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Improving Agility Techniques

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Speed, strength, power, balance, and flexibility contribute to ones agility (2). All of these are trainable factors, and improving one or all of these through a well-designed exercise protocol can result in improved performance in various agility tasks (2). There is a gap in the literature, however when it comes to examining the ideal movement techniques to perform various changes of direction, redirections, or transitions (4,5).

The numerous combinations of distances, angles, directions, and movements (backpedal, sprint, etc.) make studying agility a daunting task. Add to that a broad range of positional responsibilities, and an assortment of playing surfaces and the topic is compounded further. Therefore, what is found optimal in one study may not be applicable to a variety of sport situations.

There are a number of basic biomechanical principles that can be applied across an assortment of agility tasks. These techniques will be the focus of this article.

First, it is necessary to clarify some movement terms: "redirection" will be used to describe turns of less than 90 degrees. An example of redirection would be a receiver running a post route or getting bumped off, then returning to your rush lane on a kickoff. In both cases momentum is still carrying you downfield, and by simply leaning or stepping slightly off-line, you run at a new angle. "Change of direction" will refer to a turn of 90 degrees or more, where you must stop momentum in one direction and initiate movement in a new direction. On a football field, a receiver must change direction when running a comeback route. A "transition" takes place when the type of movement pattern changes. A cornerback, in man-coverage versus a receiver that runs a streak will transition from a backpedal to a run in the same direction.

Redirection

Redirection technique is relatively simple. Instead of the base of support (feet) moving in the same plane as the center of mass (body), one or both feet are shifted slightly. Leaning and/or stepping in a new direction will put you out of balance (5). As a result you will move in a new direction. In order to minimize slippage and maximize speed, stride length and stride frequency should remain as though you are not trying to redirect. This will help to maintain posture as well. A common mistake is to stand up and take a long powerful stride. When this occurs, you must take a second heavy step to bring yourself under control along the new path.

Change of Direction (COD)

Changes of direction (cod) require some amount of braking force followed by acceleration along a different path. This makes the techniques more complicated, but there are some basic rules that can be applied. Most importantly is alignment. Keeping the foot, shin, and thigh of the braking leg(s) pointing in the direction of the movement that you are trying to slow or stop, ensures the braking force comes from the hip, thigh, and leg muscles. Muscles are strong and powerful and loading them in the braking phase allows you to take advantage of the stretch-shortening cycle when accelerating in the new direction. Failure to align the lower extremity in this manner will load the ligaments at each of the joints (ankle, knee, hip). Another key to the success of this alignment is increased traction. Rolling the foot from heel to toe will place each of studs in contact with the field (3). Braking with the instep, which works great on a hockey skate, relies on only two or three studs for traction. This heel-toe movement should be subtle, with the toe studs coming down just off the surface when the heel makes contact in order to avoid overstriding.

Squatting down during the braking phase is the next part of good COD technique (3,5). This lowers the body's center of mass, thus reducing the forward torque about the base of support. At the same time, it will encourage active involvement of the large hip and thigh musculature. Finally this places you in a deep stance, ready to explode in the new direction.

The last variable for braking with good alignment is to increase stride frequency. Taking a few smaller steps instead of one big step allows you to make minor adjustments and reduces the absolute force required from each leg. There is a trade off, however. There will be an optimal number of steps to take depending on the speed that must be reduced and your strength level (4).

Figure 1. Change of direction, top down technique, start

Figure 2. Change of direction, top down technique, finish

Figure 3. Change of direction, bottom up technique, start

There are a few cases where this alignment rule requires clarification. The first is braking a side shuffle movement. In this case, due to the forward lean of the athlete and the architecture of the hip joints, optimal braking alignment occurs with the foot, shin, and thigh of the lead leg pointing at a 45 degree angle to the direction of braking.

A second consideration is that it is possible to make a 180 degrees COD by executing a jump turn. This is when you take a small low jump instead of braking, and rotates your entire body 180 degrees in the air. In this scenario you will land with the lower extremities aligned in the new direction. Though very committing, it is still considered effective as it loads the muscles, and with a toe-heel roll ensures good traction. This is usually considered the technique of choice for the pro shuttle test.

Transitions

With transitions, there is usually some sort of rotation that must occur to go from one movement to the next. One school of thought is that rotation should come from the top down (4). With this technique the head, then shoulders, then trunk rotate in the transverse plane thereby moving the center of mass to the side, which then allows the pelvis and hips to follow (figure 1 and 2). This is a relatively slow and inefficient process, however. Since the body is basically symmetrical, a side-bend must accompany the rotation in order to disrupt the center of mass and affect balance. This loss of posture can be detrimental to performance if contact with an opponent were to occur at this point. Furthermore, the legs are the last things to transition with the top-down technique. This is a problem if a redirection or change of direction is to be combined with the transition, as at least one extraneous step will be taken in the original direction.

The second technique has become quite popular when teaching pass coverage to defensive backs (1). This involves initiating the rotation at the hip joint of the free leg (the one not in contact with the ground) as shown in figure 3 and 4. The goal being to strike the ground on the next step with that leg pointing in the new orientation required for the movement that the athlete is transitioning to. This bottom-up technique is fast, but it has limitations. For example, if going from a shuffle to a sprint, and the trailing leg is free, it can come down in a powerful push position allowing you to maintain or increase speed as you transition to a sprint. However, if it is the lead foot that is free, when it comes down it is in a very inefficient position where it must pull the center of mass. This can result in a loss of speed. Another potential problem is that hip rotation is not unlimited. A backpedal-to-sprint transition involves 180 degrees of rotation. The hip joint cannot achieve all of this motion, so when the foot comes down, it will be pointing at an angle to the direction of movement. As was discussed in the change of direction section, this can result in the foot slipping.

A third technique, suggested by this author, involves initiating the rotation at the hip joint of the stance leg (Figure 5 and 6). This inside-out movement is effective as the center of mass is instantaneously turned in the transverse plane, which means the whole body transitions in unison. Since the rotation happens near the end of the stance phase, it allows the foot to push while aligned in the direction of movement, minimizing slippage. Finally, since the body will be airborne at the end of push, its rotation can continue despite reaching the end of hip range of motion. This allows the next step to also come down with the foot pointing along the direction of movement. There is a risk of injury from twisting at the knee joint if strength, stability, balance or hip flexibility is lacking when attempting the inside-out technique.

As you have learned there is no ideal agility technique for all athletes in all situations. The best way to improve technique is to get to know your body. Practice each of these redirection, change of direction, and transition techniques in iso-

Figure 4. Change of direction, bottom up technique, finish

Figure 5. Change of direction, inside out technique, start

Figure 7. Change of direction, inside out technique, finish

lation to make them a part of your movement pattern repertoire. As you become familiar with them, they can be combined. Eventually, they will become automatic, and your body will select the ideal pattern for a given game situation. ■

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