UNITS 3 & 4

PHYSICAL EDUCATION FOR QUEENSLAND

CRYSTAL HEDE | KATE RUSSELL | RON WEATHERBY | MONIQUE BRENNAN | WAYNE GORE | BEN WILLIAMS

SAMPLE CHAPTER

UNCORRECTED PAGE PROOFS

To access a sample of the additional digital resources and teacher materials that will support this series, visit:

www.oup.com.au/sampledigital

For more information, or to book an appointment with your local sales consultant, contact:

Tegan Hooper
Email: Tegan.Hooper@oup.com
Mobile: 0456 655 441

Melissa Wearne
Email: Melissa.Wearne@oup.com
Mobile: 0447 557 931

obook assess

OXFORD

CONTENTS

UNIT 4 ENERGY, FITNESS AND TRAINING AND PHYSICAL ACTIVITY

CHAPTER 2

TACTICAL AWARENESS

‘These young guys are playing checkers. I’m out there playing chess.’

Kobe Bryant (1978–present)
Former American professional basketball player widely regarded as one of the greatest basketball players of all time. He played his entire 20-year career with the Los Angeles Lakers of the National Basketball Association (NBA).

KEY TERMS

By the end of this chapter, you should understand the meanings of the following key terms. They are defined throughout the chapter, as well as in the glossary. Use this handy checklist to test your understanding.

- ☐ affordances
- ☐ attunement
- ☐ body and movement concepts
- ☐ body awareness
- ☐ cognitive systems approach
- ☐ constraints
- ☐ constraints-led approach
- ☐ dynamic
- ☐ dynamic models of learning
- ☐ dynamic systems approach
- ☐ dynamic systems theory
- ☐ ecological model
- ☐ environmental constraints
- ☐ fundamental movement skills
- ☐ learner constraints
- ☐ motor control system
- ☐ motor learning
- ☐ movement strategies
- ☐ perception–action coupling
- ☐ principles of decision making
- ☐ principles of play
- ☐ quality of movement
- ☐ rate limiters
- ☐ relationships
- ☐ self-organisation
- ☐ space awareness
- ☐ specialised movement sequences
- ☐ tactical awareness
- ☐ tactical strategy
- ☐ task constraints

SUBJECT MATTER OUTCOMES COVERED IN CHAPTER 2

All of the subject matter dot points you are required to cover in **Unit 3 – Topic 1** of the Physical Education General Senior Syllabus are included in this chapter. The tables below show you exactly where each subject matter dot point is covered.

Unit 3 – Topic 1: Tactical awareness integrated with one selected 'Invasion' or 'Net and court' physical activity

In Unit 3 – Topic 1, students engage in learning that involves the integration of Tactical awareness subject matter and the subject matter for a selected 'Invasion' or 'Net and court' physical activity.

Stage 1: Engage and understand

Subject matter	Section/s	Page/s
In this area of study, students will:		XXX–XXX
→ recognise and explain that two major approaches to investigate motor learning have developed over time: cognitive systems and dynamic systems		
– the cognitive systems approach, which is considered the more traditional approach, involves a hierarchical model of control where higher control centres pass commands to lower control centres resulting in linear changes in movement; it requires an understanding of the process that occurs in making decisions, planning and executing movement		
– the dynamic systems approach, where movements emerge or self-organise through the dynamic interaction of the environment, the task being performed and the individual; movements are not organised hierarchically, involve non-linear and unpredictable changes, and emerge as part of a complex system		
→ recognise and explain that tactical awareness is a personal response to the interaction of constraints of the learner, task and environment during goal-directed behaviour in a physical activity		XXX–XXX XXX–XXX
→ recognise and explain the alignment of dynamic systems to the complex nature of authentic game play		XXX–XXX
→ identify and explore dynamic models of learning including dynamic systems theory and the ecological model		XXX–XXX
→ recognise and explain that dynamic systems theory views the learner as a complex movement system of many independent and interacting parts, and that this system self-organises in response to the constraints placed upon it. This includes the understanding that		XXX–XXX
– self-organisation involves the dynamic interaction of constraints on movement and, when specific constraints are present, the system organises into a specific yet stable state or preferred method of movement		
– constraints are the boundaries within which learners can explore and search for movement solutions within a physical activity, including		
– task constraints – the characteristics of the task that can influence movement, e.g. number of players, rules and equipment		
– learner constraints – any personal characteristics of the learner that can influence movement, e.g. height, weight, body composition, motor skills and motivation		
– environmental constraints – any characteristics of the physical and social environment that can influence movement, e.g. playing surface, playing area, movement, noise, weather conditions, teacher, coach, peers and family		
– movement changes and progressions are non-linear as they involve abrupt changes from one stable state to another, e.g. changing from walking to running when increasing the speed on a treadmill		
→ recognise and explain that the ecological model focuses more on how the motor control system interacts with the environment and proposes that information to control action is consistently and directly available from our senses through a perception–action coupling. This includes the understanding that		XXX–XXX
– perception–action coupling provides a direct link between the process of interpreting or giving meaning to information from the environment and a specific action, e.g. perceiving the space between the defenders and responding with the action of running through the space		
– perception can drive the action, but action can also drive the perception		
– affordances are opportunities for action provided by the environment or task in relation to the learner's ability, e.g. a space between defenders affords the opportunity for exploitation by a performer with appropriate speed		
– as a skill is learned, individuals become more attuned to the environment and the affordances that are available for movement. This enables the learner to identify opportunities for action from the environment, e.g. attune to the size of the space between the defenders		
→ recognise and explain that a constraints-led approach to learning can be developed by combining understanding of the dynamic systems theory, which considers the constraints on the motor control system, and the ecological model, which considers how the system interacts with the environment		XXX–XXX
→ identify and explore a constraints-led approach to learning in the selected physical activity to allow opportunity for exploration of movement sequences and development of movement strategies through		XXX–XXX
– manipulation of task constraints, e.g. manipulating the scoring system, adapting specialised movement sequences		
– consideration of variations among learners' personal constraints, e.g. considering strengths and limitations of teammates and opponents		
– interaction with environmental constraints, e.g. varying dimensions within the area of play		
→ recognise and explain the principles of decision-making in the selected physical activity including		XXX–XXX
– reading play		
– recognising information and responding		
– reacting to implement movement		
– recovering with appropriate movements, e.g. recover with 'on the ball' and 'off the ball' movements		

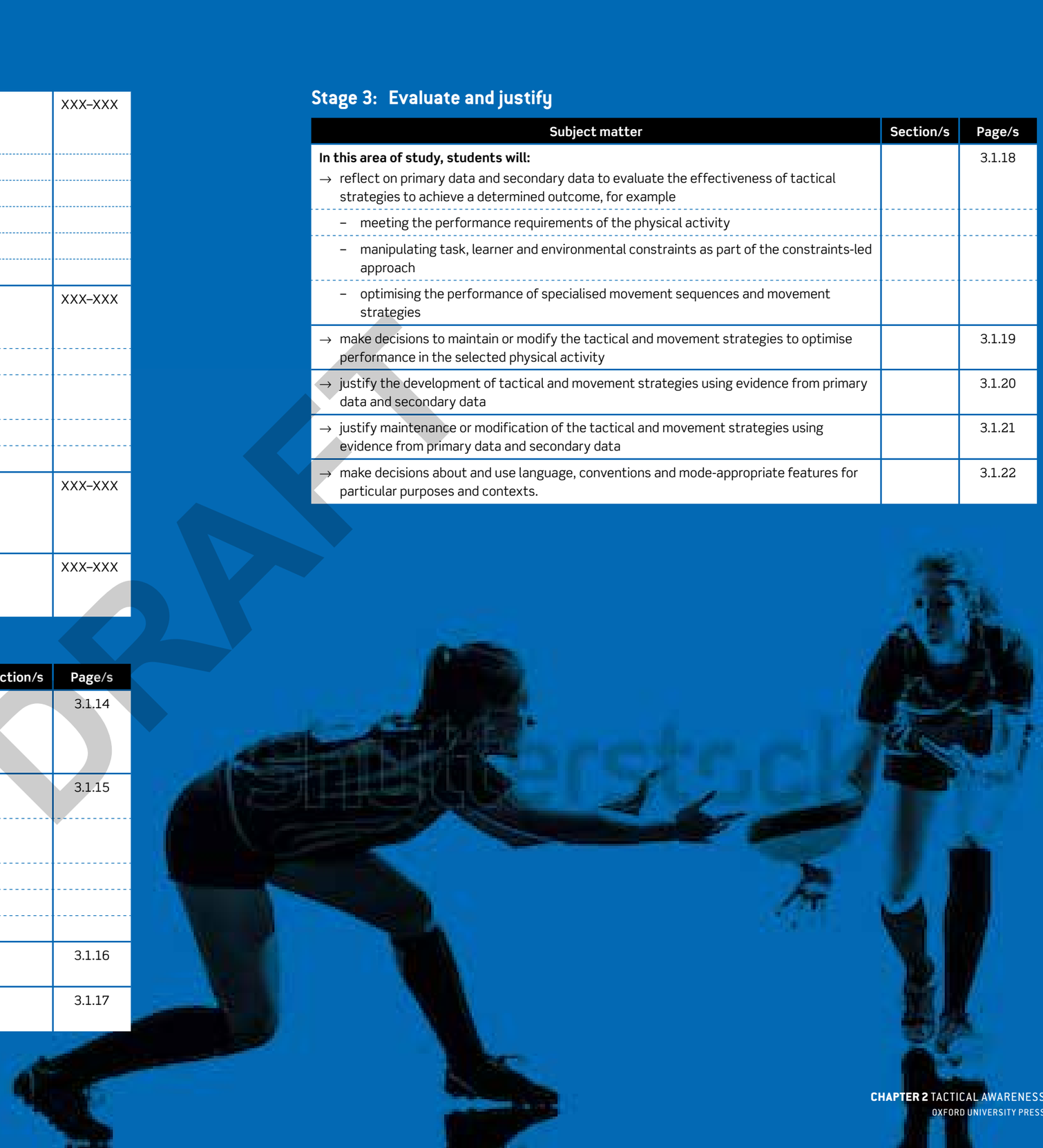
→ identify and explore the principles of play, which are fundamental movement strategies used by individuals or teams to effectively adapt to any tactical situation in authentic performance environments, including		XXX–XXX
– setting up attack		
– defending against attack		
– creating, defending and exploiting space		
– attacking opposition space		
– scoring		
→ investigate 'on-the-ball' and 'off-the-ball' movements and decision-making in authentic performance environments, using body and movement concepts as criteria. Examples include:		XXX–XXX
– body awareness, e.g. movement execution, pass or shot selection		
– space awareness, e.g. movement pathways, use of space, when to run into space or when to pass		
– quality of movement, e.g. force development, efficiency and outcome		
– relationships, e.g. interaction with opponent and team members		
→ gather primary data about the relationships between a constraints-led approach to learning, tactical awareness concepts and principles, and personal performance of specialised movement sequences and movement strategies in authentic performance environments		XXX–XXX
→ use secondary data to analyse how tactical awareness concepts and principles and a constraints-led approach to learning can influence performance in the selected physical activity.		XXX–XXX

Stage 2: Apply and analyse

Subject matter	Section/s	Page/s
In this area of study, students will:		3.1.14
→ analyse and synthesise primary data and secondary data about the influence of the constraints-led approach to learning and tactical awareness concepts and principles on movement sequences and movement strategies in the selected physical activity		
→ optimise performance in the selected physical activity by devising personal and team tactical strategies that consider the		3.1.15
– manipulation of task, learner and environmental constraints as part of a constraints-led approach		
– relevant body and movement concepts, and specialised movement sequences		
– two different principles of play		
– determined outcomes of performance in the selected physical activity		
→ implement tactical and movement strategies to gather primary data about the outcomes, implications and limitations of decision		3.1.16
→ analyse primary data and secondary data to ascertain the relationships between tactical strategies, concepts and principles, and personal and team performance.		3.1.17

Stage 3: Evaluate and justify

Subject matter	Section/s	Page/s
In this area of study, students will:		3.1.18
→ reflect on primary data and secondary data to evaluate the effectiveness of tactical strategies to achieve a determined outcome, for example		
– meeting the performance requirements of the physical activity		
– manipulating task, learner and environmental constraints as part of the constraints-led approach		
– optimising the performance of specialised movement sequences and movement strategies		
→ make decisions to maintain or modify the tactical and movement strategies to optimise performance in the selected physical activity		3.1.19
→ justify the development of tactical and movement strategies using evidence from primary data and secondary data		3.1.20
→ justify maintenance or modification of the tactical and movement strategies using evidence from primary data and secondary data		3.1.21
→ make decisions about and use language, conventions and mode-appropriate features for particular purposes and contexts.		3.1.22



2.1 Introduction to tactical awareness

That's a goal!

By the end of Section 2.1, you should be able to:

→ **define** the term 'tactical awareness'

→ **understand** and **explain** why tactical awareness is an essential skill for athletes to develop (regardless of their chosen sport or physical activity).

Defining tactical awareness

tactical awareness
an athlete's ability to identify and interpret what is happening within a game situation to help them select, adapt and apply the best physical responses and increase their chances of success

Tactical awareness is the ability to identify what is happening in a game situation and use this information to select and implement the correct physical responses in order to increase the chances of a successful outcome. Physical responses may include knowing when and how to pass a ball in order to maintain possession, creating doubt in an opponent's mind by faking a pass or isolating a defender to create a scoring opportunity.

However, being tactically aware involves much more than just identifying opportunities for yourself and taking advantage of them. It also involves having an awareness of:

- the people around you – being constantly aware of your position on the field or court in relation to other players; understanding the particular playing styles of your teammates and/or opponents; having the ability to identify the strengths and weaknesses of each player you are interacting with
- the environment you are in – understanding the playing conditions (e.g. quality of pitch/court), weather conditions (e.g. wind, rain, fog), equipment conditions (e.g. size, shape, weight, quality).

Athletes who are able to take all of this information into account during a game and process it quickly to make informed and accurate decisions and predictions about how to act, can significantly increase their chances of success, regardless of the sport they are playing.

The importance of tactical awareness in sport and physical activity

When we think of great athletes, names such as Michael Jordan, Serena Williams, Johnathan Thurston and Samantha Kerr come to mind. They each possess outstanding skill and technique, but it is more than this that makes them exceptional at what they do. What sets them apart from other athletes in their sport is their ability to read plays and make informed predictions and decisions in the moment to achieve success for their team. In other words, they are able to consistently make the right decisions and execute the appropriate skills at the best possible time. This ability is exceptional tactical awareness.

When athletes are tactically aware, they are able to scan the environment and take in all of the relevant information, looking for the opportunities that provide them with the best chance to achieve success.

Athletes like NRL legend Johnathan Thurston are often credited with having great tactical awareness because they can predict how a game will unfold much faster and more accurately than other players on the field.

During his long and successful career, Thurston helped his team claim victory countless times. In 2015, he became the first ever player to win the Dally M Medal four times. Whether he was representing Australia, Queensland or the North Queensland Cowboys, Thurston's success can be attributed to his ability to select and implement the right skill at exactly the right time. For example, he often targeted slow defenders and performed side-steps on them, threw cut-out passes with just the right level of speed and precision, and anticipated passes from opponents in order to intercept them.

SOURCE 1 Great athletes like Michael Jordan, Serena Williams, Johnathan Thurston and Samantha Kerr possess outstanding talent, skill and technique, but their ability to read plays in order to make informed predictions and split-second decisions is what sets them apart. This ability is known as tactical awareness.

Tactical awareness in different categories of physical activity

In Unit 3 – Topic 1, you will be required to focus on the concepts and principles of tactical awareness in relation to **one** physical activity from **either** the 'Invasion' physical activities listed in Source 3 or the 'Net and court' physical activities listed in Source 4.

Regardless of the physical activity you select, it is important to note that sports that have similar fundamental goals (e.g. setting up an attack and defending against an attack) also have similar ways (i.e. movement strategies) for achieving these goals. Such goals are referred to as principles of play. We will explore principles of play in more detail in Section 2.4.

For example, when implementing the principle of play setting up an attack, maintaining possession of the ball is a movement strategy common to all 'Invasion' physical activities. The movement solution to achieve this movement strategy involves successfully passing the ball to an open (i.e. unmarked) teammate. To do this:

- the teammate must move into open space
- the player with control of the ball must select and execute the best method to ensure the ball is passed successfully.


SOURCE 2 Although 'Net and court' physical activities have very different rules, the principles of play and movement strategies in one – for example, forcing the opposition to use a free ball for setting up an attack in volleyball – are similar to controlling a rally for the same principle of play in badminton and tennis.

'Invasion' physical activities

To complete an 'Invasion' physical activity as part of your studies in Unit 3 – Topic 1, you may choose one of the following:

Australian football	More detail on this physical activity is provided on your obook assess – refer to Section 2.7A
Basketball	More detail on this physical activity is provided on your obook assess – refer to Section 2.7B
Futsal	More detail on this physical activity is provided on your obook assess – refer to Section 2.7C
Netball	More detail on this physical activity is provided on your obook assess – refer to Section 2.7D
Soccer	More detail on this physical activity is provided on your obook assess – refer to Section 2.7E
Touch football	More detail on this physical activity is provided on your obook assess – refer to Section 2.7F
Water polo	More detail on this physical activity is provided on your obook assess – refer to Section 2.7G

SOURCE 3 'Invasion' physical activities in the QCE Physical Education syllabus

'Net and court' physical activities

To complete a 'Net and court' physical activity as part of your studies in Unit 3 – Topic 1, you may choose one of the following:

Badminton	More detail on this physical activity is provided on your obook assess – refer to Section 2.8A on page XX
Tennis	More detail on this physical activity is provided on your obook assess – refer to Section 2.8B on page XX
Volleyball	More detail on this physical activity is provided on your obook assess – refer to Section 2.8C on page XX

SOURCE 4 'Net and court' physical activities in the QCE Physical Education syllabus

Why study tactical awareness?

Developing tactical awareness is an essential skill for every athlete, regardless of their chosen physical activity. In sports requiring complex interactions between the team members and their environment – such as 'Invasion' and 'Net and court' physical activities – the development of skills alone is not enough to achieve success. In order to optimise performance and maximise the chances of a successful outcome, players need to be able to read the situation (i.e. identify what is happening around them) and use this information to select and implement the correct physical responses.

As is the case with most skills, techniques and abilities in the context of sport and physical activity, individual athletes naturally possess varying degrees of tactical awareness. For example, in the same team, a relatively new player may have a low degree of tactical awareness, while a more experienced player might possess a high level of tactical awareness. In contrast, a relatively new player (i.e. one with low technical skill and little knowledge of the game) may naturally possess a more developed degree of tactical awareness – or develop this over a much shorter period of time than a more experienced player.

Developing tactical awareness is a complex process that can take time to understand and master, but it is a skill that can be learnt. In fact, the experiences and training opportunities provided to learners can make a real difference to the way they acquire skills and develop tactical awareness.

Throughout this chapter, we will be exploring theories and models in order to understand the ways in which athletes develop tactical awareness. In order to do this, we will begin by developing a basic understanding of how people learn generally, and then look at how they learn (acquire) and remember (retain) the skills to perform the **specialised movement sequences** required for sport and physical activity. This field of science is known as **motor learning**.

specialised movement sequences
a combination of fundamental movement skills (and movement elements) that enable the body to move in response to a stimulus

motor learning
a field of science that investigates human movement with the goal of understanding how humans acquire and retain the motor skills required to perform specialised movements (i.e. through practice, experience and/or feedback)

Check your learning

Engage and understand

1 In your own words, **define** what is meant by the term 'tactical awareness'.
2 **Select** one of the athletes shown in Source 1 and **describe** a situation (e.g. a specific play or game) in which they demonstrated a high degree of tactical awareness in order to achieve a successful outcome.
3 **Explain** why tactical awareness is an essential skill for every athlete to develop, regardless of their chosen sport or physical activity.

Analyse and apply

4 **Identify** a movement strategy in your selected physical activity and **determine** the skills (specialised movement sequences) that can be used to achieve this strategy.

obook assess
Check your obook assess for the following additional resources and more:

- **Student book questions XX**
  [Title TBC]
- **Worksheet XX**
  [Title TBC]
- **Weblink XX**
  [Title TBC]
- **assess quiz XX**
  Test your skills with an auto-correcting multiple-choice quiz.

2.2 Approaches to motor learning and the development of tactical awareness

That's a goal!

By the end of Section 2.2 you should be able to:

→ **understand** and **define** the concept of 'motor learning'

→ **identify** two major approaches used to investigate motor learning (i.e. the cognitive systems approach and the dynamic systems approach)

→ **explain** why an understanding of motor learning is central to the development of tactical awareness.

The learning process – including the development of tactical awareness – is extremely complex and involves many different organs and systems in the body. For centuries, scientists have investigated the process of learning in an attempt to understand exactly how humans learn, remember and perform new skills. Over time, they have developed many different approaches (i.e. broad theoretical frameworks) that attempt to explain how humans learn and how we are able to remember the thousands of motor skills and specialised movement sequences we perform every day. This field of science is known as motor learning.

cognitive systems approach
a theoretical framework used to help explain the processes involved in motor learning; according to this approach, the brain acts as the central command centre for the body. It creates action plans for movements based on information it receives from the body's senses and instructs the muscles to perform these actions in a linear order (i.e. step- by- step)

dynamic systems approach
a theoretical framework used to help explain the processes involved in motor learning; according to this approach, the intelligence that coordinates and controls body movements is the result of complex interactions between the individual, the environment and the task

Defining motor learning

Motor learning seeks to study and explain many aspects of human movement. In particular it aims to understand how humans learn (acquire) and remember (retain) the motor skills and motor programs required to perform specialised movement sequences (i.e. through practice, experience and/or feedback).

Motor learning researchers do this by:

- studying different organs and systems in the body (e.g. the nervous system and musculoskeletal system) in order to understand the relationship between them
- investigating the different processes that people go through in order to learn and master a new movement or skill.

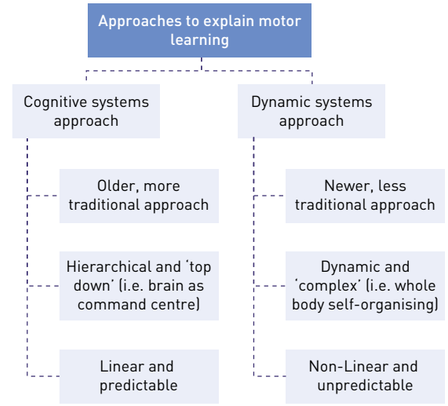
Major approaches to motor learning

In Unit 1 – Topic 1 of the QCE Physical Education course (i.e. Motor learning integrated with a selected physical activity), you learnt about two of the major approaches that were developed to help explain the process of motor learning. These are known as:

- the **cognitive systems approach** – an older, more traditional approach to understanding motor learning
- the **dynamic systems approach** – a newer, more progressive approach to understanding motor learning.

Although they are different in many ways, both of these approaches attempt to explain exactly how motor learning takes place. We will now briefly revisit both of these major approaches in order to:

- get a better understanding of how each one explains the process of learning
- learn more about the types of learning environments, training programs and coaching techniques that are most effective when it comes to helping learners develop particular skills and strategies in sport and physical activity.



SOURCE 1 Over time, two major approaches have been developed to help explain how the process of motor learning takes place: the cognitive systems approach and the dynamic systems approach.

The cognitive systems approach to motor learning

The basic idea behind the cognitive systems approach to motor learning is that the brain works like a computer that controls the body. According to this approach, a part of the brain (known as the prefrontal cortex) acts as the central command centre and creates an action plan for movement based on information it receives from the body's various senses. Once the action plan is in place, the brain informs the relevant muscles to carry out the plan one step at a time. For these reasons, the cognitive systems approach is often described as:

- hierarchical or 'top down' because it assumes that higher control centres (i.e. the brain) pass commands down to lower control centres (i.e. the muscles and nerves)
- linear because it assumes that the commands are sent from the brain in a predetermined order (i.e. step-by-step, one command after the other).

For example, according to the cognitive systems approach, to learn and perform a dig in volleyball, the brain creates an action plan (i.e. motor program). That action plan lists all of the necessary movements (i.e. sub-routines) required to complete the dig. It then sends each of these commands (in a predetermined order) to the relevant muscles that are needed to perform the skill and complete the task.

This science has informed coaching practices for many years. Coaches using a cognitive-based approach tell their athletes what they need to do, and when and how they need to do it. For example, the set plays of a team are pre-determined and skills are mostly taught in repetitive isolation (i.e. closed environments), with the understanding that athletes will become technically proficient and then apply their skills in game play, becoming more tactically aware with time and experience.

The benefits of a cognitive-based approach include:

- control over variables
- ease of planning
- convenient implementation.

STUDY TIP

It might help you to revisit and revise the key features of the cognitive systems approach and dynamic systems approach to motor learning that were covered in Unit 1 of the QCE Physical Education syllabus.

You can do this by referring to Section 2.3 (pages 46–55) and Section 2.4 (pages 56–61) of *Physical Education for Queensland Units 1 & 2*.

If you no longer have access to the printed Student book, you can still access a complete digital version online via your obook assess.

The dynamic systems approach to motor learning

Driven by a constant desire to understand more and explore new ideas, sports scientists continually challenge established ways of doing things. This process has led to the development of new approaches and theories about learning, such as the dynamic systems approach.

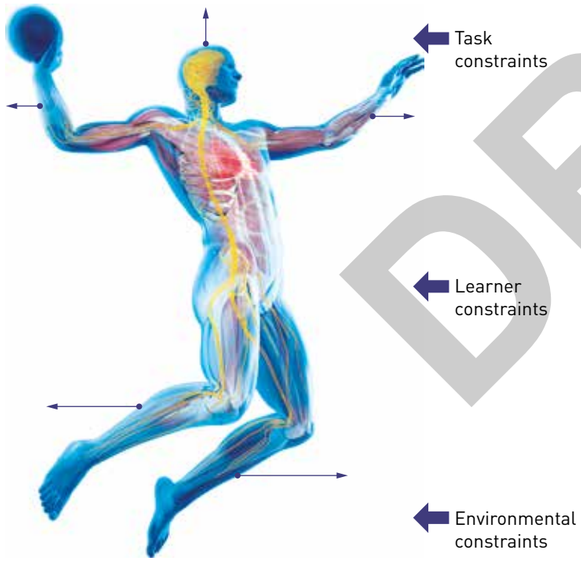
The basic idea behind the dynamic systems approach is that the body is a complex organism made up of many different systems and parts (e.g. nervous system, respiratory system, cardiovascular system, muscular system and skeletal system). Each individual system is further comprised of many components such as bone, muscle tissue, blood cells, oxygen molecules and enzymes. According to the dynamic systems approach, each of these systems and all of its components are constantly interacting with each other and the outside world.

Unlike the cognitive systems approach, which views motor learning as an organised process, the dynamic systems approach views motor learning as a much more complex, unpredictable and constantly changing process (hence the name '**dynamic**').

dynamic
a term used to describe a process or system that is constantly changing

The dynamic systems approach does not suggest that our movements are coordinated exclusively by a single, centralised command centre (i.e. our brain). Instead, it suggests that our movements are coordinated and controlled through complex, non-linear interactions between all parts of the body – and that no single body system or part is more important than the other in the learning process.

SOURCE 2 According to the cognitive systems approach, the brain works like a computer to control the body. To learn and perform the throw shown here, the brain creates an action plan that lists all of the necessary movements required. It then sends each of these commands (in order) to the relevant body systems and muscles required to perform the skill.



SOURCE 3 According to the dynamic systems approach, the body is a complex organism made up of many different systems and component parts, each of which is constantly interacting with the others as well as the outside world. To learn and perform the throw shown here, all body systems are involved in a complex and dynamic interaction between the task, the learner and the environment.

The dynamic systems approach proposes that, with a favourable environment and a suitable task to perform, an individual will spontaneously and dynamically produce effective and efficient movement sequences over time. That is, movements emerge or self-organise through the dynamic interaction between the task being performed, the individual learner and the environment they are in. The complexity of this newer approach is useful when it comes to explaining how learning takes place in authentic game environments (i.e. open environments) that are similarly complex. It also highlights that a successful solution to a problem or challenge may not be limited to one specific skill. Instead, a successful outcome might be achieved by implementing one of many different strategies or skills, all with the same effect.

For the remainder of this chapter, we will investigate the dynamic systems approach to motor learning in greater detail. We will begin by exploring the central concepts of the approach and then investigate how an understanding of these concepts can inform teaching and learning strategies, looking specifically at the **constraints-led approach** to teaching and learning.

constraints-led approach
by manipulating constraints, learning opportunities are presented to the learner and the learner is then challenged to find their own movement solutions to the problems faced or the goals to be achieved (in contrast to more traditional coaching techniques that favoured coach-directed technical drills performed in isolation outside authentic game situations)

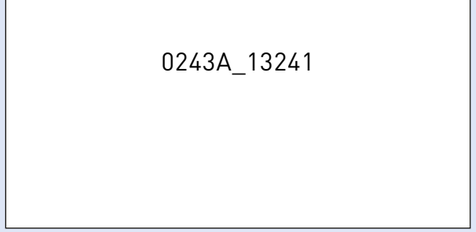
2.2 Check your learning

Engage and understand

1 **Define** what is meant by the term 'motor learning' and **explain** why sports scientists would be interested in this field.
2 **Explain** the basic idea behind the cognitive systems approach to motor learning.
3 **Explain** the basic idea behind the dynamic systems approach to motor learning.

Analyse and apply

4 The dynamic systems approach proposes that movements emerge or self-organise through the dynamic interaction between the task being performed, the individual learner and the environment they are in. **Analyse** the primary data below and categorise labels 1, 2 and 3 from the picture into the task being performed, the individual learner and environmental they are in.



SOURCE 4 Queensland player Kimberley Sue See during the 2016 State of Origin series

Evaluate and justify

5 Think about a physical activity in which you consider yourself the most tactically aware. **Reflect on** your journey as a learner in that physical activity and **discuss** whether your coaches used a predominantly cognitive systems approach or dynamic systems approach when coaching you, giving examples where possible. Present your response in no more than 150–200 words.

obook assess
Check your obook assess for the following additional resources and more:

- **Student book questions XX**
  [Title TBC]
- **Worksheet XX**
  [Title TBC]
- **Weblink XX**
  [Title TBC]
- **assess quiz XX**
  Test your skills with an auto-correcting multiple-choice quiz.

2.3 The dynamic systems approach and dynamic models of learning

That's a goal!

By the end of Section 2.3 you should be able to:

→ **identify** and **explain** the dynamic models of learning
→ **identify** and **explain** the key features of dynamic systems theory, including:
- self-organisation
- three types of constraints (i.e. task constraints, learner constraints, environmental constraints)

→ **identify** and **explain** the key features of the ecological model, including:
- perception–action coupling
- affordances
- attunement.

In this section we will explore features of the dynamic systems approach in more detail and begin to explore how it can be used to understand the development of tactical awareness. Before we begin, it is useful to note that an 'approach' is a broad theoretical framework that has developed over time. Think of the dynamic systems approach as a 'big idea' that attempts to explain the entire process of learning. Within this approach or 'big idea' there are a number of smaller models (i.e. theories) that attempt to explain specific parts of the broader process of learning. These are referred to as **dynamic models of learning**.

Defining dynamic models of learning

Dynamic models of learning are theories (i.e. ways of thinking) that support the dynamic systems approach to motor learning. In other words, they attempt to explain in more detail how humans learn through a dynamic lens.

As shown in Source 1, there are two main dynamic models of learning:

- the **dynamic systems theory** – this model views the learner as a complex movement system that self-organises in response to constraints placed upon it
- the **ecological model** – this model attempts to explain how the learner's **motor control system** interacts with the environment to simultaneously 'perceive and act' and 'act and perceive' in order to identify opportunities and produce movements that will maximise the chances of success.

Together, these models provide us with information that support the broad ideas proposed by the dynamic systems approach. They help us to understand how our minds and bodies work in order to develop technical skills – as well as tactical awareness – in a dynamic and complex way. They also tell us why we should predominantly learn in authentic and dynamic contexts. In short, these models guide us to explore the way we develop learning experiences.

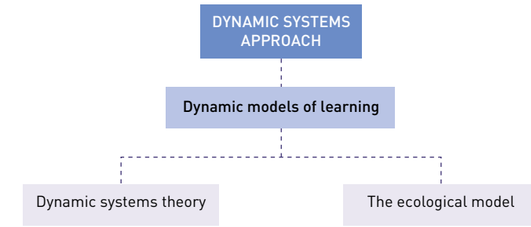
Although the ideas presented in these models are closely related and sometimes overlap, we will now explore each separately in more detail.

dynamic models of learning
theories that sit within the broader theoretical framework of the dynamic systems approach and explain and predict how certain aspects of motor learning and movement take place

dynamic systems theory
a dynamic model of learning that focuses on how a learner's motor control system interacts with the environment s and produce movements that will maximise the chances of success

ecological model
one of two main dynamic models of learning used to explain and predict how certain aspects of motor learning and movement take place; the ecological model focuses on how a learner's motor control system interacts with the environment in order to simultaneously 'perceive and act' and 'act and perceive' in order to identify opportunities and produce movements that will maximise the chances of success

motor control system
a term used to describe a range of body systems that work together in order to regulate the production of movements (i.e. the nervous system, the muscular system, skeletal system, etc.)



SOURCE 1 Think of the dynamic systems approach as a 'big idea' that attempts to explain the entire process of learning. Within this broad approach there are two dynamic models of learning that attempt to explain smaller, more specific aspects of the larger process. These are known as dynamic systems theory and the ecological model.

Dynamic systems theory

The first dynamic model of learning is known as the dynamic systems theory. This model proposes that a learner will adapt dynamically and create movement solutions in response to the situation they find themselves in. It views the learner as a complex movement system that self-organises in response to constraints placed upon it. Two concepts that are central to dynamic systems theory are:

- **constraints** – any internal or external variable (e.g. an athlete's strength, the weather, the rules of a game) that has an impact on an athlete's implementation of movement strategies and specialised movement sequences
- **self-organisation** – a process in which stable movement patterns emerge in response to a range of internal or external variables known as constraints.

Constraints

In 1986, a motor learning researcher by the name of Karl Newell developed the Theory of Constraints. He proposed that a number of variables, which he termed 'constraints', can affect an athlete's motor development. In a sporting context, a constraint is any internal or external variable that has an impact on an athlete's performance. There are three categories of constraints and all are central to the dynamic systems theory:

- **task constraints** – the characteristics of the task that need to be overcome or adapted to (e.g. the rules of a game, the time permitted, the number of players, the shape and weight of equipment, the size and shape of the playing surface)
- **learner constraints** (also known as 'individual constraints' or 'player constraints') – the characteristics of the individual that need to be overcome or adapted to. According to Newell's theory, learner constraints can be organised into two sub-groups:
  - structural learner constraints – constraints relating to physical aspects of the learner (e.g. height, weight, physical strength, fitness, speed, stamina)
  - functional learner constraints – constraints relating to psychological or behavioural aspects of the learner (e.g. confidence, motivation, fear, arousal, attention, concentration)

constraints
any internal or external variables that impact on an athlete's performance

self-organisation
a process in which many different systems and organs in the body interact dynamically with each other (in response to constraints) to achieve a goal or establish a movement pattern that is stable

task constraints
any characteristic of a task that an athlete needs to overcome or adapt to (e.g. the rules of a game, the size or shape of the equipment, the size and shape of the playing surface)

learner constraints
any characteristic of the individual (i.e. personal attribute) that an athlete needs to overcome or adapt to. Learner constraints can include structural learning constraints (e.g. height, weight, physical strength, fitness level) and functional learner constraints (e.g. confidence, motivation, concentration, anxiety)

environmental constraints
any characteristic of the environment that an athlete needs to overcome or adapt to. Environmental constraints can include physical environmental constraints (e.g. weather, light, noise) and social environmental constraints (e.g. parents, peers, coaches, cultural norms)

- **environmental constraints** – the characteristics of the environment that need to be overcome or adapted to. Environmental constraints can be organised into two sub-groups:
  - physical environmental constraints – constraints relating to the physical aspects of the environment (e.g. weather, light, noise)
  - social environmental constraints – constraints relating to the social aspects of the environment (e.g. parents, peers, coaches, cultural norms).

Constraints such as rules, field size and an individual's height generally remain consistent from game to game. A learner must work with, or overcome, these constraints in their pursuit of optimising performance. Additionally, there are many other constraints that can vary from game to game, such as the weather, opponents and an individual's fitness. The unpredictable and ever-changing nature of such constraints suggests that learning environments should be similarly unpredictable to facilitate the development of adaptability in learners. Constraints can be manipulated to provide the boundaries within which learners can explore and search for movement solutions. Working with constraints in this way prepares players for the dynamic conditions they face during competition.

Source 3 illustrates Newell's Theory of Constraints and provides examples for each type of constraint. Although most theorist agree with Newell's Theory of Constraints, you may notice that some experts disagree on exactly how some constraints are categorised.

Task constraints	Learner constraints	Environmental constraints
Characteristics of the task	Characteristics of the individual	Characteristics of the physical and social environment
• Rules of the game • Game/task/position objectives • Number of players • Time restrictions • Size, shape and weight of equipment • Size and shape of playing surface • Teammates • Opposition players	Structural learner constraints: • Height • Weight • Body composition • Endurance • Flexibility • Strength • Speed • Technique Functional learner constraints: • Motivation • Confidence • Learning style • Tactical knowledge	Physical environmental constraints: • Weather conditions • Temperature • Noise level • Light level • Gravity • Number of spectators • Mood of spectators (e.g. hostile/supportive) Social environmental constraints: • Parents • Peers • Coaches • Cultural norms

Source: adapted from Spittle. M, (2013) *Motor Learning and Skill Acquisition: Applications for Physical Education and Sport*

SOURCE 3 Newell's Theory of Constraints proposes that a number of internal and external characteristics (i.e. constraints) can affect an athlete's motor development.

According to Newell's theory, constraints do not exist in isolation (i.e. separately). He conveyed the interdependent relationship between the three types of constraints by representing them as equal corners of a triangle (see Source 8). This shows that the interaction between all three constraints is essential for learning to take place. If we were to remove one type of constraint (e.g. task constraints) from the learning process, so that an individual is learning and practising skills in the absence of any of the game rules and or objectives, the resulting skills would not be useful or transferrable when the learner re-entered an authentic game environment.

Working with constraints

It's important to remember that – despite the name – constraints are not always negative or restrictive. In fact, they can do one of three things:

- compel an athlete to respond or react in a certain way (e.g. swing a racquet during a game of tennis)
- cause an athlete to modify their movements (e.g. grip the racquet more tightly in the wake of an opponent's strong return shots)
- restrict an athlete's movements (e.g. a shoulder injury that prevents the use of a top spin backhand).

Some constraints do have a negative effect on the learning process and restrict performance. In this case, they are referred to as **rate limiters**. Rate limiters help to explain why an individual may have difficulty completing a skill, despite a concerted effort. The development of a new motor skill can also be compromised or restricted by one or more of these constraints. For example, a young child will find it difficult to develop basketball shooting and passing skills with a ball that is too large or heavy for them because their physical strength and size of their hands negatively impacts their ability to execute the skills. In this case, the child's lack of strength is a rate limiter, as is the size of their hand.

rate limiters
a type of constraint that has a negative effect on the development of motor skills in an individual and may restrict performance; rate limiters can be related to the task, the learner or the environment

Constraints elicit movement responses in learners, so it is possible to purposefully manipulate constraints in order to amplify a movement solution in players. For example, if a badminton player is relying too heavily on the forehand shot and not implementing a range of effective shots, a coach might manipulate the rules of the game to ban the use of forehand shots, forcing the player to come up with other ways to return the shuttlecock across the net.

SOURCE 2 According to dynamic systems theory, when running down a steep hill our bodies self-organise in real time to task constraints, learner constraints and environmental constraints, causing our movement pattern to become more efficient and stable. As a result, you lean back more and place more weight on your heel as you take each step.

Self-organisation

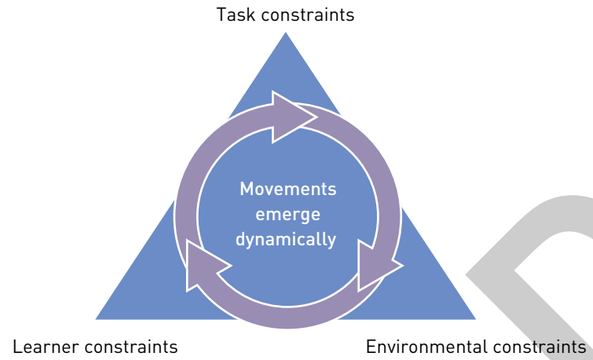
Self-organisation is another key concept of dynamic systems theory. It is a term used to describe the many large and small movement adjustments that a learner is constantly making to their body in response to the dynamic interaction with constraints. Through self-organisation, the body can find a movement solution to achieve a goal without the need for explicit direction or instruction. In other words, it is not necessary to have a pre-existing blueprint for such movement solutions; instead, they emerge through the dynamic interaction of the task being performed, the individual and the environment.

Self-organisation occurs because the human body always strives to maintain equilibrium (i.e. balance), right down to the cellular level. When the body self-organises, it is trying to establish a movement pattern that is stable and balanced. Dynamic systems theory suggests that all parts of the body work together to achieve this stability, as opposed to just the brain and the central nervous system controlling the body (as suggested by the cognitive systems approach). Once a person becomes stable, they become comfortable and can produce a motor skill easily and reliably.

Russian neurophysiologist Nikolai Bernstein (1967) proposed a model called the 'degrees of freedom problem', which explains that the body moves through three stages in order to achieve stability when executing specialised movement sequences for movement strategies. These stages are:

- freezing – fewer body parts are used to simplify the action
- releasing – actions become more fluid as extra body parts are used
- exploiting – skills are easily repeated, which allows an athlete to try different techniques.

SOURCE 4 Some constraints – known as rate limiters – have a negative effect on the learning process and restrict performance. For example, a young child will struggle to develop basketball skills with a ball that is too large or heavy for them because the physical strength and size of their hands negatively impacts their ability to execute the skill.



SOURCE 5 TBC

Working with self-organisation

You can get a better sense of what this means in a game environment if you imagine stepping onto a tennis court for the first time as a beginner. Say your coach hands you a racquet and presents you with the task objective of hitting a ball he has thrown to you back over the net, using only your racquet. Despite the limited instruction, your arms, legs and torso would naturally move in response to the task objective of hitting the ball with the racquet, and most likely produce a movement sequence somewhat resembling an actual tennis stroke. You may not actually make contact with the ball on the first attempt, but each time the ball is thrown towards you, your body will self-organise until you hit the ball.

In this example, hitting the ball over the net with a racquet is a task constraint that results in a level of instability that needs to be overcome. To do this, learners must make adjustments to their feet, arms and other body stabilisers. The body is capable of dynamically refining these movements over time to produce the most efficient technique for hitting a tennis ball over the net.

Self-organisation is something that athletes experience constantly, regardless of their skill or experience level. The ability to respond effectively to instability is an important skill – especially when it comes to the unpredictable nature of 'Invasion' and 'Net and court' physical activities – as learners are constantly required to adapt to changing situations around them. The change from instability to stability is usually more obvious in beginner performers as they refine their movement patterns and develop their tactical strategies over time. However, even elite performers are required to make minute adjustments to their movement patterns in response to the task and environment each and every time to produce a movement.

To optimise training experiences and achieve success through the dynamic systems approach, it's important that learners are exposed to a wide range of learning situations that create instability and force them to find the movement solutions dynamically (i.e. a personal **tactical strategy** that works for them in that moment).

The ecological model

The second dynamic model of learning is known as the ecological model (or ecological psychology or ecological dynamics). This model proposes that the dynamic relationship between the learner and the environment is the main driver of the movements we make during physical performance. In other words, this model focuses specifically on *how* our complex motor control system interacts with the environment and proposes that every organism (including humans) adapts to the environment in which it finds itself, through an intricate sensory network.

There are three concepts that are central to the ecological model:

- **perception–action coupling** – a process that explains how perception and action are connected through an ongoing loop whereby receiving and interpreting information from the environment (perception) drives a movement response (action) and action similarly drives perception
- **affordances** – opportunities for action provided by the environment or task in relation to the learner's ability
- **attunement** – the process of becoming increasingly aware of affordances.

Perception–action coupling

Perception–action coupling describes the intertwined nature of perceiving and acting, suggesting that perception can drive action and action can drive perception in an ongoing loop (see Source 7). Put simply, the information we perceive (become aware or conscious of) from the environment compels us to respond in a certain way but, in responding, we are compelled to perceive new information and react accordingly.

An American psychologist by the name of James Gibson (1904–1979) was one of the most important contributors to the field of visual perception. According to Gibson, 'We must perceive in order to move but we must move in order to perceive.'

For example, during a match, a soccer player perceives information as he looks for opportunities to progress towards his goal. He notices a space open up and responds by

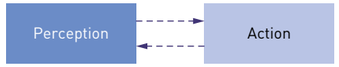
tactical strategies
an approach that assists a player or team to successfully optimise performance through the application of specialised movement sequences and movement strategies

perception–action coupling
a process that involves interpreting or giving meaning to information from the environment (i.e. perception) and linking this with a specific movement (i.e. action). This concept suggests that perceiving information and producing an action is a simultaneous two-way relationship (i.e. action influences perception at the same time as perception influences action)

affordances
opportunities for action that present themselves to athletes in a performance environment. Affordances are provided by the environment or the task – but the ability to take advantage of them depends on the ability of the learner

attunement
the ability to perceive information in a performance environment and use it to identify available affordances

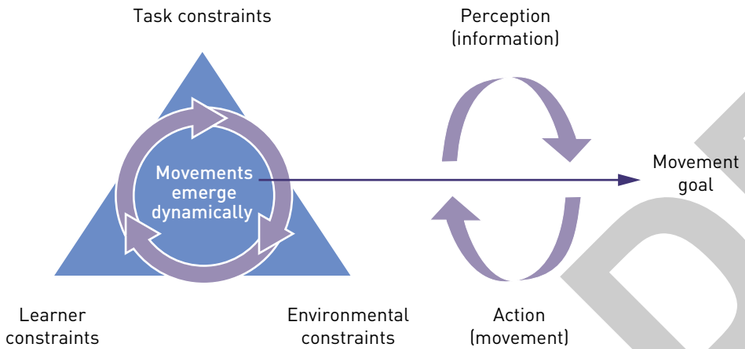
running towards it. As he starts running, he is compelled to perceive new information: his teammate is in a better position and more likely to receive the pass. He reacts to this information by changing the direction he is running in so he can support this teammate when he receives the ball.



SOURCE 7 According to the concept of perception–action coupling, perception drives action but action also drives perception.

Perception–action coupling occurs continuously throughout an athlete's participation in authentic performance environments as they take in, and act upon, information presented to them. This information may include:

- the action and position of their teammates
- the position of the ball
- their proximately to the goal
- the action and position of the opposition
- what they know about their teammates' capabilities
- what they know about the opposition players' capabilities.



SOURCE 8 To perform a motor skill such as dribbling a basketball, an athlete must continuously perceive information from the environment (e.g. the speed, force, height and direction of the bounce) and act (e.g. apply more or less force, correct changes in direction) in order for the activity to continue.

Affordances

Affordances is the second concept central to the ecological model. Put simply, affordances are opportunities for action that present themselves in a performance environment. They are provided by the environment and the task – but the ability to take advantage of them depends on the ability of the learner to perceive and act. In short, an affordance is anything that 'affords' (i.e. provides or supplies) a player or team with an opportunity to act.

SOURCE 9 An affordance provides a player or team with an opportunity to act. An empty space on the opposing side of the net is an affordance that provides this tennis player with an opportunity to attack that area.

In real terms, this means that at any time during a physical performance, the environment and the task are providing information to the players that can be taken advantage of and acted upon. Some examples of affordances include:

- a tennis player's opponent approaching the net provides an opportunity to perform a lob shot
- a basketball player breaking free from his defence provides his teammate with an opportunity to pass to them
- a high cross in soccer provides an opportunity for the goalkeeper to run forward and catch the ball.

It is important to note that affordances are always there, regardless of the sport or the skill level of the athlete or team. Whether or not an athlete notices (i.e. perceives) an affordance and has the ability to act is another matter. Athletes are said to have high degrees of tactical awareness when they can detect multiple affordances in short amounts of time and take advantage of the best one to achieve their goal.

Let's continue with the soccer example from the section on perception–action coupling to explain this idea. Imagine that the player being passed the ball misses it and the ball sails into space in front of the supporting player. The supporting player must now abandon his original idea and respond to the new affordances presented:

- the goalkeeper running out of the goal box to chase the ball
- another teammate in an open position behind him.

The player acts to exploit the first affordance, determining that they will get to the ball before the goalkeeper and chip it over the goalkeeper's head into the goal.

A less tactically aware soccer player may have seen the goalkeeper come forward but not perceived the space behind him as an opportunity to exploit, resulting in a lost affordance. Repeated immersion in authentic performance environments increases the opportunities for learners to detect and act on affordances.

Attunement

Attunement is the final concept central to the ecological model. Attunement is a concept that is closely related to affordances. It is the ability to evaluate all of the information in a performance environment and use it to identify all the available affordances. In the simplest terms, attunement is the ability to perceive affordances.

As with any skill, attunement can be acquired, developed and refined over time. In order to encourage the development of attunement, coaching and practice sessions need to be authentic or closely represent what is expected of learners during competition. This means that the tasks need to be designed to mimic the complexity of an activity and expose learners to the full range of information (i.e. affordances) they will be exposed to during authentic game play.

By comparison, practising skills or strategies in isolation (or practising motor skills that have been deconstructed from specialised movement sequences) does not expose athletes to the types of situations they will encounter during performance. For example, if a water polo goalkeeper practises making saves by repeatedly defending shots thrown by a centre forward positioned directly in front of goal, the opportunities they will have to practise attuning to affordances will be very limited. Compare this learning experience to one in which the same goalkeeper is able to practise attuning to the affordances provided when multiple players pass the ball around in front of the goal looking to break through the defence. In this case, the opportunities for learning are significantly improved.

Similarly, if a coach intervenes and explicitly directs the same goalkeeper to look for a specific type of affordance, it can actually have a negative effect on his development. This is because it can interfere with the goalkeeper's natural inclination to scan the environment more broadly looking for affordances and instead encourage him to focus on one specific area – meaning that other relevant affordances may be missed.

SOURCE 10 When players are exposed to the types of situations they will encounter in game play, they are given the opportunity to become better attuned to the available affordances.

PERFORMANCE | SKILL DRILL **2.3** | Devising a personal tactical strategy

>> Turn to pages XXX–XXX to complete this integrated physical performance activity.

2.3 Check your learning

Engage and understand

1 **Identify** the two dynamic models of learning that form part of the dynamic systems approach. **Summarise** the key features of each in a paragraph of 150 words.
2 **Define** the terms 'constraint', 'self-organisation', 'perception–action coupling', 'affordances' and 'attunement'.
3 **Identify** the three types of constraints that are central to the dynamic systems approach. Provide one example for each type.

Analyse and apply

4 **Reflect on** your selected physical activity and **complete** the table below by identifying three possible affordances and three corresponding specialised movement sequences that could be applied for each affordance.

Possible affordance	Specialised movement sequence to take advantage of affordance

5 **Apply** the concept of perception–action coupling to the physical activity you are currently studying by providing an example of a time when you have perceived, acted and then perceived new information because of your action.
6 **Reflect on** the performance of an athlete you consider to be tactically aware and comment on their level of attunement. Give specific examples where possible.

Evaluate and justify

7 'Performing closed drills in isolation provides learners with the opportunity to develop key technical skills without the stress of game day.'
Discuss this statement in a written response of 250 words. In your answer, make specific reference to the following concepts to support your position:
- the cognitive systems approach
- the dynamic systems approach
- dynamic systems theory and the ecological model.

obook assess
Check your obook assess for the following additional resources and more:

» Student book questions XX
[Title TBC]

» Worksheet XX
[Title TBC]

» Weblink XX
[Title TBC]

» assess quiz XX
Test your skills with an auto-correcting multiple-choice quiz.

2.4 Introduction to a constraints-led approach to teaching and learning

That's a goal!

By the end of Section 2.4 you should be able to:

- → **describe** the constraints-led approach to teaching and learning
- → **explain** how manipulation of task constraints can allow for the exploration of movement sequences and development of movement strategies
- → **identify** five 'principles of play' used for invasion and net and court physical activities.

Defining a constraints-led approach to teaching and learning

A constraints-led approach to teaching and learning is a contemporary teaching and coaching method based on the principles of the dynamic systems approach to motor learning and the dynamic models of learning that are part of it (i.e. dynamic systems theory and the ecological model).

As the name suggests, a constraints-led approach is an approach to teaching and learning in a physical context that encourages learners to work within a range of constraints, in authentic performance environments. It enables athletes to develop the most appropriate movement solutions for themselves while providing them with opportunities to detect affordances in an unpredictable context. The use of constraints-led activities promotes and enhances the acquisition of a whole range of skills, including tactical awareness.

principles of play
a set of movement strategies that can be used to help individual athletes or teams adapt to any tactical situation in performance environments

movement strategies
a variety of approaches that assist a player or team to successfully achieve a movement outcome or goal (e.g. moving into space to receive a pass or hitting a ball away from opponents to make it difficult to retrieve or return)

fundamental movement skills
basic skills upon which specialised movement sequences and movement strategies are created

STUDY TIP

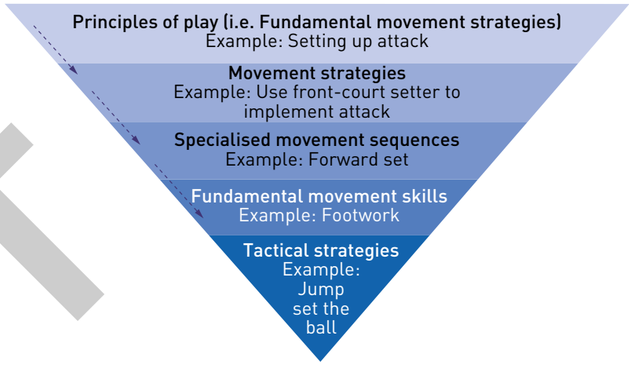
The constraints-led approach
In Unit 3 you will be required to devise a range of **personal tactical strategies** to optimise your performance. Personal tactical strategies are movement solutions that emerge to optimise your performance through the implementation of constraints-led. You will be required to explore, evaluate and justify one of these personal tactical strategies in Summative internal assessment 1: Project – folio. Detailed support for this assessment is provided in Section 2.6.

When conducting an analysis of your personal tactical strategy, you will be required to refer to the specific area of your game it relates to. You will need to understand which **principle of play**, **movement strategies** and specialised movement sequences your tactical strategy has emerged from.

Four factors must be considered when analysing the emergence of a tactical strategy:

- principles of play – common approaches to invasion and net and court physical activities that help an individual or team achieve their fundamental goal – to win (i.e. setting up attack; defending against attack; creating, defending and exploiting space; and attacking opposition goal and scoring)
- movement strategies – the variety of approaches that assist a player or team to achieve their movement outcome or goal
- specialised movement sequences – a combination of specialised fundamental movement skills and movement elements specific to a particular position used to complete a movement strategy in response to a stimulus
- **fundamental movement skills** – basic skills upon which movement sequences and movement strategies are created.

Source 1 shows the relationship between these factors, using the sport of volleyball as an example. You can see that, for the principle of play – setting up attack – a player could implement the movement strategy of using a front court setter. To complete this movement strategy, the setter uses the 'forward set' specialised movement sequence, which requires some fundamental movement skills such as footwork to complete. In response to the task, learner and environmental constraints, the player might jump set the ball. The jump set is an example of a personal tactical strategy for that player.

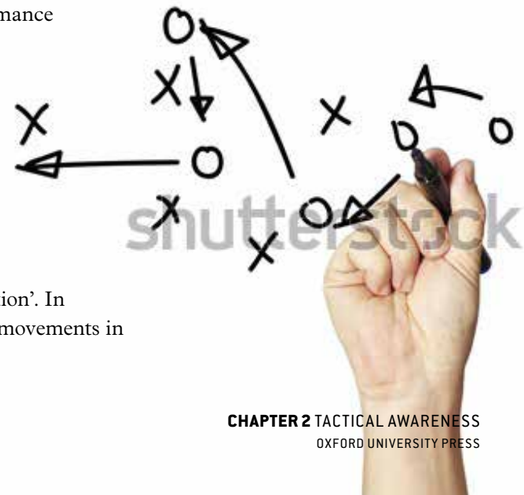


SOURCE 1 When analysing the emergence of a tactical strategy in volleyball, four factors must be considered.

How a constraints-led approach can support the development of tactical awareness

Teaching and learning activities that have been designed in accordance with a constraints-led approach replicate more complex and authentic game environments and challenge learners to self-organise in order to find movement solutions and achieve their goals. By comparison, more traditional coaching techniques favour technical drills performed in isolation, outside authentic game situations. Solutions to problems identified in performance are offered by the coach and practised by the learner. In the context of senior PE, the person responsible for setting up and facilitating these activities will vary between teacher, coach and student. For that reason, when referring to the implementation of a constraints-led approach, the term 'coach' refers to any facilitator of the activities.

As athletes, we know that when we enter an authentic performance environment, we are faced with a wide range of challenges and opportunities that we cannot always predict or prepare for. The fundamental idea behind the constraints-led approach is to expose learners to teaching and learning experiences that closely resemble these environments – and by manipulating different constraints, encourage and support learners to develop individual movement solutions that work for them.



This process of allowing the learner to practise in the unpredictability of an environment that closely represents true game play, is sometimes referred to as 'repetition without repetition'. In other words, without instructing a learner to produce repetitive movements in

a controlled environment one after the other, we use constraints to create a representative (modified) environment and allow repetition with unpredictable responses. Once the coach has set the necessary constraints based on their view of the learner's needs, they can allow the learner autonomy to develop movement strategies themselves. This repetition without repetition better prepares them for the dynamic requirements of the game.

Traditional models of learning recommended that athletes practise techniques for skills until they were refined and 'perfected', often in isolation and away from authentic game environments. The constraints-led approach to learning is different because it proposes that humans learn dynamically, and it is based on the assumption that if learners are presented with learning activities that carefully manipulate constraints, they can develop their own specialised movement sequences and tactical strategies that will assist them to successfully optimise their performance.

Features of a constraints-led approach to teaching and learning

Activities designed through the constraints-led approach to teaching and learning have a number of key features. Constraints-led activities:

- are learner-centred (i.e. designed in consultation with the learner and taking their wants and needs into account)
- do not have a goal of producing textbook, or ideal, technique or movement patterns; instead, they encourage self-organisation in each learner (i.e. there are multiple ways in which to achieve the same outcome or goal and 'ideal' is whatever works in the moment)
- are representative of authentic performance environments. They can certainly be simplified versions of authentic game play (i.e. shorter playing periods, fewer players, different rules, etc.), but they should not require learners to practise technical skills in isolation or in a 'deconstructed' manner (i.e. practising a specific motor skill from a broader specialised movement sequence)
- use constraint manipulation to encourage learners to hone in on identified problem areas in performance. Task constraints can be manipulated in many different ways to allow movement solutions to emerge that are individual to the learner. Following observation, constraint manipulation will sometimes need to be refined to direct learners to modify technique and/or detect alternative affordances.
- use repetition without repetition. Learners are put in authentic environments and asked to achieve the same goal each time. With a dynamic performance environment, learners are forced to search for movement solutions that consider a wide variety of unpredictable variables. This replicates what they are required to do in their matches.

It is important to note that constraints-led activities are not the same as modified games. Coaches use modified games that change parameters (e.g. player numbers, field size, equipment) to allow students to practise skills in environments that are more representative of competition. A constraints-led activity differs from a modified game because the manipulation of constraints has a specific purpose and is related to a clearly identified and communicated problem.

Source 2 compares the key features of a constraints-led approach with a cognitive approach to show where they differ.

Cognitive approach to teaching and learning	Constraints-led approach to teaching and learning
• Inauthentic performance environments (i.e. drills) • Drills are designed and presented as the solution (i.e. the 'correct' course of action) • The coach finds solutions to problems • The coach takes a hands-on approach, directing the learner and proposing solutions to their problems	• Authentic performance environments • Activities use targeted constraints manipulation to amplify opportunities for learners to identify movement solutions • Learners find their own movement solutions (through self-organisation and attunement) • The coach assumes a supportive role as facilitator, providing measured feedback with enough information for learning (without prescribing a right way versus a wrong way)

SOURCE 2 One way to understand the constraints-led approach to learning is to compare it to a more traditional approach to teaching and coaching.

The role of the coach in the constraints-led approach

While the constraints-led approach encourages learners to discover their own movement solutions (otherwise known as personal tactical strategies), the coach plays a crucial role in supporting the skill and tactical development of these learners. The coach's role includes:

- identifying technical and tactical problems in teams of individuals
- considering learner constraints, manipulating task constraints and interacting with environmental constraints to amplify movement solutions for the problem area
- communicating the problem and purpose of the activity without telling learners the solution to the problem (e.g. identifying that an opponent is comfortably retrieving most of the learner's shots from the middle of the court so suggesting an activity to allow them to explore options for moving their opponent around.)
- providing measured feedback that offers enough information to empower the learner to work towards their own movement solution.

SOURCE 3 Teaching and learning activities that have been designed in accordance with a constraints-led approach replicate more complex and authentic game environments.

Source 4 helps us to get a clearer sense of how the role of the coach varies between cognitive based approaches to teaching and learning and the constraints-led approach.

	Cognitive approach to teaching and learning	Constraints-led approach to teaching and learning
Examples of both approaches	• The coach (or learner) identifies a problem or a need (e.g. the touch team's attack is too slow; they are passing the ball too far behind the line, meaning that they can't gain field position). • The coach explains what it is they should be doing (i.e. the movement solution). • The coach designs a drill to fix the problem (e.g. players are given a skill or tactical drill to practise the solution to the problem; usually in isolation in an inauthentic environment). • The coach describes the drill to learners (e.g. 'I want you to line up along the halfway line. I am going to give a ball to the winger who is going to pass it down the line as you all run towards the try line. The aim is to keep passes as flat as possible and complete the drill at speed.'). • Throughout the drill process, the coach supports learners to implement the drill and gives technical advice and feedback when an error is identified. • The coach modifies the drill, if required (e.g. if it is too easy or too hard).	• The coach (or learner) identifies a problem or a need (e.g. the touch team's attack is too slow; they are passing the ball too far behind the line, meaning that they can't gain field position). • The coach communicates the problem and purpose to one or more players (e.g. 'We aren't gaining much field position in our rucking so we are going to do an activity that allows you to find ways to increase your speed moving forward.'). • The coach designs a constraints-led activity in consultation with players by manipulating task constraints (e.g. a 4v2 game on a smaller field with the additional constraint that when players make their passes, they must only look straight ahead, relying on their peripheral vision). • The coach explains the task (including the constraints) to the learners, clearly communicating the goal and why this goal is relevant and important to their success (without suggesting a solution). • Throughout the drill process, the coach supports players by offering feedback and encouragement, and by observing their progress towards meeting the goal. • The coach modifies the activity to suit a learner's progress.

SOURCE 4 The approach to learning has an impact on the role that the coach plays.

See the 'In the news' article for an example of how the emergence of a movement solution was encouraged through a non-traditional, constraints-led approach to coaching. It shows how Steve Smith was able to work with (and enhance) his natural 'flow' to come up with a personal tactical strategy that worked for him, with incredible success.

In the news

Just like the Don: Why Steve Smith's batting method is masterful

James Buckley, The Sydney Morning Herald, 1 December 2017

Steve Smith is the closest thing to Sir Donald Bradman we have ever seen.

Smith's superb innings last week, which produced a 21st Test century and boosted his average to 61.23, prompted ex-first class cricketer-turned-journalist Simon Hughes to vocalise the comparison with Bradman on his podcast The Analyst.

"I looked at his method and there is this thing called the rotation method, which he's famous for – it gave him flow. By taking the bat out to third slip or gully and then bringing it round in a semi-circle, it gave the whole body a kind of rhythm that he then brought into the stroke.

"It's uncanny the resemblance. Somebody wrote once that Smith's bat flaps around like a palm tree in a gale and in the bat lift it does waft around a bit more than Bradman's did, but when it comes down, it's exactly the same.

The beauty of Smith's batting is in its intrinsic and natural technique.

So many young batsmen are taught to take the bat back towards the wicketkeeper, keep the elbow high and then play through the line of the ball.

But Smith was never coached like that. He was always allowed to pursue his natural bat lift, and from there his game prospered.

And it's getting better with age. On home soil over the past three years he boasts an astronomical batting average of 93.5.

"Steve always had it, it was always there and I reckon it's become more obvious and more ingrained as his natural style because he scores runs," Smith's former batting coach Trent Woodhill said.

"He literally does not care how he looks, it's all about the contest each ball and that's what separates him from the others. Steven enjoys batting, each ball is a gift whereas for others, the result is a gift or the score is a gift.

SOURCE 5 Steve Smith in action for New South Wales

"He wouldn't then look at Bradman and see what he can mirror with his technique, he'd look at Bradman and see what he can mirror with his performance, or once again his commitment to each ball."

Often it's the sportsmen who don't mirror the traditional teachings who enjoy the most success.

2.4 Check your learning

Engage and understand

1 **Define** a constraints-led approach to teaching and learning.

2 **Describe** the type of communication a coach might provide to athletes when implementing a constraints-led activity. Provide an example.

3 Refer to Theory in action 'Constraints-led approach'. **Summarise** the relationships depicted in Source 1 in your own words.

Analyse and apply

4 In no more than 150–200 words, **compare** and **contrast** the traditional cognitive approach to teaching and learning with the constraints-led approach to teaching and learning.

5 The author of In the News 'Just like the Don: Why Steve Smith's batting method is masterful' states: 'The beauty of Smith's batting is in its intrinsic and natural technique.' **Apply** your knowledge to argue why this statement suggests Smith's batting aligns with the intentions of the dynamic systems approach.

Evaluate and justify

6 When Anja performs massed practice of the badminton smash in a closed environment, she can consistently execute the shot with power and precision. However, whenever she plays in an authentic performance environment, she struggles to achieve the same result. Use your knowledge of a) the dynamic systems approach and b) the constraints-led approach to learning to **propose** an explanation for Franklin's performance. Present your response in 150–200 words.

obook assess

Check your obook assess for the following additional resources and more:

- **Student book questions XX** [Title TBC]
- **Worksheet XX** [Title TBC]
- **Weblink XX** [Title TBC]
- **assess quiz XX** Test your skills with an auto-correcting multiple-choice quiz.

2.5 Implementing a constraints-led approach

That's a goal!

By the end of Section 2.5 you should be able to:

→ **identify** and **explain** how a constraints-led approach to teaching and learning can be implemented for a selected 'Invasion' or 'Net and court' physical activity by:
- manipulating task constraints (e.g. modifying a rule)
- considering learner constraints (e.g. considering the learner's level of fitness)
- interacting with environmental constraints (e.g. changing the learner's training environment)

→ **explain** the importance of body and movement concepts when making judgements about on-the-ball and off-the-ball movements and decision making in authentic performance environments

→ **define** the four principles of decision making.

Planning for the implementation of a constraint-led approach

Engaging with a constraints-led approach to teaching and learning in any sport or physical activity can be a new and challenging experience for coaches and athletes, and one that will take time to master. The process requires teachers and coaches to experiment with new techniques that may not always have the immediate desired outcome, and will involve some trial and error over an extended period of time. To lay the foundations for the successful implementation of a constraints-led approach, coaches will need to:

- understand the needs of the learner
- apply the body and movement concepts
- apply the principles of play.

We will now look at these concepts in more detail.

Understand the needs of the learner

In order to plan and implement a constraints-led approach to address a specific issue, an analysis of the learner's physical performance and ability to perceive and act must first take place. The data gathered to facilitate this analysis needs to relate to the individual's ability to:

- execute specialised movement sequences for movement strategies with accuracy, fluency, speed, etc.
- tune in to affordances.

Once an issue in skill execution and/or decision making has been identified, it is necessary to hone in on the area of gameplay that relates to these issues. For example, does the individual struggle to perform specific specialised movement sequences and make effective decisions throughout their entire performance, or does it mainly occur when they are in defence? For this reason, GPAIs used to gather performance data must always be accompanied by information about which principles of play are involved.

The principles of play have already been discussed in Section 2.4, so we will now turn our attention to body and movement concepts and the principles of decision making.

Apply the body and movement concepts

Body and movement concepts include a number of approaches that can help individual athletes or teams to be more aware of their bodies and adapt their movements in order to achieve specific goals. These concepts can be applied by athletes and coaches to help support the teaching and learning of specialised movement sequences and movement strategies in different sports and physical activities.

Developed by Hungarian dance artist and theorist Rudolf Laban in the early 1900s, body and movement concepts provide a framework for understanding and improving specialised movement sequences and movement strategies. Laban proposed that there are four body and movement concepts:

- **body awareness** – the sense (or consciousness) we have of our own body when performing a skill
- **space awareness** – the relationship between the body and its surroundings (i.e. the space around it)
- **quality of movement** – the characteristics (i.e. qualities) of a movement (e.g. speed, effort, force, accuracy, level of effort)
- **relationships** – the objects (i.e. the people and equipment) that an athlete interacts with during the performance of the skill.

Body and movement concepts can be used as a set of criteria for making judgements about the effectiveness of an athlete's performance. Each concept is broken down into more detailed subparts, so this can direct the learner to identify very specific aspects for improvement.

Apply the principles of decision making

A concept called the **principles of decision making** breaks the process of perceiving and acting down into four more 'concrete' stages. The learner can use these stages to make more discerning judgments about where problems in their decision making (attunement) lie.

As you have learnt in this chapter, perception–action coupling is a key ingredient for successful performance. It is also the essence of what makes athletes more or less tactically aware. People more typically use the term 'decision making' to describe this process.

In simple terms, decision making is the process that an individual or team goes through in order to reach an outcome. It requires individuals to consider a range

body and movement concepts
a group of four concepts used to guide the development and judge the effectiveness of specialised movement sequences and movement strategies in different sports and physical activities

body awareness
a body and movement concept; body awareness relates to the sense (or consciousness) we have of our own body when performing a skill

space awareness
a body and movement concept; space awareness relates to the relationship between the body and its surroundings (i.e. the space around it)

quality of movement
a body and movement concept; quality of movement relates to the characteristics (i.e. qualities) of a movement (e.g. speed, effort, force, accuracy, level of effort, etc.)

relationships
a body and movement concept; relationships relates to the objects (i.e. the people and equipment) that an athlete interacts with during the performance of the skill

principles of decision making
a set of guidelines (i.e. cognitive processes) that can be used to help individual athletes or teams make the best and most appropriate decisions in performance environments

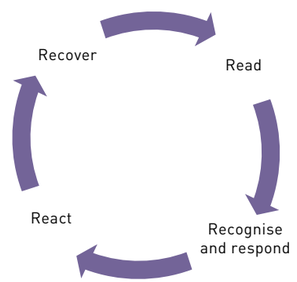
of information in their environment, weigh their options, decide on a course of action and carry it out. In a sporting context, decision making is crucial because all sports and physical activities require athletes to choose:

- what specialised movement sequences and movement strategies they need to perform (also referred to as 'on-the-ball' skills)
- when they need to perform the specialised movement sequences and movement strategies
- how they should perform the specialised movement sequences and movement strategies
- where they should position themselves to support others (referred to as 'off-the-ball' skills).

In 2003, an associate professor of physical education at the University of Victoria in Canada by the name of Dr Tim Hopper developed the 4 R model (see Source 1). The model helps athletes make better decisions in performance environments, enhance their technical skills, and improve their tactical awareness. The steps included in this model are known as the principles of decision making.

According to the principles of decision making, when play begins an athlete should:

- **READ** the play and decide where they should position themselves within the playing area
- **RECOGNISE** and **RESPOND** to cues by moving to the best position and selecting the best skill or movement sequence for the situation
- **REACT** to the finer details detected as the ball enters the player's area (e.g. force, spin, direction, speed) and make adjustments before executing the skill or movement sequence
- **RECOVER** with appropriate movements and set up for the **READ** phase again.



SOURCE 1 The 4 R model of decision making is continuous and allows individuals to read the game.

Unlike traditional cognitive approaches to decision-making – which proposed a linear and hierarchical approach that was controlled by the brain – the principles of decision-making supports a more dynamic, non-linear view. While the principles can be used as a guide, they do not prescribe a particular course of action or response in any given situation. During all phases, movements emerge dynamically in response to the information perceived in relation to the task, the environment and the learner. The better attuned an athlete is to themselves and their surroundings, the better they can become at making decisions and being tactically aware.

SOURCE 2 A constraints-led approach requires the full commitment of learners, coaches and teachers to embrace more autonomous, learner-centred activities.

The principles of decision making can be used by the learner as a tool to provide a more detailed analysis and description of how effectively they perceive affordances and act on them in authentic performance environments. In other words, they can use a more forensic process to focus on exactly where their decision-making strengths and weaknesses lie. Some reflections from the application of the decision-making principles might include:

- 'I am ineffective at recovering as video analysis shows that I am not ready to read the next phase of play.'
- 'I can read play and decide where to position myself, but my recognition and response to cues is lacking as I rely on waiting to hear an instruction from the coach or my teammates about where to move to.'
- 'I am getting better at reacting to the finer details once the ball enters my side of the court. For example, I am detecting the type of spin placed on the ball and adjusting my stance before executing an appropriate specialised movement sequence.'

How to design and implement a constraints-led approach

Developing constraints-led activities that are tailored to the needs of different learners takes time and effort, and a high degree of skill. It involves more than simply designing a few modified games and allowing students to 'flail away' in the hope that their technical proficiency, decision making and tactical strategies will emerge. In fact, a lack of a clear intent is the most common cause of ineffective constraints-led activities. Instead, every constraints-led teaching and learning activity needs to have a clear, established purpose.

When designing and implementing a constraints-led approach for any sport or physical activity, it is important to carry out and complete the process using a number of steps. Following these steps provides the best chance of achieving a successful outcome. The steps for designing and implementing a constraints-led approach are outlined below.

Part 1: Designing

Step 1 – Identify the technical and tactical problem area/s

All athletes have areas of their performance that can be improved. As previously discussed, sometimes these problem areas can be technical (i.e. technique-related) and sometimes they can be tactical (i.e. affordance-related). Furthermore, the problem area could be related to 'on-the-ball' or 'off-the-ball' movements or decision making. Having a good understanding of the specialised movement sequences and movement strategies relevant to your chosen physical activity is useful in detecting areas for improvement.

A detailed list of these aspects of each 'Invasion' and 'Net and court' physical activity is included on your obook assess. Refer to Section 2.7 for a comprehensive look at 'Invasion' and 'Net and court' physical activities.

Once you have identified problem areas, choose one to focus on for your constraints-led activity. (This could be the one that has the biggest impact on the performance of the team.) Ensure that you are clear about why the problem is occurring.

For example: A netball goal shooter struggles to take possession of the ball. The reason for this problem is that the ball is often intercepted by the defender. The interceptions occur when she stands close to the goal with her hand up, waiting for a lob pass.

SOURCE 3 'Invasion' physical activities – such as Australian football – are games where the aim is to attack an opponent's territory in order to score a goal or point while trying to defend your own territory in order to prevent an opponent scoring.

Step 2 – Design the constraints-led activity

When designing the constraints-led activity, think about what the optimal technical or tactical performance might look like. Then decide how to manipulate the task or environmental constraints to amplify the solution (the affordances you want them to become attuned to) for the athletes.

SOURCE 4 'Net and court' physical activities – such as badminton – are games that are played using a net or court where the aim is to send a projectile (e.g. a ball or shuttlecock) over a net into an opponent's section of the court so that it cannot be played or returned within the court boundaries.

STUDY TIP

The QCAA syllabus provides a thorough breakdown of the foundational movement skills, specialised movement sequences, movement strategies and principles of play for every physical activity available for study.

For example: The movement solution we would like to see in the netball shooter is for her to move into space to receive the pass. A possible constraint manipulation is to play a half-court game with a rule change that prevents the attacking players being allowed to receive a pass when they are behind their respective defender (i.e. breaking this rule would result in a turnover).

Source 5 provides a worked example of how a technical or tactical problem can be targeted for improvement through the manipulation of different types of task constraints. Additional examples of possible task constraint manipulations for 'Invasion' and 'Net and court' physical activities can be found on your obook assess.

	Physical activity	Identified technical or strategic problem	Type of task constraint	Example manipulation
'Invasion' physical activities	Australian football	• Can only handball or kick from one side (left or right)	• Rules	• Players must not use their dominant side to pass the ball.
	Basketball	• Beginner player is unable to see open teammates when dribbling	• Rules	• Impose a vision occlusion (e.g. the athlete may not look at the ball when they are dribbling).
	Futsal	• Players take too long to execute a pass	• Rules	• During a reduced court size possession game, players can have no more than two consecutive quick touches of the ball. (As players improve, reduce to one touch and/or manipulate number of players.)
	Netball	• Low conversion of scoring shots	• Rules	• To score a goal, the GA or GS must press the ball against the goal post.
	Soccer	• Players take shots too early and from too far away from goal	• Scoring methods	• Players receive: • 5 points for a header • 3 points for a goal within the 6 yard box • 2 points for a goal scored from within the 18 yard box • 1 point for any other goals.
	Touch football	• Players can't break through defence because they are not drawing the defence before making the pass	• Number of players • Field size	• Play 2v1: 2 attackers, 1 defender in a 10 m square grid. Attackers must get the ball over the line without getting touched. Note: Reducing the width of the field size will further amplify the need to draw the defender before making the pass.
	Water polo	• Shots at goal are easily read by goalkeeper	• Rules	• When successfully scoring from an outside water shot, players score a bonus point if they can immobilise or misdirect the goalkeeper before releasing the ball.
'Net and court' physical activities	Badminton	• Players make their shot selection obvious	• Rules	• The court is divided into 6 zones and the teacher calls out which zone to hit the shuttlecock to. As the players improve, the call can be delayed.
	Volleyball	• Players use the same attacking options every time	• Designated spaces and boundaries	• The court is divided into specific segments. The team cannot make consecutive shots into the same zone on the opponent's court.
	Tennis	• Player 'air swings' (i.e. they are unable to make contact with the ball)	• Equipment	• Change the ball from an official match ball to a larger, less bouncy training ball.

SOURCE 5 Examples of task constraints that can be manipulated in different physical activities to promote the emergence of a particular movement solution

Part 2: Implementing

Step 3 – Address the technical and tactical problem area/s

Now that you have designed your constraints-led activity, you are ready to implement it. You will need to ensure that athletes know why they are participating in the activity (i.e. the problem you have identified and why it is a problem). Explaining why they are doing the activity allows athletes to become invested in the task. Having buy-in prevents satisficing from becoming an issue. Satisficing is when athletes look for loopholes in the constraints of the task in order to get the job done and move on to the real fun – full game play/scoring, etc.

For example, using the previous netball example, the problem and purpose might be communicated as: 'We have identified that the ball keeps getting intercepted by your defender in the goal circle. This is preventing you from scoring, so we are going to do an activity to help you explore options to be available to receive a pass.'

Source 6 provides an example of a constraints-led learning activity designed for a group of beginner soccer players. The activity features a high degree of task manipulations in order to focus on the development of a specific skill.

Physical activity: Soccer			
Planning for constraints-led activity			Implementation
Identified technical or strategic problem	Task constraints to be manipulated	Communication of problem and purpose	The task (including set up and manipulation details)
The ball carrier loses possession of the ball due to a lack of control (i.e. their first touch is poor).	• Number of players • Field size • Scoring method • Rules	'I have noticed that you (the ball carrier) are frequently losing possession of the ball due to a lack of ball control on your first touch, so we are going to do this activity to allow you to look for ways to improve your first touch.'	**Set up and equipment:** • 20 m x 20 m field marked with cones • 3 m goals marked with cones **Constraint manipulations:** • 3v3 player game • Five consecutive passes must be made before a shot is made on goal. • If you use more than two touches your team loses possession of the ball.

SOURCE 6 Example of a learning activity with a high degree of task manipulation, designed for beginner soccer players

Source 7 provides an example of a constraints-led learning activity designed for a group of proficient soccer players. The activity features a low degree of task manipulation in order to focus on the development of a broader range of skills (e.g. a game with one manipulation).

Physical activity: Soccer			
Planning for constraints-led activity			Implementation
Identified technical or strategic problem	Task constraints to be manipulated	Communication of problem and/or purpose	The task (including set up and manipulation details)
The players are crowded in the middle of the field during play.	• Designated playing space	'I have noticed that we are crowding the middle of the field when bringing the ball up, so we are going to do this activity to help you find alternative pathways for bringing the ball up the field.'	**Set up and equipment:** • normal soccer set up **Constraint manipulations:** • Normal rules will be applied, with one exception – the ball may not enter the centre circle when crossing the halfway line.

SOURCE 7 Example of a learning activity with a low degree of task manipulation, designed for proficient soccer players

STUDY TIP

Remember to journal every activity you do in this Unit. Make careful notes about the ways in which the task constraints were manipulated. You will need to couple this information with a performance evaluation using the body and movement concepts to determine what movement solutions emerged and whether the performance technically improved. GPAIs and DCIs can be found in your obook assess to support you with the gathering of this data.

Step 4 – Run the constraints-led activity

Designate a time for the constraints-led activity to be conducted and then stick with it. Initially, the activity may appear chaotic or not to be working, but this is a common experience when implementing a new activity. Learning is happening, even if it may not appear to be.

Step 5 – Review and revise

At the end of the designated time, decide whether the movement solutions that have emerged were appropriate and offer feedback that reflects this. If the movement solutions that emerged were not effective, it may be necessary to provide more specific feedback to ensure the athletes have all the necessary information required for learning.

The key here, however, is that athletes are not directly told what they must do to fix the problem. For example, rather than telling a netballer: 'You need to be on your toes using pitter-patter steps to move more quickly and get into position earlier', the feedback should be: 'I'm seeing that by the time you have reacted to the affordance, the opportunity has been missed.' In the second example, the athlete has not been told what the movement solution is but they have been given some information that they can use to search for a movement solution that will help them solve the problem. This type of feedback should share what you can see about their ability to perceive and act, and explain why their choices are not ideal.

In the case where optimal movement solutions have not been found after a sufficient period of time has passed, it may be necessary to make modifications to the constraints-led activity to further amplify movement solutions. Think of amplifying as shining a spotlight on a solution you wish athletes to find.

For example, using the netball example, you might add a constraint that no attacking player is permitted to be standing still at any given time to have them explore being on their toes and developing their own pitter-patter movement solution.

2.5 Check your learning

Engage and understand

1 **Explain** why the body and movement concepts and principles of decision making should be used by an athlete or coach to evaluate the effectiveness of their performance before they plan and implement a constraints-led activity.
2 **Identify** the five steps for designing and implementing a constraints-led approach.
3 **List** four possible ways that task constraints can be manipulated during a constraints-led activity.
4 **Explain** what a coach, teacher or student implementing a constraints-led activity should do if the activity is not yielding a noticeable improvement or progress in the athlete/s.

Analyse and apply

5 **Identify** the issue with the following problem and purpose communication for touch football: 'Your goal for completing this activity is to take a side-step to evade the oncoming defender when they are 1 m away from you.'

6 The table below shows segments from a deconstructed constraints-led activity. **Analyse** the information in each box and use your knowledge of constraints-led activity design to **classify** them according to the following options: IP) Identified problem (or strategic problem); TC) Task constraints to be manipulated; PP) Problem and purpose communication to athletes; and T) The task.

Box 1. Classification: _____ To encourage the outside hitters to increase their shot repertoire	Box 2. Classification: _____ Set up and equipment: • Use witch's hats to make a 2x2m exclusion zone in position 5 of the volleyball court Constraint manipulation details: • Normal rules will be applied, with one exception – the ball may not be hit into the exclusion zone
Box 3. Classification: _____ Outside hitters always hit to position 5 on the volleyball court (which is the back right corner as the hitter sees it)	Box 3. Classification: _____ Designated attacking space

Evaluate and justify

7 One of the most common issues with the design of a constraints-led activity is that the manipulated task constraints do not amplify the identified problem. In other words, the performer could participate in the activity without having to face their problem, use the problematic specialised movement sequence, etc. For example, a winger in touch football might never get a chance to address their problem of poor passing because the ball never gets to them. **Reflect on** this issue and **justify** why amplification of the problem is so important.
8 After identifying that her basketball shooting is a problem area, Gisele participates in several constraints-led activities that focus on the principle of play 'attacking opposition basket and scoring' and she uses the Constraints-Led Activity GPAI 1 to gather primary data. A copy is available on your obook assess. An analysis of this data reveals that she only scores when performing a lay-up. All other shot attempts are ineffective.
   a **Suggest** possible task, learner and environmental constraints that could be impacting Gisele's performance.
   b Use the table below to **design** a constraints-led activity for Gisele. In 150 words, **justify** how this activity will lead her to find a movement solution to overcome her inability to shoot when not performing a lay-up.

Physical activity:			
Planning			Implementation
Identified technical or strategic problem	Task constraints to be manipulated	Communication of problem and purpose	The task
			Set up and equipment: Constraint manipulations:

obook assess
Check your obook assess for the following additional resources and more:

» Student book questions XX
[Title TBC]

» Worksheet XX
[Title TBC]

» Weblink XX
[Title TBC]

» assess quiz XX
Test your skills with an auto-correcting multiple-choice quiz.

2.6 Assessment support – Summative internal assessment 1: Project – folio

That's a goal!

By the end of Section 2.6 you should be able to:

→ **devise** a personal tactical strategy
→ **evaluate** and **justify** a personal tactical strategy
→ **understand** how to record, evaluate and justify your personal performance
→ **create** a video of supporting evidence of your personal performance.

Overview of summative internal assessment 1: Project – folio

As part of your assessment for Unit 3 of the QCE Physical Education syllabus, you will be required to complete a Project – folio. The Project – folio is a complex task with many different parts. This section of the chapter is designed to support you as you complete your own Project – folio. It provides a structured explanation of what is required in the task and offers practical tips and suggestions to help you perform at your best.

For clarity and simplicity, we have chosen to break the Project – folio into two sections and work through these sections in order, so that we can model one possible approach for completing the task.

Section 1 is a multimodal presentation comprised of two parts:

- Part A – Devise, evaluate and justify your personal tactical strategy
- Part B – Evaluate and justify the effectiveness of your personal performance using body and movement concepts.

Section 2 is a video comprised of highlights of your physical performance. This component is independent of your multimodal presentation (i.e. it provides additional, separate information).

Each of these parts of the task will be assessed and marked against the assessment objectives contained in the instrument-specific marking guide (ISMG). This means that all parts of the task must be completed in order to maximise your chances of success.

Section 1: Multimodal presentation

The information you gather and compile as you work through Parts A and B will be presented in a multimodal format. Examples of multimodal presentations include:

- a pre-recorded presentation submitted electronically
- a presentation conducted in front of an audience (class or teacher)
- a digital portfolio of video, images and diagrams with annotations or commentary
- a multimedia movie or slideshow that may combine images, video, sound, text and a narrative voice.

Detailed information on how to structure, create and present your Project – folio is provided on pages XXX–XXX of Chapter 1: Physical Education Toolkit. In addition to this, Skill drill 1.2A Planning, creating and presenting a Project – folio (available on your obook assess) provides a number of useful tips and instructions to help you.

Part A: Devise, evaluate and justify your personal tactical strategy

In Part A of the Project – folio, you are required to devise, evaluate and justify a personal tactical strategy for your position in your selected physical activity.

This is the largest and most significant part of the Project – folio because it requires you to apply the dynamic systems approach to the topic of tactical awareness. To do this, you will need to demonstrate your understanding of the following concepts:

- dynamic systems theory
- the ecological model
- a constraints-led approach to motor learning.

Devise your personal tactical strategy

Devising your personal tactical strategy requires considerable planning. As you have learnt in this chapter, it is possible for individuals to sit down with a pen and paper ahead of time to plan and devise strategies for specific performance situations; however, this method follows a cognitive systems approach to motor learning and could have an impact on your potential to develop a tactical strategy that best suits you as a learner in relation to the task and environmental constraints you are presented with.

Following a dynamic systems approach – and applying a constraints-led approach to teaching and learning – allows tactical strategies to emerge dynamically through self-organisation.

Source 1 outlines the steps you need to work through in order to devise your personal tactical strategy. The time needed to work through these steps may vary from a couple of lessons to several weeks. We will now explore each of these steps in more detail.

STEP 1	Identify an area for improvement (i.e. a problem) for one movement strategy for your position in your selected physical activity.
STEP 2	Participate in constraints-led activities.
STEP 3	Gather data from your constraints-led activities and analyse changes in the specialised movement sequences of your specialised movement strategy.
STEP 4	Describe the personal tactical strategy that emerged.

SOURCE 1 The steps required to devise a personal tactical strategy

STUDY TIP

Detailed information on the format and requirements of the Project – folio is provided on pages XXX–XXX of Chapter 1 – Physical Education Toolkit.

This information includes:

- a description of the task
- assessment objectives
- a summary of the ISMG.

Be sure to read this information carefully before you work through the information provided in this section!

Step 1 – Identify an area for improvement (i.e. performance problem) for one movement strategy for your position in your selected physical activity

The first step in devising your personal tactical strategy is to identify problems in your performance for which movement solutions needs to be found. In your Project – folio, you need to identify problems presented during your performance of specialised movement sequences for one movement strategy.

The GPAI in Source 2 is a useful tool for helping you to identify problem areas specific to the performance of your position within your selected physical activity. Once you have established the areas in which you need improvement, you can choose a single problem area around which to construct constraints-led activities.

Performance analysis GPAI (identifying a performance problem)

Note: It is suggested you complete Part 1 first, then focus on Part 2 separately and then complete Part 3 after completion of play.

Part 1: Performance of specialised movement sequence

		LEVEL OF EFFECTIVENESS		DECISION-MAKING	
COMMON SPECIALISED MOVEMENT SEQUENCES		EFFECTIVE	INEFFECTIVE	APPROPRIATE	INAPPROPRIATE
Dribbling	Under pressure				
	No pressure				
Passing	Under pressure				
	No pressure				
Catching	Under pressure				
	No pressure				
Shooting	Under pressure				
	No pressure				

SOURCE 2 Performance analysis GPAI (identifying a performance problem)

Example

In the sport of water polo, a goalkeeper may identify the following area for improvement (i.e. the problem).

'I opt for short passes out of the goal box because I struggle to make the long passes needed. This results in the ball taking too long to move into the attacking zone. This limits the time my teammates have to take effective shots at goal within the 30 second time limit (i.e. a rule of the game).'

SOURCE 3 TBC

Step 2 – Participate in constraints-led activities

Once you have identified an area for improvement (i.e. the problem), it is necessary to participate in a range of constraints-led activities designed to target your problem area. Constraints-led activities can be designed to encourage the emergence of possible movement solutions that will address the problem.

Participating in constraints-led activities designed to target your problem area will lead to changes in your performance of specialised movement sequences for a movement strategy. The types of changes you might expect to see include changes in:

- timing
- direction, frequency and intensity of movement
- technique
- decision making.

It is important to be able to identify these types of changes in your performance as this process will ultimately facilitate the emergence of your personal tactical strategy.

Example

In the sport of water polo, a goalkeeper may participate in the following constraints-led activity to address his performance problem (as outlined in the previous example).

A game with player numbers reduced to 4v4 and with the task constraint of having only 5 seconds for the ball to make it into the team's attacking half after a goal has been saved by the goalkeeper. This constraints-led activity will force the goalkeeper to search for a solution to make effective long passes.

FOR THE RECORD

While the basic functions of the goalkeeper in water polo have not changed much in the past 100 years, there have been changes affecting performance technique. In the 1940s, Hungary introduced the eggbeater kick, which is a technique that allows goalies to maintain a stable balance in the water.

Step 3 – Gather data from your constraints-led activities and analyse changes in the specialised movement sequences for one movement strategy

Participating in constraints-led activities will also give you the opportunity to gather and record a range of performance data relating to your identified performance problem.

There are a number of tools that you can use to gather data (i.e. evidence) relating to changes in your performance over time. These include:

- a personal journal (see Source XX)
- GPAIs (see Source XX)
- video recordings.

The GPAI shown in Source 4 is a useful tool to help you gather the data that you will need to analyse the changes in the specialised movement sequences for one movement strategy. A template for this GPAI is provided on your obook assess.

STUDY TIP

Detailed information on gathering data for the Project – folio is provided on pages XXX–XXX of Chapter 1 – Physical Education Toolkit.

This information includes links to a range of different Skill drills and printable templates that will help you gather and record data via:

- a personal journal
- GPAIs
- video recordings.

Be sure to read this information and download the relevant templates before you work through the rest of the information provided in this section!

Performance analysis GPAI (identifying a performance problem)

Note: It is suggested you complete Part 1 first, then focus on Part 2 separately and then complete Part 3 after completion of play.

Part 2: Quality of 'on the ball' and 'off the ball movements'

TOTAL TIMES THIS OCCURS		DOES THIS MOVEMENT CREATE AN OPPORTUNITY (FOR SELF OR OTHERS)?	
On the ball positioning		Yes	
		No	
Off the ball positioning		Yes	
		No	

Part 3: Reflective journal

INTERNAL FEEDBACK (WHAT YOU FELT AND NOTICED ABOUT YOUR OWN PERFORMANCE)	EXTERNAL FEEDBACK (WHAT YOUR TEACHER TOLD YOU, WHAT YOU NOTICED FROM WATCHING VIDEO RECORDING ETC.)

SOURCE 4 TBC

Analysing data you have collected over time (i.e. journal entries, data from your GPAIs and visual evidence from video recordings) will help you detect any changes in your performance, especially the less obvious ones.

This data will be the key to your success in the Project – folio as it will help you determine the impact of the resulting tactical strategy on your performance and give you the primary data you need to justify your recommendations.

Example

In the sport of water polo, a goalkeeper may gather data from constraints-led activities and analyse changes in the specialised movement sequences for one movement strategy in the following way.

'The data gathered when performing passes may initially show that I didn't get my body out of the water very far to make the longer passes, which impacted the effectiveness of my transition passes. After participating in constraints-led activities and responding to teacher feedback – which drew attention to the fact that my arm and shoulder were dragging through the water, limiting the speed and force I was able to generate through my arm – I was able to make changes to my performance. Upon analysing the video recordings collected, I observed that I began to force my body higher out of the water, using an explosive eggbeater kick. This enabled me to achieve longer passes that were more effective.'

STUDY TIP

The more data you can gather, the more valid and reliable your conclusions will be!

It is recommended that you complete a personal journal entry (see Source XX) and a GPAI (see Source XX) every time you participate in a constraints-led activity.

You should also try to record as much video footage of your performances as possible. This can increase the accuracy of your data capture because you can stop, start and record. It can also allow you to playback footage in slow or fast motion. Another benefit of gathering video footage is that it will form the visual mode of communication for your multimodal presentation (along with still images and supporting graphics, if you wish).

The combination of these three forms of data provides strong evidence on which to base your conclusions.

Step 4 – Describe the personal tactical strategy that emerged

The unique and personal movement solution that emerges during your participation in a range of constraints-led activities is known as your personal tactical strategy.

The data collection instrument (DCI) provided (see Source 5), is a useful tool to help you articulate your personal tactical strategy. A template for this DCI is available on your obook assess.

Emergence of tactical strategy DCI – Reflective journal template

Complete this DCI at the end of each week, reflecting on the Constraints-led activities participated in. Over time, repeated completion of this DCI might allow you to determine what tactical strategy has emerged.

QUERY	RESPONSE
1 What problem was identified from your performance? • For what movement strategy within which principle of play did this relate to? • What specialised movement sequences were involved??	
2 Describe what the constraints-led activities that you participated in, in order to address this problem. For each one, state the goal that was communicated to you. • List each activity (giving it a logical name). • In one sentence, provide a general overview of the activity. • Explain what constraints where manipulated. • State what goal was communicated to you for this constraints-led activity, e.g. 'The goal is for you to find the fastest way to get the ball into opposition half'.	
3 What feedback did you receive during/after participating in these constraints-led activities (from yourself and from external sources)? • What did your teacher say? • What did your teammates say? • What did video analysis reveal?	
4 Over the course of the week, what changes did you notice in your: • timing • direction, frequency and intensity of movement? • technique • decision-making?	
5 From your above analysis, can you conclude that specific movement solutions have emerged?	

SOURCE 5 TBC

This final step requires you to describe your personal tactical strategy as clearly and concisely as possible (noting the specialised movement sequences and associated movement strategy).

Example

In the sport of water polo, a goalkeeper may describe the personal tactical strategy that emerged in the following way.

'In my position as goalkeeper, I have devised a personal tactical strategy for the specialised movement sequence of delivering the ball to field players in fast breaks. The strategy involves the use of an explosive eggbeater kick to facilitate making long passes during transitions from defence to attack. This supports the movement strategy of optimising my team's opportunity to score.'

Evaluate your personal tactical strategy

Once you have devised your tactical strategy, you need to evaluate whether it has been effective or not. To make this judgement, you must consider how well you have worked with (or overcome) the task constraints, learner constraints and environmental constraints.

You also need to appraise the outcomes, implications and limitations of these constraints and your application of the principles of decision making.

To break this down, it is helpful to understand the terms 'appraising outcomes', 'appraising implications' and 'appraising limitations' in relation to constraints and the principles of decision making. We can consider these terms by answering the following questions:

Appraising outcomes

- Did the tactical strategy optimise your performance?
- How effective was the tactical strategy at overcoming the task, learner and environmental constraints?
- Did your application of the principles of decision making impact the outcome?

Example

'The use of an explosive eggbeater kick was successful in enabling a long pass, which allowed for improved opportunity for my team to attack the goal. Sometimes, when I implemented the strategy and produced a long pass, it was ineffective because my teammates were slow in transitioning. In other words, I was passing to no-one, which indicates that the application of decision-making principles was not always appropriate.'

Appraising implications

- Did the tactical strategy affect other aspects of your game or create different/new opportunities for you?
- How did you apply the principles of decision making and were there any constraints that affected this?

Example

'An interesting implication of my personal tactical strategy was that as I rose out of the water, and I was able to see that the opponent's goal was open and take the shot. This can be explained through perception–action coupling (i.e. 'I perceive, I act – I act, I perceive'). Another implication of my personal tactical strategy was that my teammates had to ensure they swam more quickly to their attacking half to receive my long passes. For some, this highlighted their personal fitness as a learner constraint. It also enabled a team strategy to emerge because the increased time my team has with the ball allows time to set up the mushroom formation, which provides greater affordances.

Appraising limitations

- Was there anything that limited your ability to implement this tactical strategy optimally?
- Did your application of the principles of decision making limit your development and implementation of the tactical strategy?

Example

'A limitation evident in my personal tactical strategy was centred on my personal fitness – a learner constraint. By the fourth quarter of most games, I found it very difficult to make the movements required to propel my body out of the water in order to make an effective long pass.'

Justify your personal tactical strategy

Once you have evaluated the effectiveness of your tactical strategy, you will be able to justify whether your strategy should be:

- **maintained** – e.g. 'My personal tactical strategy has been proven to be effective and will continue to optimise my performance.'
- **further developed** – e.g. 'My personal tactical strategy has optimised some aspects of my performance but needs opportunity for further development.'
- **modified** – e.g. 'My personal tactical strategy has not overcome or worked with the constraints of the task, learner or environment and more opportunity is needed under a constraints-led approach for an optimal tactical strategy to emerge.'

It is not enough to make a brief statement here as you are directed to *justify* your position (i.e. give reasons or evidence to support your conclusion). The best way to do this is to provide evidence from the data you have gathered (i.e. primary and secondary data). In other words, not only do you need to use data to determine what movement solutions emerged, and whether you made appropriate or inappropriate decisions, but you need to be able to combine that information with objective statistics about your performance to conclude whether your movement solutions and decisions improved or not.

Example

The water polo goalkeeper might conclude that the tactical strategy that emerged for him over the course of the term was to use an explosive eggbeater kick to achieve long passes and deliver the ball into the attacking zone in less time to increase scoring opportunities.

If the data collected shows that the strategy was successful in delivering the ball to the attacking zone faster, and that the team was able to successfully use the additional time to create scoring opportunities, then this can be used to justify that the strategy be maintained.

On the other hand, if his data shows that the team could not maintain possession from the long passes, then he might argue that he needs more time (working with the right constraints-led activities) to refine the personal tactical strategy or for a better tactical strategy to emerge.

Part B: Evaluating and justifying your personal performance

In Part B of the Project – folio, you are required to evaluate and justify your overall personal performance, with a focus on the specialised movement sequences for two principles of play. It is important to note that this evaluation is separate to the evaluation

STUDY TIP

For a full list of **task constraints, learner constraints and environmental constraints**, refer to Source XX on page XXX.

For a full list of the **principles of decision making**, refer to Source XX on page XXX.

STUDY TIP

Revisit and revise the body and movement concepts that were covered in Unit 1 of the QCE Physical Education syllabus by referring to Section 2.7 (pages 69–75) of *Physical Education for Queensland Units 1 & 2.*

If you no longer have access to the printed Student book, you can still access a complete digital version online via your obook assess.

you made of your personal tactical strategy in Part A. You can use information gathered from the same GPAIs, but you do not need to include your personal tactical strategy in this evaluation. You may choose two principles of play from the list below:

- setting up attack
- defending against an attack
- creating, defending and exploiting space
- attacking opposition space and scoring.

You are also required to apply two body and movement concepts to the performance. You must apply the body and movement concept of 'Quality of movement' plus one other body and movement concept from Source 6. To maximise your chances of success, your evaluation should reference all relevant criteria from each body and movement concept.

Quality of movement	Body awareness
Criteria: • speed (e.g. fast, slow) • timing (e.g. in time, out of time) • accuracy (e.g. on target, off target) • effort (e.g. level of motivation) • force (e.g. strong, light) • fluency and flow (e.g. free, bound)	Criteria: • body parts (e.g. arms, legs, elbows, knees, head) • body shape (e.g. stretched, curled, wide, narrow, twisted, symmetrical, asymmetrical) • body action (e.g. flexion, extension, rotation, swing, push, pull, transfer of weight, stability)
Space awareness	**Relationships**
Criteria: • space (e.g. personal and general space) • pathways of movement (e.g. curved, straight, zigzag) • planes of movement (e.g. sagittal, frontal, horizontal) • direction (e.g. forwards, backwards, sideways, up, down) • levels (e.g. high, middle, low)	Criteria: • people (e.g. alone, with partner, with group) • equipment (e.g. bats, balls and other pieces of equipment; uniforms and supplies)

SOURCE 6 The four body and movement concepts

Source 7 provides an example of how a student studying Australian football has demonstrated specialised movement sequences and two movement strategies from two principles of play. It also shows how the student has applied the body and movement concepts to evaluate their performance.

You will be expected to provide the same level of evaluation for your selected physical activity for your Project – folio. A template for this DCI is provided on your obook assess.

SUMMATIVE INTERNAL ASSESSMENT 1: Project – folio
PLANNING GUIDE

Category of physical activity: ☐ 'Invasion' ☐ 'Net and court'. **Selected physical activity:** *Australian football*		**Principle of play 1:** *Setting up attack* **Movement strategy 1:** *Break through the defence by knocking the ball forward, handballing, kicking and running to space.* **Specialised movement sequence:** *Leading, marking, handballing and kicking*	**Principle of play 2:** *Attacking opposition goal and scoring* **Movement strategy 2:** *Move the football into opponent's defensive area to score* **Specialised movement sequences:** *Marking, handballing and kicking*
Body and movement concept 1: *Quality of movement*	**Criteria:** ▶ speed (e.g. fast, slow) ▶ timing (e.g. in time, out of time) ▶ accuracy (e.g. on target, off target) ▶ effort (e.g. level of motivation) ▶ force (e.g. strong, light) ▶ fluency and flow (e.g. free, bound)	**My personal rating:** ☑ Accomplished and proficient ☐ Effective ☐ Competent ☐ Variable or inaccurate **Evident criteria:** *Accuracy, effort, fluency and flow,timing and speed* **Supporting visual evidence:** *Clips that show how I break through the defence by leading into space with an outcome that is beneficial to the team. e.g. knocking a lost ball off the ground to a teammate, breaking away from defence to receive a handball or mark, moving into free space to kick a ball to a teammate*	**My personal rating:** ☐ Accomplished and proficient ☑ Effective ☐ Competent ☐ Variable or inaccurate **Evident criteria:** *Accuracy, force, development, continuity and outcome of movement, efficiency* **Supporting visual evidence:** *To show that I have a high percentage of marks in front of the uprights and a high degree of goal accuracy (e.g. kicking effectively to a teammate for them to take a mark in reach of the uprights, optimising horizontal and vertical space and using force development by jumping to catch a mark in the scoring zone, fluently handballing on to a teammate, who is free to kick for goal.)*
Body and movement concept 2: *Relationships*	**Criteria:** ▶ people (e.g. alone, with partner, with group) ▶ equipment (e.g. bats, balls and other pieces of equipment; uniforms and supplies)	**My personal rating:** ☐ Accomplished and proficient ☑ Effective ☐ Competent ☐ Variable or inaccurate **Evident criteria:** *People (i.e. interaction with teammates and opponents)* **Supporting visual evidence:** *To show how I read the opponent's movement to perceive and act on affordances. e.g. choosing to kick the ball to an open teammate further up the field rather than handballing to a closer one who would be easily challenged, winning a physical contest (i.e. out-maneuver opponent) to take a mark.*	**My personal rating:** ☐ Accomplished and proficient ☑ Effective ☐ Competent ☐ Variable or inaccurate **Evident criteria:** *People (i.e. interaction with teammates and opponents), equipment* **Supporting visual evidence:** *Find footage to show that I use the opponent and the movement of the ball up the field to position myself effectively, creating affordances for my teammates so that I can mark their kick (e.g. moving to the left of the uprights and making myself seen, when the ball is travelling up the left hand side, successfully reading the irregular bounce of the ball to take possession.)*

SOURCE 7 To meet the task requirements, your performance evaluation must use two body and movement concepts and pertain to two principles of play, as shown in this Australian footballer's multimodal planning.

SOURCE 8 TBC

Section 2: Highlights of your physical performance

The second component of this task requires you to provide 2 to 3 minutes of supporting evidence (i.e. video footage) demonstrating your physical performance in an authentic environment. The visual evidence you supply to support your multimodal presentation should demonstrate:

- specialised movement sequences and two different movement strategies from two principles of play
- the application of quality of movement and one other body and movement concept to the performance of specialised movement sequences and two movement strategies from two different principles of play.

If you completed Part B: Evaluating and justifying your personal performance, you will already have identified the two different movement strategies from two different principles of play. For example:

Principle of play 1: Setting up attack	**Principle of play 2:** Attacking opposition goal and scoring
Movement strategy 1: Break through the defence by knocking the ball forward, handballing, kicking and running to space	**Movement strategy 2:** Move the football into opponent's defensive area to score

To demonstrate accomplished (highly skilled) and proficient (well advanced or expert) specialised movement sequences, you will need to have visual proof that shows relevant specialised movement sequences and variations of these skills. For example:

Specialised movement sequences: • Leading (e.g. moving into space) • Marking (e.g. from handballs and kicks) • Handballing (e.g. various distances, bounce pass, using left- and right-hand passes) • Kicking (e.g. drop punts of different heights and distance, torpedo, grubber)	**Specialised movement sequences:** • Marking (e.g. from handballs and kicks) • Handballing (e.g. various distances, bounce pass, using left- and right-hand passes) • Kicking for goal (e.g. snap shot, banana kick, set shot)

As your supporting evidence can only be 2 to 3 minutes long (with no voice over or annotations included), you will need to choose the footage you include carefully. You have already used visual evidence to support Section 1 of your Project – folio.

If you need more visual evidence to meet the time requirements of your supporting evidence, select clips that show variations of specialised movement sequences with successful outcomes. Section 2 does not require further evaluation and justification of how the body and movement concepts were applied; just visual evidence of your performance in authentic performance environments.

PERFORMANCE | SKILL DRILL **2.6** | Evaluate the effectiveness of your personal tactical strategy

>> Turn to pages XXX–XXX to complete this integrated physical performance activity.

2.6 Check your learning

Engage and understand

1 **Access** an up-to-date version of the instrument-specific marking guide (ISMG) for summative internal assessment 1: Project – folio. A copy is available on your obook assess. Read the assessment objectives and marks allocated for each. **Identify** the areas of the task you think will be most challenging. **Identify** some techniques that you can use to help you perform well in these areas.

2 **Identify** and **explain** three possible recommendations you will be asked to justify in the evaluation of your personal tactical strategy.

Analyse and apply

3 **Differentiate** between the terms 'outcomes', 'limitations' and 'implications' when used to evaluate your tactical strategy.

Evaluate and justify

4 **Design** a GPAI that you could use to gather data about your performance of at least two specialised movement sequences for one movement strategy.

obook assess

Check your obook assess for the following additional resources and more:

» Student book questions XX
[Title TBC]

» Worksheet XX
[Title TBC]

» Weblink XX
[Title TBC]

» assess quiz XX
Test your skills with an auto-correcting multiple-choice quiz.

Sum it up!

2.1 **Tactical awareness** is the ability to identify what is happening in a game situation and use this information to select and implement the correct physical responses in order to increase the chances of a successful outcome.

2.2 The **cognitive systems approach** is a broad theoretical framework used to help explain the processes involved in motor learning. It suggests that learning is hierarchical (i.e. top down) and linear (i.e. one command after the other).

The **dynamic systems approach** is a broad theoretical framework used to help explain the processes involved in motor learning. It suggests that our movements are coordinated and controlled through complex, non-linear interactions between all parts of the body, and that no single body system or part is more important than the other in the learning process.

2.3 **Dynamic models of learning** are theories (ways of thinking) that support the dynamic systems approach to motor learning. Dynamic systems theory and ecological model are two dynamic models of learning.

Dynamic systems theory views the learner as a complex movement system that self-organises (finds movement solutions without instruction or cognitive thought) in response to constraints placed upon it. Constraints are variables present at any given time that impact implementation of movement strategies and specialised movements sequences. Constraints can pertain to the learner, the task or the environment.

The **ecological model** attempts to explain how the learner's **motor control system** interacts with the environment to simultaneously 'perceive and act' and 'act and perceive' (perception–action coupling) in order to identify opportunities (**affordances**) and produce movements that will maximise the chances of success. The ability to successfully identify affordances is called **attunement**.

2.4 The **constraints-led approach** is a contemporary coaching method based on the principles of the dynamic systems approach to motor learning. A constraints-led approach advocates 'authentic' and 'learner-centred' opportunities to teaching and learning in sports and physical activities. By manipulating constraints, learning opportunities are presented to the learner and the learner is then challenged to find their own movement solutions to the problems faced or the goals to be achieved.

The approach to learning has an impact on the role that **the coach** plays. Under a cognitive approach, the coach favours the use of technical drills in isolation, outside authentic game situations. Under a constraints-led approach, the coach favours the use of activities that closely represent authentic game play, purposefully manipulating constraints to amplify movement solutions for a problem area.

When using the constraints-led approach to support the emergence of a personal tactical strategy, the coach should identify the specific area of the learner's game a manipulation of constraints needs to address: which **specialised movement sequences**, for which **movement strategy**, within which **principle of play** the performance relates to.

2.5 Considerable planning needs to go into the implementation of a constraints-led approach. A performance appraisal using **body and movement concepts** and the **principles of decision making** as a guide can help to identify problem areas on which to base constraint manipulation.

There are five steps to designing and implementing effective constraints-led activities: identify the technical and tactical problem area/s; design the constraints-led activity; communicate to the player what the problem is and why it needs addressing; run the activity; and review and revise the activity.

2.6 The assessment for the tactical awareness topic is a **Project – folio**, which is made up of two components. The first component is comprised of a multimodal presentation on devising, evaluating and justifying a personal tactical strategy and evaluating and justifying personal performance. The second component is a video of the highlights of your physical performance. No voiceover or accompanying text is required for this component – it's just footage.

Dig deeper!

Exam-style revision questions and tasks

SECTION A

→ Ten multiple-choice questions

QUESTION 1

Tactical awareness is developed in all of the following examples, except

(A) when using perception–action coupling to attune to affordances.
(B) during constraints-led activities where tactical strategies can emerge spontaneously.
(C) when solely using the dynamic systems approach.
(D) when principles of decision making are applied through authentic game play.

QUESTION 2

The cognitive approach is a traditional approach that uses

(A) the ecological model.
(B) the information processing model.
(C) the application of task, learner and environmental constraints.
(D) the non-linear pedagogy model.

QUESTION 3

Which of the following types of practice reflects 'repetition without repetition'?

(A) Massed practice in closed environments
(B) Distributed practice in closed environments
(C) Blocked practice
(D) Variability practice

QUESTION 4

A coach who uses principles from the dynamic system approach, would agree with which statement?

(A) Control the uncontrollable using pre-determined set plays.
(B) Any constraint modification will allow movement solutions to emerge.
(C) Exaggerate affordances through tasks constraints.
(D) Reinforce one perception–action coupling response through massed practice.

QUESTION 5

An individual's ability to use their vision to detect bowling affordances in cricket is a

(A) learner constraint.
(B) task constraint.
(C) environmental constraint.
(D) physiological constraint.

QUESTION 6

Which of the following is an example of interacting with environmental constraints?

(A) Playing on changing surfaces
(B) Allowing one bounce in volleyball
(C) Playing water polo in a swimming pool
(D) Playing using a lighter ball (e.g. using a volleyball in netball)

QUESTION 7

Participating in an activity that represents an authentic game environment but manipulates one or more task constraints is referred to as

(A) the ecological system.
(B) the constraints-led approach.
(C) the cognitive approach.
(D) the 3 A Model: Affordance-Attunement Approach.

QUESTION 8

The four principles of decision making in correct order are

(A) read, recognise and respond, react, recover.
(B) read, react, recognise and respond, recover.
(C) read, recover, react, recognise and respond.
(D) read, respond, recognise, recover.

QUESTION 9

Gibson (1979) said: 'We must perceive in order to move, but we must also move in order to perceive.' Which dynamic systems concept was he referring to?

(A) Bernstein's degrees of freedom problem
(B) Perception-action coupling
(C) Constraints-led approach
(D) Information processing stage

QUESTION 10

Refer to this secondary data. What is the coach doing?

0245_13241

(A) Manipulating ecological constraints
(B) Manipulating the learner constraints
(C) Interacting with environmental constraints
(D) Manipulating task constraints

SECTION B

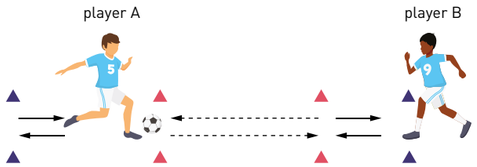
→ Two short-response questions
→ One extended written response

QUESTION 11 (150 words)

The diagram below shows a soccer coaching session. Players move at the same time from the blue markers to the red markers. Player A then passes the ball to Player B. Both players then jog back to the blue markers and repeat the drill again.

a **Explain** which approach to motor learning this drill is likely to have been based on (i.e. the cognitive systems approach or the dynamic systems approach).

b **Identify** three changes that could be made in order to make this activity more representative of an authentic environment.



QUESTION 12 (150 words)

Using examples from your selected physical activity, evaluate how manipulating task constraints can develop your ability to attune to affordances.

QUESTION 13 (400 words)

Analyse the data in Source 1, which was taken from a volleyball player's game performance. **Evaluate** the effectiveness of each hitting option and **devise** a constraints-led activity to either

a support this learner to continue to adapt an emerging strength

b amplify this learner's performance problem to encourage them to adapt.

Justify the design of your activity, referring to concepts learnt in this chapter.

Specialised movement options	Accurate execution	Inaccurate execution	Effective option (defence could not maintain possession)	Ineffective option (defence could maintain possession)
Cross-court hit	𝍸 ||	|	|	𝍸 ||
Line hit	||		||	
Tip		|		
Deep roll	|			|

SOURCE 1 A volleyball player's data from game playPage