

# 11

## Analysis of sports performance

Coaches and athletes need to know how movement and physiology affect performance. There is also increasing awareness of sports psychology, and how the mind can affect performance – factors such as stress and motivation can make the difference between winning and losing. Performance may also depend on a technical or tactical aspect. This unit introduces the need to analyse sporting performance.

During his or her career, every high-level or world-class athlete will suffer from a loss of form or a significant setback. By analysing their performance, athletes can address the issues that are affecting them and make the changes necessary to gain success. If no evaluation takes place after a poor or unsuccessful performance, athletes may continue to perform badly and miss out on medals or other measures of success. Coaches should understand the importance of this area, and how they can influence and support the athlete, both in training and in competition.

### Learning outcomes

After completing this unit you should:

1. know the performance profile of a sporting activity
2. be able to analyse sporting performance
3. be able to provide feedback to athletes regarding performance
4. understand the purpose and resources required for analysing different levels of sporting performance.

# Assessment and grading criteria

This table shows you what you must do in order to achieve a pass, merit or distinction grade, and where you can find activities in this book to help you.

To achieve a <b>pass</b> grade the evidence must show that you are able to:	To achieve a <b>merit</b> grade the evidence must show that, in addition to the pass criteria, you are able to:	To achieve a <b>distinction</b> grade the evidence must show that, in addition to the pass and merit criteria, you are able to:
<p><b>P1</b> describe the performance profile of a selected sporting activity  <b>See Assessment activity 11.1, page 15</b></p>	<p><b>M1</b> explain the performance profile of a selected sporting activity  <b>See Assessment activity 11.1, page 15</b></p>	<p><b>D1</b> analyse the performance profile of a selected sporting activity  <b>See Assessment activity 11.1, page 15</b></p>
<p><b>P2</b> describe five factors that may influence the performance of an athlete  <b>See Assessment activity 11.2, page 19</b></p>		
<p><b>P3</b> perform an assessment of a selected athlete undertaking sporting activity using three components of their performance profile, with tutor support  <b>See Assessment activity 11.2, page 19</b></p>	<p><b>M2</b> independently perform an assessment of a selected athlete undertaking sporting activity using three components of their performance profile  <b>See Assessment activity 11.2, page 19</b></p>	<p><b>D2</b> analyse the performance of a selected athlete using three components of their performance profile  <b>See Assessment activity 11.2, page 19</b></p>
<p><b>P4</b> provide feedback to the athlete based on the assessment of their performance, with tutor support  <b>See Assessment activity 11.3, page 22</b></p>	<p><b>M3</b> independently provide feedback to the athlete based on the assessment of their performance  <b>See Assessment activity 11.3, page 22</b></p>	
<p><b>P5</b> explain the purpose of, and the resources required for, analysis at two different levels of sports performance  <b>See Assessment activity 11.4, page 26</b></p>		

## How you will be assessed

Your assessments could be in the form of:

- written reports
- case studies
- presentations
- interviews
- role play
- video analysis.



### Helen, 17-year-old gymnast

This unit helped me to understand how I can improve as a gymnast. It made me think of the factors that affect my performance and how I can measure them. I particularly enjoyed using video analysis to film and watch my performances over a period of time as part of a performance profile assessment. I also liked the fitness testing aspects of the unit as I enjoy practical sport and the results helped me to set specific targets for the future and see how specific components of fitness changed with the aid of a training programme.

The unit also helped me compare my performances with other gymnasts and it helped me understand the specific techniques and requirements that I need to perform to the best of my ability. I enjoyed working with both coaches and my peers and their feedback was invaluable in giving me the information that would help me to improve.

### Over to you!

1. What aspects of this unit are you looking forward to studying?
2. What parts of your sport can you analyse?
3. How will video analysis help you to improve as a sports performer?
4. How will target setting help you to improve your performance?

# 1. Know the performance profile of a sporting activity



## Warm-up

### How can analysis improve performance?

A good understanding of **performance analysis** is vital in measuring team and individual performance and making recommendations for future improvements. Being able to analyse will enable you to set clear targets in order to achieve personal and sporting success.

In groups, discuss what areas of performance can be analysed and how you can do this. You should consider the skills you would need and how each identified area can affect performance and success.

### Key term

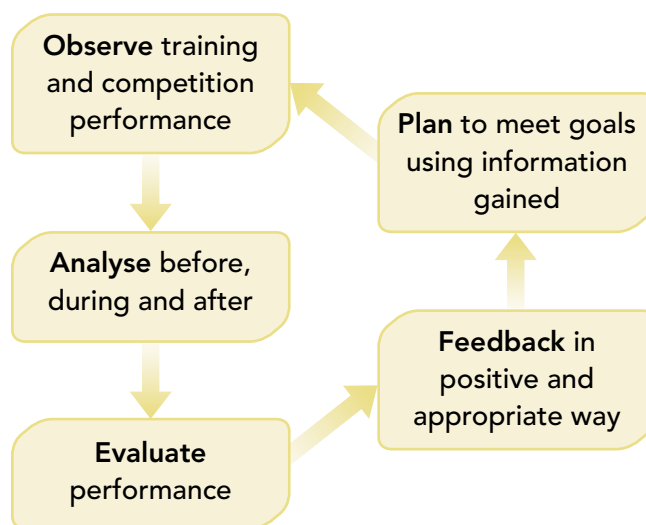
**Performance analysis** – the provision of objective feedback to performers trying to achieve a positive change in performance.

Performance profiling is a way of giving the athlete information about what *actually* happened in their sport – rather than what they *think* happened. It involves both analysing the athlete's performance through observation, and also understanding the athlete's state of mind. There may be occasions when the athlete has underperformed due to nerves or lack of concentration. Therefore the purpose of performance profiling is to:

- assist the athlete with both their physical and their psychological needs
- assess scope for technical and tactical improvement
- improve the athlete's motivation and performance.

The coach should assess the athlete before and after the event, discussing physical, technical and tactical issues, and the following important psychological factors:

- confidence
- concentration
- commitment
- control
- refocusing of effort.



**Figure 11.1:** A performance analysis will follow a clear process. What are the advantages of using such a model of analysis?

Understanding each of these will allow you to prepare a strategy to address the issues highlighted by the profiling.

## 1.1 Sporting activity

Different sports have very different requirements, and the athlete and coach should be aware of the specific physical and psychological demands needed in order to achieve success. For example, a midfield player in football will need different physical and mental skills from a goalkeeper.



What factors may affect an archer's concentration?

## Individual based

Examples of individual based sports are archery or shooting. These are unusual sports because the opposing player has no effect on the player in action. Archers are required to concentrate for long periods, and the skills they use are described as 'closed'. A closed skill is one that takes place in a stable, predictable environment – the performer knows exactly what to do, and when. However, skills can be affected by the environment, for example, the weather. Movements follow set patterns and have a clear beginning and end. The skills tend to be self-paced. An archer may have to wait for long periods before performing.

## Specific position

Different sports make different demands on athletes – and different positions within the same sport also make very different demands. An example is a goalkeeper (in any sport), who will need to concentrate for long periods without being directly or physically involved in the action.

Performance profiling should take into account the individual and specific demands of both the sport, and the position within that sport. Performance profiling and analysis can be used to document, assess and predict the ability of a goalkeeper to meet the demands of performance, covering various aspects of physical capacity, psychological factors, technical skill and tactical awareness. These may include:

- physical tests of speed, strength, power and flexibility, core stability and endurance
- psychological assessment of personality, anxiety and confidence
- biomechanical analysis of movement technique
- notational analysis of performance.

While some of these factors may be relevant to other positions within the team, any profiling or analysis must identify requirements specific to goalkeeping.

### Take it further

#### Four key areas of performance

The four key areas of performance are physical, psychological, technical and tactical. Consider each of these areas and highlight how they affect performance in a chosen sport. You may wish to consider the role of the coach as well as the performer in this analysis.

Once the individual physical, psychological, technical (biomechanical) and tactical strengths and weaknesses have been identified in relation to the unique demands of goalkeeping, the next step is to use this information to set short- and long-term goals for training. Setting goals gives purpose and direction to the training programme, and promotes the intrinsic motivation, self-confidence and sense of responsibility that will strengthen the goalkeeper's adherence to the training programme. The profiling process should be repeated at regular intervals to monitor the effectiveness of the specific training programme, and highlight any areas of good or poor progress.

Research shows that, on average, a soccer goalkeeper spends 86 per cent of a match walking or standing still, and the remaining 14 per cent performing activities at moderate to high intensity. This equates to approximately 12 minutes' pressure on the goalkeeper throughout the duration of the match.

The goalkeeper must also be prepared mentally throughout the match. From a psychological perspective, the goalkeeper must be constantly alive to potential dangers, remaining focused and concentrating on the build-up of play, which will be linked to his or her physiological ability to recover quickly after each exertion in preparation for the next attack.

### Specific action

Many sports require the analysis of a specific action. Complex actions, such as a tennis serve, should be broken down into smaller stages so that a clear analysis can be made.

Using a whole–part–whole method of analysis, it is possible for the coach and player to investigate key parts of a technique. This means that the whole skill can be analysed and practised, while more detailed or complex elements are learned and practised specifically and separately, in order to make up the whole skill. For example, the initial throw may be too far in front of the tennis player, so that he or she keeps serving into the net.

## 1.2 Performance profile

The purpose of analysing a sporting performance is to provide detailed feedback to the athlete or team in order for them to improve their game. When analysing the performance of an individual or team, you should consider a variety of questions, which might include:

- How well are specific skills executed?
- How focused and motivated are the athletes?
- Are the athletes using the correct techniques?
- Are the correct tactics adopted at the right time?

This example of a performance profile can be adapted to suit any sport. It compares where the athlete views their level of performance for each category against the perfect model of performance. Any differences can then be identified and discussed.

### Technical and tactical

Sport involves many complex skills and techniques. As we learn and practise these skills, they become more 'natural' and we are able to refine and perfect them. For example, a cricketer will practise specific shots as part of his or her training programme, to the standard needed to execute them as part of a competitive match. All sports require athletes to have good techniques in order to achieve success. Therefore it is essential that the athlete and coach focus on how individual skills are performed. This may involve observational analysis and feedback, and examining complex skills broken down into simpler parts. Skills can be divided into three categories:

- Discrete skills which have a very clear beginning and end, for example, a serve in tennis.
- Continuous skills which have no obvious beginning or end but tend to merge and flow into one another as the skill or sport progresses, for example, cycling or swimming.
- Serial skills which are composed of both discrete and continuous skills, for example, a tennis player playing a shot on the run.

All sports require tactics or strategies in order to achieve success. Sport contains many examples of tactics that a coach, athlete or team may adopt in order to win. These may include playing the offside trap in football, batting defensively in cricket, or using zone marking in basketball. When devising and using

**Table 11.1:** A completed performance profile.

Characteristics identified by the athlete	Athlete's perceived level of importance (API)	Athlete's self-assessment (ASA)	Discrepancy (10 – ASA) × API
Confidence	8	8	16
Concentration	10	6	40
Control	6	7	18
Commitment	8	8	16
Refocusing after errors	6	5	30
Enjoyment	10	8	20

tactics, it is important that all the players understand the tactic and when to employ it. Failing to do this may lead to confusion and disrupt performance.

- Shooting – sports such as football, netball, basketball and hockey all require players to hit a target in order to achieve points or goals. Therefore an important performance analysis is measuring how many shots either an individual player or team make, how many of these are on or off target, and how many are successful. Using notational analysis and evaluation of this data will allow the coach to recognise whether specific training and coaching is needed, or to devise specific tactics.
- Crossing – further analysis will allow the coach and athletes to determine the number of crosses that were successful in reaching a team mate, or in a shot on or off target. For example, if a player makes ten crosses in a game but only three of them reach a team mate, then further coaching is likely to be needed.
- Catching – many sports, such as rugby, cricket and basketball, require players to catch a ball either to defeat an opponent or to continue a pattern of play. Again, analysis will determine the number of catches that were successfully caught or dropped – if an area of weakness is discovered, further analysis can be carried out and training focused on this area.
- Passing – a key component of most team sports is passing a ball between players in order to reach a goal. Analysis could include the number of successful passes made, the number of passes that fail to reach their target, and whether short or long passes were more successful. It is important that both coach and players are clear about what is being observed, and clear definitions are made of 'success', and 'short' and 'long' passes. Tactics often use either long or short passes depending on previous analysis of individuals or opponents.
- Tackling – gaining possession through tackling is an important tactic. The coach and players should conduct an analysis that counts the number of successful tackles made, or the number of fouls committed (resulting in free or penalty kicks) through poor tackling.
- Heading – football requires players to head the ball. Heading may be necessary to pass the ball between players or to shoot at the goal. Notational analysis will count the number of successful headers, while a qualitative analysis will allow more detailed and descriptive feedback to be given, correcting poor technique.
- Dribbling – the skill of dribbling can be analysed both quantitatively and qualitatively. The time and distance an individual player dribbles with the ball can be observed and analysed, or the coach may prefer to observe dribbling technique, ensuring that the correct skills are used.
- Striking – similar to shooting, the way a soccer player strikes a ball will have a direct effect on where it goes (either successfully or unsuccessfully). Players such as Didier Drogba will use video analysis to observe their striking technique, and practise to perfect this skill. This quantitative analysis allows the player to observe a perfect model.
- Positional play – modern technology allows coaches, players and even spectators to observe the movements of players throughout a match. Television pundits use this information to offer their expert opinion on why a team is either successful or unsuccessful. Being able to observe the position of individual players can help a coach identify why, for example, a goal was scored or conceded. The information can be used to develop patterns of play and tactics such as attacking or defensive play. This is particularly important in sports such as basketball, where a coach may prefer to use man-marking in preference to zone-marking.
- Style of play – performance profiling will allow a coach to devise tactics suited to both his or her team, and the opposition's style of play. A team may prefer to focus on attacking rather than defensive play, and their tactics may be to play long balls forward. Or a team may play defensively and try and score goals on the counter-attack. Various formations have been developed by coaches that will suit their players, tactics and strategies.

## Case study: The English Institute for Sport



The English Institute of Sport provides elite athletes with the opportunity to undertake performance analysis in order to prepare for competition. The Institute describes performance analysis as the provision of objective feedback to performers trying to achieve a positive change in performance. In simple terms, this means providing the athlete with information on what they actually did, as opposed to what they think they did.

1. **For a sport of your choice, visit the English Institute of Sport's website ([www.eis2win.co.uk](http://www.eis2win.co.uk)) to investigate how your sporting performance can be enhanced through performance analysis.**

## Physical (health- and sports-related fitness)

Sport requires participants to have a high level of fitness in order to perform. It is also important to be physically fit simply for health reasons. There are five main components of fitness:

- **Strength** – the ability of a muscle or group of muscles to exert a maximal force, or overcome a maximal resistance, in a single contraction.
- **Aerobic endurance** – the ability of the heart, lungs, blood vessels and skeletal muscle to take in, transport and utilise oxygen efficiently and over a prolonged period.
- **Muscular endurance** – the ability of a muscle or group of muscles to make repeated contractions against light to moderate resistance and over a prolonged period.
- **Flexibility** – a measure of ability to move a joint through a complete and natural range of motion without discomfort or pain.
- **Body composition** – the body's physical make-up in terms of fat and lean or non-fat body tissue, measured as a percentage.

Being able to measure these will help the coach and athlete develop a training plan that will meet the specific requirements of the sport and the chosen area of fitness. Fitness tests can be conducted to measure each area, and the results analysed in order to develop a training programme.

## Physiological

- **Heart rate** – this can be measured during exercise with a heart rate monitor. Athletes can train within target zones of their maximum heart rate, at a controlled intensity.

## Activity: Heart rate



The measurement of heart rate is a good indicator of cardiovascular fitness. Using a simple test, you can measure your resting heart rate (RHR) by taking your pulse, with lower readings indicating a healthy cardiovascular system. An RHR between 60 and 70 beats per minute (bpm) is considered normal. Maximum heart rate (MHR) can be calculated as  $220 - \text{age}$ .

- What is your RHR?
- What is your MHR?
- How can you use knowledge of heart rate as part of your training? Calculate your maximum heart rate, and the workout training zones of 60, 70 and 80 per cent of your maximum heart rate.

- **Warm-up** – to perform at the highest level, physical preparation before training and competition is paramount. A warm-up generally consists of a gradual increase in intensity in physical activity. For example, before running or playing an intense sport, you might jog slowly to warm your muscles and increase your heart rate. It is important that a warm-up should be specific to the exercise that will follow, preparing the muscles to be used and activating the energy systems that are required for that particular activity. Stretching the active muscles is also recommended after doing a warm-up.

The three main functions of a warm-up are to:

- increase heart rate
- raise body temperature
- prepare the major joints of the body.

The warm-up should increase the heart rate in order to pump more blood around the body to the working muscle, in preparation for exercise. This in turn allows more energy to be produced using oxygen, and increases the body and muscle



temperature. Increasing muscle temperature will improve the elasticity of the working muscles, making them less likely to become injured. The warm-up should involve a wide range of movements specific to the exercise or sport to be undertaken.

For a warm-up to be most effective, it should be tailored to the individual client.

- **Cool down** – the purpose of a cool down is to return the body back to its pre-exercise state. The three main objectives of a cool down are to:
  - return the heart rate back to normal
  - remove any waste products that may have built up during exercise
  - return the muscles to their original state (or length, if stretched).

A cool down will keep the metabolic rate high and the capillaries dilated to enable oxygen to flush through the muscle tissue, which helps to remove lactic acid waste created by the exercise. This should stop the blood from staying in the veins, which can cause dizziness if exercise is stopped too quickly. A cool down can also reduce the effect of delayed-onset muscle soreness (DOMS), which often follows strenuous exercise that the body is not used to. The final part of the cool down should include stretching designed to facilitate and improve flexibility, as the muscles will be very warm at this stage.

- **Lung function** – being able to analyse lung function allows athletes to determine not only the size of their lungs, and therefore how much air they can inhale, but also the strength and efficiency of their lungs. Being able to inspire oxygen and deliver it to working muscle is essential to athletes of all abilities. Likewise, being able to expire waste products such as carbon dioxide is also vital to sporting performance.

Recently there has been much scientific research into lung function and aerobic sports such as cycling, long-distance running and rowing. Results indicate that the larger and stronger the lungs, the more able they are to deliver oxygen to the working muscle, especially during intense exercise. For example, an elite rower may be able to deliver up to 240 litres of air per minute in and out of the lungs. To put this in perspective, a typical value for an untrained male would be between 100 and 150 litres per minute during maximal exercise.

A spirometer is used to measure lung function. The athlete takes the deepest breath he or she can, then exhales into the spirometer as hard as possible, for as long as possible. The spirometer is then able to determine the following measurements:

- Forced vital capacity (FVC) – the total amount of air that you can forcibly blow out after full inspiration, measured in litres.
- Forced expired volume 1 (FEV 1) – the amount of air that you can forcibly blow out in 1 second, measured in litres per second (along with forced vital capacity, considered one of the primary indicators of lung function).
- Peak expiratory flow (PEF) – the speed of the air moving out of your lungs at the beginning of the expiration, also measured in litres per second.

## Psychological

- **Motivation** – understanding what motivates athletes to train and compete will help the coach devise varied and enjoyable training sessions. Motivation is the desire or need to perform a certain task; it is why we choose to do something. Motivation has been defined as ‘the direction and intensity of effort’ – meaning what we choose to do, and the amount of effort we put in. There are many theories on motivation but in general it can be regarded as **intrinsic** (internal) or **extrinsic** (external).
- **Anxiety** – a certain level of stress is needed for optimum performance. If you are under too little stress, then you will find it difficult to motivate yourself to give a good performance. Too little stress expresses itself in feelings of boredom and not being stretched.

But too much stress and anxiety can seriously affect your ability to focus on your skills and performance. Both coach and athlete should recognise the symptoms of stress and anxiety to ensure performance is not affected.

Excessive levels of stress damage performance and damage your enjoyment of your sport, and may occur:

- when you think what is being asked of you is beyond your perceived abilities
- when too much is asked of you in too short a time
- when unnecessary obstacles are put in the way of achieving goals.

An optimum level of stress will give the benefits of alertness and activation that improve performance. Anxiety is different from stress. Anxiety comes from concern about a lack of control over circumstances. In some cases, being anxious and worrying over a problem may generate a solution. But normally it will just result in negative thinking, and have a detrimental effect on performance. An example would be an athlete worrying about what the spectators think about their performance and fearing making a mistake.

- **Arousal** – this is how interested we are in performing a specific sport or action. Every sport will develop a sense of excitement, but if this becomes too great then the athlete may feel anxious, with a negative effect on performance. It is important that the levels of arousal are suitable to the skills that are being performed.
- **Attention** – a sportsperson will be presented with a wide variety of information when they are training and competing. Some of this information will be important and relevant, such as instructions from the coach and other players, while some will be of no use, such as negative comments from the crowd. It is essential that the athlete is able to focus on the relevant information that will lead to a successful performance. By selectively attending to only the important information, we are able to ignore negative factors that could affect performance. The demand for concentration varies with the sport:
  - sustained concentration – distance running, cycling, tennis, squash
  - short bursts of concentration – cricket, golf, athletic field events
  - intense concentration – sprinting events, skiing.

Common distractions include anxiety, mistakes, fatigue, weather, public announcements, coach, manager, opponent, negative thoughts, etc.
- **Confidence** – confidence describes the feeling that you are going to succeed in a given situation: you will have self-confidence if you believe that you can achieve your goal. The more confident you are, the more likely you are to achieve your goals, which in turn is likely to result in sporting success. A confident athlete is likely to persevere even when things are not going to plan, show enthusiasm, be positive in their approach, and take their share of the responsibility for both success and failure.



Why is aggression important in rugby?  
Is aggression acceptable in *all* sports?

- **Aggression** – sports such as rugby require the players to show aggression, and in this context can be considered a good thing. A player may make a hard tackle and win possession of the ball. But in most sports, and beyond a certain level, aggression is seen as bad. A player throwing a punch is seen negatively, and is normally punished by the laws of the game.
 

It is important that athletes are able to control their emotions and only use aggression in a controlled and appropriate way. Becoming frustrated by their own or others' performance may lead to feelings of anger, resulting in a lack of concentration on the task, deteriorating performance and a loss of confidence in their ability, which fuels the anger – a slippery slope to failure.

A coach must teach players that while aggression can be positive in trying to win, winning should only be achieved by playing within the rules of the game.
- **Relaxation** – relaxation is a technique that can be used to reduce anxiety and therefore enhance performance. There are many ways in which the coach can help athletes to relax, including mental imagery, progressive muscular relaxation and meditation.
 

Mental imagery is a technique used by athletes to imagine themselves in a variety of situations – perhaps performing a certain skill at a specific

place, or in a relaxing situation such as lying on a beach. Research indicates that the more detailed the imagery, the more likely the athlete is to feel prepared for a specific situation. Imagery is useful in:

- developing self-confidence
- developing strategies to teach athletes to cope with new situations before they encounter them
- helping athletes focus their attention on a particular skill they are trying to learn or develop.

Progressive muscular relaxation involves the purposeful contracting and relaxing of specific muscles. Each muscle is contracted for between 4–6 seconds and then consciously relaxed, with the athlete making a mental note of how they feel. This process allows the muscles to return to a more relaxed state.

Meditation is used to reduce stress before an event, and with experience athletes can learn to relax different muscle groups and appreciate subtle differences in muscle tension. By making a note of their breathing and muscle tension, the athlete is able to relax and focus on the competition ahead.

- **Concentration** – the ability to focus and concentrate will aid performance and success. Concentration can be described as the ability to focus on a specific task. Due to the nature of sport, many factors may cause an athlete or team to become distracted – the crowd, the weather or negative thoughts. Therefore an athlete should learn how to concentrate, especially under pressure.

### Remember

You must always concentrate on your sporting performance. Do not get put off by other players or spectators as this will have a negative effect on your performance.



## Biomechanical (quantitative and qualitative)

Biomechanics is the science that examines forces acting on the human body in sport, and explains how performance can be affected by these forces. At the highest levels of sport, in which techniques play a major role, biomechanics provides an opportunity to investigate and analyse specific movements in order for improvements to be made.

## Activity: Biomechanics in action



Forces play a significant part in many sports. However some sports people actually use these forces to aid their performance. One example of this is a cricket bowler. A bowler will keep one side of a cricket ball shiny and the other rough. This enables the ball to swing through the air as it is bowled because of the drag created by the rough side.

Consider your sport. How do forces affect performance? Are there examples of spin being used? How do playing surfaces affect performance? How can an understanding of biomechanics enhance a sportsperson's performance?

**Quantitative analysis** involves a detailed, scientific approach to observation analysis. It uses direct measurement of a technique or performance, and is often very time-consuming due to the need for detailed data collection. One method of collecting information is to watch a game and write down the action as it occurs – this is known as real-time analysis. However, sport is fast-moving and it is often necessary to video record a performance – this is known as lapsed-time analysis. For example, in a basketball match it would be very difficult to collect statistical data such as successful shots as the action occurred. As technology has advanced, suitable equipment such as video cameras and laptop computers has become affordable. This means that a coach will be able to collect data at training and competition and analyse it afterwards. Examples of quantitative analysis may include:

- recording patterns of play
- recording successful passes in basketball
- examining the techniques used by a bowler in cricket
- the number of successful tackles in football
- the number of turnovers in a basketball match.

### Key term

**Quantitative analysis** – uses numerical data or statistics to describe sporting performance.

**Qualitative analysis** is much simpler than quantitative analysis, as it simply requires general observation of a performance to be carried out. This can be done by a coach, spectators or even other players. Because this method is largely subjective (or open to interpretation), the information gathered may be biased. Therefore the more experience and knowledge an observer has, the more accurate the analysis is likely to be.

### Key term

**Qualitative analysis** – uses descriptions and words to describe sporting performance.

An example of biomechanics being used as part of a performance analysis is the study of linear displacement. This describes how far and how quickly a person or object moves in a straight line. The information can then be used to determine the velocity and the acceleration of the object. Such information (quantitative data) may be useful for a 100-metre sprinter, for example. A coach will be able to determine if the runner is slow out of the blocks, or if they get slower (or decelerate) during the race.

Sports such as the javelin or shot-put involve the athlete throwing the object the furthest distance. By using both qualitative and quantitative analyses, the performer and coach can determine technique and velocity of release. Qualitative analysis can aid the athlete by observing and analysing the technique during the throw. A coach can then highlight key aspects of the technique and give descriptive feedback, with demonstrations if necessary. Collecting numerical data through video observation (quantitative analysis), the coach can work out if the velocity of release is too low. This would result in the javelin or shot put being thrown shorter distances. Biomechanics and analysis will also allow the coach to investigate the optimum angle of release so that maximum distances can be reached.

## 1.3 Factors influencing performance

Many factors can affect an athlete's performance in competition and training. It is important that the athlete and coach recognise and understand each of these, and adapt their training and competition accordingly. These factors can be divided into two broad categories: intrinsic and extrinsic.

### Intrinsic factors

- **Age** – this constantly affects a person's level of fitness. For all forms of competitive sport there are age divisions, usually junior, youth and senior. Your body changes as you get older. The stages are shown in Figure 11.2.

Some activities are regarded as young people's sports and some as older people's sports. If an activity requires a great deal of physical exertion, it is more difficult to compete at a high level as we get older and our fitness levels begin to deteriorate. For example, an athlete's flexibility will decrease over time and will affect performance, especially in sports such as judo or gymnastics. It is important that the athlete and coach realise how the following key components can affect sporting performance:

- practising and learning – very young people can't cope with too much information and are unlikely to be able to learn complex skills
- strength – a young person will not achieve their maximum strength until they reach full adulthood

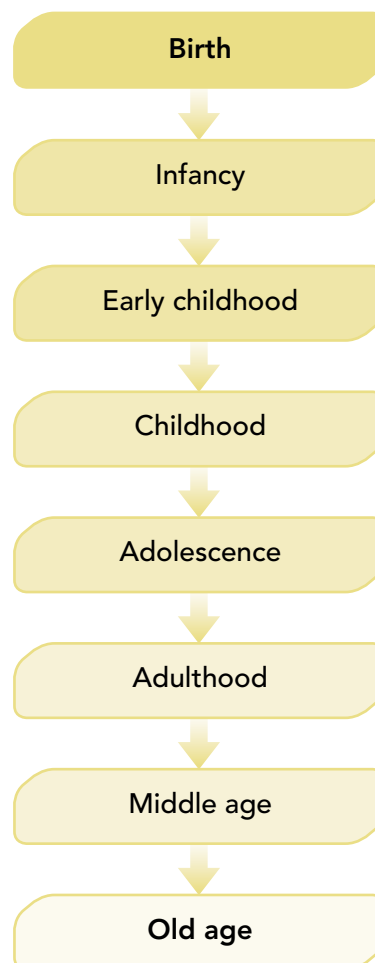


Figure 11.2: Life stages.

- skill – this can improve due to growth (high jumpers may appear more skilful as they get taller)
- flexibility – this decreases with age, with a negative effect on sports that require a wide range of movement, such as gymnastics
- diet – the body's metabolism slows down as we get older, so weight is likely to be gained
- reaction time – this decreases with age and, as many sports require quick reactions, can have a negative effect on performance
- injury and disease – older people are more likely to suffer from injury and disease, and take longer to recover.

It is also worth remembering that experience comes with age – and will generally have a positive effect on sporting performance and success.

- **Health** – recently there has been a massive growth in the number of health clubs offering both exercise classes, and complementary and relaxation therapies. For an athlete to perform at an optimum level of performance, they must be in excellent health and free from injury or illness.

However, recent studies suggest that some athletes may be exposing themselves to a range of health problems associated with inadequate dietary intake. Such behaviour is thought to stem from an obsessive desire to win, coupled with pressure from coaches and society's overwhelming obsession with body image.

- **Diet** – a suitable and balanced diet is the key to both health and the foundation of high sporting performance. An athlete's diet should contain food for energy, food for growth and repair, and food for general physical and mental health.

As athletes are more likely to need higher levels of energy than an average person, it is important that they eat suitable amounts of carbohydrates. Research indicates that the following nutrient intakes are optimum for most sports:

- 60–70 per cent of calories in the diet from carbohydrates
- 12 per cent from protein
- 18–28 per cent from fat.

What an athlete eats on a day-to-day basis is extremely important for training. Diet affects how fast and how well they progress, and how soon they reach their personal goals.

A common question that is often asked is 'When is the best time to eat?'. Many athletes will feel nervous before a competition and may not have an appetite. However, not eating should be avoided as the body's glycogen stores are likely to be low and will be needed when activity starts. The athlete should ideally have a high-complex-carbohydrate meal at least three hours before activity. This will allow the body to digest and absorb the food and to 'top up' the glycogen stores. It is also important that the athlete considers rehydration both during and after performance.

### Activity: Food diary



Think about the types and amount of food that you eat. Keep a diary of the food that you eat in one day and using the packaging work out how much fat, protein and carbohydrates you have consumed.

How does this compare to recommended daily allowances?

- **Previous training** – when analysing sporting performance, it is useful for the coach to have a picture of what the athlete has achieved previously. This may be through observation and working on a regular basis with an athlete or team, or it may be through asking questions, either in person or via questionnaires. Likewise, a coach can examine previous training sessions and determine what was successful and what was less successful. Using this knowledge, future sessions can be designed to meet the specific needs of the athlete or team.
- **Motivation** – this can be defined as 'direction and intensity of effort' and it is important for any athlete who wishes to succeed in training or competition. Motivation can be viewed as either intrinsic or extrinsic.
- **Self-confidence** – the belief that they can succeed in their sport – is important to athletes. When an athlete has self-confidence they will tend to:
  - persevere even when things are not going to plan, both in training and competition
  - show enthusiasm and a desire to win
  - be positive in their approach to their sport and to others involved in the sport, such as coaches

- o take their share of the responsibility for both success and failure.

Self-confidence will also allow the athlete to remain calm under pressure, be assertive when required, and set challenging and realistic personal or team goals. A confident athlete will take risks in their sport because they are playing to win, and will never give up even if defeat seems likely.

To improve their self-confidence, athletes can use a variety of techniques. Naturally, success will tend to lead to an increase in self-confidence, and praise and recognition of achievements can improve confidence.

It is important to recognise that a lack of confidence may lead to poor performance. An athlete suffering from a lack of confidence is likely to suffer from stress under pressure from outside factors, such as spectators or mistakes, avoid taking risks and making mistakes, and lose concentration because they are worrying about failing.

Equally, overconfidence or false confidence can be dangerous because it can lead to inadequate preparation, low motivation and low arousal.

- **Ability level** – one of the main factors affecting performance is the ability level of the performer. Much research has been conducted to determine whether a person has a fixed level of ability, or whether anyone can be coached into a world-class athlete. What is certain is that clear and professional coaching will allow an individual to maximise their natural ability in their chosen sport.

### Remember

Remember the phrase TCUP. This means Think Correctly Under Pressure and ensure that you focus only on the important aspects of your performance and not on outside factors that may hinder you such as the opposition or spectators.



## Extrinsic factors

- **Group dynamics** – the success of a sports team will be affected by the dynamics within the team or group. It is important that athletes and coaches understand the importance of group dynamics and how this can affect performance and success. A group should have a collective identity and a sense of shared purpose. Successful groups will have:

- o opportunities for members to socialise
- o members who share goals and ambitions
- o members who are able to communicate effectively
- o strong cohesion
- o members who value relationships within the group
- o a successful coach or leader who ensures that all members' contributions to the group are valued.

The development of a group normally goes through the following stages:

- o forming – the group gets together; a level of formality is common
- o storming – heightened tension associated with competition for status and influence
- o norming – rules and standards of behaviour are agreed
- o performing – the group matures to a point where it is able to work together as a team.
- **Group cohesion** – this describes the desire of a group of players to focus on a common goal and strive towards achieving that goal together. Group cohesion also describes the identity of a team. Social cohesion, where team members socialise with one another, is important for successful team cohesion. Research indicates that groups that get on with one another are likely to exhibit high levels of cohesion and ultimately team success. It is important to understand the factors that can affect team cohesion which include:
  - o stability – cohesion develops the longer a group is together with the same members, so a coach should attempt to keep the same players playing together
  - o similarity – cohesion develops where group members are similar in terms of age, skills, goals and attitudes
  - o size – cohesion develops more quickly in small groups
  - o support – cohesive teams tend to have managers and coaches who provide support to members and encourage them to support one another openly; this may include players sharing their thoughts and concerns in an open and honest forum
  - o satisfaction – cohesion is associated with the extent to which team members are pleased with each other's performance, behaviour and conformity to the norms and values of the team.

## Take it further



### Successful teams

A successful team will be more than a sum of its parts. Think about a successful team and explain how they show group cohesion. How can a coach ensure that a team works together?

- **Temperature** – this can affect the athlete in terms of both physical and psychological performance. The effects of extreme cold in sport are quite common. Through being cold, and a lack of appropriate warm-up, an athlete may suffer from torn muscles or tendons. Hypothermia (low body temperature) can also occur in extreme cases where the athlete is unable to maintain a suitable body temperature and loses heat. This can be very dangerous and can even result in death. However, it is more common for heat loss to simply affect sporting performance. To avoid hypothermia you should:
  - try and stay dry, as moisture increases the speed at which body temperature drops

- wear suitable clothing for the conditions and the environment
- avoid direct wind exposure if possible.

High temperatures can cause the athlete to overheat, and fluid loss can cause performance to drop. Athletes must take on sufficient fluid before, during and after training or competition.

- **The time of day** when an athlete trains or competes may also affect performance. If an athlete performs at the end of the day, after work or education, they may be tired and unable to concentrate. Training very early in the day may also have a negative effect on performance, as the athlete will have a slower metabolism, making it harder to produce energy.

Some major sports events are now restricted by media coverage, and television companies may dictate at what time the match should take place. This has resulted in evening fixtures as well as fixtures at midday, where the sun will be at its strongest in terms of heat.

## Assessment activity 11.1

P1 M1 D1

BTEC

A local tennis coach has asked you (as a sports science student) how her junior players could improve through detailed analysis. Using your underpinning knowledge, help provide the coach with example player profiles for a sport of your choice.

1. Describe the performance profiles of the junior tennis players. Consider specific techniques within this sport, as there may be different requirements. **P1**
2. Having described what is required in order to perform, discuss these factors with the performers for your chosen sport, making sure you explain them fully. To help you and the performers, prepare a short report that fully explains the profile you have outlined. **M1**
3. The performers are keen to understand how the profile you have outlined will help them improve in their sport. Analyse each aspect of the profile fully, and as part of your report explain the effect this may have on successful performance. **D1**

### Grading tips

- To attain **P1** don't forget to describe the physical, mental, tactical and biomechanical factors as part of the performance profile.
- To attain **M1** you should fully explain why each aspect of the performance profile is important and how being able to measure each component will allow a training programme to be developed.
- To attain **D1** you should fully examine each aspect of the profile and begin to reflect on developing a suitable training programme for a selected athlete.

## PLTS

Reflecting on your findings will allow you to address your skills as a **reflective learner**.



## Functional skills

By completing the report you are able to achieve skills in **English** and **ICT**.



## 2. Be able to analyse sporting performance

Being able to analyse sporting performance clearly is vital if weaknesses are to be identified and remedied. An athlete should always evaluate his or her performance both during and after training or competition. They should also seek the advice of others, such as a coach or tutor. It is important that when performance is analysed, an honest, clear approach is adopted. This will enable the athlete to make decisions affecting future performance. It is also important to recognise the many factors that can affect performance. These may be unavoidable (such as age or the weather) or may include factors that can be controlled by the athlete (such as diet and training).

Science has proved an important asset in improving and enhancing performance. Scientific principles are often applied to help record sporting performance, and the use of data can be analysed by the athlete, the coach or a sports scientist, with the aim of improving future performances.

A modern coach will no longer simply try to improve an athlete or team by instructing them to 'try harder'. To be an effective coach, you should be able to analyse and correct specific techniques as part of a training programme. Being able to break down complex movements into simple tasks allows the athlete to identify and correct specific aspects of his or her technique. A coach may identify movements that are ineffective or unnecessary, and these can be altered or removed from a performance.

### 2.1 Performance profile assessment

#### Technical and tactical assessment

When profiling sporting performance, good technical skills are required for success. These skills are often compared with a 'perfect model', and training and analysis should focus on developing skills that are technically correct to perform a range of motions or shots

The use of tactics and strategy is a key aspect of all sports. Tactics can be described as a specific, predetermined plan that can be implemented during

a sporting performance. For tactics to be effective, it is important that all players understand what is required and are able to execute it effectively.

When studying sport it is possible to analyse performance through observation. This may be done either 'live', actually at the sports event, or by video after the event.

**Notational analysis** studies movement patterns in team sports, and is primarily concerned with strategy and tactics. Patterns of play that led and did not lead to scoring against specific opponents can be identified, and this information is then used as a tactic or strategy in subsequent matches to outperform opponents.

Being able to analyse past performances and the performances of upcoming opponents is an essential tool used by modern football managers, and it is now common to see a laptop on the training ground, or a television and video recorder in the changing room. Most managers now have their team's matches filmed, so they can be reviewed afterwards to highlight the strengths and weaknesses of players as well as patterns of play. This enables the manager to give players feedback as part of the coaching process, highlighting specific areas to address.

#### Key term

**Notational analysis** – the collection of data either by using a computer or by hand. This process normally involves counting the frequency of an event, such as a shot on target.

**Tally charts** are a useful tool when observing sporting performance. The tally chart may include simply counting performance factors such as:

- shots on target in football
- number of fouls committed in basketball
- wide balls bowled in cricket
- number of double serves in badminton
- number of shots played to the forehand and backhand in tennis.



## Activity: Tally analysis



In small groups watch a recording of a volleyball match and conduct a basic tally analysis. You should count:

- successful serves
- unsuccessful serves
- shots to the front of the court
- shots to the back of the court
- smashes completed
- unforced errors.

Using the information that you have collected, discuss your finding with your group and identify any areas for improvement.

## Physical

- **Multi-stage fitness test** – you are probably familiar with the multi-stage fitness test (commonly referred to as the 'bleep test') to measure  $VO_2 \text{ max}$ . This is a predictive test that can be used by individuals or teams to estimate their current  $VO_2 \text{ max}$ . Undertaking the test is relatively straightforward. Two cones are placed as markers 20 metres apart, and the participants have to run to each cone in time with the predetermined beeps. These get progressively quicker, decreasing the time it takes to reach each marker cone and increasing the intensity of the exercise. The results are then recorded according to the stage you have reached, and can be converted to a predictive  $VO_2 \text{ max}$  level. The multi-stage fitness test is a cheap and valid alternative to individual laboratory testing, which is expensive and requires specialist training to analyse performance. For more information see Unit 8 Fitness testing for sport and exercise.

The results can be used by the athlete or the coach as the foundation of an aerobic training programme. The athlete and coach can re-test at set intervals to gauge whether aerobic fitness has improved or decreased.

This test is very good for games players, as it is specific to the nature of the sport, but due to the short turns it is less suitable for rowers, runners or cyclists.

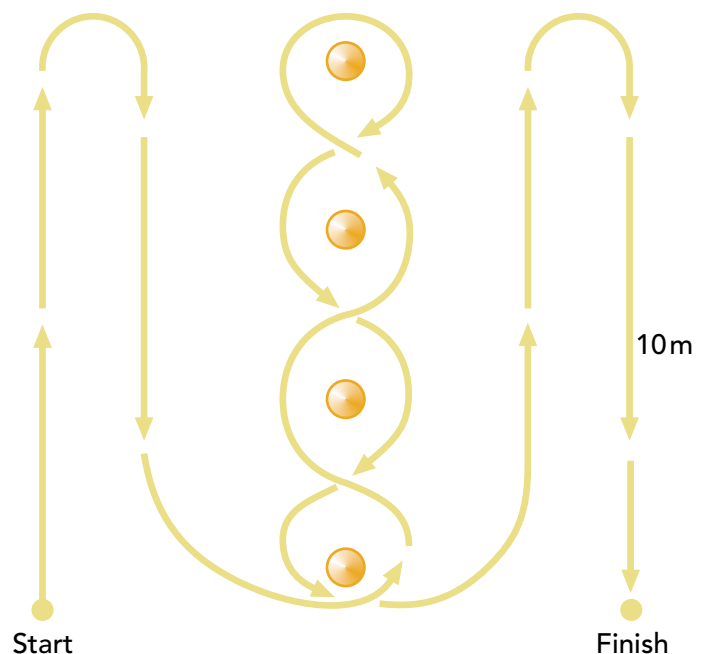
## Key term

**$VO_2 \text{ max}$**  – the maximum capacity to transport and utilise oxygen during incremental exercise.

- **Repeated anaerobic sprint test** – a repeated sprint test allows the athlete and coach to analyse sprint performance. Using quantitative analysis the coach can determine the time it takes to complete a sprint, the speed or velocity of the sprinter, and areas of acceleration and deceleration. Using this information, areas that need further training can be identified and specific training programmes can be devised. By repeating the sprint test over a number of weeks or even sessions, the coach is able to see whether improvements have been made. The repeated sprint test is also a good way to train the anaerobic systems of the body.

## Motor

Test such as the T-run or Illinois agility test analyse motor skills and the ability to move in different directions. Analysing an athlete's ability to complete these as part of a training programme will help a coach identify specific movements and the ability to change direction quickly. For more information see Unit 8 Fitness testing for sport and exercise.



**Figure 11.3:** The Illinois agility test assesses an athlete's ability to change direction quickly. What sports require the athlete to use agility and how can this test improve this?

## Physiological

A **heart rate monitor** is a convenient way of measuring heart rate before, during and after exercise. A strap attached round the athlete's chest sends an electrical impulse to a watch worn on the wrist. This allows the athlete to measure their heart rate and work within aerobic training zones (training zones are used to determine the level of intensity at which you are working; see below). Some heart rate monitors allow the recorded data to be downloaded to a computer, and the coach and athlete can analyse their training performance further. The use of such data gives valuable information so that training programmes can be devised or amended to suit the individual.

There are four main **training zones** (in percentage of maximum heart rate (MHR)):

- **fitness zone:** 60–70 per cent MHR
- **aerobic zone:** 70–80 per cent MHR
- **anaerobic zone:** 80–90 per cent MHR
- **red line zone:** 90–100 per cent MHR

Training zones are used to determine the level of intensity at which you are working. This is particularly important for cardiovascular training or exercise. Heart rate training zones are calculated by taking into consideration both your MHR and your RHR (resting heart rate). Because it is difficult to exercise and measure heart rate manually at the same time, it is useful to use a heart rate monitor.

There are a number of important factors that can affect heart rate, including:

- stress
- illness
- overtraining
- medication
- time of day
- food and drink (caffeine)
- altitude
- temperature
- hydration levels
- weather conditions.

**Peak flow** – strong, efficient lungs are essential to sporting performance. The ability to obtain and utilise oxygen will be affected if the lungs are unable to deliver oxygen (and remove carbon dioxide) in relation to exercise intensity.

## Case study: Calculating heart rate



Using heart rate as a training tool is an easy and effective way of ensuring that you train at the correct intensity. Before any cardiovascular training, an athlete should determine their specific and individual training zones. To do this you should use the following method:

Calculating the heart rate for a training zone:

Helen wants to train for a period of time in the aerobic zone (75 per cent intensity). Her resting heart rate is 60 beats per minute and her maximum heart rate is 204.

$$HR = RHR + [(MHR - RHR) \times \text{percentage intensity}]$$

So in Helen's case:

$$HR = 60 + [(204 - 65) \times 0.75]$$

So the heart rate to aim for is 149 bpm.

1. **Now measure your own RHR and MHR and work out the target heart rate for 85 per cent intensity.**
2. **What are the benefits of training at the correct level?**
3. **Why should Helen review these targets on a regular basis?**

Peak flow is a measure of how fast you can blow air out of your lungs, using a spirometer. This measures how wide the airways in your lungs are. Factors that can cause the airways to become narrow include:

- swollen lining
- mucus in the airways
- tubes constricted by the special muscles surrounding the airways.

All these may happen if you have asthma. For people with asthma, this simple test shows how well their asthma is being controlled.

## Psychological assessment

- **Interviews** – one of the easiest methods of analysing sporting performance is to interview the performer after training or competition. This gives valuable feedback on how they felt their performance went, and what areas they feel they need to improve. Using information on the athlete's personal strengths and weaknesses will

allow the coach to develop a strategy for future performances. Interviews can also be used to discuss tactics they may wish to use against a particular team or individual.

- **Questionnaires** can be designed to gain valuable information about performers. This information can be used to develop tactics and strategies as part of training preparation. The information gained as part of the questionnaire may include strengths and weaknesses, likes and dislikes in training, and concerns about past and future performances. Key areas can then be addressed by the coach and players. Some questions to ask might include:
  - Why do you play sport?
  - On a scale of 1–5 how much do you enjoy training? (1 = not at all; 5 = completely)
  - What aspects of training do you find particularly enjoyable?
- What do you dislike about training?
- How do you feel before a competition?
- How do you cope with the pressure of competition?
- What are your strengths in terms of sporting performance?
- What areas do you feel you need to address in order to improve?
- **Biomechanical** – being able to assess how the body moves during the execution of specific techniques will enable the coach to analyse if improvements or changes need to be made. For example, a tennis player may be struggling with their first serve so the coach will be able to watch or video this movement and make recommendations on changes in technique that are required.

## Assessment activity 11.2

P2 P3 M2 D2

BTEC

An amateur cricketer has approached you and asked you to help them prepare for an upcoming match. They are particularly keen to understand how different factors can affect their performance.

1. Write a report describing at least five factors that can have an effect on performance. **P2**
2. Having outlined various factors that may affect performance, produce a performance profile for the cricketer to help them recognise what is required to improve. You should consider at least three components of their performance profile. **P3**
3. To gain the merit grading criterion, you should perform this profile without tutor support. **M2**
4. To assist the cricketer, prepare a report that fully analyses three of the factors outlined in their performance profile. This analysis is designed to help the athlete improve, and should give clear feedback as well as making recommendations on areas that need to be addressed. **D2**

### Grading tips

- To attain **P2** you must fully describe both physical and psychological factors that can affect sporting performance.
- To attain **P3** you should also make specific recommendations for the cricketer and describe why you have suggested these proposals. Fully consider their performance profile and identify at least three components that can be addressed by the cricketer.
- To attain **M2** you should work independently and without additional support from your tutor.
- To attain **D2** you must further explain why you have made your profile suggestions and how these will improve specific aspects of performance. Ensure that you feed back your recommendations and explain why you have made these choices.

### PLTS

By planning a specific performance profile you are able to achieve skills as a **reflective learner**.



### Functional skills

By preparing a written report you are able to provide evidence of your skills in **English**.



# 3. Be able to provide feedback to athletes regarding performance

## 3.1 Feedback

### Strengths

When providing feedback, it is important that the coach highlights the strengths of an athlete's performance and does not focus on what is being performed incorrectly or badly. Being able to understand what went well and to develop this area further will enhance future performances both within training and in competition and boost the performer's confidence.

### Areas for improvement

Being able to identify areas for improvement will underpin all coaching. As such the coach must be able to identify these weaknesses and be able to develop these in order for future performances to improve. It is important that the coach can communicate these changes in an open and honest way so that the athlete can understand what is required and why.

### SMART targets

Target-setting is a vital aspect of sporting performance and analysis. Being able to set clear, well defined targets is a valuable tool when giving feedback to the athlete. Target-setting is a powerful technique that appears to work by providing a direction for our efforts, focusing our attention, promoting persistence and increasing our confidence (provided we achieve the targets we set ourselves). When setting targets, there are a number of aspects to consider, generally defined as the SMART principle:

**S**pecific

**M**easurable

**A**chievable

**R**ealistic

**T**imed

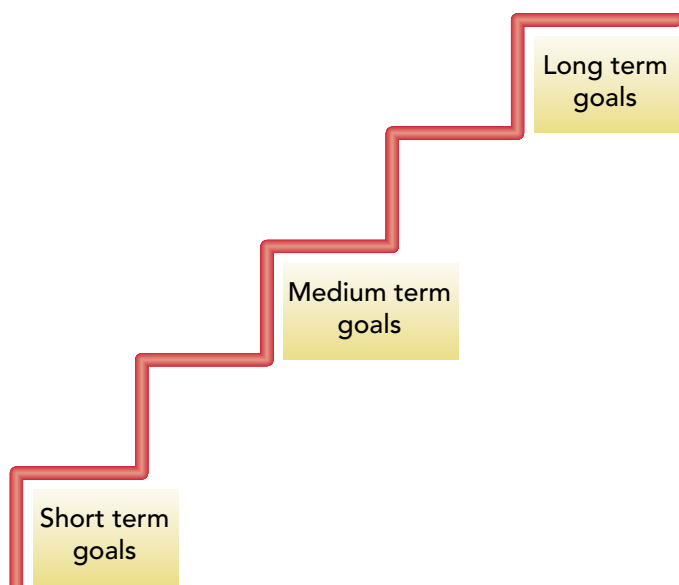
- **Specific** – targets should be specific or definitive. For example, instead of saying that a player is a 'poor batsman' in cricket, a coach may identify specific aspects of batting that need to be improved, such as defensive play or a cover drive.

- **Measurable** – goals or targets should be capable of being measured. For example, if you are trying to improve your possession of the ball in football, you may wish to count successful passes, long passes, short passes or successful crosses. This can be done before, during and after a training programme, and any improvements can be recognised. It is important that, when measuring targets, clear criteria are used and that any data collected are analysed correctly.
- **Achievable** – it must be possible to achieve any target or goal that you set yourself in a fairly short period of time. It is pointless setting targets that are impossible, too difficult or too far off. It is also important that targets are not too easy, as this will have a demotivating effect on the athlete. An example of poor target-setting would be for a novice runner to complete a marathon in under two hours. Failure in meeting goals is useful in improving technique and long-term success, as long as you draw useful lessons from it and feed these back into your training programme. ('A' is sometimes taken to stand for 'adjustable' – meaning that the achievability must be monitored and the goal can be changed to suit the circumstances if necessary.)
- **Realistic** – if targets are too difficult or impossible, it is likely the athlete will become demotivated and may even give up training or competition. Targets should be challenging and realistic, pushing the athlete in their desire and ability.
- **Timed** – targets must have defined time limits so that a coach or athlete can review progress. Open-ended targets tend to be less successful than those that have a set period in which to achieve the target. For example, an athlete may be set a six-week training programme to improve their muscular strength. After (and even during) this six-week period, a review can be carried out to see whether the specific targets have been achieved. If not, the programme can be amended to take into account any personal changes.

## Goals

When setting goals, it is important to understand that to achieve the 'dream' goal there should be a number of short- or medium-term targets to achieve on the way. The athlete who dreams of winning an Olympic gold medal will need to set short-term 'day to day' goals in order to focus their effort. Goals can be classified into short-, medium- and long-term.

- **Short-term or daily goals** are most important because they provide a focus for training in each session. Past research on Olympic athletes found that setting clear daily training goals was one factor that distinguished successful performers from their less successful counterparts.
- **Medium-term or intermediate goals** are markers of where you want to be at a specific time in your training programme. For example, if your long-term goal was to lower your 1500 metres personal best time by one second over ten months, a medium-term goal could be a half-second improvement after five months.
- **Long-term goals** are those that seem a long way off and difficult to achieve. In time terms, they may be anything from six months to several years away. These goals should comprise short- and medium-term goals.



**Figure 11.4:** Small steps will allow you to achieve your medium- and long-term goals. Consider your own goals and using the diagram outline your own short-, medium- and long-term goals. How do your short-term goals affect medium- and long-term goals? Are these goals realistic?

## Recommendations

The purpose of any performance analysis is to provide feedback to the athlete so that improvements can be made. Identifying specific areas of weakness is essential if changes are to be made.

- **Skills training** – feedback may provide information to address a specific skill that has been identified by observation. A coach may have identified that a golfer has poor balance when addressing a ball on the tee. The feedback would be very specific to the balance skill component. Using effective feedback will enable the coach to observe, demonstrate and correct the poor skill, and as part of the training a specific drill can be used to address this problem.
- **Training for specific components of fitness** – having observed and evaluated performance, the results may indicate that the athlete needs to address a specific component of fitness. The key components of fitness are:
  - strength
  - aerobic endurance
  - muscular endurance
  - flexibility
  - body composition.

By identifying the specific area, the coach can design a new training programme or adapt existing ones so that improvements can be made.

- **Technique coaching specific to movement** – a typical training programme will contain an element that addresses an athlete's technique. Coaches will regularly observe, demonstrate and correct poor technique. This feedback can be through discussion, observation or watching a video of the performance so that the athlete can see their own actions. A training programme should give the athlete an opportunity to practise a specific technique so that the 'perfect' model can be achieved. For example, a coach may observe a cricketer's bowling action and decide that, by videoing the action, clearer feedback can be given. Through discussion, the bowler can address poor technique and correct it as part of their training or practice.
- **Psychological training** – as you will have discovered in Unit 3 Sport and exercise psychology, it is now recognised that an athlete's performance

can be affected by their mind and it is important that the coach understands the psychological requirements. Therefore a coach may use interviews or questionnaires to find out how the

athlete feels both during and after performance. This information can be used to design specific psychological training methods such as imagery or meditation.

## Assessment activity 11.3

P4 M3

**BTEC**

1. Having completed a performance assessment for the amateur cricketer, it is important that you give clear feedback. This may be in the form of a short presentation or interview, and should allow the player to ask questions. This may be done with the support of a tutor. **P4**
2. To gain the merit grade you should give your feedback independently, without the help of a tutor. **M3**

### Grading tips

- To attain **P4** and **M3** you should fully prepare questions you would like to ask the athlete. You may want to practise these with a friend beforehand to ensure that they are relevant. Also spend some time considering the questions you are likely to be asked and the answers you may give in response.

### PLTS

By providing feedback to an athlete, you can demonstrate your skills as an **effective participator**.



### Functional skills

By delivering feedback to the athlete, you can provide evidence of your **ICT** and **English** skills.



# 4. Understand the purpose and resources required for analysing different levels of sporting performance

## 4.1 Levels of performance

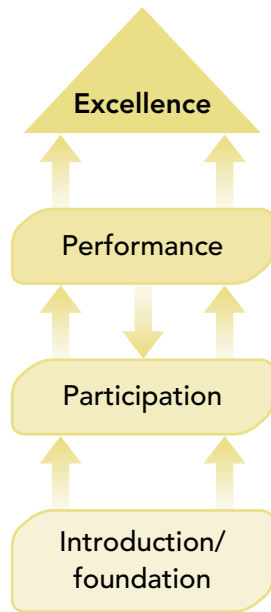
There are many different levels of performance, depending on ability. This is best illustrated in what is commonly known as the sports development continuum.

Each level of the 'pyramid' represents the stage you are at in your chosen sport. The terms can be described as follows.

- **Foundation** – the early development of sporting skills (throwing, catching, hand-eye coordination), on which most subsequent sports development is based. These are normally the skills taught as part of PE lessons in schools. Without a sound foundation, young people are unlikely to become long-term sports participants.

- **Participation** – sport undertaken primarily for fun and enjoyment, often at basic levels of competence. This includes people who play sport on a regular basis, such as a Sunday league football player.
- **Performance** – a move from basic competence to a more structured form of competitive sport at club or county level. This includes performers who have been identified as having potential in their sport and may be selected to represent district or county teams.
- **Elite** – about reaching the top – this applies to performers at the highest national and international levels. Players such as Olympians or professionals are considered to be in the excellence category.

These four levels are explored in more detail below.



**Figure 11.5:** The sports development continuum. What level are you at on the continuum? How can you progress higher up the continuum?

## Foundation

School is, very often, where children will have their first taste of organised and varied sport. This is part of the National Curriculum, which states that children must be taught at least two hours of high-quality PE and sport at school each week. In addition, the government aim is that by 2010, children will be offered two or more hours beyond the school day, delivered by a range of school, community and club providers. The government's overall objective is to enhance the take-up of sporting opportunities by 5–16-year-olds. The ambitious target is to increase the percentage of schoolchildren who spend a minimum of two hours a week on high-quality PE and school sport.

It is important that as many children as possible are actively involved in foundation sport. Not only does this provide fun, enjoyable and healthy activities, it will also mean that more children are likely to excel in sport and progress further in their sporting abilities.

Foundation level also includes sport for all beginners, regardless of age. Many organisations offer beginners lessons in their chosen sports, and these taster sessions often lead on to regular participation.

At this level, it is important that the fundamental skills are taught correctly and that participants are given an opportunity to practise these in an enjoyable environment.

## Participation

Participation sports are undertaken mainly for fun and enjoyment. Other reasons may include health and fitness, and participants will also enjoy other aspects associated with physical activity, such as social aspects and a sense of purpose and achievement. An example may be a Saturday league player who enjoys being part of a team, and has progressed from foundation level. The player will have a range of basic skills that have been practised and developed so that they are competent in their sport. A coach will aim to analyse these skills through observation and discussion, and areas such as tactics can be introduced to improve performance and success. There are many highly skilled and talented players who choose to play at the participation level simply because they enjoy the sport, or for general health and fitness.

A key area that the government is keen to develop is the number of out-of-school sports clubs that offer a range of sports. Their purpose is to ensure children are able to take part in sport after their school day or at weekends. Strategies have been devised to link local schools together, as well as linking to local sports clubs. This is to ensure that if children wish to continue in sport, they have a local opportunity to do so. The government invested over £1.5 billion between 2003 and 2008.

## Performance

When a player has consistently participated at a good standard, they may have their sporting talents recognised by local, regional or county organisations. These will provide the player with further opportunities to develop and enhance their skills using high-quality coaching and equipment. Players at this level will compete at county or even national standard.

Many local sports development units will have strategies in place to ensure talented athletes are offered opportunities for competition and training, and to support talented performers.

Through high-quality coaching and analysis, the performer may have an opportunity to further their sporting career and develop to the excellence level of the continuum.

## Elite

An Olympic or world-class athlete will need a high level of analysis as part of their training and performance in order to maximise their potential. Using the latest analytical techniques, combined with advanced technology and coaching, the high-level athlete will be able to develop their skills and aim for the 'perfect' model. The use of sports science is now common, and an athlete is just as likely to find him- or herself in a laboratory as on a training field.

## 4.2 Purpose

### Talent identification

Observation is used to identify talented athletes or produce a report on an opposing team. This is commonly referred to as scouting, and involves an experienced coach observing a performance and evaluating their findings. Reasons for doing this may include identifying new players, or preparing for a match where information about the opposition will allow you to devise a specific tactic.

### Monitoring current fitness levels

Another purpose of analysis is to gain data about an individual's current fitness level. Using a variety of fitness tests, we are able to measure the various components of fitness, and this information can be used as a starting point of any training programme. Throughout training programmes, regular fitness tests can be conducted to ensure that the benefits are being gained. If results indicate that targets are not being met, training can be adjusted to take into account any changes.

### Identification of strengths and areas for improvement

A key reason for undertaking a performance analysis is to identify areas of strength and weakness. This is of particular importance when investigating technique. Once you have identified areas that need to be improved, it is possible to develop a training programme to address these issues. For example, analysis may show that a goalkeeper is poor at gathering crosses. A training programme will incorporate specific training to improve this key area.

## Performance assessment

By assessing a team or an individual in a competition situation, you are able to see whether players are affected by outside factors such as the crowd or the opposition. This type of analysis will allow you to develop specific tactics that can be used under game conditions. Using defined conditions during training will allow a team to develop both their techniques and their tactics. An example of this would be if a team struggles to defend using man-marking in basketball. A practice may include using specific drills to highlight marking, and every time this happens the coach can stop the practice and demonstrate if it has been effective or not.

### Recovery after injury

If an athlete has been sidelined because of a short-term or long-term injury, it is useful to perform a number of assessments before they recommence training or performance. This ensures that the athlete has recovered sufficiently so that injury does not recur. Simple fitness tests can be conducted both on the injured area, and also generally to identify a base level from which to start training again. It is important that the athlete does not over-train, as this can result in continued injury and will prevent them from performing.

The coach may also wish to talk to the athlete about their injury in case there are problems or concerns about a recurrence. A player may have been hurt by a tackle, and may have developed a fear of tackling. Using this information, the coach will be able to support and encourage the athlete to overcome any psychological factors.

### Assessment of health status

It is common to use fitness testing and health screening to analyse whether a person is able to participate in exercise programmes. This may be specific to an individual who has not taken part in sport for a long time, or to a high-level athlete recovering from illness or injury. Either way, assessment of health will provide the coach with information regarding whether or not they are able to perform specific exercises, or to gauge the level at which a training programme should be set.



## Squad selection

Analysis can be used to monitor player performance both in training and in competition. Sports such as rugby and football now use large squads of players, and through performance analysis a coach will be able to select the players most likely to achieve success. If a player has been underperforming, this can be addressed and additional support given. A coach can analyse the opposition team in preparation for a match, so that tactics involving certain players can be developed and used.

## Goal setting

By using detailed analysis and evaluation of performance, it is important that clear and well defined targets or goals are set by the coach and athlete. These goals can be seen as a target that the performer wishes to achieve, and may be either short- or long-term goals. Goals should be set using the SMART principle (see page 20) and should be discussed openly by the coach and the athlete. By including the athlete in the decision-making, it is likely that they will remain more motivated to train as they feel they are in control of their training.

## 4.3 Resources

### Fiscal resources

Equipment for analysis costs money. As noted above, the ways in which performance can be analysed vary greatly. An effective evaluation can be performed by a coach simply watching a performance and feeding back their findings or thoughts to the athlete or team. Alternatively, technologically advanced equipment can be used to video techniques and computer software used to analyse specific movements. The benefit of this equipment is that it can slow techniques down to tiny movements, and measurements can be made, such as velocity of movements or joint angles. But this can be both expensive and time-consuming.

### Equipment

The equipment a coach can use to perform an analysis varies greatly. A clipboard can be used to record observations during a match, and a simple stopwatch can be used to record times. But more elite performers will require highly detailed analysis with more advanced equipment, such as movement-

analysis software, force platforms and respiratory analysers. Such performance equipment is commonly found in sports science laboratories that are designed specifically to record human performance.

### Activity: How sports equipment has changed



Tennis is a sport that has seen many changes to the equipment. Traditionally tennis was played with wooden racquets. However synthetic materials in the form of carbon fibre are now used. This has allowed players to hit the balls harder and faster and as a result tennis is more demanding on the players.

For the sports shown below, identify how the equipment has changed in recent years and how this has changed the sport:

- golf
- cricket
- football.

### Time

Performance analysis can be a very time-consuming process. If a video analysis is conducted, the coach will have to review the performance, interpret the data that has been collected, fully evaluate it, and develop the results into training programmes or tactics. For an analysis to be effective, it is important that the coach and players allocate sufficient time to evaluate findings as part of the coaching process. If evaluation is hurried, errors are likely to occur and the findings may be inaccurate.

### Facilities

It is common for high-level athletes to find themselves in a sports science laboratory as part of a performance assessment. Such laboratories will contain up to date scientific equipment which allows highly accurate and detailed physical performance information to be collected and analysed. Unfortunately, this equipment can be very expensive, and coaches may need specialist assistance in gathering information. But it is still possible to collect relevant information using common equipment such as stopwatches and simple notational analysis.



What are the benefits of using a sports science laboratory? What information could you obtain from having access to such research?

It is also important to remember that performance can be affected by *where* the athlete is performing. This must be taken into account when undertaking any form of assessment.

## Human

The best asset in developing sporting performance is people who are enthusiastic about the goal. These may be coaches, players, family or spectators, and each plays a valuable role in improving an athlete's or a team's performance. Gaining feedback from people will aid training and performance, and using such advice should be part of the coaching process. Sharing the experiences of other players will also aid performance, and a young or inexperienced athlete should seek advice from others.

## Scientific support and equipment

Having access to analysis equipment and qualified support will enable the athlete to focus on specific parts of their performance and training and be able to develop strategies to improve. However, such scientific support is usually only accessible to elite athletes because of the costs involved.

## Assessment activity 11.4

**P5**

**BTEC**

Your voluntary work at a local sports college involves you working with a range of performers of different abilities. It is important that you are able to identify the different forms of analysis that can be used for the four different levels of sport. To help the athletes, prepare a presentation that outlines and describes the purpose of analysis for a sport at two different levels (for example, foundation and excellence) and the resources you require. **P5**

### Grading tip

- To attain **P5** be realistic. If you are working at the foundation level you may not have the expensive, technological resources available to you. How can you overcome this? What types of analysis can you perform at this level that do not require advanced technology?

### PLTS

By describing the resources required for the analysis of different levels of sport, you can demonstrate your skill as a **creative thinker**.

### Functional skills

By preparing a presentation you can demonstrate your **ICT** skills.

# Rizana Suhail

## Performance analyst



Rizana works at a human performance centre where she carries out sporting performance analysis on individuals and teams. She uses the latest technology and equipment to perform a variety of analyses including:

- technical analysis that looks at individual sporting performances
- match analysis that will look at the tactical performance of a team.

An example of her job is notating a football match which may include the numbers of passes made, the numbers of corners conceded or the shots on or off target. Such data will be collected and analysed.

Rizana is then able to set specific targets, tactics and training techniques to help improve performance.

'I start work at 8 a.m. and my first job is checking my schedule for the day. I can see if I am working with an individual or a team. I will then check the specific equipment that I might need such as a video camera, laptop and any notational checklists.

When the individual or team arrive I will have a brief meeting with them to explain the purpose of the analysis and how their performance is going to be measured. Any questions can be asked and I can highlight the specific aspects of performance that will be measured.

Having completed a session I will then analyse the measured data and prepare a report. This will outline my findings and I will have a meeting with the people involved to discuss and explain them. This will allow the individual or a coach to set specific targets or goals as part of their training programmes.

The best thing about my job is working with so many different athletes. Every day presents me with new challenges and I get lots of satisfaction from helping athletes reach their performance goals.

In terms of skills, I have to communicate with other members of the team and clients every day so this is at the top of the list. The practical skills I practised during my Sport BTEC, I now use every day to analyse performance and make specific recommendations. My knowledge of a wide variety of sports has also developed.'

### Think about it!

- What are the benefits of using a performance analyst like Rizana?
- How can the use of video analysis help an athlete or team improve?
- What skills do you think you need to be successful in this job?

## Just checking

1. Giving examples, explain what is meant by discrete skills, serial skills and continuous skills.
2. For a sport of your choice, explain the specific skills that are required to perform at excellence level.
3. Discuss how an understanding of sports psychology can aid performance.
4. Name two methods of psychological training that can be used to enhance performance, and discuss why these methods may work.
5. Outline the psychological factors that can affect a performance, and explain how a coach can address these as part of a training programme.
6. What is notational analysis and how is it used in sport?
7. What is meant by goal setting? Use examples from a chosen sport to explain this.
8. List and explain the four levels of sporting performance.
9. How may a coach use performance analysis for a group of beginners?
10. How can technology improve sporting performance?

## Assignment tips

- Remember that you will need to be able to communicate with a wide range of people. Enjoy the experience and you are far more likely to see improvements in your skills and techniques.
- Support your peers and they will support you. Work together giving each other tips and encouragement.
- Practise by watching performances in a wide variety of sports. Remember a successful sports analyst will need knowledge of many sports.
- Make sure that you are well prepared when performing an analysis. Remember sports action takes place very quickly so you need to know what to watch in advance.
- Use the national governing body websites to help you gather research material. They contain plenty of useful information.
- Ensure that you read the assignment briefs properly. Take your time and ensure you are happy with the task set for you. If not ask your tutor for additional assistance.
- Make sure you attempt all parts of the assignment briefs and not just the pass criteria.