlike the snatch balance, the heaving snatch balance begins with the feet already in the squat stance and keeps them attached to the platform. This can be a good option for athletes who have trouble floating or with inconsistent or incorrect foot placement during snatches or simply as a way to incorporate some variation into a program. Because athletes tend to lock out the elbows in a higher position in the heaving snatch balance than in the snatch balance, it's generally somewhat of a hybrid between a snatch balance and overhead squat.

Heaving snatch balance

Hip Extension

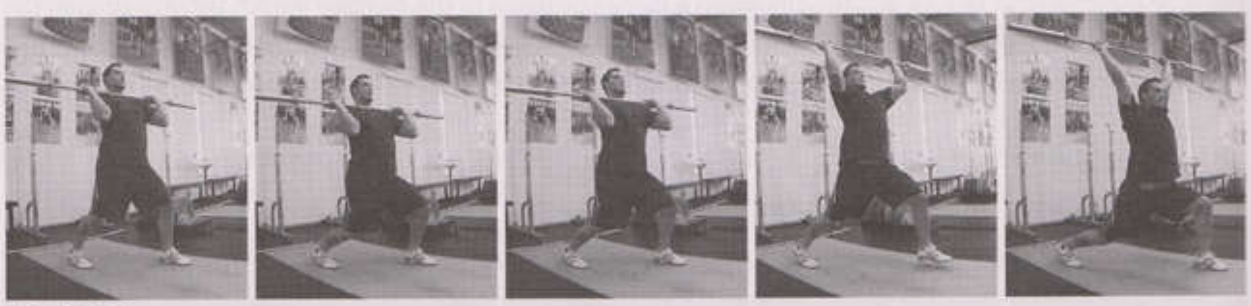
Hip extension generally refers to the movement as performed on a glute-ham bench or similar piece of equipment. Often this exercise is incorrectly called a back extension (see the description of the back extension above). The hip extension is a supplemental back exercise—the difference being the former is dynamic and the latter isometric—in addition to a hip extension exercise. With the fulcrum of the glute-ham bench or similar contacting the upper thighs, the athlete will lock the spine in extension and flex the hip until the torso is as near to vertical as flexibility will allow without any change in back extension. The athlete will then reverse the movement and may pause for a moment at the top. Hip extensions can be performed with or without additional weight.

Hip (and back) extensions differ practically from the lifts enough that they will never replace the standing back and hip exercises like the stiff-legged deadlift or Romanian deadlift. Because the body is oriented horizontally, the greatest torque experienced occurs when the hip is fully extended. In the snatch and clean, as well as the squat and deadlift and any other standing movement, torque on the hip and back increases with hip flexion. Hip extensions are valuable primarily as light recuperative exercises for the back, high-volume work, or as a way to get direct back training in without the systemic taxing effect of heavy lifts like stiff-legged deadlifts or RDLs.

Hip Extension

Jerk Balance

The jerk balance is a helpful drill for athletes having difficulty driving their hips far enough under the jerk or who tend to drive the chest through the arms excessively and push themselves backward. The athlete will begin with the bar in the jerk rack position and the feet in a split position about half to two-thirds the length of the full split. From here, the athlete will dip and drive vertically just as he or she would for a normal jerk, and then keeping the rear foot planted, lift and reach the front foot and drive his or her body forward under the bar into the full split position. The keys to this exercise are patiently finishing the vertical drive on the bar before moving forward under it, and pushing the torso under the bar as a whole rather than leaning the chest forward.



Jerk balance

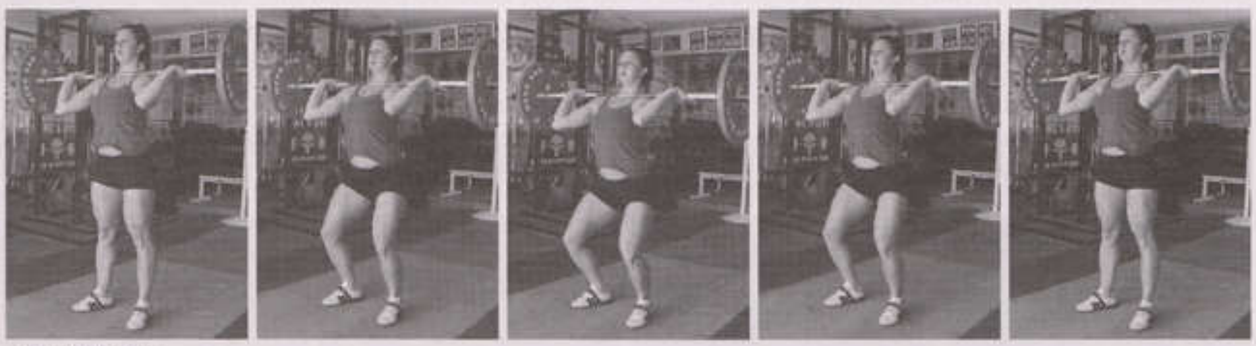
Jerk Behind The Neck

The jerk behind the neck is a variation of the jerk in which the barbell begins on the shoulders behind the neck as it would in a back squat. This placement provides a more stable platform from which to jerk, generally allowing the athlete to jerk more weight than from the front. This provides the opportunity to overload the jerk as both a strength developer and a confidence builder.

The exercise is also helpful to teach and reinforce correct positioning in the jerk. Because of the bar's starting point over the base of the neck, the bar and body do not have to move horizontally relative to each other during the movement. This makes it easier for the athlete to drive straight down under the bar and place him- or herself in the correct receiving position. This can be particularly helpful for athletes who have trouble leaning into the split jerk rather than moving the body under as a whole.

Jerk Dip Squat

The jerk dip squat is nothing more than the dip portion of the jerk, often performed with loads well over what the athlete is capable of jerking. This is largely positional strengthening because the movement can't effectively be performed with a drive of the speed necessary for a jerk. Instead, it simply allows the athlete to develop strength in the awkward vertical torso, quad-dominant dip position. Weights need to be limited to those that can be handled with correct posture and positioning—any deviation fails to strengthen the athlete as intended, and creates conflicting motor patterns. These can also be done with the bar in immediate proximity to the uprights of a power rack or raised squat rack to force a vertical bar path.



Jerk Dip Squat

Jerk Lockouts

Jerk lockouts are a simple exercise that can be used to train both the speed of elbow lockout and lockout strength. The athlete will place a bench in a power rack and set the pins in the rack at a height that places the barbell 2-3 inches below full overhead lockout position with the athlete seated upright on the bench. After getting into position under the barbell with a jerk width grip and pressurizing to ensure a solid trunk, the athlete will drive the barbell off the pins to full elbow lockout as quickly as possible. This can be done with lighter weights to work on elbow extension speed, or with much heavier weights to build strength in the final extension; for the latter, a hold in extension for a few seconds is beneficial as well.

Jerk off Blocks

Jerks can be performed off of jerk blocks rather than from a squat rack. This creates elevated platforms for the bumpers without affecting the level of the athlete, serving as racks to allow the athlete to rack the bar without having to lift it from the floor, but more importantly, allowing the athlete to drop the bar to that same elevated starting height after each rep. This gives the athlete an opportunity to perform multiple reps in the jerk with weights greater that what could be reasonably lowered by the athlete back to the shoulders each time.

Jerk Rack Support

The jerk rack support is identical to the clean rack support described previously with the exception of the rack position. It can be performed in a squat rack, but preferably on jerk blocks or in a power rack for safety. The bar should be set at a height just below its height on the standing athlete's shoulders, and loaded with the athlete's best jerk weight or more. The athlete will set the jerk rack position and lift the bar straight up from the rack and hold the torso position tightly for 3-5 seconds—longer holds will work, but are often impossible because the athlete will tend to get dizzy.

Jerk Support

The jerk support allows the athlete to hold more weight overhead than is possible with any jerk variation. This is useful both for building confidence for the jerk, general and connective tissue strength, and overhead stability. The bar will be set in a power rack at a height a few inches below the level it will be when held overhead by the athlete. The athlete will grip the bar in a jerk hand placement, establish the correct overhead position with fully extended elbows, and bend at the knees to position him- or herself under the bar. Once stable and in position with a pressurized torso, the athlete will lift the bar from the rack and hold it for the prescribed count, generally 3-5 seconds. Pressurization and stabilization of the torso is critical for this exercise as athletes will often have a tendency to hyperextend their lower backs instead of further bending the knees to place themselves under the bar. In such cases, the starting height of the bar can be increased as much as possible—the point of this exercise is holding the weight, not lifting it.

Jerk Support

Jerk Recovery

The setup for the jerk recovery is the same as the jerk support, but with a slightly lower starting bar height. Instead of simply lifting the barbell a short distance and holding it overhead, the recovery will begin with the athlete in the split position and the arms in the correct overhead position while gripping the bar. From here, the athlete will lift the barbell and recreate the recovery of a split jerk, bringing the front foot back approximately a third of the way back and then the back foot up to meet it. This adds to the element of significant overhead overload the stabilization necessary to recover from the split of a heavy jerk.

Jerk Recovery

Jump Squat

This is a speed exercise that uses very light weights (around 20-25% of the athlete's best back squat). This light weight is necessary to ensure maximal acceleration. The athlete will perform a controlled back squat to the bottom, use no bounce, and then accelerate immediately from the bottom position into a maximal vertical jump. Because speed is the goal, reps should be kept to no more than three.

Jumping Squat

This exercise may more accurately be called a jumping quarter squat, and can be performed either with an actual countermovement squat beginning at the top, or from the bottom position directly.

For a drive from the bottom position without a countermovement, the barbell will be placed on jerk blocks or the pins of a power rack at approximately quarter squat depth. The athlete will position him- or herself with a back squat bar placement and the feet in the pulling or drive position. From here the athlete will lift the bar from the rack and accelerate it, attempting to jump as high as possible, although with extremely heavy weights, the height may be less than an inch. The athlete should not attempt to stop the weight on the way down, but simply guide it back to the blocks or pins—holding the weight tightly against the shoulders will prevent it from bouncing—and then drop out from underneath it as it returns to the blocks or pins.

To perform the exercise with a countermovement, the rack or blocks will be set up the same way (likely slightly lower to prevent the bar or bumpers from hitting the pins or blocks at the bottom of the countermovement), but the athlete will lift the bar off the rack to the standing position to begin. From this standing starting position, the athlete will perform the same partial depth squat, transitioning and returning aggressively enough for the feet to separate from the floor. The athlete will finish each rep the same way described above, dropping out from under the bar and allowing it to come to rest again on the

Jumping Squat

blocks or pins.

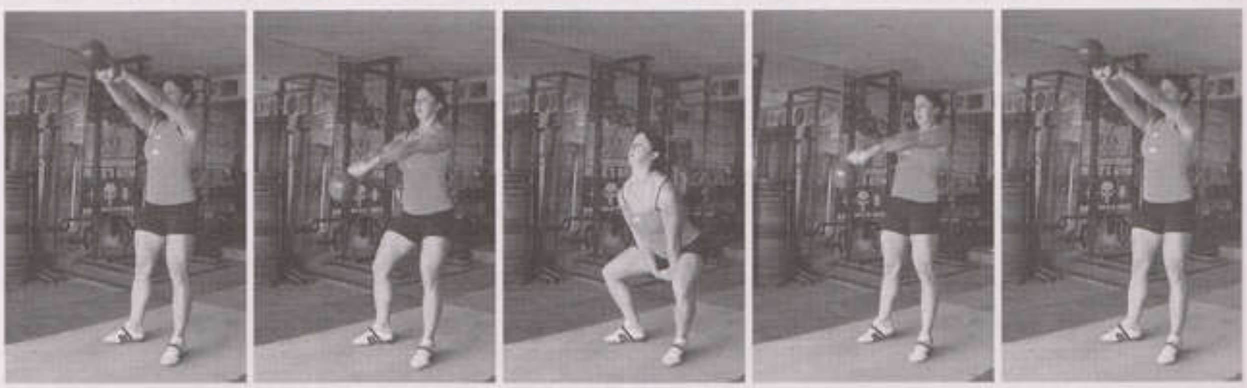
This exercise can be effective for developing power for the final extension of the snatch and clean as well as the drive of the jerk. As with pulls and shrugs, speed is the point of the jumping squat, so loads beyond what allows the athlete to genuinely jump should be avoided.

Kettlebell Swing

The swing is the most fundamental kettlebell exercise, and that with the most application to weightlifting. It's an excellent posterior chain developer, and offers particularly beneficial work for the lower back due to the isometric resistance of ballistic loading (although it's more difficult to maintain forceful back extension in the swing than in exercises like good mornings or RDLs). Standing in a squat stance with a single kettlebell held in both hands (single-arm and double-kettlebell swings are also possible) between the legs, the athlete will push the bell back while hinging at the hips and bending the knees slightly, then aggressively extend the knees and hips, keeping the arms long and loose, forcing the kettlebell to swing forward to about chin height. The bell should be allowed to fall back in the same arc, loading the next rep.

The swing can be extended to just short of overhead to increase the demand on acceleration and the force needing to be arrested and reversed at the bottom of each rep. With such a swing, the athlete will need to engage the shoulders and back to finish the swing at the top. Additionally, the athlete can increase the challenge of the swing by actively pulling the kettlebell back down into the next rep instead of simply allowing it to fall.

This exercise should be introduced to athletes with very conservative volume—10-15 total reps even—it can cause extreme soreness due to the demanding eccentric element.



Kettlebell Swing

Lunge

There are numerous variations of lunges that can be used for different reasons. The basic walking lunge is a staple of dynamic warm-ups and the most fundamental of all unilateral leg and hip exercises. Most athletes will benefit considerably from simply performing a short series of walking lunges with every

Front barbell lunge

warm-up.

Lunges can be performed with a barbell racked on the back or on the shoulders like in a front squat, or dumbbells can be held at the sides. Overhead lunges can also be done with a barbell or dumbbells. In any case, these weighted lunges can be done in the walking format, but more suitable is stepping out with the lead leg, and then stepping back to the starting position.

Muscle Clean/Snatch

The muscle clean or snatch begins like the classic lift and then mimics the movement of the upper body during the third pull of the according lift, i.e. the athlete pulling him- or herself under the bar, without any actual movement under the bar. The exercise is identical to the lift until the end of the second pull, at which time the lifter continues bringing the bar up to its overhead or rack position without re-bending the knees—the bar and the lifter both move up only. The muscle snatch is an excellent developer of strength, timing and positioning for the turnover of the third pull, while the muscle clean can be helpful to develop the accuracy of the athlete's delivery of the bar to the rack position.

Muscle snatch (top); Muscle clean (bottom).

Overhead Squat

Because the loading will never match that of the front or back squat, the overhead squat isn't useful for developing leg strength, but instead tying existing leg strength into overhead balance and stability, and developing overall strength in the bottom position and recovery of the snatch.

Before beginning the overhead squat, the bar must be situated overhead with a snatch push press or jerk. Some choose to push press with the typical jerk or pulling foot placement and move the feet to the squat width once the bar is overhead; others prefer push pressing with the feet already in the squat stance. As the weight increases, the latter method becomes more appealing.

With the bar positioned correctly overhead, the athlete will pressurize the torso and begin descending. The speed of the descent should be controlled, and the deepest possible bottom position achieved. It's enticing to rush to ascend before hitting rock bottom because of the general heinousness of the exercise with heavy loading. If overhead stability at the bottom is a problem, the athlete can remain down there for a few seconds with each rep to force continued stabilization.

If the weight is light enough, it can be returned to the back as is done with the snatch push press. With heavier loads or fatigued athletes, dropping the bar in front to the floor is wise.

Pause Squat

The pause squat is simply any squat—generally back or front—performed with a pause in the bottom position followed by a drive out of the bottom from a dead stop. Pause times should be 2-3 seconds to ensure a genuine stop, and no bouncing used to initiate the drive up.

A similar exercise can be performed by beginning with the barbell set on the pins of a power rack at the bottom position of the front or back squat. The athlete will get under the bar in the bottom squat position, and drive the bar off the pins to a standing position. The difference between this exercise and a pause squat is comparable to the difference between performing a lift from the hang versus off the blocks—that is, the effect is essentially the same, but driving off the rack is somewhat more difficult, although the pause squat requires more core stabilization effort in the bottom position.

Planks

Planks are a simple but effective exercise for improving isometric core strength. Front planks are performed with the athlete's toes on the floor, the body extended straight, and the upper body supported on the forearms with the elbows bent 90 degrees. The key to the front plank is the maintenance of neutral spinal curvature, or even slight lumbar flexion—athletes will typically fall into lumbar hyperextension, which largely defeats the purpose of the exercise.

Lateral planks are performed by rotating the body to one side and supporting on one forearm and the outer edge of the same-side foot. Like with front planks, the athlete needs to maintain the body in its neutral position. Planks can be made more difficult by extending the arms forward to varying degrees, the most difficult position being the greatest possible extension without the body touching the floor—this exercise is called a superman plank.

Planks can also be converted to dynamic exercises as plank lifts. In either the side or front plank position, the athlete will simply bend to bring the hips to the floor and back up into plank position.

Front plank; lateral plank; superman plank

Power Clean/Snatch

The power clean or power snatch is technically identical to the clean or snatch—the sole difference is the height at which the bar is received. A lift qualifies as a power variation if the bar is received *and* stopped with the thighs above horizontal. If the bar is received with the thighs above horizontal but the athlete fails to arrest the descent quickly enough and the thighs pass below horizontal, the attempt is not a power lift, no matter how high the initial receipt is. This variation is often preferable for non-weightlifter athletes because it focuses on the aggressive hip and knee extension element, demands less weightlifting-specific flexibility, and uses loads that maximize power production by allowing greater speed. That said, athletes who learn the classic versions of the snatch and clean first invariably perform the power versions with greater proficiency.

The power snatch and power clean are discussed in greater detail in the Snatch and Clean sections of the book.

Press

The press is the basic standing lift of a barbell from the shoulders to overhead. Originally one of the Olympic lifts, the press was eliminated from competition in 1976 largely because of increasing difficulty in judging the event. Over time, the competitive press evolved from the intended strict strength movement to a much more dynamic one utilizing sometimes extreme back bending and whipping—essentially a jerk using the hips and back instead of the knees—for the initial acceleration of the bar. As a strength training exercise, a stricter version of the press is more useful—torso layback should be limited to what is necessary to guide the bar past the face and into the overhead position in a direct path, and whipping should not be involved.

Because the press has been described in great detail in the Jerk section, the actual execution of the lift will not be discussed again here. The press is the best exercise for developing overhead pressing strength and is arguably a better choice than the bench press for many athletes. Unlike the bench press, the press contains elements of core stabilization and complete range of motion for the shoulders and elbows. For weightlifters, the push press is often a better choice, but for beginning lifters and those obviously lacking sufficient shoulder strength, the press is an excellent lift.

Pull-up / Chin-up

The pull-up is quite possibly the single most valuable non-barbell exercise. It offers extremely important training effects such as shoulder girdle flexibility, joint stability and the balancing of pressing strength. For any athlete regularly performing overhead work, the pull-up is invaluable.

The pull-up is performed with the hands pronated (palms facing away from the athlete) and the chin-up with the hands supinated (palms facing the athlete). The primary difference is the greater bicep recruitment of the chin-up. If bicep development is a priority, the chin-up may be the better choice, but the more generally valuable exercise is the pull-up. The pull-up allows a great range of motion for the shoulders, improving flexibility, connective tissue integrity and shoulder stability, and is easier on the elbows and wrists. The pull-up should be performed with the hands outside shoulder width (approximately jerk hand width), and begin with the elbows at full extension and the shoulders fully open, and end with the chin over the bar at minimum, but ideally with the clavicles at the bar. The motion of the pull-up should be very similar to the press in terms of position, movement and range of motion.

Power Jerk / Push Jerk

Like the press, the power jerk was described in detail in the Jerk section of the book. In training, the power jerk can serve a few purposes. It can be used to develop greater jerk drive power by forcing the athlete to elevate the bar higher due to the limited possible receiving depth. It can also be used in series with the split jerk to tire the athlete and force the performance of the split jerk in a fatigued state. Finally, it can be used to help improve the bar path and the vertical dip and drive because of the relatively limited ability to compensate for divergent bars fore and aft during its receipt.

The push jerk is a power jerk in which the feet remain in contact with the platform (power jerk and push jerk are analogous to snatch balance and heaving snatch balance). This variation can be helpful for lifters who have trouble with slow or improper foot movement, or slow change of direction at the top of the drive.

Push Press

Again like both the press and push jerk, a description of the push press can be found in the Jerk section. The push press is the primary pressing strength exercise for weightlifters, strengthening the dip, drive and posture, the shoulders, and the triceps' ability to lock out the elbows. It can also be very effective for training the movement of the dip and drive for the jerk for athletes who have a tendency to dip too deeply or lean the torso forward on the jerk.

Reverse Glute-Ham Bench Crunch

The reverse glute-ham bench crunch is an excellent exercise for developing lower back stability. The athlete will place him- or herself backward on the GHB with the fulcrum under the lower back initially and the hands gripping the footplate or pads. With the knees bent and the hips flexed to about 90 degrees, the athlete will extend and flex the spine—this is essentially a curl of the lumbar spine with as little leg movement relative to the pelvis as possible. As the athlete's strength improves, the fulcrum can be moved farther up the back to increase the moment on the spine. A dumbbell or medicine ball can be held between the knees or ankles to add resistance.

Reverse GHB Crunch

Reverse Hyperextension

The reverse hyperextension is essentially the hip extension exercise described previously, but with the torso supported while the legs move. Large and expensive equipment has been made and sold quite successfully for this exercise, but it can be performed on a number of implements, including a glute-ham bench or high plyo box. Essentially anything that will support the torso horizontally, provide a place for the athlete to grip securely, and allow the legs to hang vertically without hitting the ground will work. Reverse hyper machines provide easy addition of weight; without one, a dumbbell can be held between the ankles or elastic bands can be used. If space and finances allow, a reverse hyper machine is a good investment, as it will allow the exercise to be performed with maximal effectiveness and minimal discomfort. The reverse hyper can be used as a lower back and general posterior chain strength exercise, but is most valuable as a recuperative exercise in between heavy back training sessions that decompresses the lower back and allows the sacrum to rotate and self-adjust fairly well.

Reverse Hyperextension

Roll-Out

Roll-outs force isometric trunk stabilization during hip flexion and extension and in particular can be excellent for improving the stabilization of the lower back against hyperextension. That said, they're also an opportunity for unprepared athletes to unintentionally place themselves in lumbar hyperextension—athletes not strong enough for this exercise can begin with planks.

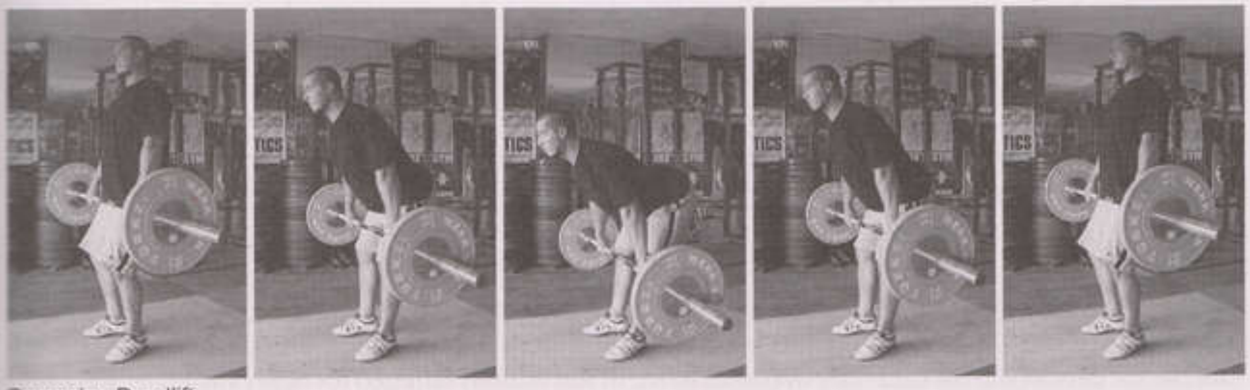
The athlete will hold either an inexpensive ab wheel or barbell loaded with small plates with a narrow grip. Initially the athlete will begin on the knees; as strength improves, he or she will move to the feet. With the wheel starting near the feet or knees and the arms held tightly just short of full elbow extension, the athlete will slowly roll the wheel away from the body until the hips are fully extended and the shoulders open, but the body not resting on the floor. The athlete will then reverse the movement to return to the starting position. Again, it cannot be overstated that the athlete must prevent the lower back from hyperextending—the purpose of the exercise is to develop the strength necessary to maintain the pelvis's neutral relationship to the spine. The difficulty can be increased by performing only partial reps from the mid-point to full extension, which will force a continuously high degree of muscular tension, or one or more of these partial reps can be added to each full rep for variety.

To progress from the knees to the feet, it's often necessary for intermediate steps. This can be achieved by performing the roll-out from the feet uphill or on a ramp. As strength improves, the grade of the hill or ramp can be reduced gradually. Another option is performing the roll-out from the feet with a box or similar in place to stop the wheel's forward movement at the farthest point to which the athlete is able to extend—this distance can be incrementally increased. With a similar setup, eccentric-only reps can be performed as part of a progression.

Roll-out

Romanian Deadlift

The Romanian deadlift is quite possibly the center of more argument regarding execution than any other exercise. The confusion arises from the fact that everyone agrees on its fundamental historical source—the Romanian weightlifter Nicu Vlad while training in the US—but no one seems to agree on what exactly



Romanian Deadlift

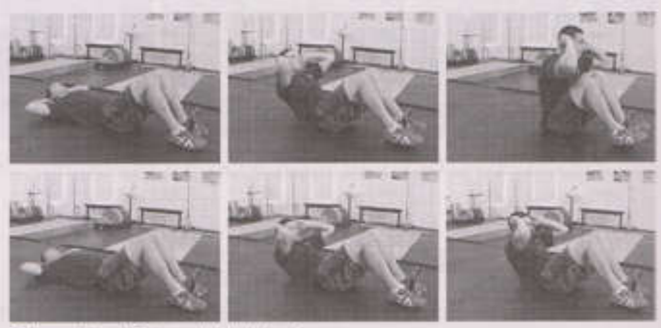
Vlad was doing or why (and there are even reports of the witnessing and naming of the exercise at at least two different locations: the Sports Palace in San Francisco and the Olympic Training Center in Colorado Springs). Since then, the name has been thrown around liberally and whatever it was actually intended to describe originally is now debatable.

The RDL begins with the athlete standing with the feet in the pulling position and the barbell hanging at arms' length with a clean grip. Whether the athlete arrives here by pulling the bar from a rack or deadlifting it from the floor is immaterial. From the standing position, the athlete will flex the knees slightly and maintain that slight degree of flexion as he or she flexes at the hip with the back locked in forceful complete extension, lowering the torso as far as flexibility allows with the back properly extended, keeping the barbell in light contact with the legs. The motion is then reversed, and the athlete returns the torso to vertical, *without extending the knees again.* This continued slight flexion of the knees is the distinguishing characteristic of the RDL. The movement will look and feel essentially like the knees scooping forward under the bar, and then shifting back again.

Sit-Up / Crunch

The sit-up is the most basic of abdominal exercises, although it has grown less common in recent years, replaced largely by the crunch based on a combination of unfounded fear of back strain and a bodybuilding-esque attempt at greater isolation of the abs. Both exercises may have roles in an athlete's training, but the sit-up definitely deserves priority over the crunch.

Sit-ups begin with the back flat on the floor and the knees bent to 90 degrees or slightly more to place the feet flat on the floor. Without jerking, the athlete will begin by flexing the torso maximally and continue into an upright position while maintaining this crunched torso. The athlete will reverse the motion, leaning back with a crunched torso, and then allowing the back to re-extend to flatten against the floor again. Crunches are simply the initial portion of the sit-up—the flexion of the torso—with no flexion of the hips. The goal with both exercises is to maintain contraction of the abs throughout each rep, and to begin and end with torso flexion and extension rather than with hip flexion.



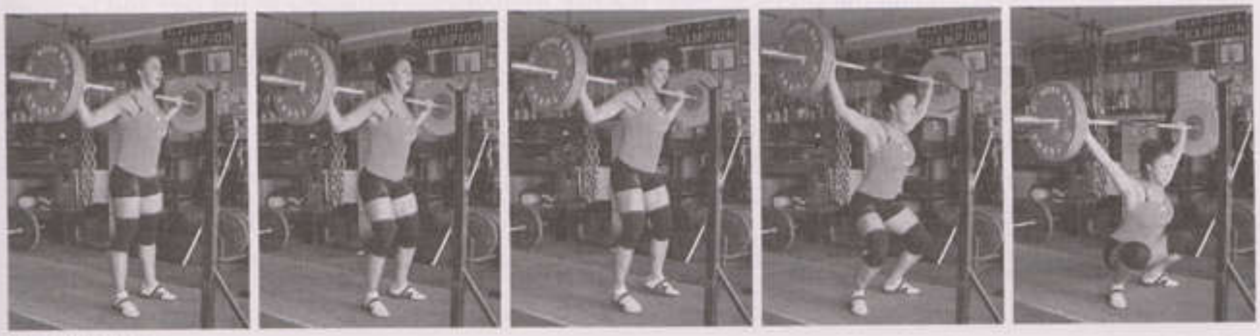
Sit-up (top); Crunch (bottom)

Both exercises can be performed with additional weight. This weight is best held behind the neck in the form of a dumbbell or small plate. Holding weight on the chest will allow greater loads to be used, but only because the leverage is better and gets dramatically better as the athlete sits up (particularly because athletes will tend to allow the weight to roll down toward the stomach with each rep).

In any case, a rolled towel or similar can be placed under the lower back to support the normal arch during the sit-up, somewhat improving the range of motion and creating a smoother transition between spinal flexion and hip flexion.

Snatch Balance

The snatch balance has been described in detail in the Snatch section of the book. This is an excellent exercise for developing the necessary overhead strength and stability required for heavy snatching and offers the advantage of a much more dynamic nature than the overhead squat, improving speed, aggressiveness and balance. It can also serve as a confidence builder—with adequate practice, athletes will generally be capable of snatch balancing more than they snatch, assuring them when they attempt a record snatch that they're able to successfully receive and support the weight.



Snatch Balance

Snatch Jerk

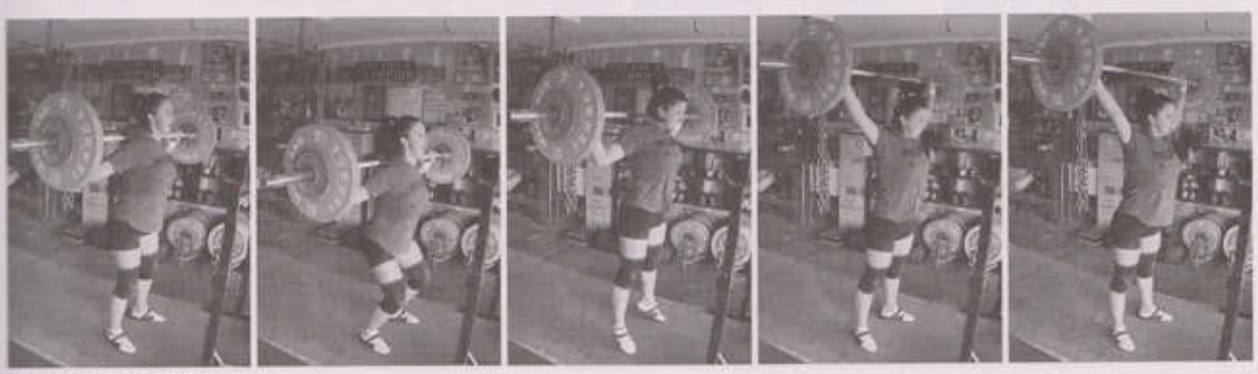
The snatch jerk is simply a power jerk behind the neck with a snatch width grip. It could also be considered a snatch balance with only a partial-depth squat under. While not a staple exercise, it can be useful at times when practice of dynamic and aggressive entry into the snatch overhead position is needed, but additional squatting is not desirable or possible for whatever reason.

With the feet in the pulling or drive position, the bar on the back and the hands in a snatch-width grip, the athlete will dip at the knees and drive against the ground. As the legs finish extending, the athlete will transition the feet to the receiving position while driving against the bar aggressively with the arms, locking out the elbows to receive the bar at approximately quarter squat depth.

Snatch (Push) Press

The snatch push press can be used to develop strength in the snatch overhead position as well as confidence under the weight, and is also the typical method of bringing the bar overhead in preparation for the overhead squat. The athlete will set the bar on the back as he or she would for a back squat, step back from the rack, position the hands in a snatch-width grip, and perform a push press behind the neck exactly as he or she would with the normal press grip.

If the overhead position is a particular weakness for the athlete, he or she should hold the bar overhead for 1-3 seconds with each rep before returning it to the back. Even if the overhead position is



Snatch push press

not an exceptional weakness, the athlete should keep the bar overhead long enough to ensure the position is stable. Rushed returns of the bar can mask unrecognized instability or poor positioning, and limit the development of elbow extension strength and stability.

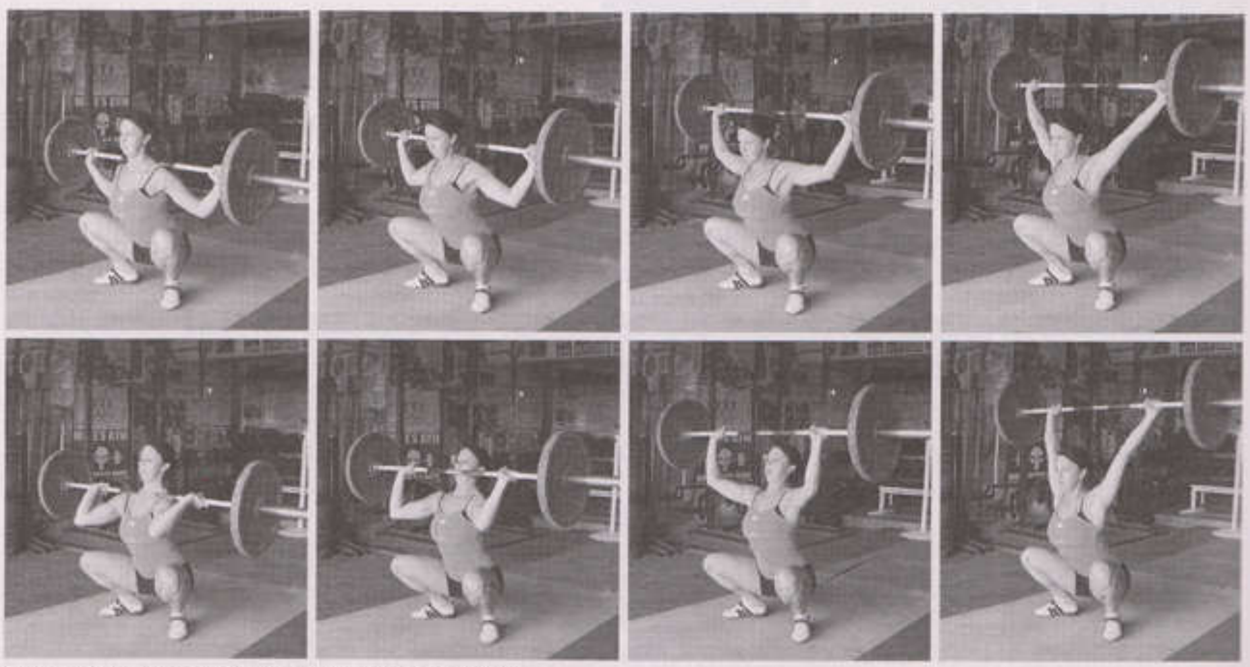
To return the bar to the back, the athlete will bend the arms to begin lowering it under control and absorb the weight by extending the ankles to meet the bar, immediately returning to flat feet and bending the legs as it reaches the back to absorb the load. Athletes can nearly invariably lift more weight with the snatch push press than the push press because of the more solid platform of the back, the straight bar path, and the shorter range of motion.

The snatch press is simply a snatch-grip press from behind the neck. This demands more shoulder and upper back mobility than the snatch push press because of the need to actually push the bar with the arms and shoulders directly from the back of the neck. This can be a good mobility exercise for the overhead position and does offer strength work for those mobile enough to use more weight.

Sots Press

The Sots press (named after Soviet weightlifter Viktor Sots) has two possible variations—snatch or clean—although typically the name without any qualifier refers to the snatch variation. With a snatch grip on the bar and the bar racked on the shoulders behind the neck, the athlete will squat and hold the bottom position. From the bottom of the squat, he or she will press the bar from behind the neck. This is extremely demanding of hip and shoulder flexibility, but can be an excellent component of a warm-up for a snatch training session. The clean variation is performed with a clean grip from the bottom of a front squat. Both snatch and clean Sots presses can also be started from the overhead position instead of on the back or shoulders.

The snatch variation of the Sots press in particular can also be performed in somewhat of a push press or jerk fashion. From the bottom squat position with the bar on the back, the athlete will bounce with the legs to initiate the drive up of the bar, locking the elbows out as he or she returns to the bottom of the squat. This will allow somewhat heavier weights to be used without reducing the effectiveness of the exercise.



Snatch Sots press (top); Clean Sots press (bottom)

Split Clean/Snatch

The split clean and split snatch, although now very rare, actually pre-date the squat versions now used most commonly. When it was recognized that the squat would allow lifters to lower their bodies farther to receive the bar—and shoes with elevated heels became available that allowed the ankle range of motion required to achieve the low squat with an upright torso—the squat variation of the lifts made the split essentially obsolete in competition.

However, the split snatch and clean remain valuable exercises for athletic training. Because the split receiving position prevents the athlete from achieving as low of a position as the squat, the bar must be pulled higher, and in this sense, the split snatch and clean are similar to the power snatch and clean. In addition, the split foot position brings another element of athleticism to the exercise, requiring somewhat greater coordination and placing the athlete in a staggered stance like will often be encountered in many sports. The split versions are also somewhat less demanding of flexibility and easier on the knees, and accordingly are often embraced by older athletes or those otherwise possessed of limited flexibility and unhealthy knees.

The performance of the split snatch and split clean is really no different than their squat counterparts with the exception of the foot placement. Any athlete who is capable of snatching, cleaning and split jerking will likely be able to perform a split snatch or clean without much trouble, although without practice, the possible loading will likely be limited. If being used by non-weightlifter athletes, alternation of the lead leg in the split will ensure balanced coordination and prevent strength and flexibility imbalances that can arise from consistent same-side splitting as performed by competitive weightlifters.

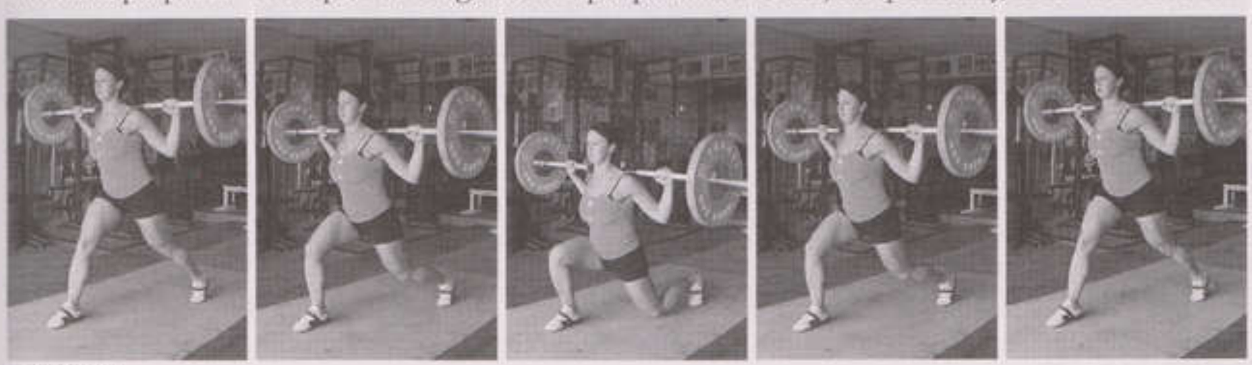
Split Push Press (Behind the Neck)

The split push press is a push press performed with the feet in the jerk split position. The lift can be done with the bar starting in the front rack position or behind the neck. The latter is arguably more useful because it will allow somewhat greater loading and also reinforce the proper bar position overhead and balance in the split receiving position.

The athlete should ensure his or her weight is balanced evenly between the front and back feet and that the back knee is soft. He or she will dip straight down, drive straight up, and then dip again into the bottom of the split position as the bar is punched up into the locked out position overhead. Usually sets of 3-5 reps are recommended with at least a brief hold overhead.

Split Squat

The split squat is precisely what it sounds like—a squat performed in the split position. It can be used for two basic purposes—to improve strength in the split position for the jerk specifically, or to work the non-



Split Squat

dominant split leg to help maintain lateral balance in strength and flexibility. That is, an athlete who jerks with the left leg in front may include split squats with the right leg forward to help offset the imbalance produced by always leading with the same side. Split squats may be performed with the bar racked in either the front or back.

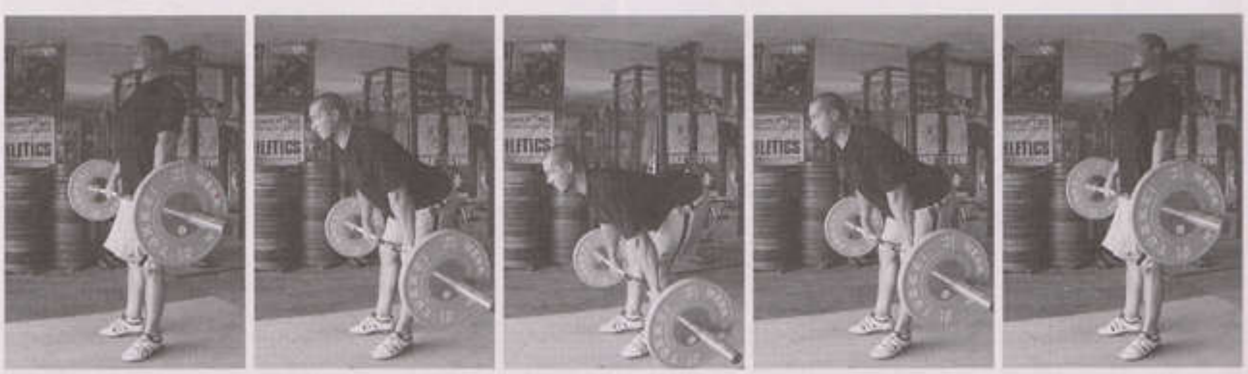
Squat Jerk

The squat jerk is a rarely used jerk variation because of its extreme demands on flexibility, precision, stability and leg strength. The lift is identical to the power jerk with the exception that the athlete continues down into a full squat as he or she receives the bar overhead. While it may have application occasionally for training, it's very unlikely to be a good choice as a competitive lift.

Squat jerk

Stiff-Legged Deadlift

The stiff-legged deadlift is party to the confusion surrounding the Romanian deadlift, and the two exercises are commonly considered one and the same. Some sources state that what distinguishes the two is that the SLDL begins and ends on the floor, while the RDL begins and ends with the athlete standing, allowing a stretch reflex for the RDL not possible with the static start of the SLDL. However, just as many if not more sources describe the SLDL also starting in the standing position. In this author's humble opinion (or, more accurately, the opinion about which I'm humble), both lifts should begin at the top. First, starting at the top doesn't necessarily mean a stretch reflex at the bottom—the athlete is more than capable of pausing in the bottom position to prevent the reflex if desired, so if a concentric pull from a static start is what the coach or athlete is after, this doesn't require the bar start on the floor (although yes, it's harder to lift a bar from the floor than from the hang). More importantly, very few athletes will be flexible enough to achieve complete back extension with minimal knee flexion while reaching a bar on the floor. The lift then has to be modified by increasing the flexion of the knee at the bottom, which begins changing the



Stiff-Legged Deadlift

nature of the movement.

Along with the starting position argument is the question of the path of the bar. Again, the universe seems to be split fairly evenly between two options. The first is that the bar remains in light contact with the legs as it would in the RDL, deadlift, and any other pulling exercise. The second is that the bar is allowed to hang directly down from the shoulders at the bottom, meaning it will be off the shins by a matter of inches. This would make the SLDL similar to the good morning in that the torque on the hips and back would increase considerably more as the hip flexes than it does if the bar remains against the legs. Considering that every other pulling lift will involve an active pull of the bar into the body, the light contact variation seems more applicable.

The above said, the stiff-legged deadlift begins with the athlete standing with the feet in the pulling position and a barbell hanging at arms' length with a clean grip. With the back locked in complete and forceful extension, the athlete will flex the hip to bring the torso to as close to horizontal as possible or even below if flexibility allows, slightly unlocking the knees in the process, and extending the knees again as the hip re-extends. In other words, this notion of the SLDL differs from the RDL only in the detail of when the knees flex—in the RDL, they flex before the hip begins flexing and remain flexed to the same degree throughout the movement; in the SLDL, the knees flex to the same degree, but flex as the hips flex, and extend again as the hips do.

Straight-Legged Deadlift

Straight-legged deadlift is often considered an interchangeable name with stiff-legged deadlift; however, we will describe it here as a distinct exercise. This exercise, like the RDL and SLDL, begins in the standing position with the barbell at arms' length. The athlete will lock the knees in full extension and flex the hips and back. That is, the athlete will end up with a rounded back in the bottom of the lift. The back flexion greatly increases the reach of the arms, so this exercise will typically need to be performed while standing on an elevated platform, box or bench. The bar can be allowed to hang down directly from the shoulders instead of being pulled into the legs.

This exercise is widely frowned upon because of the pervasive fear of loaded lumbar flexion. Its performance certainly warrants caution, but the movement is not inherently injurious, and performed judiciously, can serve a protective function for the back by developing the strength to support the spine in cases of unexpected flexion. In any case, the exercise should be introduced very conservatively to a training program with light weights and low volume initially, and only with experienced athletes in possession of excellent body awareness and control, as well as above-average flexibility.

Straight-Legged Deadlift

Tall Clean/Snatch/Jerk

The tall clean or snatch is essentially the third pull of the lift performed without the normal prior upward acceleration of the barbell. The athlete will begin standing with the feet in the pulling position and the bar at arms' length with either a clean or snatch grip. Some coaches have the athlete begin with the ankles extended and others prefer a flat-footed start. The latter is more appropriate and more effective—holding the body up on the balls of the feet shifts the weight of the athlete forward in a manner that should not occur in the performance of either the snatch or clean. This is described in greater detail in the Snatch section.

From this starting position, the athlete will initiate the movement by beginning the transition of the feet from the pulling to the receiving position, and with a slight layback of the torso and an aggressive shrug of the shoulders, pull under the bar with the arms aggressively. With no previous upward acceleration of the bar, this movement must be vicious and incredibly fast for the lift to be successful, and indeed that is the reason for its usefulness—the tall clean and snatch improve the athlete's speed and power for the third pull of the lifts. It's important the feet are removed from the platform as the movement is initiated to ensure the athlete is pulling under the bar rather than lifting it.

The tall jerk is identical in principle to the tall clean and snatch. The upward acceleration of the bar is removed, leaving only the downward drive for the athlete to position him- or herself under the bar. Beginning with the bar pressed partway—approximately at the level of the forehead—the athlete will transition the feet from the pulling to receiving position (whether split or power jerk) and drive him- or herself down under the bar aggressively.

Trap-Bar Squats

The trap-bar squat is simply a trap-bar deadlift performed with the athlete standing on a riser to allow a full squat range of motion. This exercise can prove a useful squat substitute when injuries prevent squatting due to problems supporting the bar on the back or shoulders. Most athletes will need to use larger hex-bars to allow the knees space to travel through their normal positions.

Trap-bar Squat

NUTRITION

THE BASICS

The fundamental goal of any athletic nutritional approach is to support continued performance gains. Depending on the sport in question, performance-oriented nutrition may or may not be optimally supportive of health. By coincidence only, the nutritional approach that best serves the competitive weightlifter is also one that supports long-term health quite well. Super-heavyweights are an exception in most cases because the remarkably great demand for total calorie intake reaches beyond what can be achieved in an entirely healthy fashion; in addition to this is simply forcing, in most cases, the body to carry significantly more mass than it was intended to.

There are three fundamental components of nutrition: quantity, quality, and macronutrient composition. None can be neglected in the pursuit of optimal performance, but as specific goals vary during different periods of training over the long term, the importance of one may temporarily eclipse the others.

Quantity

Quantity is the simplest value to understand. It refers to how much food is being eaten in a given period of time, measured in calories, or more accurately, kilocalories (kcal). This gives us a measure of the amount of energy being taken in, and can be considered a kind of gross adjustment tool, the manipulation of which can produce the most dramatic changes in the body such as relatively large degrees of weight gain and weight loss.

Quality

Food quality is a more nebulous value than quantity, with widespread and occasionally vehement contention existing, regarding in particular foods such as grains and dairy. The guiding principle in food quality is remarkably simple: natural foods are superior. This leaves us primarily with meats, vegetables, fruits, tubers, nuts and seeds, and possibly certain dairy products. A discussion of the depth required to fully explain the science behind this perspective is better left for more appropriate channels and those with greater expertise on the subject. The take-home point is that processed foods cannot compete with the nutritional density of natural foods, and carry with them numerous potential health risks. The quality of foods is what will supply required micronutrients, prevent autoimmune disorders, and support long-term health. To a great extent, food quality will also support athletic performance, but as health and performance diverge at times, so too will this relationship change occasionally to some degree.

Macronutrient Composition

The final element of nutrition is macronutrient composition: the relative quantities of protein, fat and carbohydrate that produce the total caloric intake. With the total quantity acting as our gross adjustment tool, macronutrient composition provides us a tool for generally more minor but potentially significant adjustments.

Protein should be considered the first priority in terms of macronutrients, particularly for strength athletes. Recommendations for protein intake vary from extremely minimal to quite epic. The numbers on the lower end of the spectrum are put forth by most of the medical community and government organizations and are reflections of absolute minimal intakes to support life, not optimal intakes to support athletic performance, health or longevity.

A good baseline for protein intake is 1 gram per pound (or 2.2 grams per kilogram) of bodyweight. This is an arbitrary number in a sense, but its efficacy has been well demonstrated for many years in the strength training world. From this starting point, adjustments can be made as needed for each individual. Many will find they operate better with intakes twice as high at times (and even more during periods of weight gain). Experimentation is recommended without dipping below the 1g/1b/day baseline.

The quality of protein varies with its source. Meat, fish, eggs and high-quality egg and whey supplements will provide protein of the greatest bioavailability and amino acid balance. The protein content of nuts and seeds, grains, and legumes is negligible in terms of both quantity and quality and should not even be considered in the total. Soy has been pushed for years as a source of quality protein, but the claims are largely unfounded, and more research on soy's effects on health are producing frightening results; soy in any considerable quantity does not belong in the diet, with the occasional exception of fermented products such as soy sauce (ideally tamari, which is made without wheat). Supplemental protein will be discussed in more detail in the Supplements chapter.

Fat is next in the macronutrient priority line behind protein. Although it's been thoroughly demonized, fat is not only not inherently a threat to health, but is absolutely necessary to support it.

Mono-unsaturated fats should make up the bulk of fat intake. This will be supplied by foods such as nuts and seeds, avocado, and olive oil, and even by many meats (approximately half of the fat in beef is mono-unsaturated, for example). Poly-unsaturated fats such as vegetable oils should be used sparingly, particularly when using oil to cook at high heats, such as with fried foods. The poly-unsaturated fat is a very unstable molecule and is easily damaged, creating unhealthy substances such as trans-fats and lipid peroxides.

Saturated fat like that found in animal products should not necessarily be sought out in great quantities, but as a stable molecule among other features, it's preferable over poly-unsaturated fat. Saturated fat is widely associated with dietary cholesterol, which is widely associated with heart disease. No research to date has conclusively demonstrated any causative relationship between fat or dietary cholesterol and heart disease, and more recent work is demonstrating that the relationship between cholesterol levels and heart disease risk is far from straightforward. This again is well outside the scope of this book, but the reader is strongly encouraged to do some homework. Keep in mind when encumbered by the fear of saturated fat and cholesterol that's been instilled in most of us that cholesterol is a structural component of every single cell in the body, and, among many other things, required in the production of steroid hormones (e.g. testosterone). It is absolutely essential to life, and the majority of cholesterol in the body is produced by the liver. This is why efforts to lower cholesterol levels through the extreme reduction of dietary cholesterol invariably fail—the body simply manufactures what it needs to take up the slack, just as it reduces production in the presence of adequate dietary cholesterol.

Omega-3 fatty acids are an essential fatty acid largely absent from most individuals' diets with the rare consumption of organ meats and only somewhat more common consumption of O-3-rich fish.

Omega-6 fatty acids are also essential, but their consumption is typically sufficient and often excessive relative to O-3s due to their presence in common foods such as meat, eggs and nuts; they are also pro-inflammatory. Few are willing to add organ meats to their diets and increase fish consumption adequately, so other sources of Omega-3s are usually necessary. Eggs enriched with O-3s are a wise choice since this will help balance the naturally high levels of O-6 in eggs; grass-fed beef is also higher in O-3s than grain-fed. Reducing O-6s is a better idea than increasing O-3s dramatically to improve the ratio.

In addition to supporting optimal health, fat can be used to supply a large quantity of daily calories.

The third and final macronutrient is carbohydrate, which continues to be promoted as the cornerstone of great health as much as fat is vilified. This again is a subject demanding a venue other than this book for its due; suffice it to say claims of carbohydrate's role in health are often exaggerated.

Carbohydrate requirements vary considerably among athletes and among periods of training. Low-repetition, high-intensity lifting is not demanding on glycolytic metabolism like somewhat more sustained, relatively intense activity is. With such training, carbohydrate intake can usually be kept fairly low, aiding in body composition and general health, with no negative effect on performance. However, with higher training volume or efforts at weight gain, carbohydrate intake will need to be increased. How much will vary, and experimentation will be important for each athlete. In any case, weightlifters will not have the carbohydrate requirements of endurance athletes or even those who engage in extended sprint-type efforts like football. Superheavyweights will generally require higher carbohydrate intakes simply to sustain their bodyweight.

Vegetables and some fruit should be the foundation of carbohydrate intake because of the micronutrient density. More energy-dense carbohydrate sources like tubers, corn products and rice (if tolerated by the athlete) can be added to fill out total carbohydrate need as determined by each athlete.

Planning Nutrition

To assemble this into practical application, first we need to know that protein and carbohydrate provide approximately 4 kcals per gram and fat 9 kcals. Next we need to determine the athlete's approximate daily caloric needs. To do this, we can use any number of formulas, none of which are ever remarkably accurate, or we can use a food journal to track food consumption and bodyweight for at least a week. Using online or other resources, calorie content can be determined for the food in the journal and daily totals can be calculated, from which a daily average over the period of the food journal can then be calculated. This average will be the starting point for daily calorie consumption (This assumes bodyweight is presently static—weight loss, gain, maintenance is covered in more detail in following sections).

Since we've made protein the first priority and defined a clear quantitative guide for its consumption, we can determine the baseline daily protein requirements of the athlete: 1 gram of protein per pound of bodyweight per day. So with a 200 lb (91 kg) athlete, that gives us 200 g or 800 kcal of protein. If we've determined through assessment of the food journal and subsequent calculation that the athlete's total daily calorie requirements are 3000, that leaves us a gap of 2200 calories to fill. Eating vegetables and fruit throughout the day may give us about 100 g or 400 kcals, which narrows the calorie gap to 1800. If we decide this athlete needs more carbohydrates than this, we can add in some sweet potatoes or similar for another 50 g, or 200 kcal, leaving 1600 calories. This we can achieve with quality fat from sources like avocado, olive oil and nuts. If it's determined that the athlete requires more carbohydrate, that amount can be increased with additional denser sources, and the fat intake reduced accordingly. (Note that these calorie numbers are approximate and are taking into account only the primary macronutrient in a given food—the total number of calories in a food containing the stated grams of a macronutrient will be higher due to the presence in at least small quantities of other macronutrients.)

This takes care of the quantity and macronutrient composition elements—these must simply now be fulfilled with food of the appropriate quality. It's easy to determine approximate macronutrient and calorie quantities of any imaginable food with online sources.

There should be no need to make a case for the importance of adequate hydration here—make it happen. Intake recommendations vary dramatically, and recently some have begun to lean toward lower quantities. A reasonable starting point is:

Bodyweight (lbs) X 0.4 = oz/day

For our 200 lb (91 kg) athlete, we would end up with 80 oz (2.4 L) per day. This is a baseline intake and doesn't take into account water loss during physical activity. Before, during and after any activity, water should be consumed according to the intensity and duration of the activity and obvious loss through sweat. For more accurate re-hydration, replace every pound of bodyweight lost during activity with 16 oz of water (or every kg with 1 L).

BODYWEIGHT

Managing bodyweight is primarily a concern of competitive weightlifters, although most athletes will certainly have reason to control their weight in order to maximize performance. There are three basic bodyweight scenarios: maintaining weight, losing weight and gaining weight. All three have the implicit goal of maximizing functional muscle mass.

Bodyweight can be controlled by both training and nutrition. However, training should be focused as much as possible on achieving athletic and functional objectives. Additionally, while training influences the nature of weight gain or loss, nutrition is what ultimately allows the most significant gains or losses.

A fundamental principle of bodyweight is the First Law of Thermodynamics: Neither matter nor energy can be created or destroyed. The two can be converted, but there is never any net change in the total quantity. What this means in terms of bodyweight is that weight cannot be reduced without a deficit of energy, and weight cannot be increased without a surplus of energy. No amount of heavy back squatting will make a skinny kid huge if said skinny kid refuses to eat more energy and material than his body is using simply to survive—as remarkable as the human body is, it cannot create tissue from thin air. Likewise, no amount of physical activity will cause a reduction in bodyweight if the individual is consuming more food energy than is being used in a given period of time. When evaluating a bodyweight plan, always return to and rely on this fundamental principle to guide your decisions.

The above said, it's unfortunately not such a simple equation—human metabolism manages to be remarkably complex. The first consideration is the second law of thermodynamics—entropy. Entropy is the transfer of a percentage of the energy during a chemical reaction to the realm outside the reaction—commonly this transfer is referred to as a "loss", but because, according to the first law, energy cannot be lost, it is simply being relocated, usually in the form of heat.

Macronutrients ultimately provide different net calories because of the variation the efficiency of their metabolism. For example, protein has fewer usable calories per gram than carbohydrate because the greater number of chemical reactions required to use protein as energy result in a lower net amount of energy with the increased entropy (although this is a very small difference). This of course does not alter the fact that a calorie is a calorie—it only forces us to consider calories in terms of net instead of gross. And it certainly does not change the fact that an individual cannot gain weight without a net calorie surplus, or lose weight without a net calorie deficit.

To complicate things further, it turns out that the basic energy balance equation that's relied on for most bodyweight recommendations is widely misinterpreted, as brought to light by Gary Taubes:

Change in energy stores = Energy intake – Energy expenditure

This is commonly understood to mean that the change in bodyweight is entirely a product of the relationship between calories consumed and calories expended. In other words, it's assumed that by increasing energy intake, bodyweight must increase, and by reducing energy intake, bodyweight must decrease, because the equation has to remain balanced or the universe will fall apart—the calories in and calories out are the cause of bodyweight status.

However, real-world evidence demonstrates that this is not in fact the case. Instead, the body apparently has a fairly well-established set point in terms of bodyweight and composition that it attempts to maintain—changes in energy intake will cause the body to make changes in its energy expenditure in order to maintain that set point. For example, if an individual increases his calorie consumption, the body will find ways to expend more energy through generally unnoticed processes. This is why dieting of the basic calorie-reduction form fails so much—the dieter's body simply reduces its energy expenditure to match intake as much as possible.

All this said, pursuit of bodyweight changes is not hopeless, just more complicated. In the case of weight gain, it appears that the body can only increase its energy expenditure so much—this simply means that calorie surpluses will often need to be even greater than expected to exceed the body's ability to compensate. After an athlete lives at a greater bodyweight for a period of time, the set point seems to be adjusted upwards, making maintenance and further gains easier. With regard to weight loss, the issue appears to be one largely of macronutrient composition and its effect on metabolic status. That is, management of insulin, gut health and inflammation coupled with less dramatic calorie reduction seems to be far more productive than extreme calorie restriction. Again, with time at a new bodyweight, the set point seems to be readjusted. In all cases, slower changes seem to be more effective than attempts at rapid ones.

Finally, just as each athlete has a ceiling for performance determined by genetic factors, each athlete's genetics will largely control the rate of weight and body composition changes, as well as the ultimate states of each. No matter how precise an athlete's nutrition is, he or she may never achieve the level of leanness, for example, of another athlete. Again, just like training, nutrition can be used to reach each athlete's ultimate genetic potential, but never actually alter it.

Maintaining Weight

Bodyweight maintenance can range from requiring no work at all to being extremely troublesome. For those who maintain their weights without any thought, the only remaining issue is that of body composition.

The maintenance of bodyweight is simply a matter of balancing energy consumed as food and energy expended through metabolism. For those whose bodyweights fluctuate continually, the goal is developing consistency in eating and activity—to establish the body's set point at the desired weight and then support its maintenance.

The first step is to assess the current situation. A detailed food journal should be kept for at least a week, describing accurate quantities of all food and any beverages, including water. Online programs can be used to then calculate calories and macronutrients for each day. In this journal, records of bodyweight can be kept as well. Weight should be taken at the same time and under the same conditions every time. The typical recommendation is to weigh first thing in the morning on an empty stomach; however, we're concerned with bodyweight two hours prior to competition. This being the case, for the most accuracy, weight should be checked multiple times each day. The food and weight journal should be paired with the athlete's training records to provide a complete picture.

The first thing to look at is water consumption—16 ounces of water weighs 1 pound (and 1 liter weighs 1 kg). Much bodyweight fluctuation can be attributed to inconsistent hydration, particularly considering most individuals are not extraordinarily disciplined with their water intake. If the food log shows large changes in water consumption that correspond with bodyweight changes—that is, lower water intake is associate with lower bodyweight and vice versa—the first step should be equalizing daily water consumption for a period of time and evaluating its effect on bodyweight.

If during a period of consistent hydration bodyweight does not stabilize satisfactorily, it will be necessary to make additional adjustments. Start by averaging the daily calorie totals from the food log to arrive at a baseline. From this, determine a daily calorie intake: if the weight fluctuation tends to be heavy, start with 5-10% fewer calories than the average; if the weight fluctuation tends to be light, start with 5-10% more calories than the average. Attempt to hit this calorie number every day for a week and assess its effect on bodyweight. Continue making minor calorie intake adjustments accordingly until the desired bodyweight is reached and maintained. Be patient and give each intake level at least a week before adjusting. Again, this more deliberate approach is more effective than attempting dramatic changes, which will be resisted by the body through adjustments in energy expenditure.

Once the correct bodyweight has been achieved, more focus can be directed to improving body composition through macronutrient adjustment. If the desired bodyweight requires unusually difficult food intake, whether too little or too much, the athlete should consider changing weight classes to allow living closer to a natural bodyweight if it will not negatively impact performance. That said, patience is important—over time, the body will adjust to a given weight and maintenance will become less of a struggle.

Losing Weight

Losing weight is achieved by creating a calorie deficit while supporting healthy metabolic activity, largely through the management of insulin, intestinal health and systemic inflammation. This is done through gradual and small reductions in calorie intake, generally lower carbohydrate intake, the elimination or at least reduction in gut-irritating foods like grains, the proper balance of essential fatty acids, and lifestyle components like adequate sleep. Because of the body's natural reaction of metabolic adjustment, the more gradual the weight loss, the less of a negative effect on performance it will have. Large calorie deficits will produce systemic fatigue and decreases in strength and stamina, and will be psychologically taxing. Plan weight loss as far out from a competition as possible to allow continued successful training during the drop. Too often weightlifters are content to remain overweight most of the year and then struggle to lose significant amounts in very little time for competition, often unsuccessfully or with considerable detriment to performance. This stress, performance reduction and potential failure can be avoided easily through better planning and weight management.

Our weight loss plan begins in the same way as our maintenance plan—we first need to record and find our average daily calorie intake over a week. From here, we'll drop this figure and consume the calculated number of calories consistently for 1-2 weeks, evaluate the progress, and readjust if necessary.

How much we drop the calorie level will depend on two things. First, is bodyweight constant, increasing or decreasing at present? Second, how quickly does the weight need to come off?

If bodyweight is constant and we have no time constraints, we may drop the calories by 10-15% or so for 1-2 weeks and monitor weight and performance. If the weight is dropping at a reasonable rate—probably around 0.25 – 1% of bodyweight per week—and performance has not been negatively affected to any degree beyond what is acceptable, this calorie level can be maintained until weight loss begins to slow. At that point, the calorie intake will have to be again dropped to account for the lower bodyweight. In this fashion, a gradual but steady rate of weight loss can usually be maintained.

If bodyweight is already dropping, the goal is either to maintain the current rate of decrease or accelerate it if and when necessary. In the same manner, calculate current average daily calorie intake and continue adhering to this level until progress slows, at which time calorie intake can be decreased another 10% or so.

If bodyweight is currently increasing, the initial calorie decrease will simply need to be greater. Depending on how quickly weight is increasing, this initial cut may be as much as 20%. Unusually large drops are not advisable because of their potential to cause counterproductive metabolic shifts and impact on performance.

If time for weight loss is limited, more aggressive calorie deficits can be created; however, it's important to keep in mind that the greater the deficit, the greater its impact on performance will be, and that there's no guarantee it will be successful because of the body's attempt to readjust. As much as possible, this situation should be avoided.

In any case of weight loss, macronutrient composition is critical. Primarily, the greater the drop in calorie intake, the greater the percentage of total calories should be from protein. One gram of protein per pound of bodyweight, as arbitrary as it actually is, should be considered a minimum during weight loss; protein intake can, in fact, be considerably higher.

During periods of weight loss, restricting carbohydrate intake to vegetables only, in concert with adequate protein intake, will encourage the maintenance of lean tissue and the minimization of body fat and help prevent compensatory actions by the body to maintain weight. However, very low carbohydrate intakes can negatively affect performance. One solution to work around this is to use a cyclic carbohydrate intake: keeping carbohydrate intake very low for 3-5 days, then increasing it to normal or even high levels for 1-2 days.

The remaining required calories should be filled in with quality fats. Conveniently enough, dietary fat will encourage the body to rely more on both dietary and stored fat for energy needs.

Last minute weight loss in order to make weight for competition is covered in the Competition section.

Gaining Weight

While in theory gaining weight is no more complex than either maintaining or losing it, in practice it invariably proves difficult for a variety of reasons. Foremost of those reasons is that the discipline required by the pursuit of functional mass often surpasses that of even aggressive weight loss.

The fundamental principle of weight gain is merely the opposite of weight loss: create a surplus of energy and material while attempting to prevent compensatory metabolic adjustment by the body to maintain its set point bodyweight and encourage the accumulation of muscle mass over body fat. In cases of aggressive weight gain, simply consuming the necessary quantity of food is uncomfortable at best and seemingly impossible at worst. Contributing to the difficulty is the great importance of food quality and macronutrient composition. A great enough calorie surplus of any composition will produce at least some weight gain—but the role of additional weight is to provide additional functional capacity, and body fat is incapable of contributing in any direct manner to strength and power. The difficulty lies in encouraging the body not to simply increase its mass, but to do so through functional muscular hypertrophy—this demands the control of food quality and macronutrient composition and creating a hormonal state that encourages lean tissue growth.

As is the case with weight loss, the longer the period of time over which weight is gained, the more the quality of the added mass can be controlled. There are limits to the rate at which the body's lean mass can grow, and reaching far beyond these limits will result in greater gains in body fat relative to muscle mass.

That said, weightlifting is a sport with broad weight classes and essentially no off-season, and often weight must be gained rapidly in order for an ascending lifter to remain competitive. In these cases, quality will take a back seat to quantity with the presumption that efforts will be made to improve quality once the lifter has settled into the higher weight.

For gradual weight gain, the process is in essence no different than gradual weight loss, the difference being only that the daily calories will be incrementally increased instead of decreased. Accurate record keeping is equally important—the same ease of self-delusion during weight loss applies to weight gain. Protein intake can be adjusted up to as much as 2-3 grams per pound of bodyweight per day. How well this higher protein intake accelerates muscle gain seems to vary among individuals, but it has certainly never hurt. Vegetable and fruit consumption should be maintained, and fat intake can be adjusted to account for the necessary caloric increase after any increases in protein are considered. Carbohydrate intake should be increased to some degree and to a large degree if determined to be necessary for a given athlete.

For more aggressive weight gain, the rules must be changed somewhat. The rule standing high above all is *eat more*. More than you ate before, more than what you want to eat, more than what you think you can eat. Quality and macronutrient composition are irrelevant until quantity has been taken care of. This is by no means intended to dissuade attempts to maintain quality and composition, but to more forcefully underscore the importance of a large and consistent calorie surplus. In other words, if the only options are eating fast food and eating little or nothing, the choice must be fast food, and more than is appealing. Always remember—if you're not uncomfortable, you're not eating enough, and if you're hungry, you're failing miserably.

With gradual weight gain, the body is allowed time to adjust to progressively larger quantities of food; with rapid weight gain, there is no such luxury. In order to mitigate this problem, foods with the greatest possible caloric density will become necessities. Fats will be instrumental considering that a given quantity has over twice the calorie content of the same quantity of either protein or carbohydrate. Nut butters, olive oil, and coconut milk are relatively easily stomached but extraordinarily calorie-dense. For those who eat dairy, whole milk should replace its reduced-fat counterparts. In the same vein is supplemental protein, which will provide an extremely helpful service considering the physical difficulty of eating enormous quantities of meat. This will be discussed more in the Supplements chapter.

Fitting in another meal in the middle of the night has been a successful tactic for many. Typically this meal is in the form of a shake consisting of supplemental protein, milk, nut butter, coconut milk, and possibly fruit. This can obviously increase the number of quality calories in a 24-hour period significantly, and will consequently be successful if eating the rest of the day is in order. However, the quality and quantity of sleep, particularly during times of weight gain, is of great importance. Because of this, the recommendation is to prepare a shake and place it in the refrigerator. If the athlete wakes naturally during the night, he or she can drink the shake. If not, he or she can drink it the next morning. Intentionally disrupting sleep is potentially more detrimental than night feedings are beneficial. If an athlete is the kind of individual who can be awakened, drink a shake, and fall immediately back to sleep, this may not be an issue. But for some, a five-minute task can result in multiple hours of lost sleep.

Just as with weight loss, individuals will respond very differently during weight gain. That is, with a given calorie surplus, athletes will gain different amounts of weight of different qualities, according to genetic predisposition. Again—if no weight is being gained, not enough is being eaten.

Individuals with extreme difficulty gaining weight will generally find that an increase in carbohydrate intake will help through the effects of insulin on the metabolism. Dense carbohydrate sources should as much as possible be limited to tubers, corn products, and rice if necessary, still avoiding wheat and other grain products. This increase in carbohydrate intake can replace the equivalent number of fat calories if needed—or ideally just be an addition. Finally, higher carbohydrate meals should always be accompanied with a good dose of quality protein, and usually fat. Carbohydrate-only or fat and carbohydrate meals should be avoided.

Milk is commonly endorsed among old school strength coaches and athletes as the ultimate weight gaining food. There is no question that milk offers a generally easily consumed and inexpensive source of potentially enormous amounts of protein and calories, and consequently can help encourage rapid weight gain. Whether or not milk actually produces gains in muscle mass any better than the equivalent totals of quality protein, fat and carbohydrate is not as clear, but anecdotal evidence seems to suggest it may. In any case, its convenience is hard to beat.

Recommendations tend to be between one half and one gallon of whole milk each day—this would supply approximately 1300-2600 calories. It's not surprising weight gain would be the result of this practice when supplementing continued whole food consumption at previous quantities.

For those unconcerned by potential but generally minor health drawbacks of dairy consumption, this is certainly worth evaluating. For those who normally wouldn't consume dairy, this can be considered temporary—adequate gains in weight will probably be achieved in two-three months, after which time, a return to a healthier diet to maintain the new weight will be possible.

Lactose intolerance can be managed with inexpensive lactase supplements. Raw milk is another option that will itself supply some of the needed lactase enzymes, as well as some colostrum, both of which will reduce the cost of supplementation for these two items. Whole milk with 100% of the lactose removed is also available.

The Super-Heavyweight

As has been alluded to a number of times previously, the super-heavyweight (over 105 kg / 231 lbs for men; over 75 kg / 165 lbs for women) lifter is somewhat of a special case in terms of nutrition. In essence he or she is eternally attempting to gain weight, and doing so at an already very large body mass. This extreme demand on the body often necessitates more extreme measures.

Ideally the super-heavyweight follows the same kind of nutritional prescription as any other lifter; that is, an optimal amount of quality protein, carbohydrate limited to vegetables, fruits and tubers, and large amounts of quality fat. Carbohydrate is only slightly more energy-dense than protein in terms of net calories, and is less than half as dense than fat, by the gram, but it's invariably much easier to consume in great quantities, and its elicitation of insulin secretion appears to help with weight gain both by encouraging nutrient storage and promoting hunger. Because of this, for many super-heavies, carbohydrate intake will be much greater than what would normally be considered necessary or healthy. This is acceptable to a degree; however, being a super-heavyweight is not an excuse to entirely abandon quality nutrition. Any non-vegetable, fruit or tuber carbohydrate foods should be considered supplemental to the foundational diet, not substitutes for the more appropriate foods. In other words, their use should be limited to bridging any gaps between actual and needed caloric intake that the lifter feels unable to close with protein, fat and more desirable carbohydrates.

Genetic Limitations

As with all morphological changes in the body, genetic factors will control an individual's ability to both gain muscular weight and to lose body fat. As a consequence, a great deal of variation among athletes will be seen, even to identical protocols. Athletes must simply work with what they have and maximize gains underneath their genetic ceilings. With this in mind, expectations for gaining or losing weight or shifting body composition must be considered realistically.

1 This idea was first brought to my attention by Dr. Michael Eades.

2 This and much more information regarding bodyweight and composition can be found in the book *Good Calories, Bad Calories* by Gary Taubes.

TRAINING NUTRITION

At times, athletes will want to introduce nutrition to the pre-workout, peri-workout and post-workout periods for certain effects. As with nearly all subjects in the realm of nutrition, much of the more detailed practices are largely speculative and certainly subject to individual experimentation—any such experimentation should be clearly documented to allow accurate evaluation.

Pre-Workout

The pre-workout period will most often involve nothing more than the athlete's normal eating habits. Timing of the last meal before training will vary among athletes depending on what the meal is comprised of and how the athlete tolerates such foods with training.

For athletes attempting to gain weight, a dose of easily-digested protein 10-20 minutes prior to training may create a more anabolic environment and encourage greater muscle growth. This should be 20-40 g of supplemental whey or egg protein. Instead of or in addition to this, athletes may find similar results from a high dose of a branched-chain amino acid supplement.

Athletes should also ensure they're adequately hydrated in preparation for training. An easy method is simply making a habit of drinking 8-16 oz or so of water on the way to the gym.

Peri-Workout

During the training session itself, nutrition should not be an issue in most cases. For particularly lengthy training sessions, the same quality food eaten throughout the day can be eaten during breaks in the session—deli meat, nuts and fruit are convenient. Carbohydrate-based drinks work well for some individuals, but are usually unnecessary except for cases of unusually large training volumes.

Maintaining hydration will be the primary concern, particularly during the hotter months of the year during which athletes can lose significant quantities of water. In such circumstances, athletes may be well served by adding some kind of electrolyte mixture to their water (electrolytes are addressed in the Supplements chapter). For those attempting to gain weight, another dose of BCAAs in water or protein supplement can be sipped during the training session, provided the athlete has determined that neither causes gastrointestinal discomfort during training.

Post-Workout

Post-workout nutrition should aim to replace what has been used during training and assist the body in recuperating maximally. A common practice is to use a 3:1 carbohydrate to protein mixture. This ratio can be altered according to each athlete's needs with regard to carbohydrates.

This post-workout meal can consist of whole foods such as a combination of grilled chicken and sweet potatoes, or it can be comprised of supplemental protein that contains carbohydrate, protein powder and a carbohydrate drink, or some similar combination. In any case, this meal should be consumed immediately after the workout.

The post-workout meal can help encourage the anabolic processes in response to training. More recent research is suggesting that pre-workout protein might be more effective, but in most cases, both is advisable. A normal meal should follow when possible.

SUPPLEMENTS

Nutritional supplementation is an enormous industry populated overwhelmingly with overpriced and ineffective gimmicks supported by inaccurate, cleverly manipulated, misunderstood, or occasionally non-existent science. There are, however, a few supplements that deserve discussion, experimentation, or recommendation. The following supplements are considered effective and useful to a degree that warrants at least educated experimentation.

Competitive athletes are encouraged to verify with the US Anti-Doping Agency (USADA), World Anti-Doping Agency (WADA), or the appropriate organization supplements' legality in and out of competition before beginning use. Ignorance of the rules is not grounds for immunity or leniency.

Vitamin D

Vitamin D supplementation is becoming more and more popular as increasingly individuals are being found deficient. Many of us spend the vast majority of our time indoors and as a consequence are exposed to very little sunlight. Vitamin D levels can be tested easily with routine blood work and supplementation can be based on the level of deficiency. Typically it will be recommended in cases of deficiency to start with a higher dose and step down to a lower maintenance dose after a month or so. Supplemental Vitamin D in cases of deficiency can have dramatic effects on energy, mood and recuperation.

Fish Oil

Available as either liquid or in capsules, fish oil provides the Omega-3 fatty acids that are essential to health, performance, and life itself, but are often largely absent in our diets. The compounds in which we're interested are EPA and DHA, and how much is contained in the total amount of fish oil is the number with which to be concerned. For example, some fish oil supplements will have a combined total of 300 mg of EPA and DHA per 1000 mg serving, while others will have 600 mg of EPA and DHA in a 1000 mg serving. The former will often appear less expensive, but with a direct comparison of EPA and DHA content with the latter, the price gap will typically disappear.

A starting dose should be 1-2 grams of total EPA/DHA per day, ideally taken with fat-containing meals to improve digestion and absorption. After 1-2 weeks, the dose can be increased 500 mg – 1 g. This can be repeated until no further benefits are noticed or digestive discomfort appears. It's advisable to reduce excessive Omega-6 intake and other pro-inflammatory foods more than increase Omega-3 intake to counteract it; a top-end dose would be 4-6 grams daily. If any amount of fish oil produces digestive problems, it can be accompanied by ox bile, which will help with the fat's digestion. Make sure to keep fish oil in the refrigerator or freezer to prevent untimely oxidation.

Protein

With the importance of quality protein and the difficulty of consuming large amounts of it in whole foods, supplemental protein is commonplace in athletes' diets. The abundant use of supplemental protein means a wide range of type and quality. There are only two types of supplemental protein that should even be considered: whey and egg. Soy is not an option, and casein is just a lower quality filler protein used in inexpensive supplements.

Supplemental protein should contain precisely what the name implies: protein. There will typically be trace amounts of fat and carbohydrate in any protein supplement, but it should be minimal because any added fat or carbohydrate will generally be of poor quality and better supplied by whole foods (An exception to this would be a combination protein and carbohydrate supplement intended for use post-workout). Also look for supplements with no or minimal amounts of artificial sweeteners.

For athletes needing to consume unusually large amounts of protein, a hydrolyzed supplement will be a wise choice if not entirely necessary. Hydrolyzation breaks down the proteins into smaller peptides, making the supplement easier to digest. If hydrolyzation proves inadequate to prevent digestive trouble, additional digestive enzymes can help.

And don't forget to chew your shakes as you would solid food—this action is necessary to fully stimulate the digestive process.

Multi-Vitamin/Mineral

Depending on the quality of food being consumed consistently by an athlete, it may or may not be necessary or beneficial for an athlete to take a multi-nutrient supplement. Generally a wise approach for athletes who eat well consistently is taking a multi-nutrient every other day or even less frequently. Athletes for whom food quality is inconsistent may take one more frequently. Keep in mind that repeatedly it has been shown that vitamin and mineral supplementation does not have beneficial effects beyond eliminating deficiencies. More recent research actually suggests that excessive intake can have negative effects on health.

Digestive Enzymes

For the rapid weight gain crowd, digestive enzymes can be the difference between success and failure. Typically in cases of quick weight gain, the sheer volume of food being consumed will exceed the body's ability to digest it adequately, resulting in anything from discomfort to serious GI distress. Enzymes are relatively inexpensive and will greatly improve the usability of the food being eaten. Take with large meals as needed.

Ox bile is an inexpensive supplement that will aid in the emulsification of fats and reduce fat-related digestive discomfort. It can be taken with high-fat meals and with fish oil as needed to improve digestion.

Creatine

The effectiveness of creatine probably varies among individuals more than any other supplement. For 20-25% of the population, response is immediate and measurable. For many, there may be marginal results, but nothing remarkably convincing. And for a final group, there will be no apparent response at all, although bodyweight may increase slightly from water retention with no accompanying performance gains.

Creatine is inexpensive and certainly merits experimentation. While some athletes may not noticeably respond in terms of performance, creatine may decrease cortisol levels and oxidative damage, and taken at bedtime may increase growth hormone secretion during sleep. Because of this, even non-responders may consider supplementation.

There is no need for a loading period—simply start with the normal dose of 5-10 grams/day in water. It appears the body may have a saturation point, after which it will reduce its own production of creatine to return quantities to below its natural level. Cycling 2-6 weeks on and 1 week off should help counteract this to keep the average level over time above normal. A simple and effective way to cycle creatine is to simply time it with training cycles; that is, during weeks of reduced intensity and/or volume, creatine use can be stopped, and then resumed with normal training. In any case, it's important to ensure use is timed appropriately for competitions, and should not be used pre-competition without previous experience.

ZMA

ZMA (Zinc monomethionine aspartate, Magnesium Aspartate and vitamin B6) is a supplement commonly used among athletes to improve sleep. Because male athletes in particular are often low in all three components, ZMA can be helpful to raise their levels as well. Often ZMA will need to be taken consistently for a week or two before individuals see improvements. It may also increase the intensity of dreams.

GABA

GABA (Gamma-aminobutyric acid) is an amino acid used to improve sleep essentially by calming the nervous system. This is a particularly effective supplement for athletes who tend to remain mentally excited late at night.

Branched-Chain Amino Acids

The branched-chain amino acids are luecine, isoleucine, and valine. Use of BCAAs appears to assist in muscle growth, although many claims of effectiveness are greatly exaggerated. Supplementation with large dose BCAAs is worth experimenting with during periods of mass gain. Some will find these large doses to cause GI discomfort and will need to reduce the dosage, although if the necessary reduction is dramatic, it may not be worth continuing use. Some BCAA supplements are combined wisely with glutamine to improve muscle protein sparing and muscle growth response. Be sure to purchase as powder instead of capsules for better cost per dose.

Glutamine

Glutamine is an amino acid often used in large quantities, and often added to branched-chain amino acid supplements. Research has suggested it can increase growth hormone levels, improve protein synthesis, and improve immune system function. Like creatine and BCAAs, individuals seem to respond to glutamine supplementation very differently, some feeling significant improvement in recovery from training and others experiencing no noticeable benefit. Glutamine should be purchased in bulk powder form as beneficial doses will be multiple grams.

Vitamin C

Vitamin C is an inexpensive supplement that can be helpful in a number of ways. As an immune function supporter, it can obviously help keep athletes healthy and training at full speed. It can also help lower cortisol levels, and for this purpose can be taken post workout and at bedtime. Supplements that contain bioflavanoids rather than only ascorbic acid are more effective in general, and in particular for adrenal function support. As mentioned with regard to multi-vitamin and mineral supplements, excessive consumption is not recommended.

Probiotics

Probiotic supplements encourage the proliferation and maintenance of the natural microorganisms that inhabit the human gut. This is a commonly underappreciated element of general health, and consequently athletic performance. Quality probiotics typically come in powdered form and should be refrigerated.

Glucosamine / Chondroiton / MSM

Glucosamine, chondroiton and MSM have all been demonstrated widely to improve cartilage repair and general joint health, and are most commonly taken in combination with each other. Considering the abuse the joints will take when exposed to weightlifting over any extended period of time, this is a wise addition to the nutrition program.

Colostrum

Bovine colostrum is typically sold as an immune function supporter, but its effects at high doses on muscle growth have been demonstrated in at least a few studies and in much real world experience. The dosage required to elicit measurable lean mass gain makes colostrum an expensive supplement, but for those having trouble gaining weight, it's worth evaluating. Dosage in pertinent studies has been 20 grams daily; athletes can adjust for their bodyweights by using about 10% of bodyweight in pounds per day in grams, e.g. a 230-lb athlete would use 23 grams daily.

Caffeine

Caffeine is a substance that attracts as wide an array of opinions as any other. There is little argument regarding its ability to improve athletic performance in the short-term; the more contentious issue is its effects on long-term health, particularly its potential impact on adrenal function. As long as adrenal problems don't exist presently, dosing is appropriate, and caffeine is not relied on as a substitute for adequate sleep, there is little concern.

Because caffeine's effects vary among individuals, it's important for lifters to have experience training while caffeinated before bringing it into a competitive situation. Keep doses reasonable—there will be a point at which more caffeine will fail to improve performance and instead begin disrupting it. Further, excessive caffeine use and the resulting high level of arousal during training can increase systemic fatigue and encourage overtraining.

A wise approach to caffeine intake might be cycling. After a period of normal caffeine use, a significant reduction or elimination of intake for a week or two may provide time for the body to recover from any accumulated systemic fatigue that has developed from the greater degree of physical excitement experienced with caffeine use and reset caffeine sensitivity to a lower baseline. This back-off period may be particularly beneficial in the 1-2 weeks prior to a competition, with the reintroduction of caffeine just prior to the event. Experiment with this outside of competition first to gauge response, as it may be dramatically different than expected.

Electrolytes

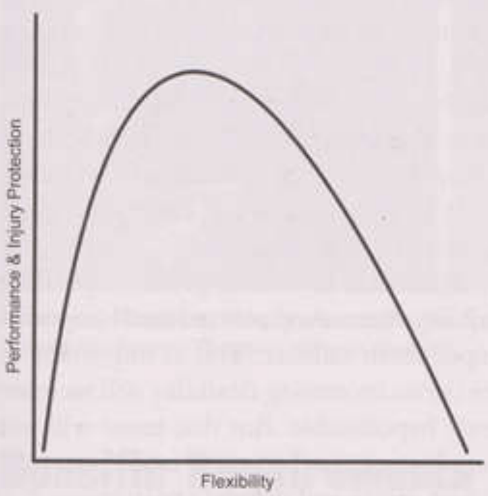
During intense training in the summer months, athletes can lose considerable amounts of water, along with which will come electrolytes—sodium, potassium and chloride. Electrolyte replacement drinks or powders can be purchased, but are generally accompanied by sugar and other unwanted ingredients. To make an equally effective electrolyte solution, add about a half-teaspoon of salt and half-teaspoon of potassium chloride (sold commonly as a salt substitute) to each liter of water.

FLEXIBILITY

FLEXIBILITY TRAINING

Weightlifting demands a high degree of flexibility relative to many other sports, and certainly to any other strength sport. The hips, shoulders, wrists and ankles must be able to move unimpeded through the necessary ranges of motions in order to allow the proper performance of the lifts and avoid unnecessary stress and potential injury. More often than not, athletes will initially possess inadequate flexibility for weightlifting, and will need to improve their flexibility in order to perform the movements effectively and safely.

The field of athletic training is abounding with poor and conflicting information regarding flexibility and stretching. The reigning popular notion of flexibility and stretching is that their relationships to both athletic performance and injury protection are positive and linear; that is, as stretching and flexibility increase, so do athletic performance and injury protection. The actual research and experience of coaches and athletes, however, have failed to demonstrate this relationship, and the evidence in concert with a dose of reason suggests a different association.



Flexibility Curve: The relationship of injury protection and performance to flexibility describes a modified bell curve. The apex represents optimal flexibility—the degree of flexibility that allows the greatest performance and provides the greatest protection from injury. Note that the curve is steeper on the hypoflexibility side of the apex—in proximity to optimal flexibility, a given degree of hypoflexibility impedes performance and increases the risk of injury to a greater extent than that same degree of hyperflexibility.

It's more likely that the relationship of flexibility to both injury and performance describes a modified bell curve; that is, both hypoflexibility and hyperflexibility increase the risk of injury and may limit performance. However, in close proximity to the apex representing optimal flexibility—the degree of flexibility associated with the least risk of injury and the greatest performance—hypoflexibility is associated with greater injury risk and greater performance inhibition than is hyperflexibility. In other words, excessive flexibility is only slightly more desirable than inadequate flexibility.

It's important to understand the difference between reducing or eliminating a performance-limiting factor and actually improving performance. It's also important to visualize this trend on the bell curve described previously and note that past the apex, the increasing flexibility that initially improved performance may begin to harm it instead. In terms of athletic performance, optimal flexibility will not improve in any dramatic manner strength, power, speed or any other physiological capacity. It will simply eliminate hypoflexibility-related performance limitations. If those limitations in a particular athlete are extraordinarily great, however, the improvement in performance gained from increased flexibility may be dramatic.

In the context of weightlifting specifically, this can be seen, for example, with an athlete's inability to achieve a solid jerk rack position. This poor positioning may prevent a solid connection between the bar and torso, limiting the athlete's ability to accelerate the bar upward; it may place the bar too far forward of the spine and create an excessive moment on the back, encouraging forward collapse during the dip and a subsequent forward bar path; and it may place the arms in a very disadvantageous position for pressing under the bar, resulting in trouble locking out the bar overhead. These things will all undoubtedly limit the athlete's maximal jerk. As the inflexibility that prevents proper positioning is reduced, the athlete's ability to jerk will increase accordingly. Once the athlete has achieved as much flexibility as is required for a perfect jerk rack position, further increases in flexibility will have no more positive effect on jerk performance.

As should be clear with any consideration, the demands of flexibility will vary, sometimes greatly, among sports. The first step of developing any flexibility protocol is determining the needs of the athlete. There are two categories of flexibility requirements—universal and sport-specific. That is, there is a defined set of positions and ranges of motion that are requisite to functional, healthy human life; and there is a set of positions and ranges of motions that are defined by the demands of the chosen athletic pursuits. The degree to which sport-specific requirements differ from the universal requirements is wholly dependent on the unique demands of the sport.

All athletic activity involves movement and the attainment and sometimes maintenance of certain positions (e.g. overhead squat in weightlifting, static holds in gymnastics). Some sports demand those things in the presence of significant loading or forces far exceeding bodyweight. Sport-specific positions may be functional, reflective to varying degrees of some of our universal positions and movements, while others may be wholly non-functional in this sense.

For example, a flare in gymnastics is a movement demanding of a high degree of flexibility, but it is not functional in the fundamental sense of the word—it's not a movement the human body would ever need to perform in the course of practical existence. A squat, on the other hand, is found in numerous variations in many sports, but also epitomizes functionality in terms of an individuals ability to navigate the physical demands of life freely and without injury.

In most cases, sport-specific flexibility requirements will involve a greater degree of flexibility than the universal requirements, but this is not a rule without exception. Distance runners, for example, have relatively little demand for athletic flexibility; the sport requires a very limited range of motion of all joints. On the other end of the spectrum is gymnastics, which demands movement and the control of great resistance through ranges of motion far beyond those found in universal requirements.

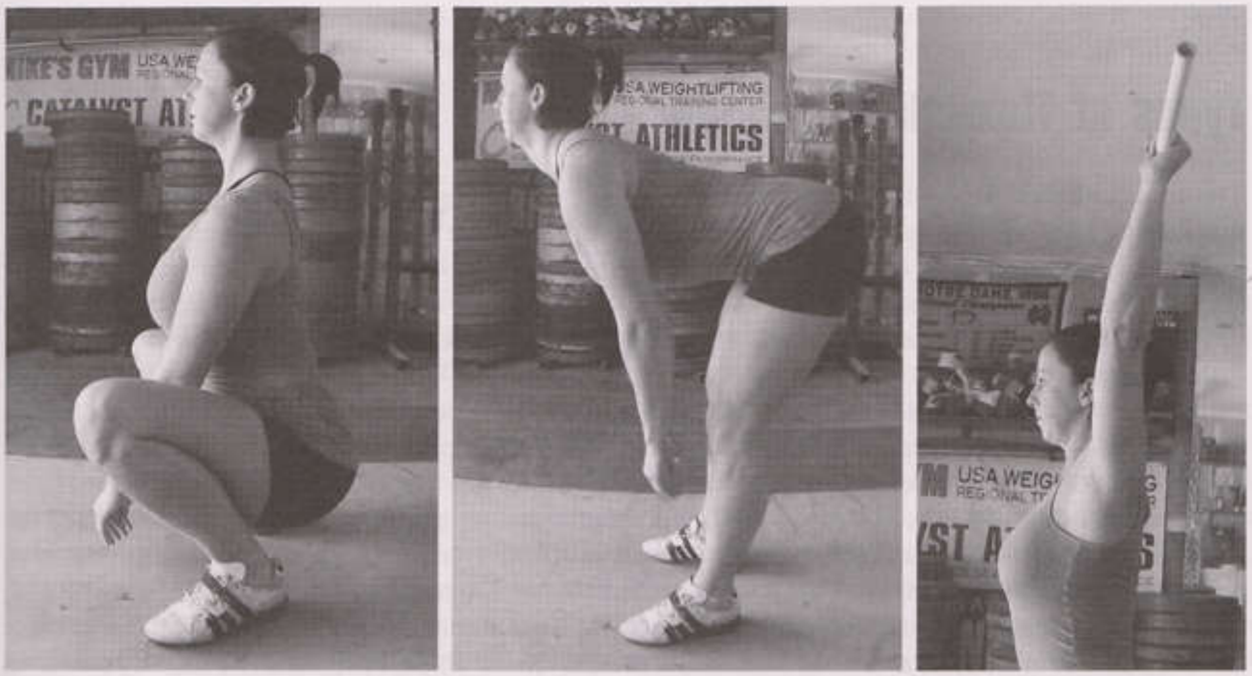
The manner in which optimal flexibility improves athletic performance also varies greatly depending on the sport, but more importantly, on its relation to previous flexibility status. As discussed earlier, optimal flexibility is not technically a performance enhancer, but an impediment reducer. This is important to keep in mind when considering the flexibility-injury-performance curve: increasing flexibility will increase performance and decrease risk of injury if an athlete is presently hypoflexible. But that trend will not continue indefinitely. Beyond the apex of the curve representing optimal flexibility, the trend prior will invert, and it's likely that increasing flexibility will increase the risk of injury and decrease performance.

The protocol for developing individual flexibility training programming includes a few steps. First and foremost, we must define and understand the program's goal: achieving optimal flexibility to reduce performance impediments and the risk of injury as much as possible. Next, we must determine the requirements to define the individual's optimal flexibility. Once we know our requirements, we can develop the actual training methods to satisfy them. Of course we then must actually implement our program consistently. And finally, we must continue re-evaluating our flexibility status and adjusting our training accordingly.

Universal Requirements

The universal flexibility requirements are simple and few, but not necessarily easy to achieve. The first and second requirements are the abilities to maintain proper lumbar spine extension through the entire range of motion of two movements: a full-depth squat and hip flexion to a minimum of 90 degrees relative to the legs. The third requirement is the ability to achieve a proper overhead position.

Limited mobility in the shoulder girdle and thoracic spine are a commonly overlooked cause of lower back injuries and pain. If the shoulders are unable to open fully (extend the arms vertically), the overhead position is not actually overhead. Therefore, when attempting to lift the arms overhead, the lumbar spine tends to hyperextend, rotating the torso backward to allow the arms attached to the partially opened shoulders to extend vertically. The ability to fully open the shoulder, then, is integral to long-term functionality and injury prevention.



Universal Flexibility Requirements Proper spinal extension at the bottom of the squat; Proper spinal extension with 90+ degree hip flexion; Proper overhead position.

Specific Requirements

Specific flexibility requirements are simply the positions and ranges of motion demanded by the athlete's sport. Any experienced athlete or coach should be able to quickly and easily identify these with little effort. For weightlifting, the position and range of motion demands have been described in great detail throughout this book and should need no further discussion. The weightlifter will need to recognize which of those positions he or she is presently unable to achieve and make these the emphasis of flexibility training.

It is unnecessary to identify the actual muscles in need of stretching; attempts at naming such muscles are typically inaccurate and incomplete anyway. There are approximately 640 skeletal muscles in the human body—it's extremely uncommon to find a coach or athlete who can name more than 10% of them, and even less common for those coaches and athletes to be able to accurately identify that 10% with respect to inflexibility.

Just as we approach training from the perspective of movement and position rather than the use of specific muscles, so too should we simply concern ourselves with positions rather than muscles with respect to flexibility. In other words, we need only determine in which positions an athlete is inflexible, and then find or create exercises that stretch those positions. Interestingly enough, often the best stretches are the actual exercises or positions we're trying to improve—performing the lifts themselves is some of the most effective flexibility training that can be performed.

Generalizations can certainly be made with respect to the flexibility limitations of new weightlifters. Problems tend to exist with upper back and shoulder flexibility in the overhead position; in the hip extensors and adductors at the bottom of the squat and the starting position of the snatch and clean; in the ankles at the bottom of the squat; and in the shoulders and wrists in the clean and jerk rack positions. However, depending on each athlete's background, we may see quite different sets of problems, and accordingly, each athlete's flexibility program will need to be approached individually.

Types of Flexibility Training

The most common type of flexibility training is static stretching—entering a stretched position and maintaining it for a given period of time. Static stretching offers the most potential for dramatic increases in flexibility, but should be considered more of a remediation tool. That is, aggressive static stretching should be employed to bring an athlete's flexibility up to optimal as quickly as possible, but once that optimal flexibility has been achieved, static stretching can become gentler and less frequent to simply help maintain flexibility.

Research has demonstrated that static stretching may temporarily disrupt nerve function, resulting in diminished force production capacity and delayed reaction to proprioceptive input. This means the possibility of slightly less strength and power and greater injury risk if static stretching is performed prior to activity. For this reason, in addition to the fact that static stretching prior to activity that has warmed the muscles and maximized their pliability is not particularly effective, static stretching of significant duration and intensity should generally not be done prior to training or competition.

That said, there are situations in which pre-activity static stretching may be advisable. This practice will be limited to athletes with extreme inflexibility that prevents their ability to achieve necessary positions within a safe range. For example, an athlete with extraordinarily tight hamstrings or adductors may be unable to squat to full depth with the maintenance of proper lumbar extension. In such a case, time spent stretching prior to a squat workout may loosen the muscles enough to allow a safer position, and this improvement outweighs any potential force-production problems. In addition to the previous exceptions are the ankles and wrists. This pre-activity static stretching should be preceded with a thorough warm-up to ensure safety and effectiveness.

PNF (Proprioceptive Neuromuscular Facilitation) stretching is a more aggressive type of static stretching that can deliver improved flexibility in less time. It can be employed in essentially any stretch, although some may prove more difficult—generally working with a partner is ideal. The athlete will first assume a normal static stretch and hold for approximately 30 seconds. The athlete will then isometrically activate the muscle being stretched against resistance for 5 seconds. At the end of that 5 seconds, the athlete will shut off the activation immediately and pull the stretch slightly farther to hold for 5 seconds. This contract-relax cycle can be repeated about 5 times, increasing the degree of the stretch each time, then followed by a final 30-second static stretch. The athlete should hold his or her breath during the contraction phase, and release it abruptly along with the contraction as he or she moves into the increased stretch. Contractions should not be of maximal intensity; 20-50% effort has been shown to be as effective and poses less of a risk of injury.

Active stretching is a form of static stretching that uses the control of antagonist muscles to pull the agonists into an extended position. A simple example would be lifting a straight leg to the front with the hip flexors to extend and stretch the hip extensors. This type of stretching has limited application as a stand-alone tool. However, active stretches are continually performed naturally as part of positioning. For instance, sitting in the bottom of a squat, particularly an overhead squat, involves active stretching.

The type of flexibility training that will remain an indefinitely valuable tool irrespective of the athlete's present flexibility is dynamic stretching, more accurately termed mobility training. Mobility training is simply the movement of the joints through their full ranges of motion as defined by the athlete's requirements. Training itself may be considered a form of mobility work because the movements—assuming they're being performed correctly through the full range of motion—will preserve that range of motion quite well. Additional mobility work serves more as a bridge between inactivity and activity in the context of a warm-up or to ensure more balanced mobility for athletic specialists.

In short, the role of static stretching can be limited largely to remediation, while dynamic stretching or mobility work should remain an ongoing element of every athlete's training, both for flexibility maintenance and as part of pre-training and pre-competition warm-ups.

Creating a Flexibility Program

Once the needs of the athlete have been determined, a program to correct any flexibility deficiencies can be created and implemented. Encouraging an athlete to stretch more than necessary or in inappropriate manners has the potential to be counterproductive and to discourage adherence to the stretching legitimately needed. With little exception, stretching is not an activity athletes enjoy, particularly after taxing training sessions and when time is limited. If the coach can create a flexibility program that both minimizes the necessary time and effort of the athlete while delivering measurable gains in performance, athletes will be much more likely to remain consistent and reap the potential benefits. The coach actually assisting the athlete with partner stretches is an easy way to ensure stretching is being undertaken as well. Similarly, encouraging a team of athletes to stretch together is often much more effective than athletes stretching individually. In addition, the more specific a stretching program is, the more likely an athlete will be to perform it; vague programs or suggestions by the coach with the expectation that the athlete will take the initiative and choose stretches, times and the like often results in the athlete doing very little at all. This means they see little or no progress, and consequently develop a poor opinion of stretching generally.

Dynamic stretching upon rising in the morning can help improve flexibility throughout the day by essentially helping to neurologically reset muscle length that diminishes due to the limited movement during sleep. The morning is not the time to go for extensive ranges of motion—this should be gentle, incrementally increasing movement comfortably below the ranges of motion possible later in the day when warm. This practice takes little time and can make significant improvements in mobility and joint comfort. A series of arm circles forward and backward, torso rotations, and leg swings forward and backward is adequate. Some light calisthenics will also be helpful.

On training days, static stretching should be performed immediately following the training session when the muscles will be the most pliable and receptive to adaptation (if foam rolling is being performed, stretching should follow it). On days without training, static stretching should be preceded by a hot shower or hot bath whenever possible, or at least later in the day. Static stretching should generally not be performed in the early part of the day as flexibility will be most limited and stretching will less of an effect.

Recommendations for durations of static stretches range from 2-120 seconds. The simple reason is that nearly any stretching protocol will effectively improve flexibility. The most important factor in improving flexibility is consistency over an extended period of time, not the actual stretching protocol used.

A solid guideline for static stretches is 30-90-second durations. The final stretched position should be attained gradually instead of forcefully. Athletes may find stretching more effective—or possibly more tolerable—by holding each stretch for 20-30 seconds and performing multiple circuits of the selected stretches. PNF stretching should be used when possible for more rapid improvements.

In the following chapter are descriptions and illustrations of some of the most effective static stretches appropriate for the weightlifter.

STRETCHES

The following selection of stretches will be sufficient to prepare nearly any athlete for weightlifting. As was discussed in the previous chapter, these stretches should be used frequently and aggressively to bring the inflexible athlete to a state of optimal flexibility as quickly as possible. After this has been accomplished, static stretching can be reduced dramatically to only the minimum necessary to, along with lifting and dynamic flexibility work, maintain flexibility.

It should be understood clearly that aggressive stretching implies discomfort, not pain. At no time sould a stretch feel injurious, and soreness following a bout of stretching is indicative of too much intensity.

The stretches are organized according to the muscles they stretch or the joints around which those muscles act (seemingly contradictory to the previous chapter's suggestion to avoid thinking in terms of actual muscles, but most appropriate for organizational reasons in this instance). This is a basic set that addresses the most common flexibility problems of weightlifters.

Stretches are in general quite intuitive and easy to create—if an athlete has a flexibility issue not satisfactorily addressed by any of the following stretches, he or she is encouraged to experiment with positions that reach the areas in need of stretching.

Hip Flexors & Quads

Tight quads and hip flexors are extremely common sources of knee pain among weightlifters and other athletes. It can be remarkable to witness the speed at which knee discomfort abates with a short period of flexibility and SMR work (covered in the following chapter). Likewise, lower back tightness and pain can often be traced to tight hip flexors. With the exception of the back leg in the split jerk, the rectus femoris (mid-line quad muscle that crosses both the knee and the hip) is always in a relatively shortened position, and is often encouraged to shorten further by ab work that includes large volumes of hip flexion without commensurate stretching. Bringing the hip flexors and quads to a point of optimal flexibility can result in

Final position of the quad and hip flexor stretch (far left); emphasizing the stretch on the hip flexors (second from left); emphasizing the stretch on the quads (third from left). Lunge stretch (second from right); lunge with rotation (far right).

dramatic improvements.

With a single position, we can stretch both the quads and hip flexors extremely well, and with slight modifications, emphasize one over the other. The athlete will place the top of his or her foot on a chair, box or similar object approximately knee height behind him or her. Entering into a lunge position, the athlete will attempt to flex the back knee completely while simultaneously extending the hip completely. This will be the most advanced position and will cover both the quads and hip flexors equally. To reduce the stretch on the hip flexors while continuing to stretch the quads, the hip can be flexed partially and the knee kept flexed completely. To reduce the stretch on the quad and emphasize the stretch of the hip flexors, the front leg can be stepped farther forward, the knee opened somewhat, and the hip extended fully. In any variation, the trunk can be rotated toward the front leg to increase the stretch on the hip flexors.

The hip flexors can also be stretched with the lunge and its variations. Further stretching of the hip flexor can be achieved in the lunge position by rotating the vertical torso to the side of the front leg. In all cases of hip flexor stretching, the glute on the side being stretched should be contracted to help relax the hip flexor and prevent hyperextension of the lower back (which will allow the hip flexor to be stretched more in addition to being safer for the spine).

Hip Extensors & Adductors

The hamstrings are notoriously resistant to stretching and consequently notoriously tight. For weightlifters, typically in concert with tight adductors, this means an inability to maintain correct spinal extension in the squat and possibly in the early stages of the snatch or clean pull from the floor. This is not only detrimental to performance, but unsafe.

A contributor to the hamstrings' seeming resistance to flexibility is the simple yet overlooked fact that the vast majority of hamstring stretching is performed incorrectly or in manners that inherently prevent adequate stretching. These practices limit the extension of the hamstrings by relying on lumbar flexion to give the appearance of increased range of motion—this flexion prevents the pelvis from having to rotate anteriorly and consequently the origins of the hamstrings don't travel far enough from their insertions to cause an adequate stretch. This also develops excessive mobility of the lumbar spine, exposing it to greater injury risk, particularly in concert with tight hamstrings.

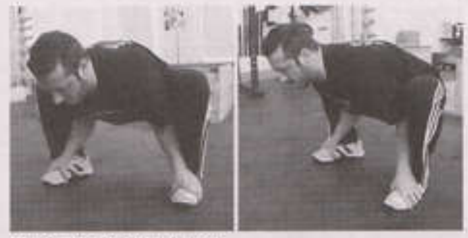
The key to all hamstring stretching is that the hamstrings originate on the pelvis—they have nothing to do with the spine beyond the fact that the spine is also attached to the pelvis. That means in order to stretch the hamstrings, the pelvis must be rotated forward—*hip* flexion, not spine flexion.

The ideal position to ensure the hamstrings are being stretched while the curve of the lumbar spine and its integrity are preserved is lying on the back. A towel roll or similar can be placed under the lower back to support a normal arch and further isolate hip flexion. Leaving one leg straight and flat on the floor to help prevent the pelvis from rotating posteriorly and stretching the back, the athlete will bring the other leg up by flexing at the hip and hold it in a stretched position. This stretch should be performed both with a straight knee and with a partially flexed knee. To stretch straight-legged, the knee should be locked

Straight-knee hamstring stretch (far left); bent-knee hamstring stretch (second from left); spiderman (third from left); straddle (second from right); butterfly (far right) and the hip gradually flexed; to stretch bent-legged, the hip should be fully flexed (bringing the knee to the chest), and the knee gradually extended while maintaining the hip flexion. In both straight and bent knee stretches, the leg can be moved laterally to emphasis the stretch on the inner or outer hamstrings as needed. A length of nylon webbing or similar can be hooked over the middle of the foot to provide the athlete a convenient handle with which to draw the leg toward the chest. This is a perfect stretch with which to use the PNF protocol.

The spiderman lunge is simply a very long lunge in which the athlete tries to lower the chest to the floor inside the forward knee and drop the hips as low as possible—bringing the elbow to the inside of the front foot is a good target, but the primary focus is lowering the hips. This is an excellent stretch for all of the hip extensors and adductors that tend to interfere with deep squatting, and will generally improve movement in the hip capsule. The athlete should attempt to rotate the pelvis forward as the torso drops rather than simply bending the back.

The Russian Baby Maker (I will take credit for creating this stretch, but keep the backstory of the name to myself; the reader may be assured it's funny.) is a good stretch for opening the hips to improve the bottom position of the squat. With the feet slightly wider than the normal squat stance, the athlete will place the hands on the tops of the feet and wedge the elbows inside the thighs as deep as possible (back toward the groin). He or she will then sit the hips down into a squatting position while pushing the elbows out, trying to spread the legs apart at the proximal ends (i.e. push the legs apart where they meet the hips). The back does not need to be arched and the athlete does not need to be in an upright squat position at full depth. In the lowest position, at least some of the athlete's bodyweight will be supported on the elbows.


Russian Baby Maker

The seated straddle is performed by simply sitting upright and extending the legs into the widest angle relative to each other possible. Some forward pelvic tilt will introduce an additional stretch—but this should not be confused as flexing the lower back, which will accomplish nothing. The athlete simply needs to attempt to sit erect with lumbar extension.

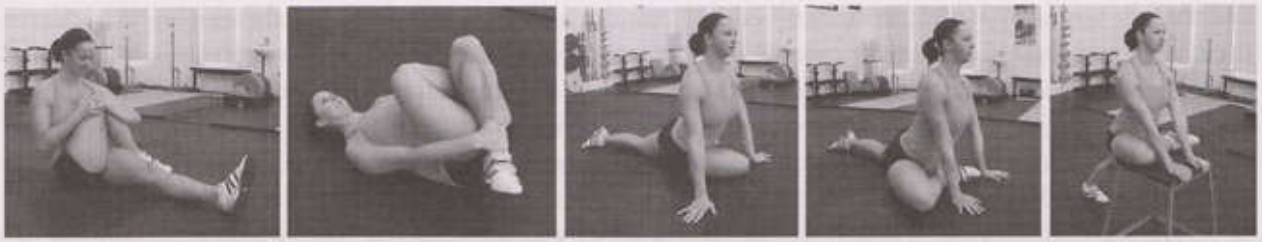
The butterfly stretch is performed in the same seated position but with the soles of the feet in contact with each other and as close to the body as possible. The knees can be pushed toward the floor by the elbows with the hands grasping the feet as an anchor. Like in the straddle, the athlete should attempt to sit upright with normal lumbar extension.

Posterior/Lateral Hip & Lateral Leg

The glutes and lateral muscles of the hips are most often in shortened positions due to the external rotation of the legs during squatting and consequently tend to become undesirably tight. It's relatively uncommon for this tightness to produce any considerable problem, but it may exacerbate existing problems and if significant enough, may begin leading to position changes that can create pain and injury.

There are a few stretches that can be used for the lateral hip; each will hit the muscles at a slightly different angle, so alternating among them is helpful. However, some will be inaccessible or impractical with great enough inflexibility.

The first and easiest stretch is performed from a seated position with one leg extended straight and the other bent with the foot placed on the outside of the straight leg. The athlete will hook the crook of the opposite elbow over the bent knee and pull it toward that shoulder. This pull can be from directly horizontal to a more upward direction to create a more complete stretch. Sitting more or less erect will also change the feel of the stretch.



Lateral hip stretches in order of description

Next in the progression will place the athlete lying on the back with both knees bent and the lower leg of one side on top of the lower thigh of the other, as if seated cross-legged. The athlete will grab the ankle area of each leg and pull toward the chest to stretch the hip area of the closer leg. The angle of the upper leg relative to the torso can be changed to adjust the direction and exact area of the stretch.

We can also approach this area with the leg being stretched on the floor. The athlete will bend one knee and bring the other leg straight backward to lean forward and down over the front leg. The thigh of the front leg should be kept flat on the floor to prevent any unnecessary torque on the knee. The athlete will try to push the hips straight forward and down into the floor. This stretch can be changed by varying the position of the knee relative to the trunk. We can move the knee to the outside of the torso, or move it so the thigh crosses in front of the torso.

Finally, one of the best stretches to hit this area places the body in a similar orientation to the previous, but with the athlete standing on one leg and the bent leg up on a box or similar platform. The lower leg should be flat on the front edge of the top surface to allow the upper leg to drop down without interference during the stretch. The athlete will keep the pelvis and spine neutral and lean forward and sink down to create the stretch and either hold here or lean forward. Like the previous stretch, the positions of the leg and the rest of the body can be manipulated to improve and/or change the stretch appropriately.

Standing ITB stretch

We will also need to address the lateral leg, in particular the TFL and ITB. Excessive ITB/TFL tightness can interfere with smooth knee function and produce anything from minor pain to serious knee injury. The easiest TFL/ITB stretch is done in a standing position. The athlete will simply cross one leg in front of the other, keep the back knee straight, and lean forward at the hip (not round the lower back). The stretch will be felt along the outside of the back leg, usually all the way down to the ankle.

One that may be more effective for certain athletes can be done following lying hamstring stretches with a strap. With the same straight-legged position used in the hamstring stretch, the athlete will pull the strap across the body to pull the leg across the midline while maintaining an approximately 90 degree angle of the hip.

Shoulders & Chest

The positions of weightlifting demand considerable shoulder girdle flexibility. Most individuals are naturally internal-rotator dominant, and practices such as typical sitting posture and excessive, unbalanced bench pressing and limited upper body pulling exercises further shorten the structures and limit shoulder movement.

The most aggressive shoulder girdle stretches are the bent arm pec stretch against a doorjamb or rack and variations of hanging from a pull-up bar. The doorjamb stretch can be done with both arms simultaneously or with one arm at a time depending on what the athlete finds more effective (usually single arm). Standing in a doorway (or inside a power rack), the athlete will bend the elbow and place the


Door jamb stretch variations.

forearm vertically against the side of a doorway (or the upright of the rack) with the elbow at least a little higher than the shoulder, then push the chest forward and turn away from the arm, keeping the torso upright rather than leaning down. The athlete can also place both hands overhead against the top of the doorframe or rack at about shoulder width and push the chest through.

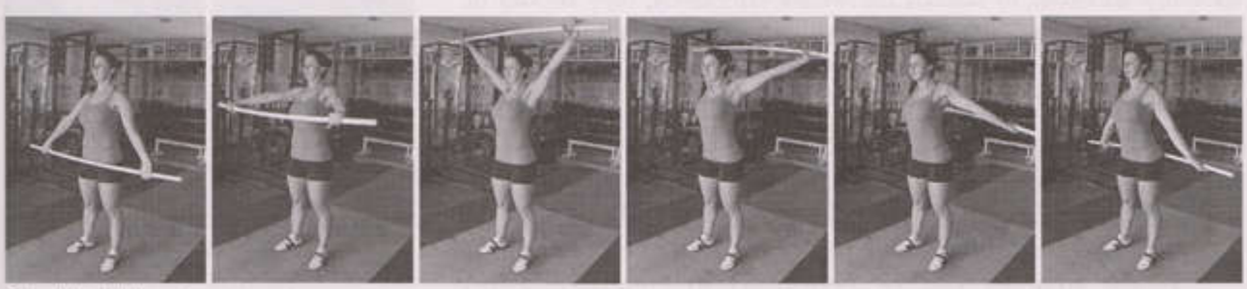
Athletes can simply hang from a pull-up bar to stretch the shoulder girdle, but some modifications to this can make it more effective. Often hanging freely will prevent a complete stretch and make it too difficult for the athlete to breath to allow longer stretches. The athlete can leave the toes in contact with the floor (or box or similar as needed for height) to give just enough support to allow more relaxation of the shoulder girdle. The feet can also be placed slightly behind the bar to allow the athlete to actually lean forward through the arms somewhat rather than hanging straight down. The grip width can be varied to change the effect of the stretch.

To get to the triceps, lats and other attachments under the shoulder, the athlete can lift one arm, bend the elbow completely and lean the underside of the upper arm near the elbow against a rack or wall and lean forward to open the shoulder. The stretch of the triceps can be increased by using the other hand to push the elbow closed farther while in the stretched position.


Tricep/Lat Stretch

The classic shoulder dislocate is a fairly effective way to stretch the anterior shoulder and chest structures through the spectrum of angles, although to be effective it does require a certain degree of existing flexibility. Taking a wide grip on a length of PVC or stretching strap, the athlete will bring the implement up over the head and to the back, retracting the shoulder blades as the arms pass overhead, and maintaining elbow extension. The grip should be placed conservatively wide initially and incrementally narrowed. In no case should the movement be painful or forced through a sticking point. Once the grip has reached its final width, the athlete can pause at the tightest place during each pass to emphasize the stretch.

Often apparent shoulder inflexibility in the overhead position is actually the result of thoracic spine immobility. Some individuals have pronounced kyphosis and limited movement, which positions the shoulders disadvantageously and makes unreasonable demands on their range of motion. This can be addressed with foam rolling (described in the following chapter) and through basic upper back stretches. The simplest is lying supine with a half foam roll or rolled towel under the upper back (perpendicular to the spine) and allowing the spine to relax over the curve.


Shoulder dislocates

Calves

The calves are comprised of the gastrocnemius, which crosses both the ankle and the knee, and the soleus, which crosses only the ankle (and the plantaris, which is generally not a concern). The soleus is the source of most problems related to weightlifting since the ankles are at their greatest flexion in the bottom of the squat and tension on the gastrocnemious is minimal due to knee flexion.

Soleus stretch (left); gastrocnemius stretch (right)

For the preferred soleus stretch, the athlete will assume the bottom position of a squat, and by leaning his or her elbow onto one knee, will attempt to flex the ankle as much as possible. It's important the foot remain flat on the floor to ensure the mid-foot isn't stretched along with the calf; lifting shoes should also be worn to make sure the arch of the foot remains intact. A similar stretch is often performed by sitting in the bottom of a squat and pressing down on a barbell lying across the thighs near the knees—this is a good stretch, but makes aggressive focus on one ankle more difficult.

If the gastrocnemius does require attention, stretching must be done with a straight knee. The athlete can place the toes against a wall with the heel on the floor and lean the body forward to flex the ankle. The heel being supported on the floor is important—hanging off an edge on the balls of the feet means the calf being stretched must help support the weight of the body and cannot relax into a legitimate stretch. Better than a wall is the upright of a power rack. This will provide the surface needed for the foot, but will also give the athlete something to hold onto and pull against as needed. If the soleus requires PNF stretching, this same wall/rack stretch can be used, but with a bent knee.

Wrists & Shoulders

The positional demands on the wrists by weightlifting are great, and inflexibility will limit performance and expose the athlete to injury. Wrist flexibility can be a constant struggle because of the large volume of flexor work from gripping a barbell. Over time, athletes will likely find themselves habitually performing wrists stretches throughout the day.

The primary issue will be the finger and wrist flexors—these will be what limit the athlete's ability to assume the clean and jerk rack positions. The remaining stretching is more for balanced mobility than direct benefit.

Wrist flexor stretches (top); wrist extensor stretches (bottom)

The wrist is comprised of a large number of small bones and deals regularly with high degrees of compression. This compression can become residual and leave the wrist in a condition of reduced mobility. In order to stretch the wrists effectively, they should be first decompressed—this will allow a fuller stretch and prevent unnecessary stress on the carpals. When initiating a flexor stretch, the hand should simply be pulled straight out from the forearm before it's extended. This pulling action should continue during the stretch, directed toward the tips of the fingers. Simply shaking the hands out as well is effective for loosening up the structures of the wrist before and after stretches.

Flexor stretches can be performed to emphasize either the finger or wrist flexors. Finger flexor flexibility will always be accompanied by the need for wrist flexor flexibility—in the clean rack position, for example, when both are in an extended position—but wrist flexibility can be necessary without accompanying need for finger flexor flexibility, such as is the case with the jerk rack position in which the wrists will be extended to a great degree while the fingers remain flexed. In order to emphasize the wrist flexors, the stretch should be performed by pressing against the palm of the hand rather than the fingers—this will ensure the fullest possible extension of the wrist. To stretch the finger flexors as well, the fingers will be pressed, bringing them and the wrist into extension. This will be the default stretch because it will hit both flexor groups, but often the fingers will limit the range of motion of the wrist somewhat, so more direct wrist flexor stretching may be necessary.

In order to promote full mobility and balance, the extensor groups should be stretched as well. This is done simply with the reverse action as the flexor stretches—pressing against the back of the hand to flex the wrist.

Flexor and extensor stretches can be performed with one hand pressing against the other (as described in the Warming Up chapter of the book), but are often easier when pressing the hand against the floor while kneeling or against a wall while standing. Different degrees of internal/external rotation of the arms can be used to change the stretch somewhat. These flexor stretches can also be done against a barbell in a squat rack (usually one hand will need to hold the bar and provide resistance while the other hand is pushed against the bar to be stretched).

For some athletes, the introduction of the hook grip will prove painful as the structures adjust to the unfamiliar demand. This can be mitigated somewhat by stretching the thumb extensors. The athlete will tuck the thumb into the palm, wrap the fingers over it into a fist, and ulnar deviate the wrist (stretch the wrist away from the thumb's origin) as described in the Warming Up chapter of the book.

For many, the shoulders will also need stretching to enter the ideal clean and jerk rack positions. In order to stretch all parts involved in this position, the position itself is ideal. Placing a bar in a rack just below shoulder height and loading it to a weight that cannot be easily lifted will provide an anchor around which to stretch. The athlete will place either a clean or jerk grip on the bar, position the body underneath, and use the legs to drive him- or herself up into the bar.

A stretch for the clean rack position can be performed similarly to that described above. Assuming the best rack position under the bar possible with one arm, the athlete will then use the free hand to push or pull the other elbow up. Once this has been done for each arm, both arms should be stretched simultaneously, the athlete attempting to elevate the elbows as high as possible under the direct control of the arms themselves. Alternatively, the athlete can enter the best possible clean rack position, and a partner can lift the elbows up.

Another helpful shoulder stretch for the rack position is one used frequently by Mike Burgener. The athlete will place the bar behind the neck with a closed grip and drive the elbows up and forward as much as possible. The width of the grip can be changed to hit the backs of the shoulders differently.

Scapular protraction stretches for both rack positions can be done simply by holding onto something immoveable with an arm held straight forward from the shoulder and leaning backward away from it.

Clean stretch (far left & second from left); Jerk stretch (third from left and fourth from left); Bar shoulder stretch (far right)

SELF-MYOFASCIAL RELEASE

Self-Myofacsial Release (SMR), commonly referred to as foam-rolling, can benefit athletes dramatically in both remediation and maintenance capacities. Its value lies primarily in economics and convenience—a $30 cylinder of foam can routinely provide much of the results of expensive manual soft tissue work and can be done with a frequency that would be impossible for actual massage.

Muscles are sheathed in connective tissue that encases the entire muscle belly continuously with the tendons, and layers within the belly surrounding both fascicles and individual muscle fibers. These fascial sheets can develop scar tissue and other irregularities that disrupt the smooth movement of the muscle internally and in relation to surrounding structures. This disruption can produce anything from chronic pain to dysfunctional movement to injury. Like deep-tissue massage, foam-rolling and similar myofascial release techniques can break up the adhesions within the connective tissue and promote improved function and a reduction in injury risk.

For most athletes foam-rolling will be painful, occasionally excruciatingly so in certain locations. However, the pain produced by the practice will abate with regular performance; pain is a clear indication of the need for foam-rolling. Once the offending adhesions have been eliminated in a given area, foam-rolling will cease to be painful, at which point its purpose will shift from correction to maintenance.

Foam rolls should be selected according to density and size. A 6-inch roll of the densest foam is generally appropriate, and will conveniently be durable. Softer rolls fail to produce adequate pressure on the muscles. That said, certain athletes may need to start with softer rolls until a reasonable degree of improvement is attained and harder rolls can be tolerated.

The basic self-myofascial release protocol is extremely simple. With the foam roll on the floor, the athlete will place the body part to be treated on top of it. He or she will begin with gentle rolls across the foam, possibly with reduced pressure from support of partial bodyweight by the arms and/or feet, making alternating passes across the length of the muscle or targeted area for around 15-30 seconds. The athlete will can stop with the roll under each particularly painful point, giving the pressure time to help release any trigger points. Short, quick rolls on these points can be used as well. Once all the hotspots have been covered individually, the athlete can finish the body part with another series of complete passes.

For some locations, a foam roll may prove unsuitable. In these cases, alternatives such as lacrosse or golf balls can be used (tools made specifically for this use are also available). With these implements, smaller points can be reached more effectively, such as in the scapular musculature, the origins of the hamstrings, or to reach more deeply into the ITBs. Tennis balls may work for light pressure applications, but are too soft to support individuals of considerable bodyweight.

If an athlete is performing static stretching following a training session, preceding it with foam-rolling will prepare the muscles to be more receptive to the flexibility work. This is also the appropriate time for more focused and aggressive rolling.

Foam rolling is also an excellent element of a warm-up and is strongly recommended. Pre-training or competition foam-rolling should not be aggressive, but should involve smooth rolls over large areas for

10-20 passes. The illustrated rolls that follow can be performed as the first part of any warm-up.

Foam rolling can be experimented with as part of an athlete's warm-up if rolling is kept comparatively light and is performed following an initial warm-up on a rower or similar. Aggressive rolling, like intense static stretching or deep-tissue massage, is not recommended pre-training or competition.

Although not actually myofascial release, weightlifters and many other athletes will find foam-rolling helpful for improving thoracic spine mobility. The upper back is often very immobile and locked into a limited range of motion with exaggerated kyphosis. This creates undue stress on the spine and can hamper shoulder mobility during overhead work.

The athlete will lie supine on the roll with the spine perpendicular to the length of the roll. Crossing the arms over the chest and loosely holding the upper back straight, the athlete will roll back and forth the length of the thoracic spine, allowing the vertebrae to release and shift slightly around the curve of the roll. The athlete will typically be met initially by audible cracking, but this will invariably be both temporary and extremely satisfying. With regular practice, cracking will decrease and generally stop entirely. This mobility work can be remarkably helpful for athletes struggling with front and overhead squatting due to forward rounding of the upper back that limits shoulder mobility.

Foam-rolling can be performed on non-training days along with any necessary static stretching, but like static stretching is best preceded by a hot bath or shower to improve the compliance of the muscles.

Thoracic Spine

Foam-rolling on the upper back can improve thoracic spine mobility. The athlete will lie with the upper back on the foam roll, with the roll perpendicular to the spine. With the arms across the chest and the back held loosely in a neutral position, the athlete will roll from the top to bottom of the upper back until it feels looser.

Thoracic spine

Quads, TFL & ITB

Rolling on the quads will need to be done from the anterior to lateral aspects. Generally the most sensitive area will be the insertion of the lateral quad above the knee or along the ITB. The end of the roll can also be placed against the origin of the rectus femoris.

Quad; TFL/Rectus Femoris; ITB

Glutes & Lateral Hip

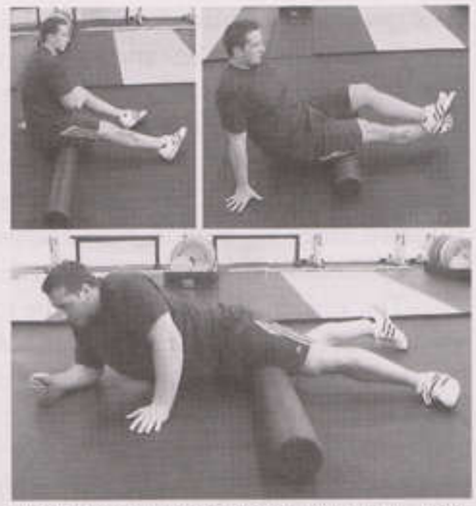
Like the quads, the glutes and lateral hip will need to be hit from a number of angles. This can be done with a straight leg on the lateral hip, particularly using the edge of the foam roller to reach deeper. The glutes can be hit well across all aspects by crossing the leg of the side to be rolled to place the ankle on the thigh of the other leg.

Glutes

Hamstrings & Adductors

The hamstrings can be best hit one at a time by crossing one leg over the other. Pressure can be reduced by keeping the free foot on the floor to support part of the bodyweight. Hamstring origins can also be hit better with the edge of the roller or with a ball.

The adductors are an awkward muscle group to hit, but will benefit greatly from work. The athlete can sit on the edge of the roller to hit the adductors near their origins, or can lie on the roller.



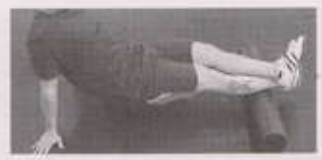
Hamstring/Adductor origins (top left); hamstrings (top right); adductors (bottom)

Calves

The soleus will tend to need more attention than the gastrocnemius. Roll at all angles all the way to the insertion of the Achilles tendon.

Lats/Teres Major & Minor

The lats, teres major and teres minor near their attachments to the arm can be painful rolling locations as they tend to receive little care but perform a great deal of work. Pressure can be reduced by leaning away from the shoulder and increased by elevating the lower body.



Calves

Chest & Anterior Shoulder

Individuals with tight shoulder girdles may find rolling on the chest and anterior shoulder helpful with improving shoulder mobility for overhead positioning.

Upper Back

The upper back musculature is prone to tight spots, particularly as it ties into the many points of the scapulae. Rolling should be done in multiple directions. Athletes may need to use lacrosse or golf balls to hit deep into small areas over the shoulder blades. The edge of the foam roller can also be used to get into more focused areas.

Upper back (left); Lats (middle); Chest (right)

COMPETITION

WEIGHTLIFTING COMPETITION

Weightlifting competition is remarkably simple in theory—the athlete snatches three times and clean & jerks three times, attempting to total as much weight as possible with the best of each lift—but the details governing how this actually occurs can be overwhelming. As with anything, knowledge will provide the athlete and coach the basic tools for the job, but only experience will allow the comfort and confidence necessary for the highest levels of success.

Weightlifting competition rules in the USA comply with the rules set forth by the International Weightlifting Federation (IWF). A free copy of the rules manuals for both the IWF and USA Weightlifting can be obtained from the organizations' websites (provided in the Resources section of the book).

The earliest stage of competition is the weigh-in. Weigh-ins are scheduled to begin two hours prior to the beginning of the weight class's session, or, in the case of some small local competitions, all athletes irrespective of weight class may weigh-in together approximately two hours prior to the start of the first session. During the weigh-in, each athlete will provide the official his or her intended opening lift weights for the snatch and clean & jerk. These may be changed later, but these numbers will be used to create the initial lineup.

If enough athletes are present, each weight class will lift in its own session. In many local meets, because there are so few lifters, weight classes may be combined, occasionally to a single class for each gender.

The snatch is performed first and the clean & jerk second. Athletes are allowed three attempts with each lift. To begin the session, the barbell is loaded to the lowest opening weight for the session stated on the weigh-in cards. With national and higher level competitions, there will be an introduction of all the athletes in the session shortly before the lifting of the session begins.

Lifters are ordered according to four figures, listed in order of priority: the attempt weight; current attempt number; increase in weight from last attempt; lot number. The lifters are ordered primarily by the weight of their attempts—that is, the bar moves continually from lowest to highest weight and the athletes make their attempts as those attempts meet with the weight on the bar. If two lifters have declared the same weight, the lifter with fewer completed attempts goes first—for example, if two lifters are attempting 120 kg, the lifter for whom it will be a first attempt goes before the lifter for whom it will be a second or third attempt. If there are two lifters on the same attempt number with the same weight, the lifter who has made the largest jump from the previous attempt will go first; for example, if the first lifter's first attempt was 110 kg and the second lifter's first attempt was 115 kg, the first lifter will take 120 kg first. Finally, in the event that all of these conditions are the same among two or more lifters, they will lift according to the order of the lot numbers assigned randomly to the lifters during registration or weigh-ins, lowest number lifting first.

The first lifter's name is announced and he or she then has one minute to begin the lift. Within the first 30 seconds, the lifter may choose to change the weight of his or her attempt. If this new weight is no longer the lowest one in the cards, and there is another lifter whose opening attempt is the weight currently on the bar, this other lifter will be called to the platform and the 1-minute clock will begin again. If the next lowest opening attempt is not the same, the bar weight will be increased accordingly, the lifter for that weight called, and the clock begun. If this new declared weight is still the lowest attempt, the clock will stop while the loaders change the weight on the bar, and will resume when they finish for the original lifter.

After completing the attempt on the platform, the athlete will declare to the officials his or her next attempt if there is one. A successful lift is not required to increase the weight of the next attempt—the athlete can declare any weight greater than their last attempt with a minimum increase of 2 kg after the first attempt and 1 kg after the second attempt. If no declared attempts exist between the lift just taken and that lifter's next declared attempt, that lifter will follow himself. In this case, he or she will be given a 2-minute clock within which the lift must be started following the loading of the bar. If the next lifter in line will be attempting the same weight, a 1-minute clock will be started for him or her after the barbell is re-adjusted on the platform. Otherwise, the lifter whose next attempt is the next highest in the cards will be called and given a 1-minute clock following the loading of the bar.

Athletes may change their declared attempt weights up to two times prior to the final call of a given attempt (within 30 seconds of first being called for a normal attempt, and within 90 seconds of being called when following him- or herself). This right to make changes is forfeited if the athlete or coach fails to make the initial declaration within the first 30 seconds, even if it is to accept the automatic 1 or 2 kg increase.

Weight changes are often used as a strategy to increase the rest time for the athlete to prepare for a heavier lift because the clock is stopped during the change. For example, following a lift at 120 kg, an athlete who intends to actually attempt 125 kg next, may declare 122 kg immediately following completion of 120 kg. Shortly after 122 kg is loaded, the athlete may change the attempt to 124 kg. Again waiting until shortly after 124 kg is loaded, the athlete may finally declare his 125 kg with his last weight change. Depending on the proficiency of the loaders at the meet, this may buy as much as a minute of additional rest time for the lifter.

Athletes can reduce the weight of their next attempt only if the desired weight is still equal to or greater than what's currently on the bar—that is, the weight on the bar can never be lowered. Practically speaking, this means the athlete can only lower a declared attempt weight well prior to being called for that attempt. Attempts can be declined and athletes can withdraw from competition. Neither decision can be reversed once the official announcement has been made.

This process of progressive loading and lifting will continue until all athletes have made three snatch attempts (unless any athletes decline to take final attempts). When all snatching is complete, the athletes are given a 10-minute break before the clean & jerk attempts begin (the time of this break varies occasionally depending on how on-schedule a meet is).

During the break, the barbell will be loaded to the first clean & jerk attempt weight. The process used for the snatch is then repeated identically for the clean & jerk. Once all attempts have been completed, each lifter's best snatch and best clean & jerk are added to produce his or her total. In national and international competition, medals are awarded for best snatch, best clean & jerk, and best total within each weight class. Generally in local meets, only the totals are considered, and awards may or may not be given.

Age Categories

Category	Age
Youth	13-17
Junior	18-20
Senior	21 & older
Master	35 & older

There are a number of age categories in weightlifting to allow more appropriately matched competition. To determine eligibility for an age category, subtract the athlete's birth year from the year of the competition (e.g. an athlete born in 1994 would be eligible for the 16-17 year-old category in the 2011 School Age National Championships (2011-1994 = 17)). The senior class is open to all athletes who are able to make any required qualifying totals for particular competitions. For example, athletes under the age of 21 or over the age of 35 may compete in the senior category if their lifts qualify them for a given meet. Youth (School age) is broken up into 13 & Under, 14-15 and 16-17 categories.

Bodyweight Categories

There are eight weight classes for men and seven for women. The weight of each class indicates the top-end limit, e.g. a 94 kg lifter may weight between 85.01-94.00 kg. The superheavyweight class (105+ for men and 75+ for women) has no upper-end limit.

Athletes are best served by training and competing at the heaviest bodyweights allowed by their classes. In the case of tying lifts or totals, the lighter athlete is given the win; however, this is not a wise strategy for competition unless useable by chance in a particular situation. Instead, the athlete should take advantage as much as possible of the allowable weight.

When registering for competition, athletes declare their weight class. If an athlete fails to make weight at the weigh-in, he or she is disqualified from competition.

WEIGHT CLASSES

MEN		WOMEN	
KG	LB	KG	LB
105+	231+	75+	165+
105	231	75	165
94	207	69	152
85	187	63	138
77	169	58	127
69	152	53	116
62	136	48	105
56	123		

Making Weight

Most athletes train close to the upper limit of their weight classes. For some, it's matter of trying to keep weight on, while others must be cautious of gaining too much weight unintentionally. Another group of athletes intentionally train considerably heavier than their competition weight, generally as a way to handle heavier loads in training. As long as an athlete does not have unusual difficulty dropping weight for competition, this is recommended. Weight surpluses should be kept reasonable to prevent unnecessarily draining weight loss for competition; depending on the weight class, generally 1-3% of bodyweight.

Typically athletes will lose some amount of weight simply as a result of increased nervous energy in the final days before the contest—sometimes as much as 3 kg—but with experience, athletes will be able to predict this weight loss accurately enough to plan for it. If an athlete expects such a weight loss, he or she should plan to approach the contest with the according excess of weight. It's also particularly important for such athletes to ensure quality sleep and adequate nutrition as a competition nears.

In the final days of the contest, the athlete's bodyweight can be closely monitored and eating and drinking can be managed accordingly. Food can be weighed if necessary, and water can be consumed with the knowledge that 16 oz weighs 1 lb or 35 oz equals 1 kg. That said, the athlete is better off arriving in these final days safely within weight so he or she is able to eat and drink as normal instead of enduring restriction, which certainly has no benefit on performance either physically or psychologically.

Whatever the reason for an unintended excess, athletes will occasionally have to drop sometimes considerable weight immediately prior to competition in order to successfully weigh in. While some athletes intentionally drop weight in such a manner in the belief that it gives them a competitive advantage, nearly all the evidence suggests this belief is unfounded in the case of weightlifting because of the proximity of the weigh-in to the contest; this differs dramatically from other sports such as boxing in which weigh-ins are commonly held as much as 24-hours prior to the event, providing the athletes adequate time to rehydrate completely and consequently to dehydrate to extreme degrees in order to make weight without detriment to performance.

It's likely a lifter will encounter a situation in which he or she will need to drop weight at the last minute at least once in his or her competitive career. Whatever the reason may be, there are a number of strategies to consider, many of which may be implemented together, and all of which rely on dehydration. Note that any water-reducing protocol is not particularly healthy, although for presently healthy individuals, it should create no problems. Athletes with health problems should avoid it, or at least consult with a physician prior to experimenting.

Sauna/Steam Room

Probably the most traditional method of dehydration weight loss is the use of a sauna or steam room to accelerate sweating. The effect of the heat can be accentuated by wearing warm clothing and/or non-breathable clothing such as plastic sweat suits that prevent the evaporation and cooling effect of sweat and consequently encourage even greater sweating. Aside from being remarkably uncomfortable, this approach to rapid weight loss can be extremely draining on the athlete both physically and psychologically. It's common for combat athletes to perform some kind of activity such as jumping rope or calisthenics while in the sauna to increase sweating even further, but this is well beyond what most weightlifters will be able to manage. In consideration of the brief time between weigh-in and competition, this method of weight loss should be limited to relatively small increments of weight that weren't able to be lost in time through less taxing methods.

Boiling

Boiling is essentially a method of mimicking the effect of the sauna when one isn't available but a bathtub is, such as in the athlete's hotel room at the competition venue. The athlete will sit in a bath of the hottest water he or she can stand, ideally wearing a towel or other warm item on the head to further increase body temperature. Once the athlete is as warm as the water will get him or her, the athlete will wrap him- or herself in towels or put on a sweat suit or similar to force as much sweating as possible as a result of the heat from the bath. This process can be repeated, re-entering a freshly-warmed bath as soon as the rate of sweating seems to start slowing. Similarly, an athlete can dress in warm clothing and run a hot shower in a closed bathroom to simulate a steam room.

Heater

Another option in the absence of either a sauna, bathtub or shower is using the heater of a home, hotel room or car in concert with warm clothing to produce sweating.

Hyperhydration

Although hyperhydration[1] is not actually a last-minute weight loss protocol, it warrants mention here because of its ability to help athletes lose water weight in a less physically taxing manner. By initially over-hydrating and then systematically reducing water intake, we can encourage the body to shed water weight without the use of forced sweating and its draining effects on energy and confidence. The water intake protocol is simple and can be adjusted slightly for the size of the athlete.

From Meet	Water Intake
5 days	5 liters
4 days	4 liters
3 days	3 liters
1 day	2 liters
Day of meet	No water

The following rehydration can be accomplished fairly quickly. It will be more effective with an isotonic solution (same salt content as body's cells) such as Pedialyte or a less expensive homemade recipe of about a half-teaspoon of salt and half-teaspoon of potassium chloride (sold commonly as a salt substitute) per liter of water. This rehydration needs to begin immediately following the weigh-in because of the brevity of the timeframe. The quantity of water needing to be replaced can be estimated according to the weight loss—again, 1 kg of lost bodyweight will need to be replaced by approximately 35 oz of water.

This protocol should be tested at least once well prior to any competition to evaluate the athlete's response in terms of weight loss, rate of rehydration, and performance following the process. Notes should be taken each day of the process that the athlete can refer to later when preparing for an actual competition to ensure he or she is on track and the predictions that have been made can be relied upon. Hyperhydration can be used to help drop the bulk of necessary weight and supplemented with one or more of the last-minute methods above to reduce their negative effects.

Weighing In

The weigh-in process will vary somewhat between small local events and larger national events. In local meets, often lifters from all weight classes will weigh in at the same time instead of weighing in within their own class. In the latter case, lifters will be called in the order of the randomly assigned lot numbers to be weighed. In the former, it will generally be a first-come, first-weighed protocol.

In either case, there will be an attempt card for each lifter. The official monitoring the scale will enter the athlete's bodyweight on the card, and the athlete will be asked to declare his or her opening snatch and clean & jerk attempt weights. Again, these weights may be changed later.

Clothing & Gear

Competitors' attire must conform to a number of rules. Athletes will be required to wear a tight-fitting singlet that covers neither the knees nor the elbows and has no collar. Additional garments such as T-shirts and lycra shorts can be worn underneath, but none of these may cover the elbows or knees. Singlets can be purchased through a number of weightlifting equipment suppliers. It's common for athletes to wear a short-sleeved T-shirt or similar garment under the singlet to provide a more secure surface for the bar during clean & jerks. Sweat on bare shoulders can cause problems with cleans that are not racked deeply enough. While the actual rules regarding footwear are quite vague, athletes should be wearing weightlifting shoes, just as they should in training. These shoes may not be taller than 130 mm from the top of the sole to the top of the shoe; there is no limit on heel elevation; no restrictions on materials; the sole may not extend horizontally from the rest of the shoe more than 5 mm at any point. Socks may be of any length, but may not cover the knees, and may not cover any illegal wraps or bandaging.

Belts of any type may be worn outside of the singlet, and cannot be more than 120 mm tall. One-piece sleeves or wraps without any reinforcement can be worn on the knees and must be less than 300 mm tall. These can touch neither the singlet at the top nor the sock at the bottom.

Wraps or tape under 100 mm wide can be worn on the wrists. Tape or plasters may be worn on the hands and fingers. These can be attached to the wrist, but may not protrude past the tips of the fingers.

Tape or bandages cannot be worn on the elbows, thighs, shins or arms, with the exception of bandages placed by meet staff to cover bleeding. Only one type of wrap is allowed per bodypart, e.g. an athlete cannot tape the wrists and wear wraps over the tape.

Nutrition

Nutrition prior to and during competition should vary as little as possible from the athlete's customary routine. The athlete's daily nutrition should already be optimal to support recovery and performance, and no last-minute changes prior to competition will produce any considerable improvements. Absolutely the worst possible idea is to experiment with unfamiliar practices during competition. Any desired protocols should be tested thoroughly long before competition to evaluate the athlete's response. The key to successful competition is maintaining as much consistency with training as possible—to minimize variables and allow the athlete to focus on nothing more than the lifts themselves.

Generally athletes will want to eat something between snatch and clean & jerk sessions. Small protein shakes and bars, deli meat, nuts and fruit are the best options, and quantities should be limited to what is necessary to prevent GI discomfort during competition.

Athletes should be conscious of water intake during a meet to ensure adequate hydration is maintained. A combination of fatigue and dehydration can make the athlete's clean & jerks remarkably difficult.

Qualifying Totals

Certain competitions require athletes to achieve certain totals to be eligible. These totals generally must be made in sanctioned competitions within a year of the meet in question—or at the meet's last occurrence—and at the same bodyweight class or lighter. In other cases, qualification will also include being chosen for a team, which may involve athlete rankings and/or finishes at more than one competition.

Pre-Contest Preparation

The athlete's activity prior to competition can have a considerable effect on performance. Essentially, we want to minimize fatigue, both physical and psychological, and maximize confidence.

Smaller local competitions can last many hours, and national and international competitions are typically spread over three or more days. Depending on the athlete's weight class, this can mean a lot of waiting either at the venue itself or in the case of longer distance travel, in a hotel. The natural desire for most will be to watch other lifting sessions, particularly if friends and teammates are competing. This should be avoided as much as possible—it's very psychologically tiring and distracts the athlete from his or her own upcoming performance. Whenever possible, the athlete should remain in his or her hotel room or in a part of the venue in which he or she can relax and focus.

Ideally the athlete is relaxed and resting, but not entirely sedentary. Some light movement throughout the day such as the dynamic range of motion exercises used to warm-up will better prepare the body for performance.

Additionally, visualization of the upcoming performance can be helpful. Such visualization should of course consist of successful lifting. The athlete should attempt to perform such visualization without getting excited—psychological arousal at this point can be tiring and detract from the athlete's performance when it matters. Visualization should be an exercise in composure, focus and confidence.

Warming Up

Warming up properly in preparation for competition attempts is considerably more complicated than warming up in the gym because of the need to time the athlete's warm-up lifts correctly. This is generally best done by planning the athlete's warm-ups according to the attempts being taken on the competition platform during the session.

We can predict approximately how much time the athlete has until his or her first attempt on the competition platform based on the number of attempts by other athletes that will occur first because we know the barbell will be loaded progressively from the lightest to heaviest attempt weights and we know that each lifter has 1 minute after being called or 2 minutes if following him- or herself.

If we want the athlete to take a warm-up lift approximately every 3 minutes, we can try to make those warm-up lifts coincide with every 3 attempts made on the competition platform. Two-minute clocks and weight changes will extend that time somewhat, particularly if there happen to be several in a row. It can disrupt the process considerably, but generally a 2-minute clock is not a concern unless it is obvious from the first evaluation of the warm-up cards that there will be athletes following themselves. As the athlete gets closer to his first competition attempt, 2-minute clocks should be taken into consideration and adjustments made to the warm-up timing.

Each athlete will have an attempt card showing his or her declared attempts, any attempt changes, and taken lifts. These will be used by the officials to order the lifters appropriately, but they'll also be used by the coach to count attempts. The cards will be arranged on the official's table in order of the athlete's next attempts—these will be checked by the coach at the start of the meet to get an initial count, and checked periodically during the session to account for any changes made.

Higher class competitions will, in addition to these cards, use computerized systems to track and display attempts. Usually there will be a screen visible to the coaches and athletes in the warm-up room that can be used instead of the actual cards, which are often located largely inaccessibly.

Counting attempts is not an exact practice—there is some degree of unpredictability involved. This unpredictability is a result primarily of the uncertainty of the amount of weight each lifter will increase after each attempt. When counting attempts, the coach must make assumptions that are occasionally incorrect. This is why the coach must continue to return to the cards during the session to recount.

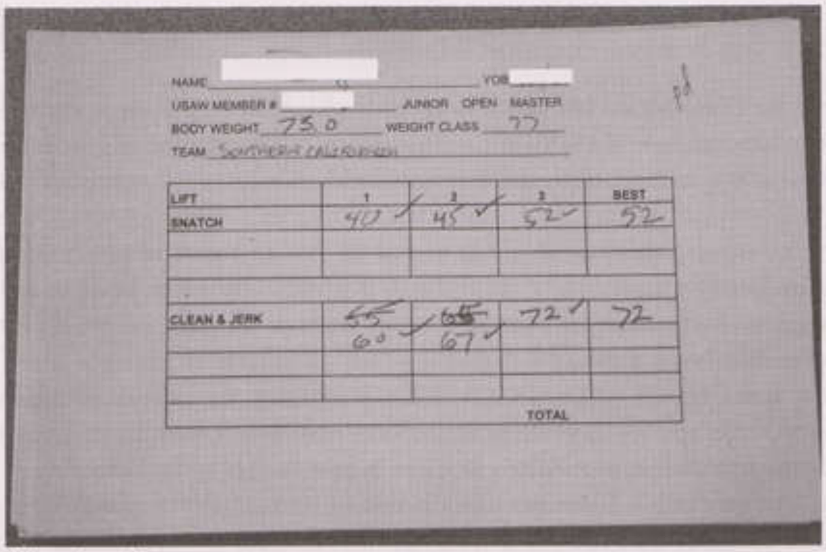
The coach can assume that lifters will likely increase 2-5 kg between snatch attempts and 4-8 kg between clean & jerk attempts and use this to make the initial count. That is, if our lifter is opening in the snatch at 100 kg and another lifter is opening at 90 kg, we can expect that lifter to take at least 2 and possibly 3 attempts before our lifter opens at 100 kg.

As the session progresses, more accurate counts can be made. The number of attempts, and therefore the chances for unexpected changes, decreases. Also, the coach can better predict other lifters' weight increases between their second and third attempts based on their performance and their jumps in weight between the first and second attempts. It should also be kept in mind that lifters will likely take smaller jumps between their second and third attempts than between their first and second.

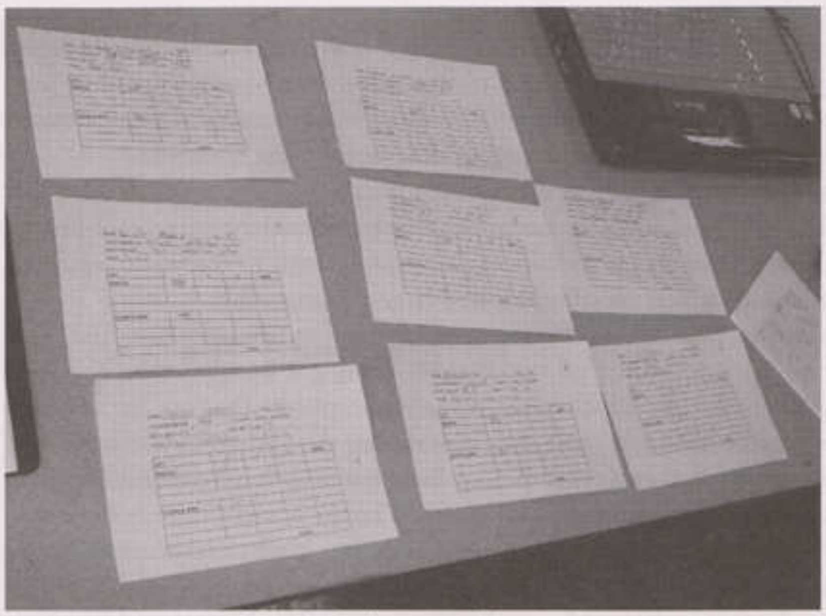
The coach can track warm-ups and attempts with simple notes during the session. Prior to the session, the coach and athlete should determine the athlete's warm-up progression, also taking into consideration a general warm-up, work with the empty bar, and even things like taping that the athlete must be sure to have done on time. With this information, the coach can create a warm-up card for the athlete.

A warm-up card to help the coach keep track of the athlete's warm-ups and the competition attempts.

This warm-up card should list the athlete's warm-up lifts in sequence as well as other procedures to be planned, and alongside each, note how many attempts out it should be performed. For example, if we want the athlete's warm-ups to be timed every three attempts, the last warm-up lift will be taken



Attempt card

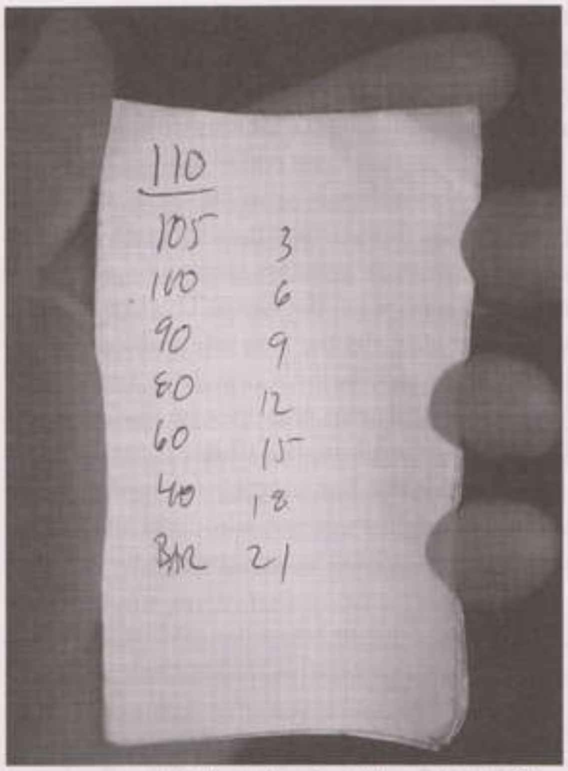

Attempt cards arranged in order during competition

3 attempts out, the second to last 6 attempts out, the third to last 9 attempts out, etc.

Other notes can be made as the session progresses to help the coach keep track, as the process can get confusing with all of the possible distractions, particularly if managing more than one athlete in a session. For example, the coach may decide to make hash marks to log completed competition attempts to help remain on schedule—this can reduce the number of times the coach has to return to the attempt cards to recount. Of course, the coach should still recount periodically to ensure no unexpected changes have occurred for which he or she hasn't accounted. This also allows more opportunities to recognize previous mistakes and adjust accordingly.

For athletes whose opening attempts place them at the very beginning of the session, there will be an insufficient number of competition attempts for the athlete's warm-ups. In this case, the warm-ups can be timed directly. For example, if our athlete will be the first lifter, we can time his or her last warm-up to occur 3 minutes before the session is supposed to start. With clean & jerks, this is a little more complicated because there will likely not be enough time between the snatch and clean & jerk sessions for the athlete's entire warm-up, so it must be started while the snatch session is still in progress, meaning the timing will need to be estimated initially and then adjusted once the session finishes and the clock starts prior to the clean & jerk session. This can also be complicated by the fact that sessions often fail to begin precisely on time.

When instructing the athlete to take a warm-up attempt, the coach should take into consideration any additional demands on time. For example, if an athlete is sharing a bar with another, the weight may need to be changed; the athlete may have to cross a large warm-up room to get chalk; and nervous athletes may find themselves needing to visit the restroom frequently during their warm-ups. Bars should be loaded for the athlete's next warm-up immediately following the previous lift, or immediately following another athlete's warm-up if necessary. Whenever possible, the coach or another assistant should load the bar to



A warm-up card to help the coach keep track of the athlete's warm-ups and the competition attempts.

allow the athlete to continue resting. The coach may instruct the athlete to get chalk one attempt before the intended attempt for the athlete's warm-up to ensure he or she can make the lift at the correct time. Any restroom visits should be made immediately following a lift to ensure they don't cut into the time needed for the next warm-up.

In some cases, whether due to changes or a mistake on the coach's part, there may be more time before the athlete's first attempt than expected and the warm-ups must be altered. In these cases, it's important to have a holding pattern planned. The athlete should have an idea of a weight he or she can lift possibility multiple times that's heavy enough to keep him or her prepared, but not so heavy that it causes too much fatigue. This holding weight can be taken one or more times to extend the warm-up as needed.

If the mistake is realized early on in the warm-up process, the athlete should remain at the current warm-up weight until the time gap is closed. That is, if the athlete has just taken 60 kg and the coach realizes there will be 6 more attempts than expected, that athlete may take 60 kg for 2 more warm-up lifts before proceeding to the next planned weight to get the warm-up progression back on schedule. If the weight is already beyond what the athlete can reasonably take more than once, the weight will need to be dropped to the holding pattern weight until the process can be resumed on schedule. Another option, more appropriate for the snatch than the clean & jerk, is for the athlete to perform only a pull with a weight closer to the opener rather than a full lift with a lighter weight.

In the opposite situation—the coach miscounting and there being fewer attempts than expected—the warm-up process will need to be shortened. How this is done may vary among athletes depending on what they're comfortable with. For example, some athletes may prefer to take a big jump between their last warm-up and their opener, while others may prefer to take a big jump between their second to last and last warm-up lifts and a smaller jump between their last warm-up and opener. If there is enough time, the athlete may be able to take the planned warm-up lifts but at shorter intervals, such as every 2 attempts instead of 3.

Competition Attempts

Prior to competition, athletes should be familiar with the technical rules of weightlifting with respect to the performance of the lifts, and should know what to expect on the competition platform.

There will be three officials judging each lift—one directly in front of the platform and one to either side at an oblique angle. Following each lift, these officials will provide their decisions regarding the lifts—either passing or not. With light systems, a white light indicates the judge has declared a good lift, and red indicates a no-lift. At smaller local meets, the judges may have red and white flags or similar, or may even simply use a thumbs-up/thumbs-down system. With light systems, once all three officials have declared their decisions, a light and buzzer will instruct the athlete he or she can now drop the weight.

Otherwise, the center judge will give a down signal manually and audibly. The down signal will not be given until the lifter has returned to the final standing position and has the weight under control. If the weight is dropped before the officials give the down signal, even if the athlete appears to have had the weight under control, the lift is not counted. When dropped, the athlete must maintain contact with the bar until it passes the waist.

The snatch and clean & jerk are considered complete when the athlete is standing erect with both feet next to each other in an orientation parallel with the bar—that is, they cannot be staggered. No part of the body other than the feet may touch the platform at any time, such as knees during a split or the glutes during a squat. The arms may not touch the legs during the receipt of the clean. The bar must be jerked from the position in which it was received in the clean—that is, if the bar was received low on the chest, it cannot be adjusted up onto the shoulders for the jerk. There may be only one drive attempt for the jerk—the athlete can bounce the bar in order to adjust the hands and arms, but once he or she begins to dip for a jerk attempt, it cannot be aborted and repeated. Following the clean, the athlete cannot initiate the jerk until any oscillation of the bar stops. With the snatch and jerk, the bar must be received with the elbows locked, and they must remain locked until the lift is completed. For athletes who have anatomical conditions preventing the full lockout of the elbows, this condition must be demonstrated to the officials prior to the athlete lifting.

Athletes should be prepared to lift with the center judge likely directly in his or her eyeline. As much as possible, the athlete should look over the official's head, or if necessary, at his or her chest, to avoid distracting eye contact.

Judges are not perfect and their decisions may not be consistent from lifter to lifter and session to session. At times mistakes may be in the lifter's favor, and at other times, they won't be. In larger competitions, a jury of officials can overturn the judge's decisions when necessary, but overturned decisions are also not always in the athlete's favor. Knowing that judges are capable of missing technical mistakes, the athlete should never indicate that he or she is aware an error has been made and complete the lift as if it is successful until told otherwise. For example, an athlete may feel a slight pressout with the elbow, but this may not be seen by the judges (and often what feels like a failing pressout is actually minimal enough movement to be passable). If the athlete in some manner indicates knowledge of the error, it's more likely the judges will notice it and call a no-lift. In short, the athlete should assume the lift is good until the officials indicate otherwise.

Determining Attempt Weights

Decisions will need to be made by the athlete and coach regarding the weights the athlete will take for each attempt. Opening weights can be chosen well prior to a meet, and adjusted if necessary during the warm-up process. Generally, openers should be lifts with which the athlete is wholly confident—a successful opening attempt will ensure the lifter makes a total, and will provide confidence for the subsequent attempts; missed openers can be devastating psychologically and often prevent athletes from successfully making subsequent lifts even well within their physical abilities.

The second and third attempt weights will be determined according to the athlete's performance on the preceding lifts and competition strategy. Generally, of course, the goal is to increase as much as is believed possible in order to make the heaviest lift possible; how easily the athlete made the previous lift will be the best indicator of what weight can be expected to be made next. However, at times the athlete and coach may decide to take smaller jumps to ensure a win over a competitor. For example, in a situation in which an athlete is 1 kg behind a competitor who has no further attempts, that athlete may decide to increase only 2 kg even if he or she feels more is possible to make a successful lift and consequently a win more likely. This is particularly important in team competition—athletes should make attempts based on earning necessary team points rather than individual goals.

As was mentioned previously, changes can be made to attempt weights. When declaring opening attempts during the weigh-in, it's wise to declare weights slightly lower than intended if an athlete has been inconsistent or unexpectedly fatigued leading up to the meet. These can be increased later if determined appropriate, but will allow the athlete some security in case his warm-ups indicate he or she is not performing as well as hoped.

In cases in which the coach or athlete wants to allow more time for the athlete to recover between attempts, a lower weight than actually wanted can be declared. Once the athlete is called for the attempt, two changes to the weight can be made before the final 30 seconds. Because the clock is stopped while the loaders change the weight on the bar, this buys some time for the athlete. This is primarily used in cases in which the athlete must follow him- or herself and receives a 2-minute clock between lifts; making attempt changes may add as much as a minute to this time for the athlete to recover.

Strategies for competition lifts vary among coaches and athletes. Many use competitions as an opportunity to make personal records, as this is generally the most appropriate time—the athlete is recovered and prepared specifically for lifting maximal weights, and will be under the influence of the greatest possible levels of physiological and psychological excitement. Exceptions, of course, are athletes who are not particularly good at dealing with pressure and tend to actually perform worse in meets.

Other coaches and athletes have a very different perspective on competition attempts. This group prefers to make records in the gym, and make lifts in competition. That is, the competition is viewed as a time to make as many successful lifts as possible; in order to ensure high success rates, competition attempts do not exceed the athlete's best lifts in the gym. While this certainly improves the number of successful attempts a lifter is likely to have in competition, it also limits the potential maximal weights.

Which strategy is used is entirely up to the coach and athlete, and may change depending on the circumstances of each competition.

1 This trick comes from Robb Wolf

RESOURCES

More information on weightlifting, including articles and videos, can be found on the Catalyst Athletics website:

www.cathletics.com

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