# OPTIMISING SPEED AND AGILITY DEVELOPMENT USING TARGET CLASSIFICATIONS AND MOTOR LEARNING PRINCIPLES

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*Part one of a two part article that looks at optimising speed and agility development. It uses a new system of classifying speed and agility movements to establish appropriate coaching systems, utilising the key principles of motor learning. It also highlights how these can be placed into an appropriate development programme to optimise the long term development of these important fitness elements.*

## Introduction

Speed and agility are a vital part of many sports, and as a reflections of this, in recent years there has been a proliferation of training methods aimed at enhancing these two key fitness elements. A look at sports training today will see the use of speed ladders, hurdles and other similar gadgets, all promising greater speed and agility, with their use spreading across all levels of sport from professional to junior levels. Whilst this emphasis on the development of speed and agility is to be applauded, it is has to be remembered that the tools themselves will not optimally develop speed and agility. As with any sport skill, it is the quality of drill selection, application and coaching that will ultimately influence the effectiveness of the programme.

## Speed and agility are skills

What is generally accepted today is that speed and agility are neuromuscular skills,[6] and that with appropriate training these can be improved in all athletes. What is less clear is the most efficacious training. Using a motor learning perspective, applying basic skill acquisition theories, then basic recommendations can be made that will optimise speed and agility training programmes. By following the fundamentals of skill learning and development the likelihood of optimising learning is enhanced.[7]

## Sport is movement

Whilst speed and agility are accepted terms in the sports literature in development situations the term movement may be more appropriate.[3] A close look at peak performance will reveal that athletes are not always employing maximum speed in all movements. It can be argued that it is the control of movement that is most important in the initial stages of development, and that ultimately maximum speed and agility depends upon appropriate movement control. It is not always the fastest athlete that is most effective but often the athlete who is in greater control. The maximum
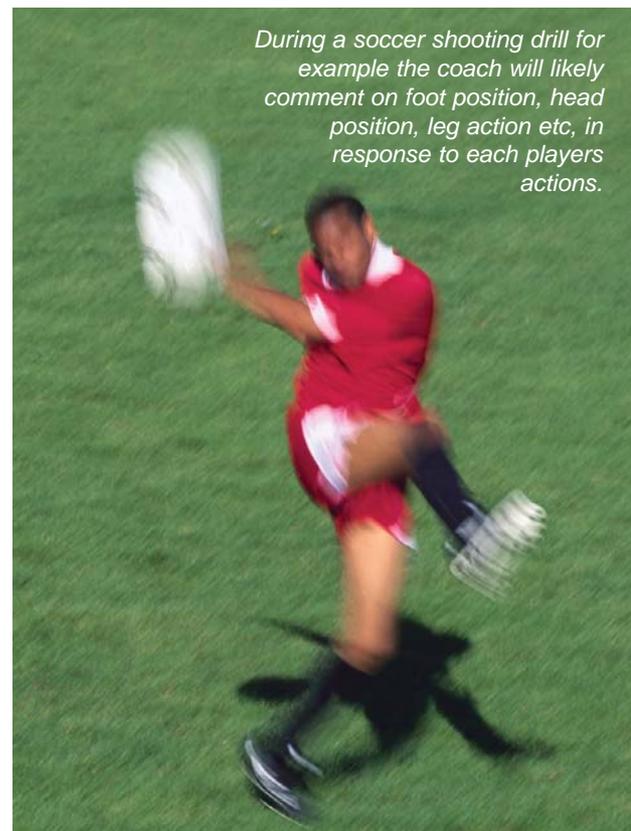


*During a soccer shooting drill for example the coach will likely comment on foot position, head position, leg action etc, in response to each players actions.*

speed element implied by the terms speed and agility may actually impede appropriate development in the early stages, where control and mastery of movement are the major aims.

## Developing skills

It is generally accepted that speed and agility are motor skills.[6] If that is the case, then speed and agility should be subjected to the same skill development guidelines as traditional sports skills such as kicking, catching and hitting.[7] Unfortunately, not all speed and agility programmes do this, and often consist of a series of drills. In coaching sports skills, there should be an aim to each drill, with the coach armed with the appropriate skill knowledge and coaching points to use during the drill. During a soccer shooting drill for example the coach will likely comment on foot position, head position, leg action etc, in response to each player's actions. This should be the same during any movement drill, and only in this way will the skill learning take place.

## Drills are means to an end, not an end in themselves

Drills must never be seen as the end product, regardless of how effectively they mimic sports movements. Drills are simply a means by which to enhance movement and these will only be effective if appropriate coaching takes place during the performance of the drills. Picture the soccer coach, who, after setting up a shooting drill from the edge of the box, then proceeds to say nothing as shot after shot sails over the bar. Is this appropriate coaching? Naturally you would expect the coach to either say something to alter the players technique or adapt the drill to accommodate their current skill level. Unfortunately, this does not always seem to be the case in speed and agility sessions, where drills can be too complicated for the player, or where too few coaching tips are given to enhance performance. Clearly this is not ideal for enhancing agility. How then do we get to a situation where the drills selected are appropriate to the athlete, and where coaching enhances performance during the drills? A start is to understand the essentials of sports movement. Speed and agility training is specific,[5,8] and so we need to develop the key movement patterns our performers will need in their sports.

## Breaking down movement - target movement patterns

Just as it is possible to break down strength based exercises into general movement patterns such as squatting, lunging, pressing, twisting etc[1] it is also possible to break down locomotive movement into basic patterns.[2] Whilst they may differ slightly between sports a number of basic patterns can be identified. These can include

>> The athletic position
>> Starting (straight ahead, to the side, to the back)
>> Running gait (acceleration, cruising and maximum speed)
>> Side-shuffling
>> Back-pedalling
>> Decelerating
>> Direction changes
>> Tracking

## Target mechanics

Just as sports skills have optimal mechanical patterns, each of the target movement patterns is optimised by appropriate biomechanical positions. These ensure that movement is optimised in terms of efficiency effectiveness, force production etc. It is important therefore that all coaches are able to identify the most effective mechanics for all movements they coach.

A coach needs to be aware of the key mechanics for each of the target movement patterns they will coach. In this way a coach can identify optimal target mechanics for starting, side shuffling, back-pedalling etc. These then provide for an ideal coaching checklist against which to look at athletes performance during the performance of the drill, allowing for effective qualitative analysis of the athlete during the performance of the drill.[4] They can also be used in evaluating whether drills develop the required target mechanics.

### Basic patterns of locomotive movement can include

◆ The athletic position
◆ Starting (straight ahead, to the side, to the back)
◆ Running gait (acceleration, cruising and maximum speed)
◆ Side-shuffling
◆ Back-pedalling
◆ Decelerating
◆ Direction changes
◆ Tracking

The principle areas of focus for any agility drill are:

*Head & torso* This includes the position alignment and action of the head, torso and hips, together with the height of the centre of gravity, and eye focus.

*Leg action* This includes foot placement, range and direction of leg action, and joint angles

*Arm action* This includes the direction and range of arm action together with appropriate joint angles.

# Identifying the target function

Another useful classification in developing movement programmes is the target function classification. This looks at each movement in term of their function, and is useful in assessing whether drills are effective in preparing athletes for sports. This system classifies movements into three categories, namely initiation, transition, and actualisation.

*Initiation movements* These involve either starting or changing movement. Movements such as crossteps, dropsteps, cuts etc all fall into these categories. The aim in all of these is to utilise effective movements that result in an optimal change of movement. Using the target mechanics system ensures that athletes are able to develop effective movements that allow them to react and change direction to optimise their performance. A coach can look at the patterns of movement and identify the key initiation movements required. Drills can then be selected that develop these patterns.

*Transition movements* Transition movements normally occur as an athlete is waiting to react to a stimulus, such as a basketball defender shadowing the opponent, using a sideshuffle action. During transition movements, the aim is to ensure the athlete is in an optimal position from where they can react to the stimulus with an appropriate action, e.g. the basketball defender jumping up to block the opponents jump shot. In this example, by side-shuffling appropriately, a body position is maintained that allows for a subsequently effective jump. This is an important classification, as control of movement is often more important than speed during transition movements, especially where speed results in a poor body position and an inability to subsequently react. Side-shuffles, back-pedals and chop-steps are good examples of transition movements. Unfortunately, many programmes train transition movements as

actualisation movements e.g. side shuffling as fast as possible for 20 yards in a single direction. In reality if the aim was to cover this 20 metres as fast as possible the athlete would actually crosstep and sprint the distance. By using this classification coaches can identify the key transition patterns along with distances, response stimuli etc. Armed with this information they can then select appropriate drills and use the target mechanics to coach these drills.

*Actualisation movements* These normally follow either an initiation or transition and normally either employ maximum running speed or involve a sport skill. In terms of running speed two key patterns exist, an acceleration gait and a maximum speed gait. Again the coach can look for the key patterns of actualisation and select drills that develop these appropriately.

# Summary

These classification systems provide an important building block around which to develop any sports movement development programme. In this way the target movement patterns involved in the sport can be identified. The associated target mechanics can be identified together with their target function. Taken together these allow for an appropriate system by which to select, develop and coach speed and agility sessions and programmes.

Part two of this article looks at how a movement development programme can be established based around these classifications, and based on sound motor learning theories.

### References

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