

# Weight lifting technique: Observations and coaching practice

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I am not sure how many members of the UKSCA read Brian Hamill's weightlifting newsletter. I would suggest that this is a worthwhile, as it contains many interesting snippets of information and opportunities to stimulate discussion amongst coaches. For example, in the latest edition (Bulletin 10), I particularly enjoyed the following extract:

"If you think what sprinters must do the point is clear. With a foot contact time of 0.1-0.2s he must push up to 5 times his own body weight. He needs great force capacity (strength) and a high rate of force development, neither of which come from open kinetic chain machines or high rep medium to low weight routines" (P.5)

Previous papers<sup>4,14</sup> have illustrated the importance of multi-joint, multi-muscle lifting actions that replicate the biomechanical demands of sports specific movements.<sup>1</sup> This includes replication of joint ranges of movement (strength gain is specific to the angle at which training occurs<sup>7</sup>: incorporation of co-ordinated (simultaneous) triple extensions of the ankle, knee & hip,<sup>2,3,11,12</sup> countermovements & very explosive actions.<sup>17,18</sup> Weight lifting is also a medium that allows all of these factors to be progressively overloaded in an easily controlled manner in a skilled individual, through the addition of more weight to the bar whilst maintaining the velocity of the movement being performed.<sup>10</sup>

Brian's newsletter also refers to watching a strength coach working with a sprinter on the clean. The commentary refers to the fact that every demonstration included the double knee bend, but none included the hip thrust, with a consequence that the bar stopped at mid-pull (mid-thigh), went down, and then came up again.

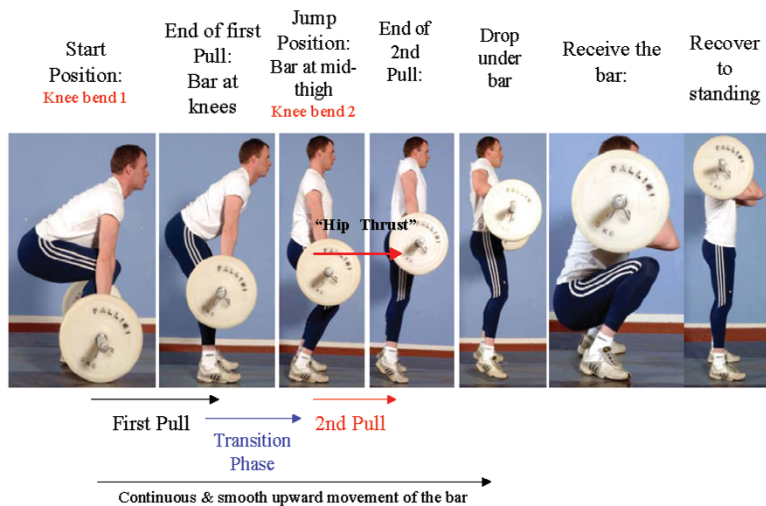
The purpose of this article is to try and articulate, as we do on the UKSCA weight lifting courses, that this is not the correct way to perform a lift, and not a practice that is the consequence of an appropriately developed technique progression, such as would be endorsed by the UKSCA. Prompted by Brian's newsletter, I have written this discussion piece to look at firstly what the correct positions of the bar are at each stage of the lift, and, more importantly, how a coach can put together teaching sequences that facilitate these positions as part of a natural movement within an athlete (with a sign-posting to a video-based resource that can be accessed for free). The end result should be that, when the full technique is displayed, the bar should move up the front of the body in "one clean movement", and there should be no loss in upward movement during this process. There will be a change in bar velocity at different stages of the upward movement,<sup>15</sup> but it is a continuing upward movement none-the-less.

Before I progress to look at the different stages of the upward movement, can I also say that, whilst agreeing that the coaching demonstrations were not technically correct, we need to realise that there was no context upon the newsletters' authors observations of the coaching practice. I am heartened to hear that people are working with sprinters of different levels on free weight lifting techniques (as opposed to the some of the more traditional methods, such as circuit training or



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**Figure 1. The clean lifting sequence**



done by completing the first pull appropriately<sup>9</sup>: through the jump position (where the bar brushes against the thigh as the lifter performs the hip thrust movement) creates a stretch-reflex in the knee extensor muscles.<sup>6</sup> The need to incorporate speed-strength exercises, and to perform these at high velocities has been well documented for power-based sports.<sup>14</sup> Similarly, when considering pre-habilitation of injuries, we need to ensure that the neuromuscular system is adequately trained to

those referred to in the above quote), and also, we need to consider the amount of coaching experience that the observed coach has: Nobody gets to become good without gaining experiential learning on the way, and that means not being afraid to make mistakes on the way, and trying things to develop your own coaching methods, and individualise these to each athlete, as no 2 athletes will have the same pattern of technical execution!

Being receptive to feedback about your coaching practices is part of this process. Therefore, as part of the coaching role, I would encourage experienced practitioners to ask some questions that enable coaches to think about the practices that they are delivering. Effective questioning is a vital tool that enables levels of awareness to be raised from “unconscious incompetence” (I don’t know what I am doing wrong) to conscious incompetence (I know what I am doing wrong), and this can form the basis for action planning to enable the coach to become consciously competent (I know that what I am doing is right – or within the boundaries of technical competence). I would hope therefore that, within the UKSCA, we become confident in speaking to other coaches at the end of the session and asking questions of the coach about what they were trying to achieve. I hasten to add that this should be done in a supportive & non-threatening manner, and not in front of the athlete, but it should stimulate some interesting dialogue, and hopefully some learning scenarios, that enable coaching practices to progress towards more acceptable technical deliveries.

So what are the correct technical positions for the lift described, and how can we develop these in our athletes? Firstly, let us look at the positions of the body and bar that should be achieved as the bar moves up the body in a clean or snatch lift (Figure 1).

These stages of the lift are crucial, as moving through a transition phase (which can only be

tolerate the imposed strains during functional tasks.<sup>1</sup> Most explosive movements in sport (such as running kicking or throwing) involve the reflex/elastic properties of the muscle-tendon complex and are ballistic in nature, even when initiated from a static position. For more information on the stretch-reflex, the reader is directed to Siff.<sup>13</sup>

Training for maximum strength will not train these elastic properties within a muscle, therefore training for sports should not only encourage the inclusion of such stretch-shortening (plyometric) methods, but it should also incorporate stretch-shortening cycles into training movements as much as possible to enable the athlete to produce maximal forces in training movements. The amortisation or reactive phases of the stretch-shortening cycle (the transition phase between eccentric lengthening and concentric shortening) should be as short / rapid as possible (hence the movement through the first pull, transition and jump phases of the lift is a smooth and continuous process): Indeed, the rules of competitive weightlifting were changed in 1964 to allow the bar to come into contact with the athlete’s thighs. This occurred as a result of coaches and athletes realising that heavier weights could be lifted by taking advantage of the double knee bend movement. Since this rule change, 99% of the first 5 places that have been achieved at international competition have been won using a DKB technique.<sup>16</sup>

Over time, many coaches have observed that the transition phase (or double knee bend – see Figure 1 – however it is termed) “just happens” in experienced lifters. However, it would seem logical for a coach to be able to make a particular skill execution happen in all athletes from the initial phases of skill learning, rather than waiting for an athlete to stumble upon the technique as an accidental phenomenon.<sup>4</sup> Put another way, given the fact that the major training benefits of the snatch and clean cannot be gained by an

athlete who is not experiencing the stretch-shortening cycle of the transition phase, it can be argued that the coach who is not using techniques to make this happen is doing his / her athlete a dis-service: Therefore the way the coach teaches the athlete to perform these pulling movements in training should lead to the correct execution of the lift. However, this doesn't mean that the most appropriate manner (realising of course that the "most appropriate manner" is specific to the needs of the individual athlete) in which to coach this is to start with the bar on the floor and coach the lift in sequence.

Indeed, Mike Stone and I<sup>5</sup> published an internet paper with video clips suggesting a backward sequencing approach to coaching athletes so that they learn the positions of the lift whilst performing specific drills and activities that are great training exercises in their own right. This paper (which charts a learning progression with a novice athlete) and videos are freely available to readers at the following address:  
[http://www.coachesinfo.com/category/strength\\_and\\_conditioning](http://www.coachesinfo.com/category/strength_and_conditioning)

As presented by Internationally respected (and UKSCA accredited) colleagues from the USA, both Mike Stone (UKSCA Conference, 2005) and Kyle Pierce (UKSCA conference, 2006), it has long been recognised that often the best starting point for teaching both the snatch and clean lifts is the end phases of the lift, i.e. the front squat and overhead squat respectively, that can then be progressed to more specific and high velocity exercises such as the drop-snatch. This paper looks at sequences that might follow these stages, in relation to getting the bar up the front of the body.

#### *Drill 1: 2nd pull from thigh:*

Anecdotally speaking, I would suggest that the pull exercise (from the floor, knees or thigh) is one of the most undervalued and utilised in coaches programmes, and one which has many values in its own right. This movement allows the athlete to develop vertical power without the technical complexity and physical demands of the catch.

The athlete begins in the jump position, with knees bent to between 130-140o, and trunk vertical. To identify what will be the ideal position for individual, have them perform a couple of maximal counter-movement vertical jumps, and then hold the bottom position. This will give them an indication of the end point of the transition phase (the "jump" position).

This movement can also be made from boxes set at a height that puts the athlete into the jump position to initiate the movement (Figure 2). This has several advantages:

- It ensures that the athlete experiences a consistent jump position at the start of every lift: This replication aids the motor learning of the position.

- The boxes prevent the novice athlete moving downwards from the start position in an attempt to put in another counter-movement to potentiate more vertical force.

The boxes allow the athlete to rest between repetitions without strain on the novice athletes grip or legs.

These supports need to be sturdy and able to cope with the mass of the bar landing upon them. However, as Figure 2 shows, when doing technique work, these boxes can be built up from more temporary platforms. It is essential that the height of the platform be set at the correct height for the athlete to begin the lift in the jump position: This is determined by the height of the athlete. In the first few months of lifting, our<sup>5</sup> experience tells us that the athlete should perform the majority of his / her pulling movements from this position, to ensure mastery of this stage of the lift.

Holding the bar in either the snatch or the clean grip, the athlete accelerates vertically into the triple extension position (Figure 3) followed by a violent shrug.

#### *Drill 2: Jump, Shrug, throw:*

This is a progression of drill 1: The purpose of the drill is to reinforce in the athlete the importance of the pulling movements (jump and shrug sequences) by getting the athlete to perform 2 consecutive pulls followed by a third movement which sees the completion of the snatch (or clean) lift from the high hang (jump) position. The idea is that the athlete will do nothing different in the pulling sequence of the 3rd stage of the lift (the "throw" stage) from the first 2 stages: However, the coach should watch out for cognitive intrusions relating to how to throw the bar interfering with the athletes movements at this stage. Coaching cues such as "shrug & Jump", "Shrug & Jump", "shrug, jump, THROW" may help the athlete focus away from thinking in depth about the movement patterns associated with the pull and catch stages of the lift.

This drill should also be performed from boxes as part of the lifting technique development. It can also be progressed by lessening the number of

**Figure 2. The jump position from boxes (Snatch grip)**



pulling movements that are performed prior to the completion of the hang clean/ snatch.

*Drill 3: Shrug & Jump to hang position:*

This drill is a progression from drill 2, designed to familiarise the athlete with the bar position at the knees (See Figure 1), and be comfortable moving through the transition phase, from beginning to end point, without having to link the transition and pulling phases.

*Drill 4: Pull from knees:*

The key positions to focus the athlete on feeling by holding them are: Bar at the knees (Start position), End of transition phase (Jump position), top of the Jump & shrug movement.

As Figure 5 illustrates, boxes set at the appropriate height for the individual provide a good starting point for this drill:

*Drill 5: Pull from knees into snatch:*

This drill is about 2 repetitions: A pull movement (knees forward, jump and shrug), followed by a snatch from the knees. The athlete uses the high pull movement to reinforce sequentially the stages of the pull, and uses this to potentiate for the snatch. The coach should emphasise that the athlete should not change the pulling movements between the pull and the full lift: the pull needs to be completed before the athlete moves into the position to catch the bar: An incomplete pull is often the reason why an athlete is not able to execute the catch properly in heavy lifting movements.

*Drill 6: Reverse to floor:*

This drill enables the athlete to further develop the proprioceptive awareness of each of the positions in the pull movement, including the movement from the floor. The athlete moves into a shrug, then down to the jump position, down to the end of the first pull (hang position: bar at knees), and then down into the start position. The

**Figure 3. The top of the triple extension followed by a violent shrug (Snatch grip)**



athlete should begin by holding each of the individual positions, then speeding the movement up so that the sequence becomes linked and fluid.

*Drill 7: Knees back, knees forward, Shrug & Jump:*

This is the first time that the athlete is introduced to the full pull sequence in its complete form. The athlete moves through the sequence following verbal cues from the coach. Thus the lift is artificially choreographed, allowing the athlete to move into the correct positions, in the right sequence, and begin to develop further motor programmes that will eventually enable skill mastery. The athlete should now be familiar with the individual positions; it is now the sequencing that the coach needs to reinforce. The speed of this can be gradually increased until the coach is confident that the athlete can self-determine the pacing of the movement through the positions into a fluid movement. It is also possible for one coach to choreograph a large number of athletes performing this motion simultaneously using this drill.

**Figure 5. High pull sequence from box with bar at the knees**



**Figure 6. The choreographed double knee bend and pull**



Coaching cues should focus the athlete in to the positions (which with practice will become more autonomous) rather than how to find the positions: If the athlete is focusing in on how to get into these positions at this stage, processing the technique thoughts may interfere with the automatic (unconscious) actions relating to the positions. Therefore the cues are kept as simple as possible:

#### *Drill 8: Pyramids:*

The athlete has now been familiarised into the DKB movement from the floor. In this drill the athlete moves the bar to the top of the pull, and then back through the positions of the movement to return the bar to the start position. This serves to reinforce both the movements and the positions of the pulling sequence.

After the technique practices, the athlete should now be challenged to put the movements together into a full lift from the floor, exploiting fully the positions of the complete movement.

## Summary

Coaching techniques are developed through a process of education and experiential knowledge, and not all coaching techniques are relevant to every athlete: That's the art of coaching, and something that coaches may need help in developing.

The most efficient pulling technique for both the clean and the snatch lift has been observed over time to be one that incorporates a transition phase, or double knee bend. Not only does this introduce a sudden forceful stretch-shortening cycle into the movement, but the unweighted position also reduces tension on the back.<sup>8</sup>

This movement should be deliberately coached into athletes from the early stages of skill learning in order to ensure that athletes are utilising the most effective lifting techniques because of the coaching that they are receiving,

rather than despite of it. This paper has identified the key components of the double knee bend movement, and demonstrated a series of technique drills that a coach can use to develop this movement in the novice lifter from the outset of learning.

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