Teaching Techniques #3:

The Back Squat

1. When instructing proper exercise technique for the back squat weight training exercise, list some of the common technique errors observed in the beginning lifter.

Kelso: A) Not obtaining a parallel position of the femur to the ground at the mid-range phase of the exercise.
B) Allowing the heels to raise off the ground as the trainee nears the mid-range phase. This places too much weight on the balls of the feet and extreme pressure on the knee joint.
C) Too much forward lean of the torso. Some forward lean will naturally occur due to the compensation for the shifting center of gravity of the combined barbell-trainee mass during the descent of the lift. Too much forward lean places the weight over the balls of the feet, not over the desired base of support (ball to heel).
D) Initiating the upward movement from the mid-range phase by increasing the angle of the back to the vertical. This occurs when the knee and hip joints extend, but the shoulder joint remains low. In such a case, the movement tends to be more of a good morning exercise.

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Thomas Helton is the head strength and conditioning coach at the University of Florida in Gainesville. Throughout his career, he has coached and recruited at the NCAA Division I level.

Barnes: Technique errors I have noticed include:
1. Feet either too narrow or too wide
2. Head tilted back with eyes looking at the ceiling when beginning the lift (Head should be in normal position with eyes straight ahead)
3. Failure to maintain tight torso throughout the lift
4. Excessive rounding of the back
5. Excessive upper torso lean

John Gumble is the strength and conditioning coach at the University of Virginia in Charlottesville. In 1985, Barnes earned NSCA Strength and Conditioning Coach of the Year.

Nancy Gumble is the director of player development at Georgia Tech University. She also serves as the NSCA state director for Georgia. Pamela has earned many powerlifting honors during her time as a lifter.

Barnes: For correct movement:
6. Failure to control the rate of descent
7. Lack of acceleration out of the bottom position
8. Bouncing at the bottom position
9. Coming out of the bottom position with the hips going up and out first
10. Failure to sit into the lift (Common error is to lead with the knees rather than the buttocks)
11. Failure to keep the knees in line

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over the middle of the toes
12. Lack of hip-ankle flexibility
13. Pulling the knees back too quickly during the upward movement
14. Failure to lead with the chest and thrusting the head back during the upward movement
15. Knees going inward during the upward movement of the bar

Coach’s Checklist

The Back Squat

The Start
1. The bar is evenly loaded with collars
2. Height of the bar on the rack is approximately at mid-chest
3. Hands are placed evenly on the bar using a slightly wider than shoulder width grip with thumbs around the bar
4. Step under the bar with both feet
5. Place upper back in center of the bar, bar rests across posterior deltoids and the middle of the trapezius
6. Chest is held up and out, shoulder blades are pulled together
7. Straighten both legs to lift bar off the rack; take one step back
8. Position feet approximately shoulder width or wider apart with toes pointed slightly out
9. Feet remain flat on floor throughout the motion
10. Head faces straight forward throughout the motion
11. Torso is held straight and rigid throughout the exercise

The Descent
12. Start descent by slightly bending forward at the hips first, then bending the knees
13. Weight is over the middle of the foot or the heels, not over the toes
14. As knees bend they stay over the ankles
15. Descend slowly (45 degrees/second) until tops of thighs are parallel to the floor
16. Push the bar up to the starting position

The Ascent
17. The ascent should be done rapidly but under control
18. Keep hips under the bar as much as possible
19. Do not shift knees toward one another
20. Use a smooth motion; do not “jam” or accelerate the bar at the top of the motion
21. Step back to the rack taking small steps with both feet after lift is completed

The Squat
22. “Sit back” in the down phase (do not shift forward)
23. Do not bounce at the bottom
24. Inhale at the top before lowering the bar, hold your breath during the lowering phase, and slowly exhale while lifting the bar to the starting position

Avoid
25. Hips too far forward—results in torso too upright
26. Rounding of back
27. Bouncing at bottom position
28. Excessive forward lean at waist
29. Pulling knees together

Gamble: Based on my experience of teaching the squat, some of the most common flaws are:
1) Bar placement—too high on the trapezius which could pull the athlete forward (The bar should be within a range of two inches from the top of the posterior deltoid)
2) Hand position too wide causes the athlete to lose control of the bar. The hands should be slightly wider than shoulder width.
3) Rounding of the back instead of keeping the back flat
4) Knees too far over the toes, which causes the body weight to shift to the front of the feet. This is one reason why we have the myth of squats hurting your knees.
5) Stance too wide or too close and toes pointing straight (Feet should be slightly wider than shoulder width)
6) When the lifter descends into the squat, the beginner tends to raise his/her heels in the bottom position and/or knees come together. The lifter should keep body weight from instep to heel throughout the exercise.
7) Looking at the floor while in the act of squatting

Hill: A few of the most common technique errors observed in the beginning lifter when learning to squat are:
1. Uneven grip on the bar
2. Lifting the weight off the rack with the back instead of positioning the feet under the bar so the lift-off is with the legs
3. Feet positioned too wide or too narrow
4. Not squatting deeply enough
5. Rounded back
6. Improper head position
7. Relaxed abdomen
8. Moving out of the bottom position of the squat with the hips moving first, instead of the hips and shoulders moving together
9. Letting the weight shift forward to the toes instead of keeping the weight over the full foot
10. Improper breathing technique (deep breath before starting down, exhaling on the way up)
11. Racking the weight using the lower back, instead of walking back into the rack

Pasanella: The barbell squat is a complex coordinated total body movement. Proper technique is essential if the exercise is to be performed safely and result in the maximum benefit of the lift.

We perform two varieties of the squat, the olympic squat (high bar position, narrow base squat) and our main lift, the power squat (low bar, wide base squat). In setting up the lift we look for the specific bar position and the foot placement unique to each type of squat. In the case of the olympic style squat we look for bar placement on the back to be high, resting on the trapezius. Foot placement should be approximately shoulder width apart, toes straight ahead or flared slightly. Weight should be distributed toward the heels. In the power squat, the bar should rest lower on the back on the posterior deltoids. Foot placement is wider than shoulder width, with specific width based on comfort and technique; again weight is distributed toward the heels. The variation in foot placement and bar position adds variety by emphasizing specific muscle groups. Olympic style emphasizes quad work while the power squat emphasizes glute and hamstring work.

While foot placement and bar position are different for both lifts, specific technique considerations and common errors are very similar. Upon setting up with the bar, the lifter must hold a tight erect position. The beginning lifter will often lean over at the waist or round the back. This error is usually caused by either improper bar placement or specific lack of strength in the supportive musculature of the torso (abdominals or erector spinae group).

During the squat itself, it is important that the bar is always positioned directly over the instep of the foot. This ensures that the center of gravity of the bar remains squarely over its base of support. This is important to note, as this is where we see the most errors among beginning lifters during the eccentric and concentric phases of the lift.

The eccentric (lowering) phase of the lift is initiated by shifting the hips and back, placing more weight on the heels. The “breaking of the hips” first allows the shins to remain in an upright position, minimizing the forward shifting of the shins. When the shins shift forward, it forces the center of gravity of the lifter forward on the balls of his feet causing the heels to come up and forcing the shoulders forward, placing the athlete in an inappropriate position to effectively lift the weight.

As we progress through the eccentric phase of the lift, another problem we see with beginning lifters is a too rapid descent with a bounce at the bottom of the lift. A rapid descent such as this can create many technique problems and can be dangerous. The lifter will get out of position with the shoulders going forward and the hips rising too fast out of the bottom. We stress to our athletes the importance of controlling the lowering of the bar by telling them to flex the hips and quads as they lower the bar, effectively squatting or lifting the bar down into the full squat position. We also emphasize to our athletes that by lowering the bar in this manner we are enhancing our strength development by stressing the eccentric contraction of the muscle.

Throughout the squat we stress that the athlete maintain an erect torso with an arched back. During the switch to the concentric phase of the lift, this becomes essential to the successful completion of the lift. We most often see a problem with this
during the ascent. Often the younger lifter will either round his back or will extend too rapidly with his knees. Both of these problems are again caused by either improper technique or a lack of torso strength. As stated earlier, this problem can start in the eccentric phase, with a too rapid descent, or it can occur when the lifter fails to keep his shoulders back and does not drive his hips through while extending the knees. The lift should be explosive out of the bottom, driving with the legs. The lifter should finish the lift by decelerating slightly at the last few inches before lockout, allowing the bar to remain stable on his back.

2. Are there any special safety and/or spotting considerations for the beginning lifter learning the back squat weight training exercise?

Barnes: Safety considerations I employ include:
1. Beginner must use light weights until the technique skills of the lift have been sufficiently mastered
2. Use of power racks (Beginner can now feel confident so that total concentration can be given to the proper technique)
3. Safety check of bar and rack before beginning lift
4. Use of collars, thereby preventing any shifting of the weights
5. Use of lifting belt
6. Everyone who lifts is always required to be dressed properly, i.e. shirt, shoes, socks.
7. Use of lifting chalk on the hands, bar and back of the shirt where the bar rests
8. Appropriate number of spotters in place and alert
9. Spotters should be aware of the proper training gear (i.e., shoes with solid sole, lifting belt, knee wraps when necessary, etc.).
10. Lifter should face rack so he/she can back out to begin the lift and walk forward to re-rack the bar.
11. Adequate instruction and supervision
12. Proper warm-up and stretching routine

Gamble: Yes, in teaching the squat, safety considerations should be of primary concern to the coach or instructor.
1) Be sure that the athlete has the

Hill: The beginning lifter should take into consideration the following safety and spotting tips:
1. Use a power rack with adjustable spotter pins or a step down squat rack whenever possible.
2. Start with light weight until technique is perfected.
3. Do not attempt maximum weights until technique is perfected, and use at least three spotters, one behind and one on each side of the bar.

Pasanella: The beginning squatter should be instructed to concentrate on correct technique. Such a technique prioritization requires a relatively lighter weight than one would utilize if the individual were in a strength development phase. However, proper spotting methods should always be used. The onset of fatigue may be unpredictable with the beginner.

When spotting the squat exercise, two side spotters will always be more efficient than one spotter acting from the rear. Spotters should be instructed to help the guide the bar back into the rack and not pick it up unless the athlete requires assistance. One side spotter aiding the other alone
may actually cause a serious back or hip injury; therefore, side spotters must be, at all times, in communication and act in unison. A rear spotter should provide assistance by reaching around the athlete and applying pressure at the chest. When the athlete cannot complete the lift, the spotter should lift the athlete straight up while stabilizing body position. Spotting an athlete at the waist may cause the lifter to bend over and possibly injure the lower back area.

**Kelso:** Yes. To minimize major technique faults in the learning stage, the beginner should use a very light resistance until the skill is mastered to the best of his/her ability.

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**Barnes:** I require the following basic skills:
1. Athlete should have proper flexibility program (emphasis on knee, ankle, hip and lower back flexibility).
2. Athlete should work assistance exercises such as:
   a. Leg extensions
   b. Leg curls
   c. Hyperextensions
   d. Calf raises
3. Athletes can begin the back squat in their workout immediately, as long as the emphasis is on proper technique through a full range of motion rather than the amount of weight lifted.

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3. Are there any prerequisite strength or skill requirements before the beginning lifter should include the back squat in his/her work out?

**Gamble:** Any athlete that I teach the squat to will participate in an extensive flexibility program to be sure the athlete can adapt to the training, muscle soreness, and go through the full range of motion.

The athlete will go through technique for at least three weeks to assure me that the athlete has developed adequate technique.

**Hill:** The only prerequisites I would recommend a beginner have before he/she includes the squat in their workout would be to learn the proper technique of the exercise and start with light weights.

**Pasanella:** Any athlete can include the squat exercise. It is important to note the similarity between the barbell squat and the knee bend advised as a proper movement of the President’s Council on Physical Fitness. The utilization of proper resistance levels should be limited by the athlete’s technique level, and not just the athlete’s strength level.

**Kelso:** Not necessarily. As long as the trainee learns proper execution of the back squat with a light resistance and increases the resistance gradually within the confines of proper technique, its use will be justified.

Some athletes, however, may not be suited for this exercise. Those endowed with unfavorable leverages (i.e. long legs and short torso or extreme stature in general) may have difficulty achieving a parallel position at the mid-range position which is necessary for maximum benefits of the exercise. In such cases, trainees would be better off using a leg press apparatus which would provide a full range of movement with less difficulty.

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4. Are there any particular instructional methods you have found helpful when teaching the back squat to your athletes?

**Hill:** When teaching the squat to athletes who have never performed this exercise before, we start with just the bar; teaching the proper grip, stance, head position, trunk position, breathing and depth; performing five repetitions per set gradually increasing weight until an approximately 5 RM is determined.

The only special technique I use when teaching the squat to athletes who are experiencing difficulties with balance or depth would be to use a wooden stick in place of the bar and
have the athlete assume his/her squat stance, close their eyes and perform several reps. This forces them to concentrate on balance and spatial awareness.

**Pasanello:** From a mechanical and motivational standpoint there are several techniques which we utilize, including:

1. Before the athlete even steps under the bar, he will perform one set of body weight squats emphasizing each phase of the lift.
2. After breaking at the hips, in many instances, an individual might experience difficulty keeping weight on the heels after the backward shift of hips. If this occurs (depending upon the individual) the athlete will be instructed to lift the toes as he descends. Pressure can also be applied to the back of the heels of the athlete by the coach. This technique allows the lifter to identify with the specific areas to push with.
3. Occasionally an athlete will be touched by the coach in specific areas, allowing him to identify with the specific muscles emphasized during certain phases of the lift.
4. When an athlete is having a problem sitting back, the use of the safety squat bar can be helpful. The safety squat bar (when used correctly) can assist in teaching the rear hip position by supporting the athlete through the squat movement.

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**Kelso:** Yes. One thing I have found which gets the trainee in the proper “groove” of the exercise is to initiate the descent, first by movement at the hip, then at the knee. At the start of the exercise when the knee is fully extended, instruct the trainee to push the buttocks backward by a slight flexion of the hip joint while maintaining an upright, or near upright, torso. This will place the barbell/trainee center of gravity in a position over the whole base of support (balls of feet to heels) and allow it to be maintained more easily over the base during the descent. Initiating the descent by flexing the knees first causes the center of gravity to go forward over the base (onto balls of feet) and the trainee must then concentrate more on maintaining balance rather than on muscle stimulation. This would tend to be counterproductive.

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**Barnes:** Teaching of skills should be the “whole-part-whole” teaching method. The steps are as follows:

1. Show the whole movement at normal speed. (This should include each detail from addressing the bar to the re-racking of the bar).
2. Show the parts explaining each detail step by step.
3. Show the whole movement again.
4. Demonstrate the parts again with less explanation.
5. Show the whole movement again.
6. The athlete does the movement part by part. (Use the empty bar or light weight).
7. The athlete does the whole movement slowly.
8. The athlete does the parts, more quickly, step by step.
9. The whole movement is done at normal speed.

I also recommend that you have visual pictures of each step posted in your weightroom. Use older, more experienced lifters as teaching models and develop appropriate ter-

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“As long as the trainee learns proper execution of the back squat with a light resistance and increases the resistance gradually...its use will be justified.”

—Thomas Kelso

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*Use video both for technique modeling, in which the athlete observes proper technique by another person, and for feedback, as an individual observes himself performing the specific movement.*

—Dave Pasanello
5. Do you use any audio-visual aids or special equipment to assist in teaching your athletes how to perform the back squat?

Barnes: We use videotape showing proper technique, slide film showing technique step by step and posters describing technique as well as the particular muscle groups exercised by the lift. Power racks, lifting belts and chalk are also used.

Pasanello: Video equipment is used and is very beneficial in assisting the athlete's technical development. There are two different ways to utilize video for training technique. One is technique modeling, in which the athlete observes on video proper technique demonstrations by another individual, and the second is feedback as an individual observes himself performing the specific movement. The videotape of the athlete is broken down and evaluated by the coach in the presence of the athlete.
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