5.2 Information Processing

5.2 Information processing

1. Outline the **two** continua of motor skill classification below. Illustrate your answers using sporting examples.
(i) Fine and gross *[3]*
(ii) Externally and internally paced skills *[3]*

fine and gross:
this is concerned with the precision of accuracy of movement / involvement of muscle mass;
gross motor skills involve large muscle movements *e.g.* running/jumping;
fine motor skills involve more intricate movements using small muscle groups *e.g.* rifle shooting / finger action across the seam of cricket ball;

externally and internally paced skill:
this refers to the timing of the movements / the extent to which the performer has control over the timing of the movement;
external paced skills are sailing/windsurfing/receiving a serve;
internal paced skills are javelin throw/gymnastics routine;

(d) Compare the type of performance you would expect to observe between a skilled performer and a novice performer. *[4]*

feature	**skilled**	**novice**
consistency	high	low;
accuracy	high	low;
learned	*nature* good/autonomous	poor/cognitive;
control	high	low;
efficiency	high	low;
certainty	high	low;
fluency	smooth	erratic;
goal direction	good	poor;

6. (a) (i) Define the term *technique*. *[1]*

(i) a way of doing/way in which a sports skill is performed / natural or acquired facility in a specific activity ***[1]***

(ii) State the relationship between ability, skill and technique. *[1]*

(ii) skill = ability + selection of an appropriate technique / skill is the ability to perform the appropriate technique on demand ***[1]***

5.2 Information processing

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Why is Cristiano Ronaldo so good?

5.2 Information processing

Why is Cristiano Ronaldo so good?

Unit 5.2	Information processing
Key learning intention (KLI)	To understand how the brain processes information and how that affects sports performance and practice
Success criteria	I can produce a concept map using Welford's (1968) model of information processing that gives a detailed explanation of what happens during the performance of a movement in sport (Ronaldo skill).
Resources	P114-121
Key words	Information processing model, feedback, response time, reaction time, movement time, psychological refractory period (PRP)

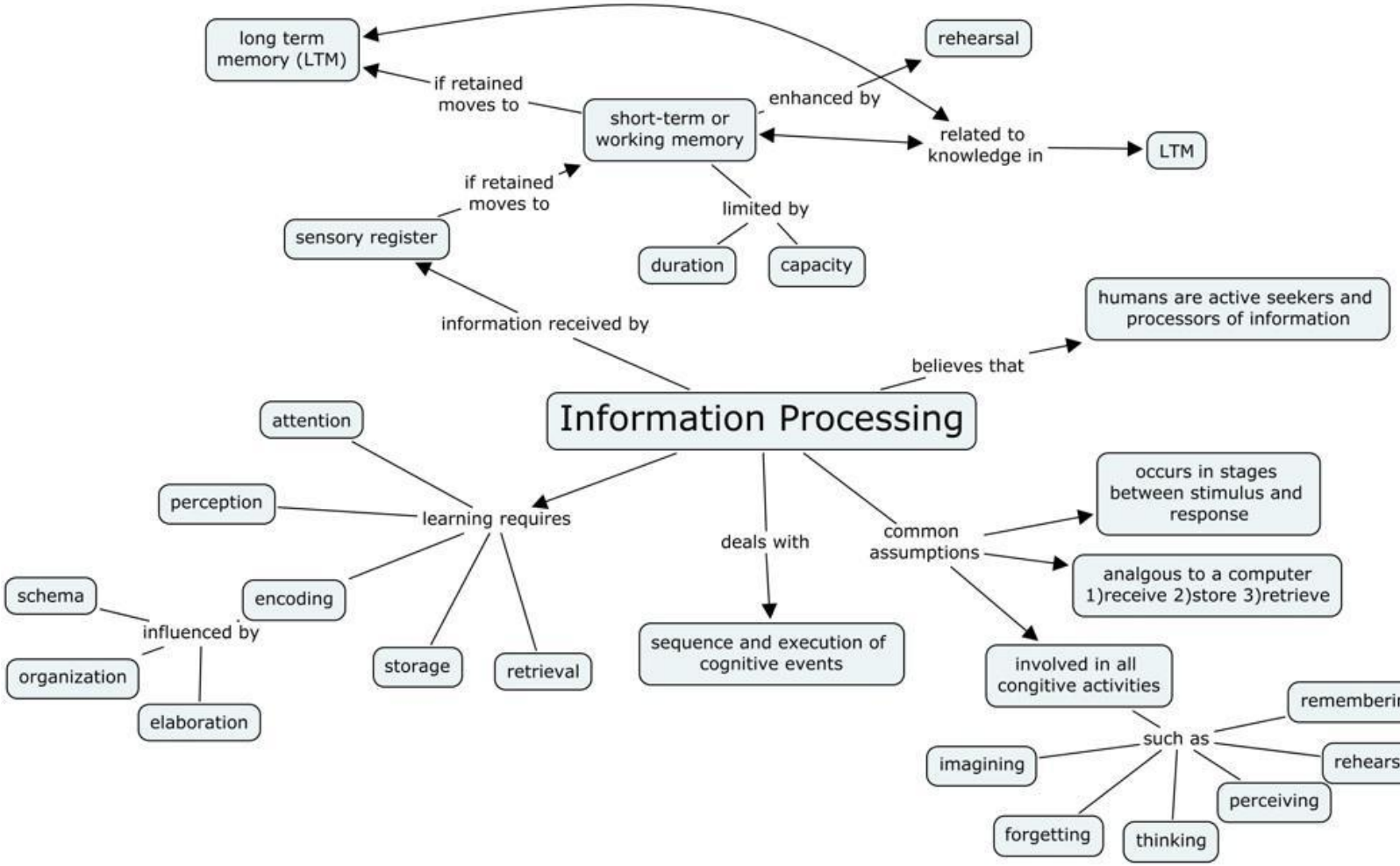
5.2 Information processing

- When we perform skills we do so in environments of varying complexities.
- Open skills in particular are performed in very complex environments. Just think about games like soccer and field hockey: 22 players, 1 referee and 2 assistants (soccer) or 2 referees (field hockey), the ball, the goals, the line markings, the spectators and the coaches.
- The players have to take all of this into account when performing.

- Just how we humans can do this has puzzled psychologists for many years.

5.2 Information processing

Concept map example



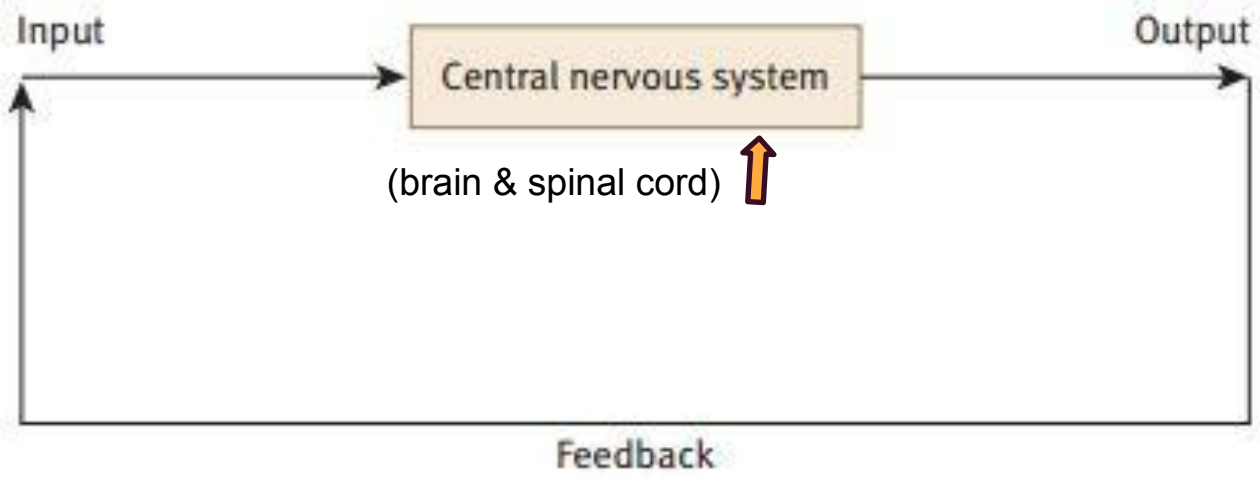
5.2.1 Describe a simple model of information processing

- The input refers to the environment that the performer can see, hear and feel.
- It is sometimes called the display and sometimes even the stimulus.
- In fact, in sport it is very rarely one stimulus but several stimuli

- The output is what the performer did.
- This is also often referred to as the response.

5.2.1 Describe a simple model of information processing

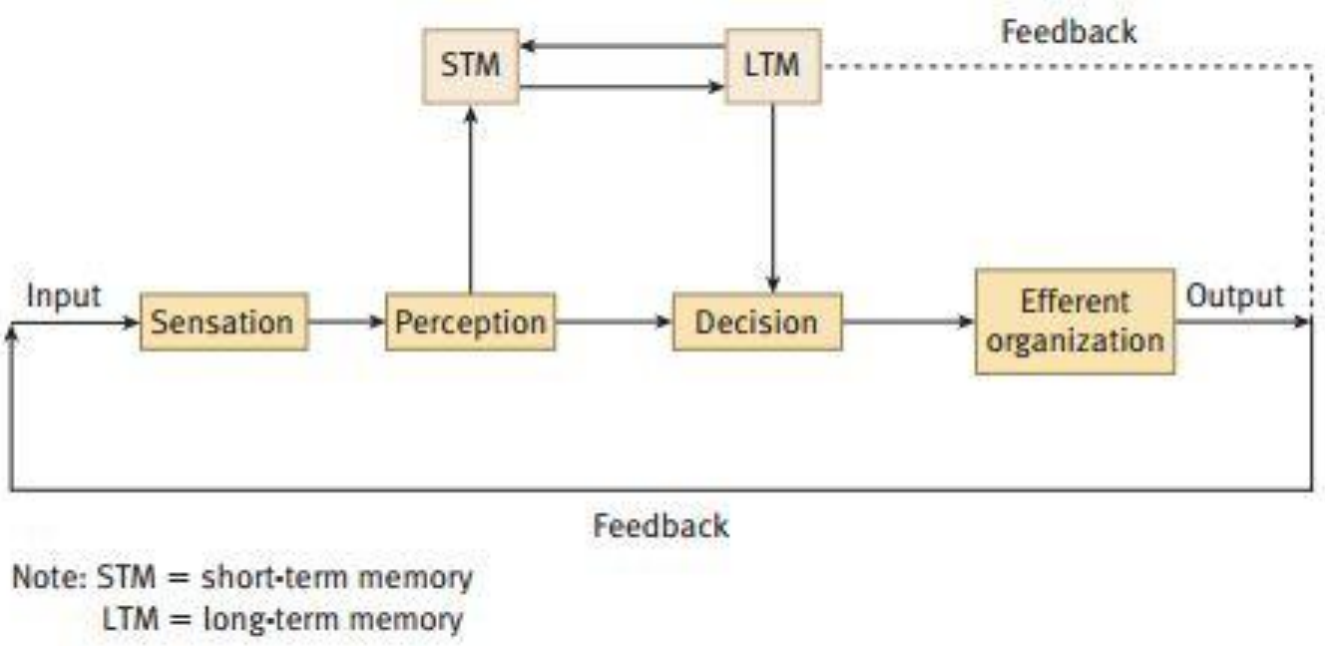
The Black Box Model of information processing



Using a skill of your choice, explain what happens at each stage.

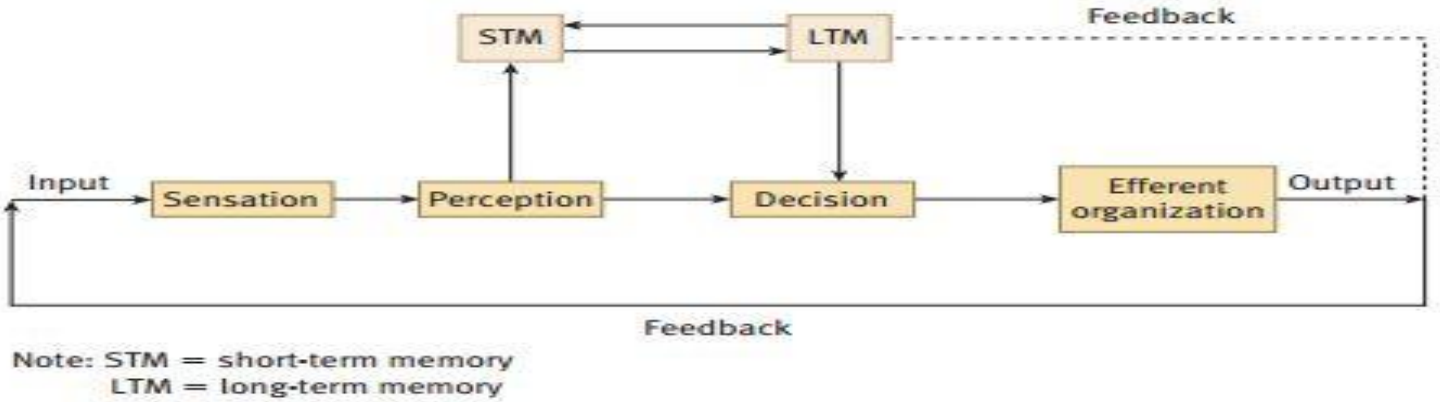
5.2.2 Describe Welford's model of information processing

One of the first researchers to try to explain what actually happens in the CNS when processing information was AT Welford



Efferent organization – organizing a reaction starting from the brain and extends outward (whatever part/s of the body are carrying out the output response.

5.2.2 Describe Welford's model of information processing



Welford's model suggests that we:

- Take in information through our senses and temporarily store all of these inputs prior to sorting them out (**sensation**)
- The inputs that are seen as relevant to the decision are then stored in the short-term memory (**perception**)
- A decision is made by comparing the information in the short-term memory with previous experiences stored in the long-term memory
- With reference to the long term memory for the required action the decision is carried out (**decision**)
- The action and the results are stored for future reference
- The whole process then begins again

5.2.3 Outline the components associated with sensory input

Sensation or sensory input

- The senses are responsible for relaying information about the environment to the brain.
- This information is then interpreted by the brain based on past experience of similar situations, and is held in the long-term memory (LTM).

- The senses can be divided into exteroceptors and interoceptors.

5.2.3 Outline the components associated with sensory input

Sensation or sensory input

- Exteroceptors provide information from outside of the body.
- The main exteroceptors involved in sensation with regard to sport are vision and audition
    - Sensory nerve end receptors/sense organ that respond(s) to external light/sound/odour/tactile stimuli;
    - Located in the skin/oral cavity/eyes/ears/nose;

5.2.3 Outline the components associated with sensory input

Sensation or sensory input

- Interoceptors provide information from within the body, information about body position and the position of limbs.
- The main interoceptors involved in sport are the vestibular apparatus, which provides information about balance; and joint receptors, muscle spindles which provide information about limb positions.
    - Neuromuscular receptors that register stimuli such as stretch/tension/movement/sensory nerve receptors / awareness of body position in space; (**PROPRIOCEPTORS**!!)
    - Located in the muscles/tendons/joints/inner ear;
    - Sensory nerve end receptors; located in the lining of the mucous membrane of the respiratory and digestive tracts/internal visceral organs/vascular system/blood vessels (blood pH)/chemoreceptors/nociceptors (free nerve endings in most body tissues that respond to potentially damaging stimuli/pain)

5.2.4 Explain the signal-detection process

- A researcher named Swets (1964) theorized that individuals receive over **100,000 pieces of information per second**.
- This may be information from the environment and/ or from within the person themselves.

- Thus actually perceiving an important piece of information, what he called a "signal", is problematic.
- In order to explain how we do this, Swets developed the **signal detection theory.**

5.2.4 Explain the signal-detection process

- Swets termed the background, non-essential information "noise".
- This may mean actual noise, e.g. the sound of spectators, but **covers all information** that is not part of the signal.
- So noise can be **visual or from within yourself** such as worrying about failing.

- According to signal detection theory, the probability of detecting any given signal depends on the intensity of the signal compared to the intensity of the background noise.

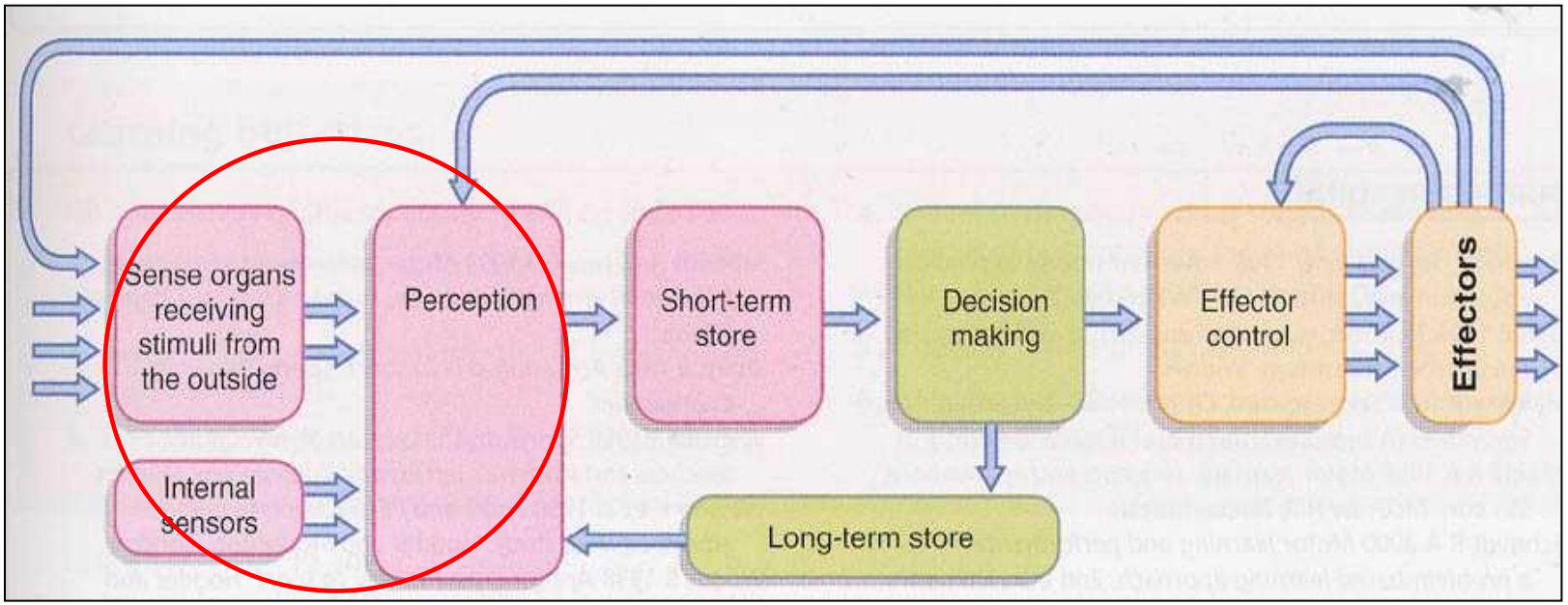
5.2.4 Explain the signal-detection process

- The likelihood of detecting the signal would depend on the interaction between two variables, d-prime (d´) and the criterion (C).
    - d´ represents the individual's sensitivity to that particular signal. This sensitivity may depend on the efficiency of the person's sense organs, e.g. eyes, vestibular apparatus.
    - It may also depend on experience, e.g. familiar signals are thought to be more readily detected than unfamiliar stimuli.

5.2.4 Explain the signal-detection process

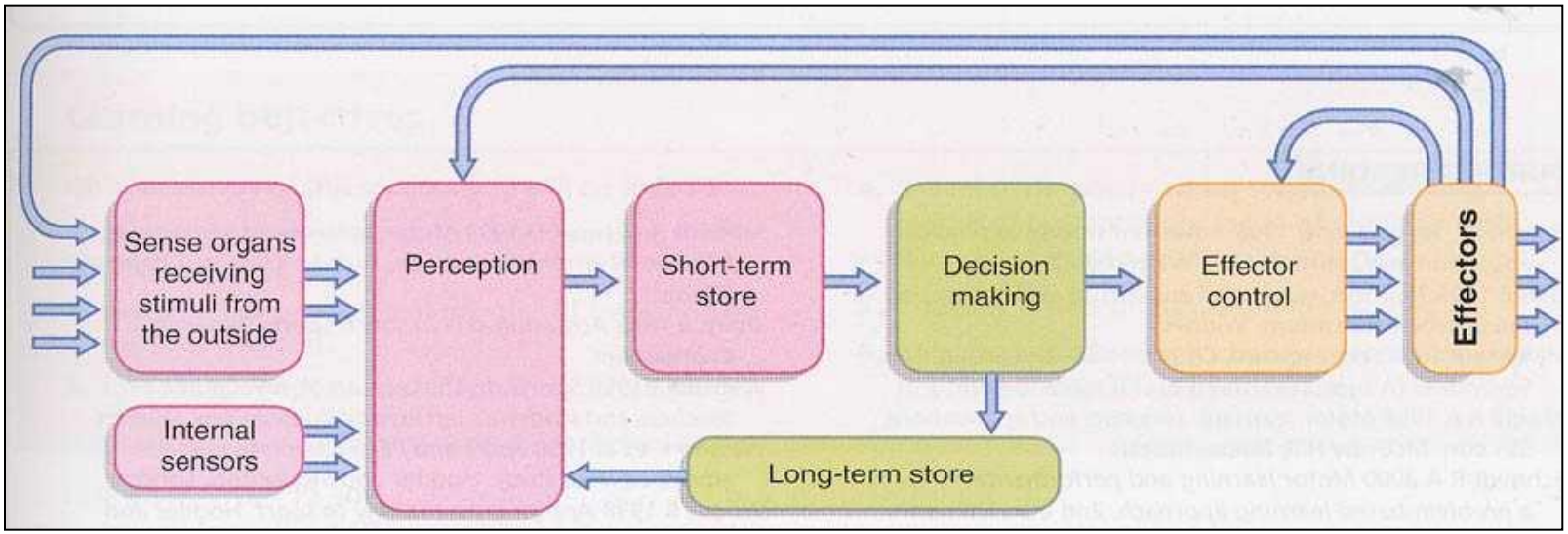
- The likelihood of detecting the signal would depend on the interaction between two variables, d-prime (d´) and the criterion (C).
    - C represents the effect of a person's bias on detection.
    - C is thought to be affected by arousal level, which in turn affects the probability of the detection of a signal.
    - When arousal is low the signal is missed, what we call an error of omission.
    - If, however, arousal is high the person will have a higher degree of detection (heightened awareness).

5.2.4 Explain the signal-detection process



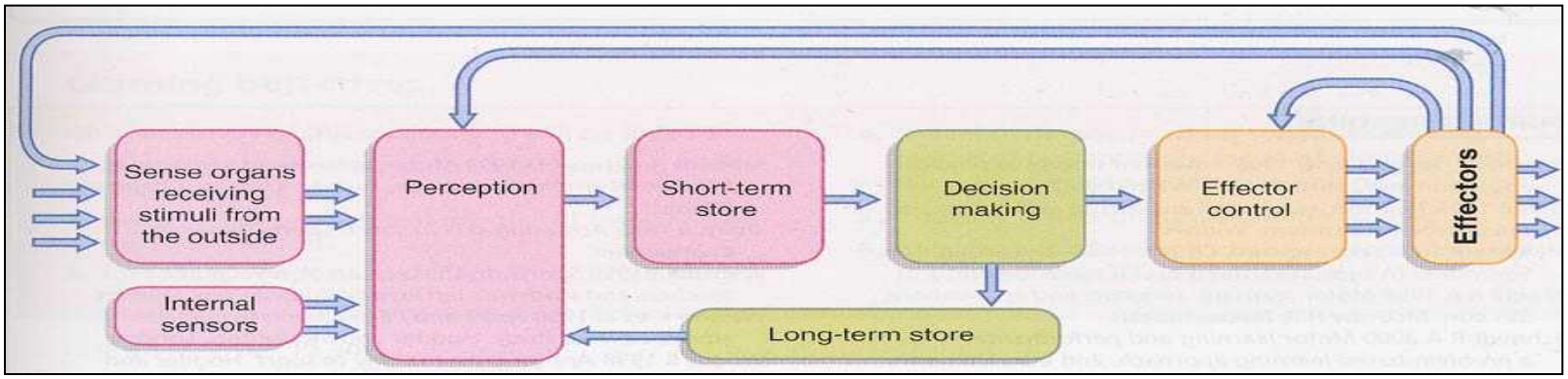
1. **Perception is the process by which the brain makes sense of the stimuli received**
2. Short term memory stores large amounts of information for a very short time
3. Selective attention looks out for anticipated stimuli;
4. Selected stimuli compared to long term memory to select the appropriate response

5.2.4 Explain the signal-detection process



- Perception is the process by which the brain interprets and makes sense of the information it is receiving from the sensory organs *e.g.* the height of the server's ball toss;
- The senses, which are the most important in the perception of information present in the environment, are visual and auditory receptors;
- Vision is generally considered to be the most important of the senses
- **Perception consists of detection, comparison and recognition (DCR);**
- Detection is the process by which the brain identifies that a stimulus is present
- Examples of the stimulus are the spin of the ball/the flight path of the ball/the position of the ball from ball toss relative to the server;

5.2.4 Explain the signal-detection process

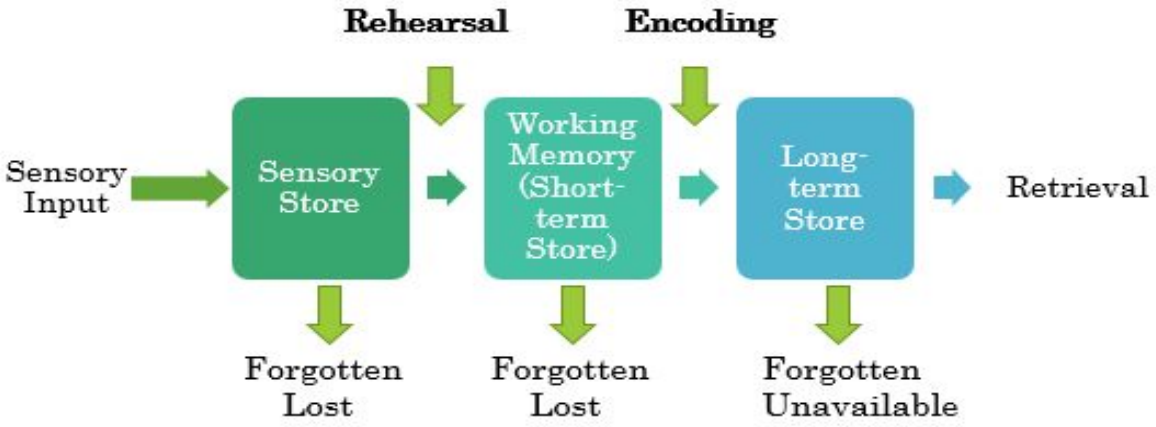


- Stimulus stands out from the background noise/those aspects of the display that are not directly relevant to receiving service *e.g.* the color of the server's socks;
- Early signal detection / perceive a signal from only partial information / pattern recognition *e.g.* early detection of the spin of a curveball;
- Improve signal detection by selective attention (block out irrelevant stimuli)
- Selective attention can be improved through learning from past experience
- Comparison – the stimulus is passed through the memory and compared with similar codes stored in the memory *e.g.* from previous serves in this match or even from previous matches with the same opponent;
- Recognition occurs when the code of the incoming information matches a code stored in the long-term memory;

5.2.5 Distinguish between the characteristics of short-term sensory store, short-term memory and long-term memory

- Another researcher, Tulving (1985), described memory as being the "capacity that permits organisms to benefit from their past experiences".
- In Welford's model he highlights **short-term memory (STM)** and **long-term memory (LTM)** but another stage of memory, the **sensory information store (SIS)** has also been described.
- All incoming information is held for a brief time in the SIS. Most of the information is lost within **0.5 seconds**. It is only retained and processed if it is attended to (requires action).
- If this information is to pass to STM, it must be rehearsed. Rehearsal means being attended to, or processed mentally and/or physically

5.2.5 Distinguish between the characteristics of short-term sensory store, short-term memory and long-term memory



- Ninety per cent of all information entering the **STM is lost within 10 seconds.**
- Retention and passage to the LTM are **dependent on rehearsal, mental, physical or both.**
- Time is not the only limitation on the STM. Miller (1956) found that STM has a capacity or space limitation. **He claimed that individuals could remember 7±2 bits (pieces) of information.**
- This does not mean that if you read out a list of 12 words to a friend they would only be able to remember 9 of them

What is Selective attention?

What is Selective attention?

5.2.6 Discuss the relationship between selective attention and memory

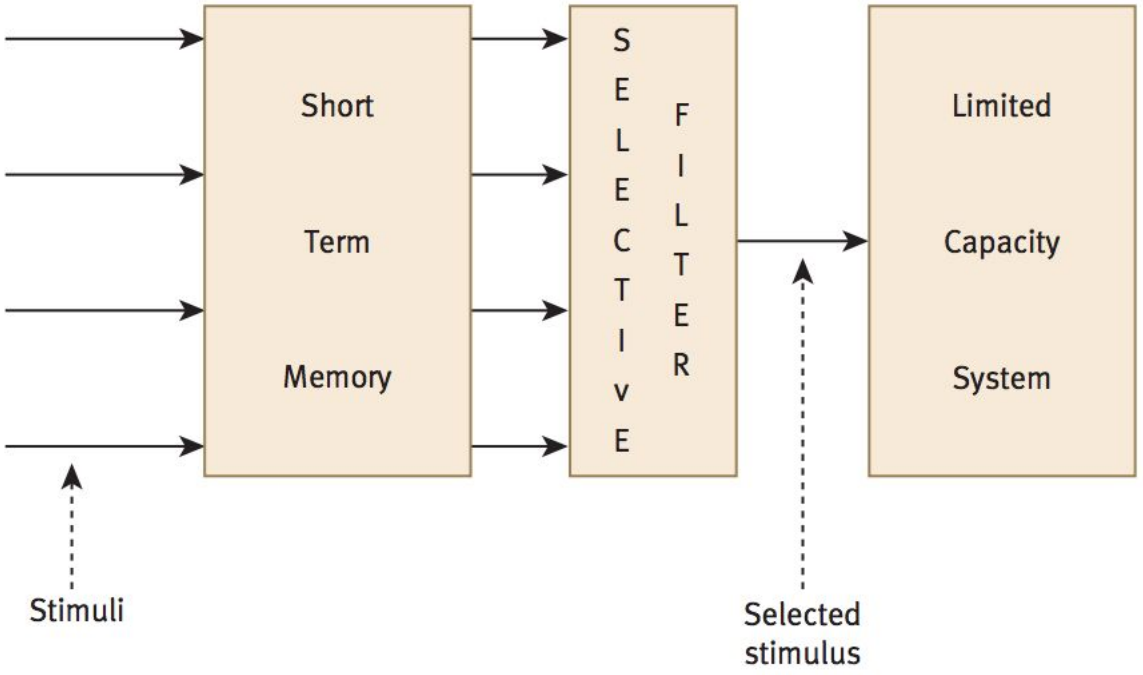
- Given that our STM has a limited capacity, we have a problem when trying to deal with all of the information in our environment.
- The limitation is so great that some psychologists believe that we can only deal with one thing at a time; this is called single channel theory
- Others have argued that we can deal with more than one piece of information at a time if the tasks are dissimilar, for example, running down the court bouncing a basketball while at the same time making a decision as to whether to pass or shoot.

5.2.6 Discuss the relationship between selective attention and memory

- Running with the ball occupies a different part of the brain to making the decision therefore the two tasks will not affect one another.
- The way we overcome this limited capacity is by the use of selective attention.
    - Selective attention refers to the individual focusing on relevant information while ignoring irrelevant information.

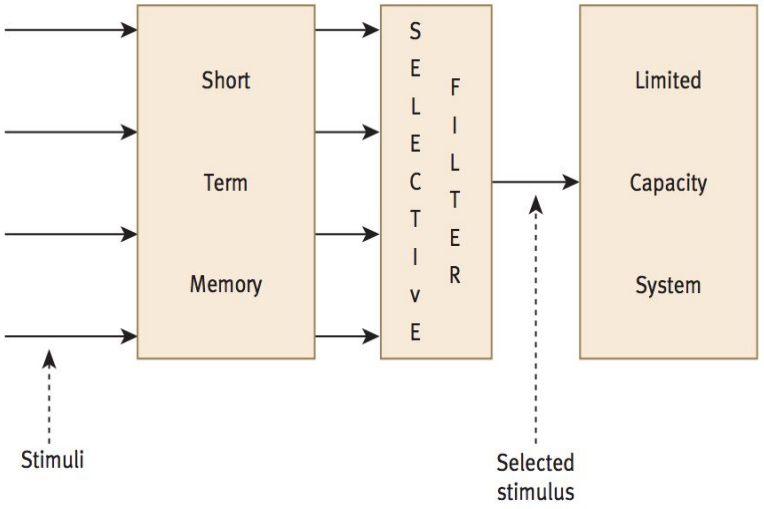
5.2.6 Discuss the relationship between selective attention and memory

- All information enters the STM, but we only attend to the selected stimuli. Unselected stimuli are filtered out but selected stimuli are compared to information stored in LTM. This allows us to make decisions on what action to take.



5.2.6 Discuss the relationship between selective attention and memory

- While selective attention takes place stimuli being chosen for processing after entering STM, we can also make decisions on what to process before the information enters STM.
- Past experience of similar situations allows the performer to search the appropriate areas of the environment for relevant information.
- Sometimes attention is involuntary, however. A sudden loud noise or a flash of bright light will attract our attention probably as a subconscious safety factor.



5.2.7 Compare different methods of memory improvement

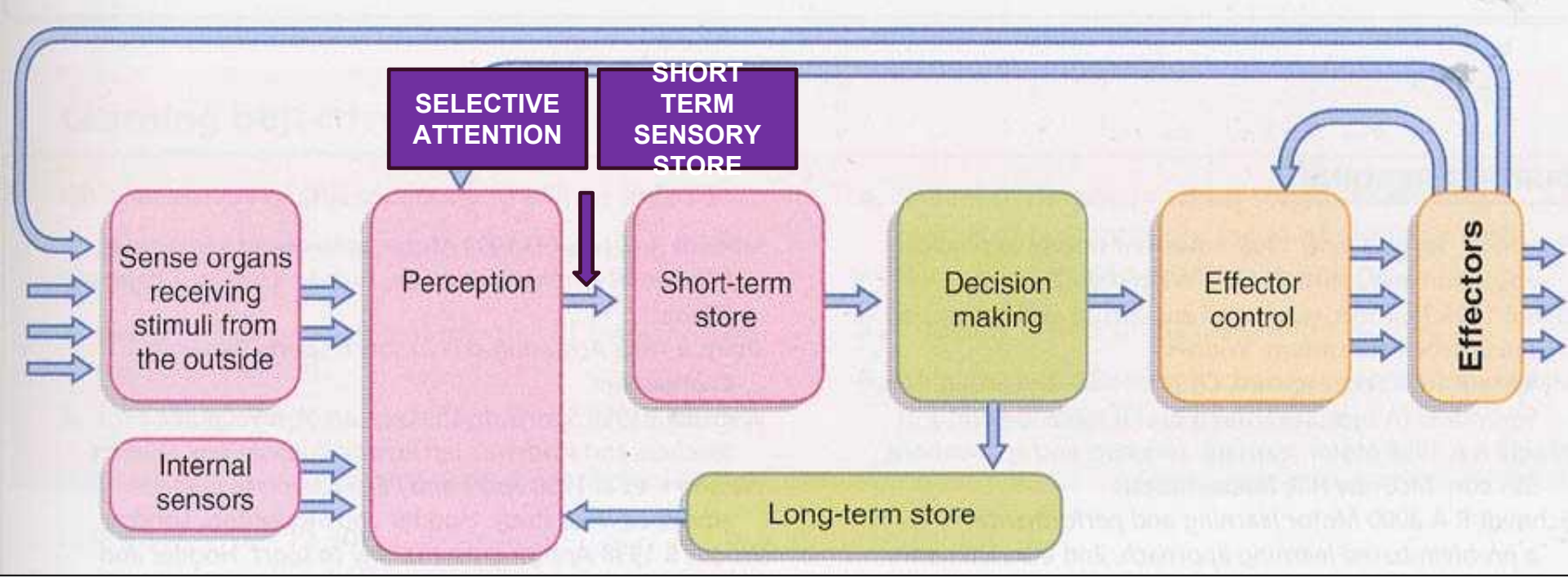
There are other strategies to help with retention and retrieval for improving learning, skill acquisition practice or teaching/coaching skills.

Outline the following:

- action words
- brevity
- clarity
- organization
- association
- practice

(a) Outline two methods which can be employed to improve a person's memory. *[2]*

1. Action words e.g. assist you in describing your experiences and accomplishments
2. brevity *e.g.* giving a learner a small amount of information at a time to avoid overload;
3. clarity *e.g.* avoid trying to learn or teach two similar but distinct items in the same session, as the memory of one may interfere with the memory of the other;
4. organization *e.g.* we remember more easily if we organize the way in which we are to learn and ensure that the information is meaningful / coaches often use imagery to aid organization / *OWTTE*;
5. association *e.g.* good coaches and teachers always ensure that new learning is linked to what players already know;
6. practice *e.g.* no skill is learned without practice / practice shuttles the image of the skill backwards and forwards between the short-term and long-term memory and in doing so establishes what is known as a "memory trace"/pathway; rehearsal *e.g.* processed mentally or physically;



selective attention ‹SA› operates in the short term sensory store ‹STSS›

only the relevant information is passed to the short-term memory ‹STM› where it is held for several seconds

information selected to the STM can be determined through previous experience and information in the LTM

SA ensures that information overload does not occur and prevents confusion as the brain would not be able to cope with streams of information

SA is very important when accuracy/fast responses are required

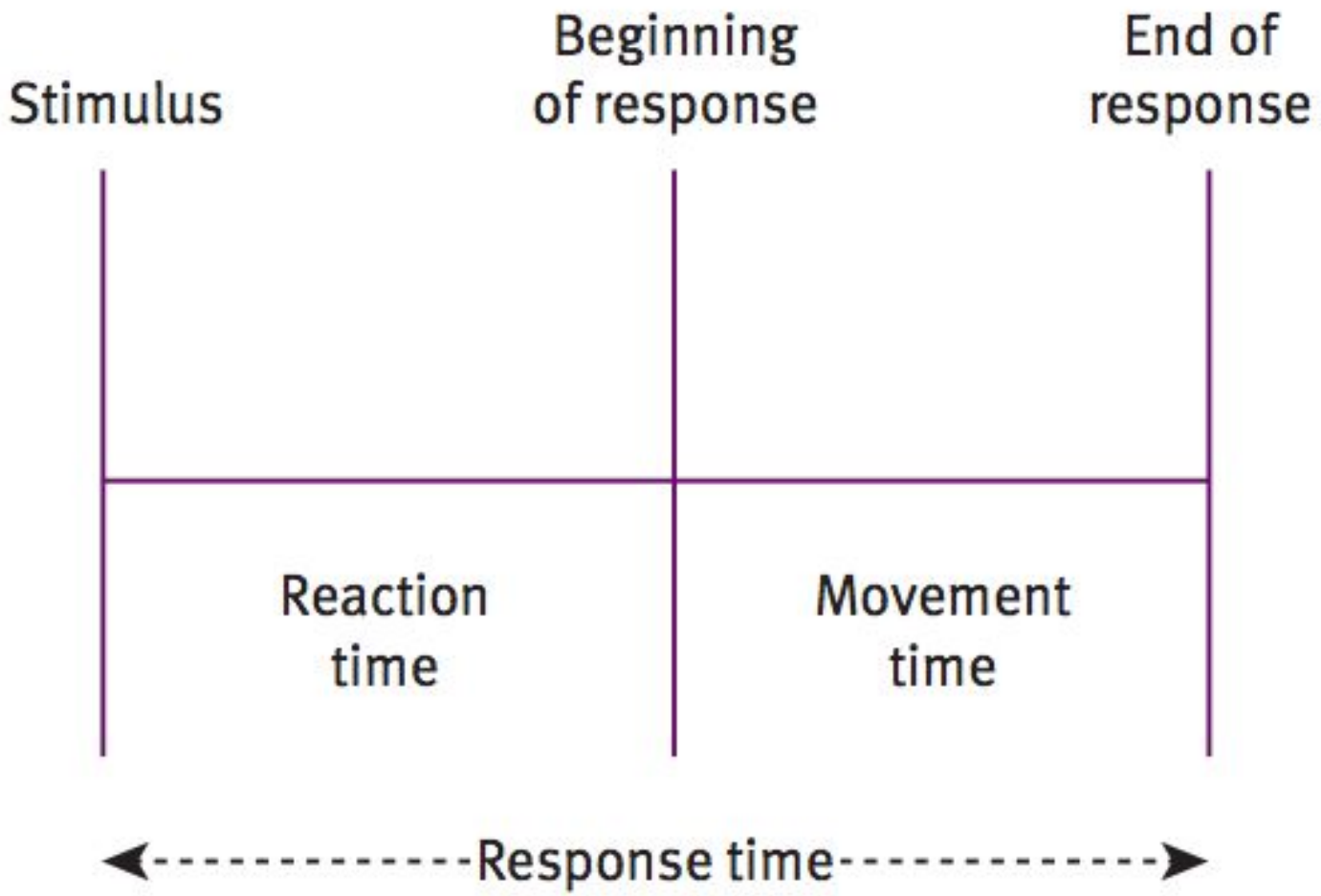
a filtering mechanism operates, which separates the relevant information from the irrelevant ‹noise› information so that athletes concentrate on one cue/stimulus ‹for example the ball, position of player in a game of tennis› to the exclusion of others

SA can be improved by learning through past experience/practice/coaching which improves a person's anticipation/interaction with long-term memory/memory trace

5.2.8 Define the term response time

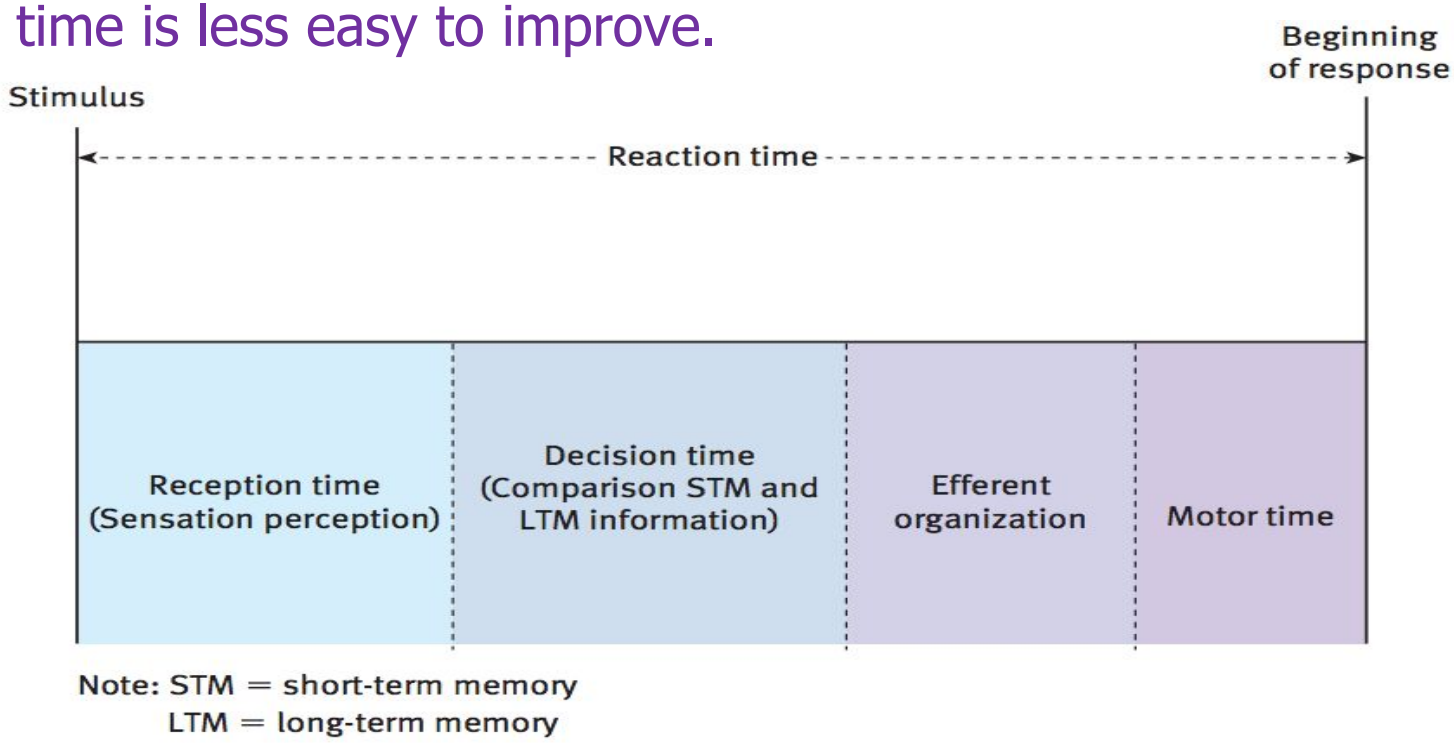
- **Response time is the time from the introduction of a stimulus to the completion of the action required to deal with the problem.**
  - Response time is made up of reaction time and movement time.
  - Reaction time is the time that elapses from the sudden onset of a stimulus to the beginning of an overt response.
  - Movement time is the time it takes to carry out the motor aspects of the performance.

5.2.8 Define the term response time



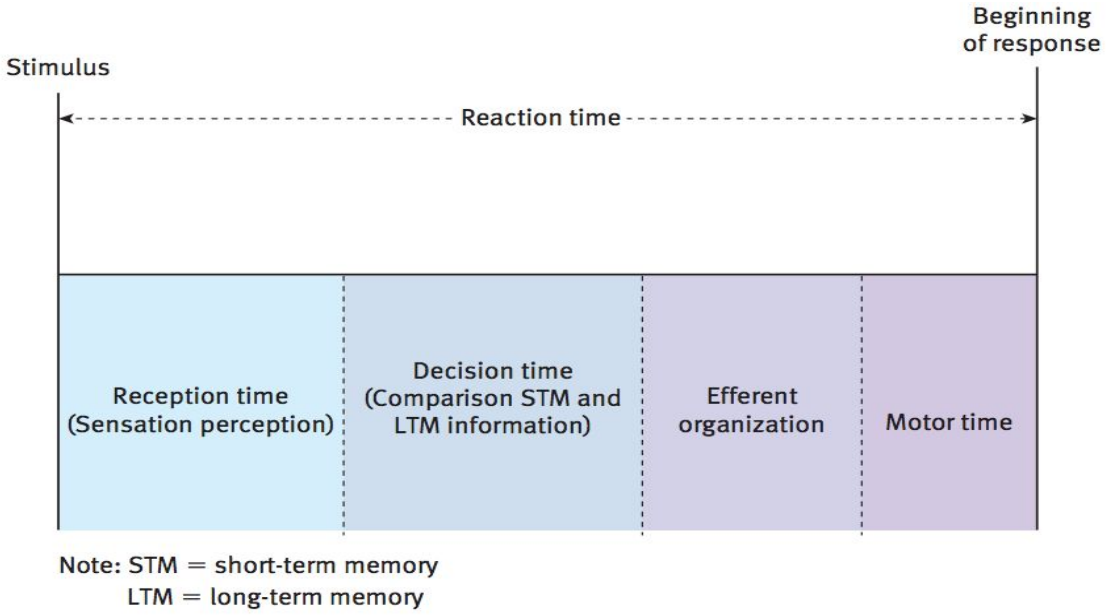
5.2.9 Outline factors that determine response time

- Response time increases throughout childhood and adolescence, however, as we get older it gets slower.
- Movement time is affected by fitness, particularly power and speed of limb movement.
- Training can greatly affect movement time but reaction time is less easy to improve.



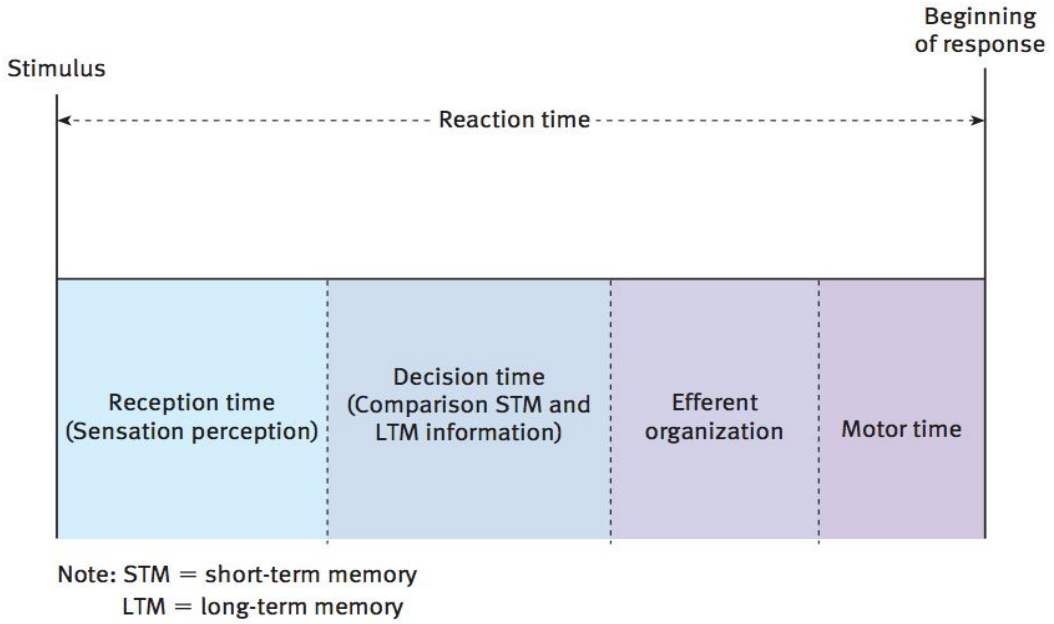
5.2.9 Outline factors that determine response time

- The main factor affecting speed of reaction is the number of choices that the individual has to make.
- If there are no choices, what we call simple reaction time, the mean times range between 170 and 200 msecs.
- However, as we increase the number of choices, what is termed choice reaction time, the times increase.

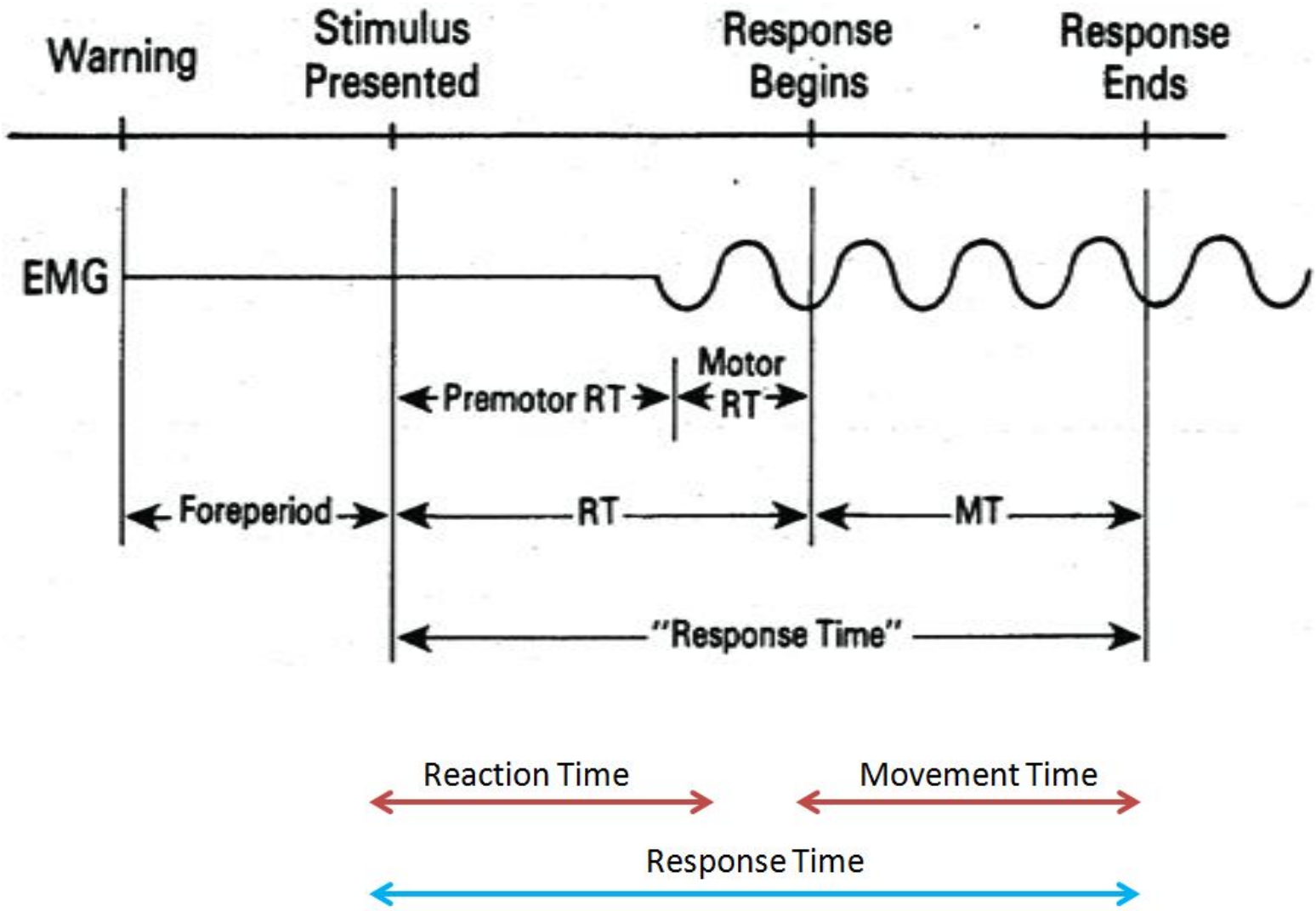


5.2.9 Outline factors that determine response time

- Hick (1952) found that as you doubled the number of stimulus-response couplings the reaction time increased.
- If the reaction time is plotted against the log of the stimulus-response couplings there is a linear increase.
- This is known as Hick's Law. Generally, reaction time increases by about 150 msecs every time the stimulus-response groupings are doubled



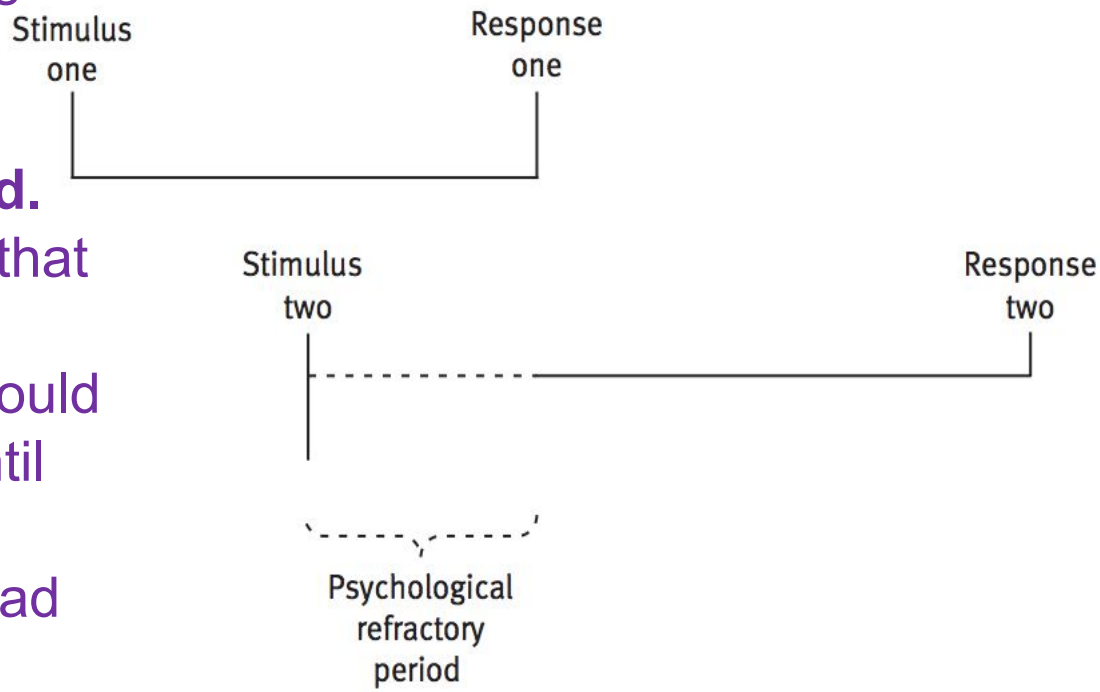
Response time, reaction time and movement time.



5.2.10 Evaluate the concept of the psychological response period (PRP)

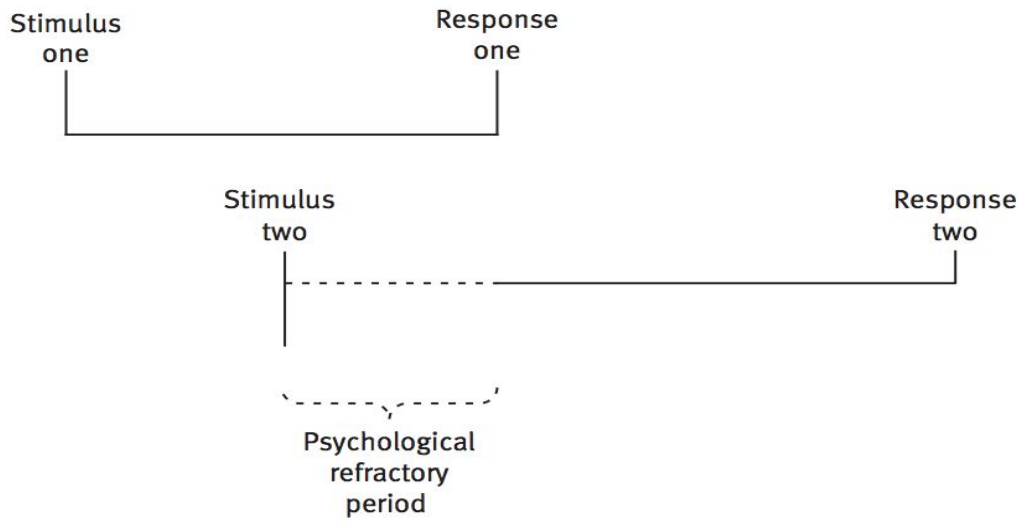
Psychological Response Period (PRP)

- When two stimuli are presented close together the reaction time to the second stimulus is slower than normal reaction time.
- The time gap was called the **psychological refractory period.**
- Welford claimed that processing of stimulus 2 (S2) could not take place until processing of stimulus 1 (S1) had been completed.



5.2.10 Evaluate the concept of the psychological response period (PRP)

- The effect of the psychological refractory period can be seen in many sports.
- Any example of a feint, dodge or dummy is an example of the use of the psychological refractory period.
- The feint is S1 and the actual movement is S2. If the timing is correct, the defender will be comparatively slow in reacting to the real movement.

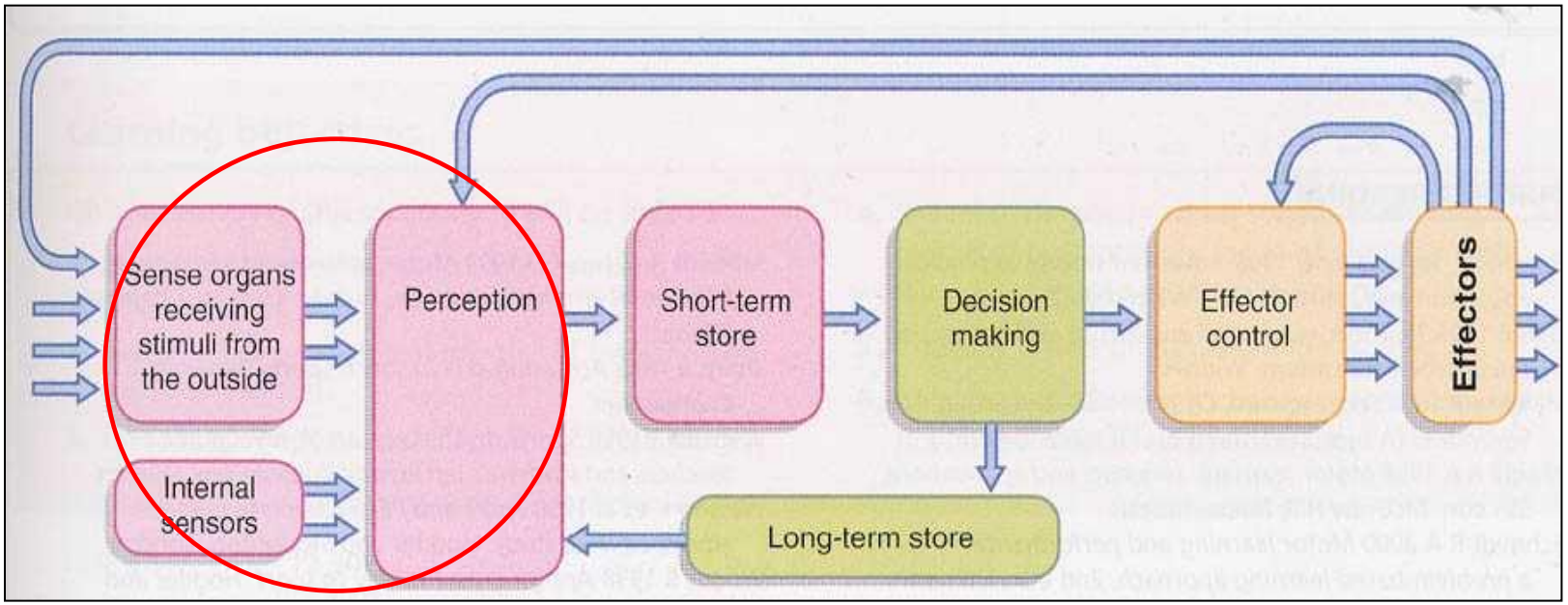


Feint - make a deceptive or distracting movement, typically during a fight.

5.2.10 Evaluate the concept of the psychological response period (PRP)

- This is the skill of football players like Le'veon Bell, basketball players like Russell Westbrook and soccer players such as Cristiano Ronaldo.
- Similar feints can be seen in the drop shot in badminton or a dummy punch in boxing.

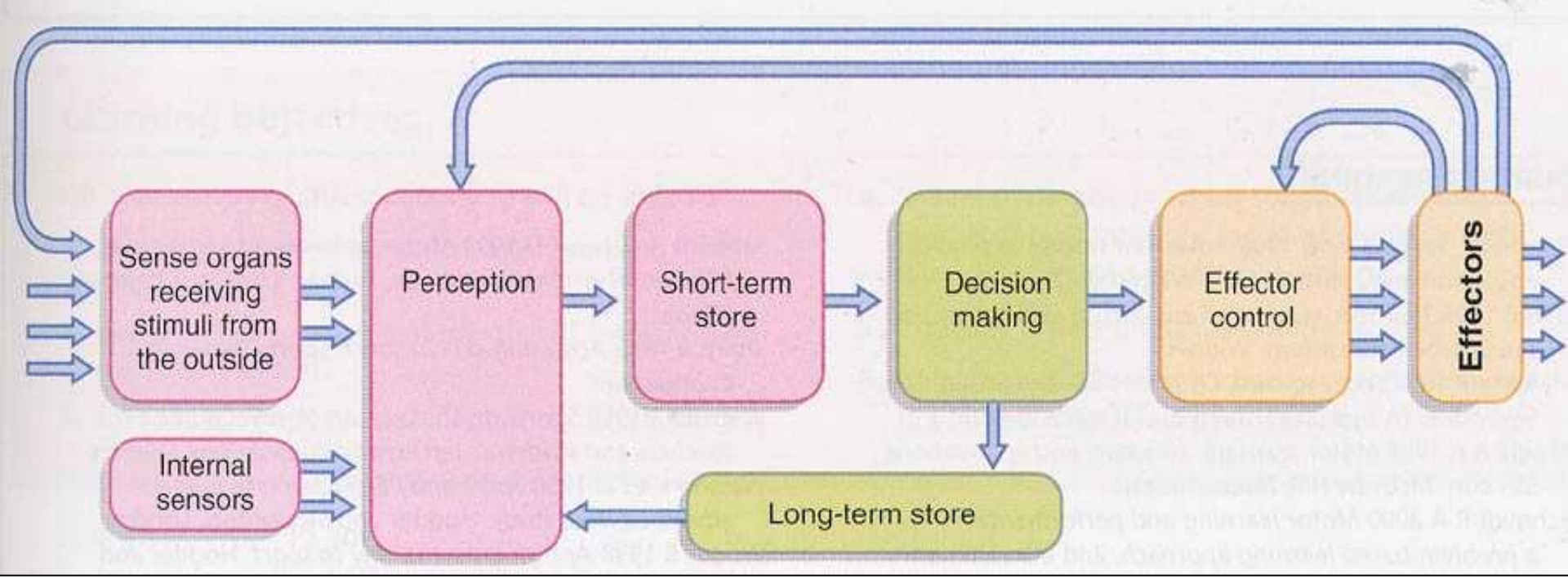
Memory and its relationship with Selective attention



We know about sensing the world around us and how that information is delivered.

Make sure this information is on your concept map.

But what happens next?



memory allows us to benefit from our past experiences

all incoming information is held for a short time in the short-term sensory store ‹STSS›/most of the information in the STSS is lost within about 0.5second

incoming information is only retained and processed if it is attended to in the short-term memory ‹STM›

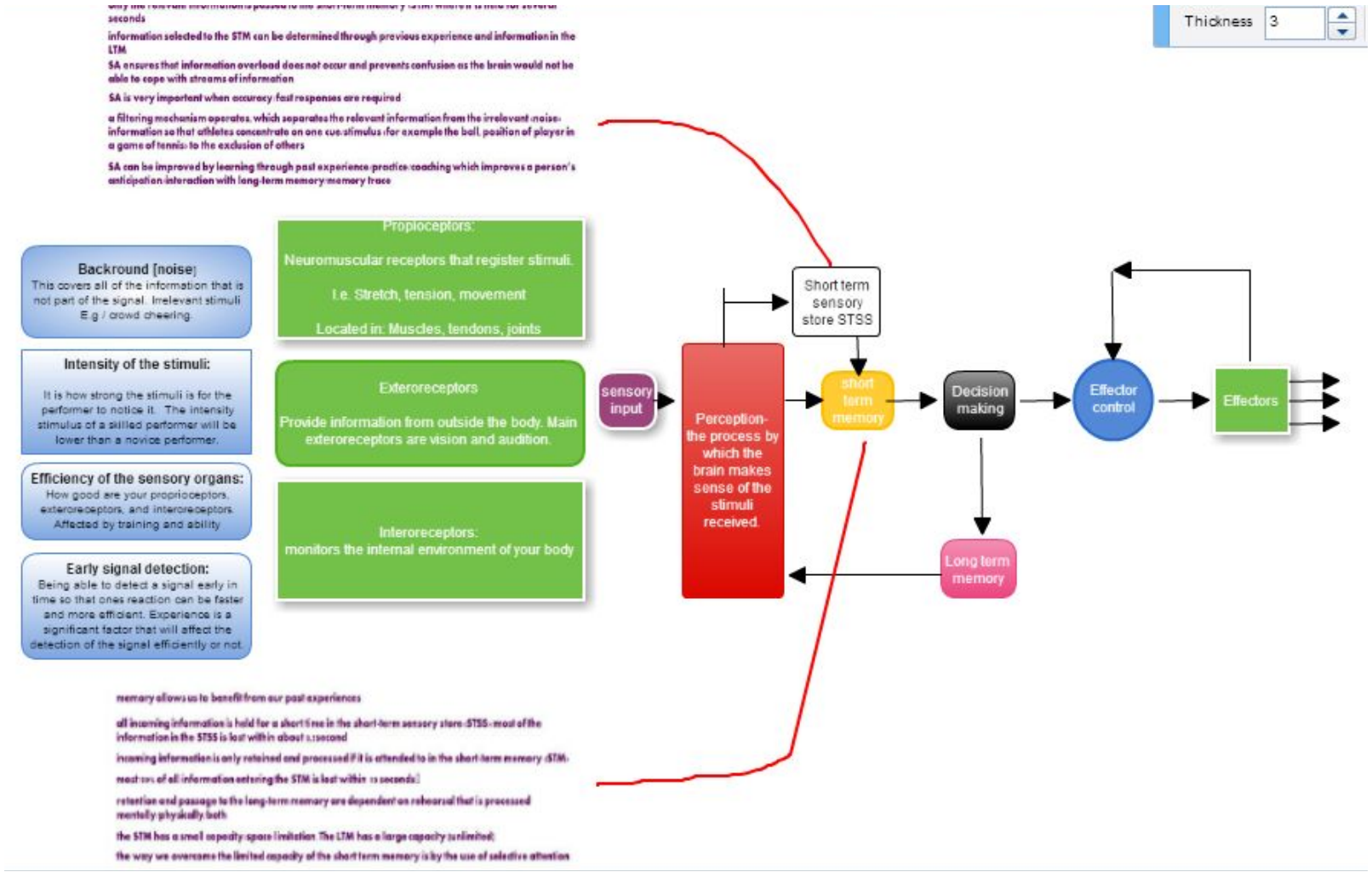
most/90% of all information entering the STM is lost within 10 seconds

retention and passage to the long-term memory are dependent on rehearsal that is processed mentally/physically/both

the STM has a small capacity/space limitation. The LTM has a large capacity (unlimited)

the way we overcome the limited capacity of the short term memory is by the use of selective attention

What have we learned so far?



5.2.11 Describe a motor program

- Keele (1968) defined a motor program as being a set of muscle commands that allow movements to be performed without any peripheral feedback.

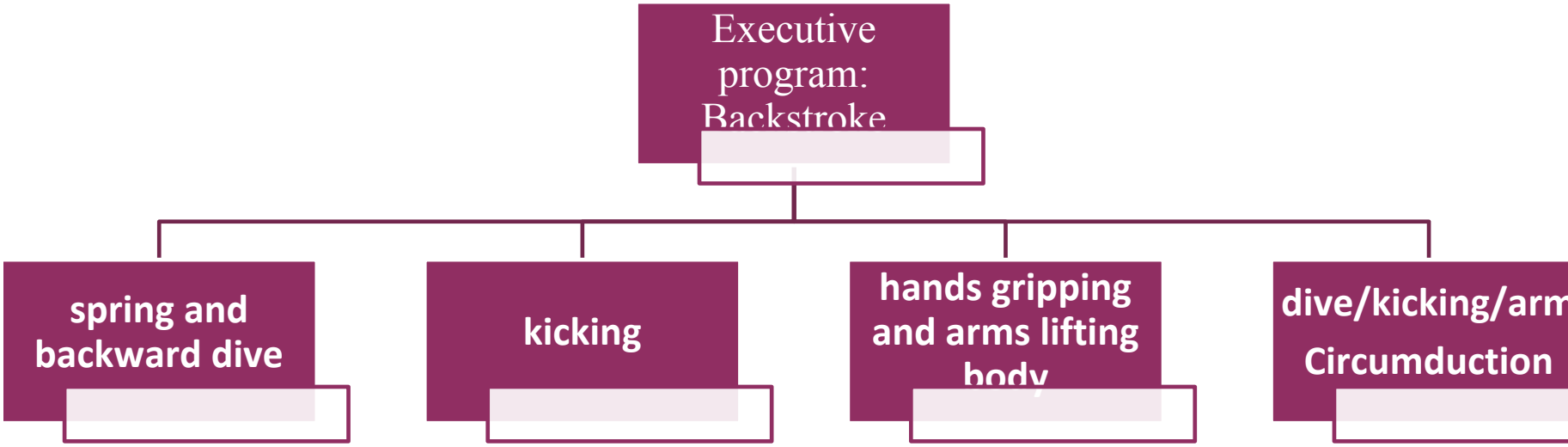
  - Examples of **motor programs** are basically any skill that you can think of. Hitting a tennis ball, catching a baseball and doing a somersault are all examples of motor programs.

  - A number of motor programs can be put together to form an **executive motor program**, e.g. the triple jump (hop, step and jump).

Peripheral feedback specifically refers to sensory feedback that is gathered outside of the central nervous system

Motor Programs and executive programs

A number of subroutines can be put together to make up an Executive Program.



Choose an executive program from your own sport and select the subroutines that are involved.

5.2.11 Describe a motor program

- The executive program itself can become part of an even greater program.
- Many gymnastics routines involve the completion of a number of executive motor programs in quick succession.

  - To the gymnast they have become one large executive program.

5.2.12 Compare motor programs from both open and closed loop perspectives

- Keele's (1968) model of motor programs is what we call an **open loop model.**
- It accounts for the performance of a skill **without recourse** to feedback. (doesn't take feedback into account)
- It explains how we can carry out very fast movements.

- For example, a boxer throwing a straight left will do so at about 60–70 msecs. This is too fast for him to use feedback to alter the movement once it has begun.

- The same can be said for someone trying to hit a baseball pitched at over 90 miles per hour. Once the swing has begun, it cannot be changed.

5.2.12 Compare motor programs from both open and closed loop perspectives

- However, not all movements take place this quickly.
- Many movements can be altered during their execution.
- We can alter our movements when hitting a baseball pitched at say 50 kilometers per hour or returning a slow serve in tennis.
- These movements are under what we term **closed loop control**

5.2.12 Compare motor programs from both open and closed loop perspectives

- Close loop – Have the ability to use feedback to influence decision
- The **perceptual trace** is memory for the feel of successful past movements.
- Once we have developed the perceptual trace, we can compare the trace with the feel of the **ongoing movement.**
- This allows us to **correct inappropriate actions**.
- While the perceptual trace controls an already ongoing movement, the selection and initiation of the movement is under the control of the memory trace. (Memory trace is when you select a movement before performing it)

What is meant by perceptual trace? Respond.

5.2.12 Compare motor programs from both open and closed loop perspectives

- Richard Schmidt (1975) set out to develop an explanation of motor programs that included both open and closed loop control.
- This theory became known as schema theory. Schmidt described a schema as being a set of generalized rules or rules that are generic to a group of movements.
- Schmidt believed that we develop two kinds of memory for movements, which he called the recall and recognition schemas.

- The recall schema is memory with regard to the choice and initiation of action.

- The recognition schema is memory for the feel of a movement and it allows us to make appropriate changes in the action. Both schemas require the individual to recall memory

5.2.12 Compare motor programs from both open and closed loop perspectives

- Both schemas require the individual to recall memory of similar past situations from LTM.
- These are then stored in STM and allow the person to decide the actual movement to be used. - Remember the schema is a generalized set of rules but we must carry out a specific action. - So comparing what I hold in STM about the past situations with what I hold with regard to the present situation allows me to decide on the specifics of the movement. - Schmidt called this process deciding the response specifications.

Schmidts schema theory

The schema connection

- A short stop is able to throw to different bases from various positions on the file by assigning appropriate parameters values to the motor program.

- But how does the performer know exactly how much force or how fast the ball should be thrown?

- The answer lies in the development of a schema which is Schmidt's second aspect of motor program theory.

- Schema is rule or relationship that directs decisions making when a learner is faced with a movement problem.

Schmidts schema theory

Performing a skill....

When you perform a skill in a situation, you subconsciously subtract 4 pieces of information.

- Initial conditions (start of the movement)
- Response specifications (parameters used in execution of the movement, such as speed)
- Sensory consequence of the movement
- Response outcome (end result)

Schmidts schema theory

Schema & Performing....

These four sources of information is stored in memory following a movement attempt.

The schema begins to develop.

With each additional movement attempt the schema become stronger.

What result from practice is the development of the motor response schema.

Motor Programmes and executive programmes

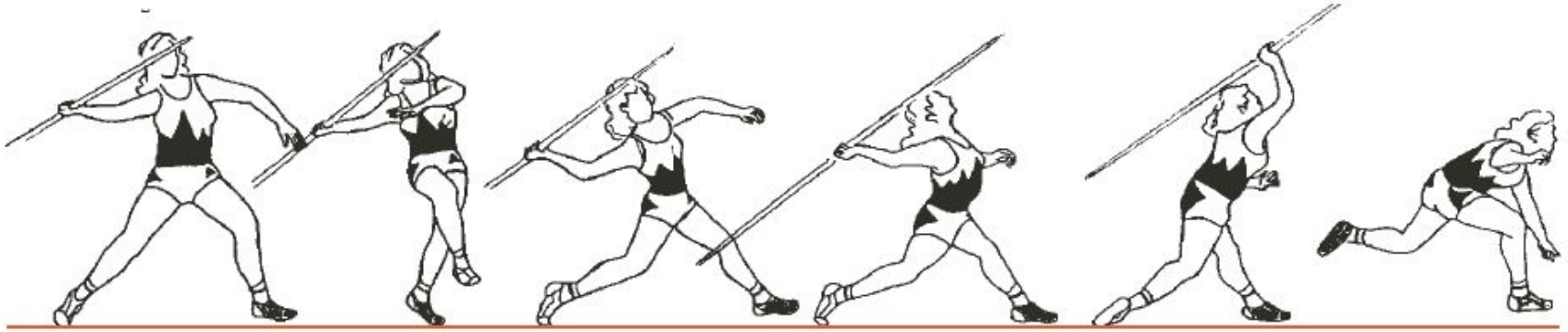
Practice questions

1) a) Explain what is meant by a motor programme and give an example.
How can a programme become a subroutine? 4 marks

b) How is closed loop control used to make a movement more skilful?
Explain the contribution of the use of subroutines to open loop control and the autonomous phase of learning. 5 marks

2) a) Looking at figure 110, list six major subroutines of the executive programme for throwing. 6 marks

figure 110 – a javelin thrower



Motor Programmes and executive programmes

How is movement controlled once the motor program is issued??

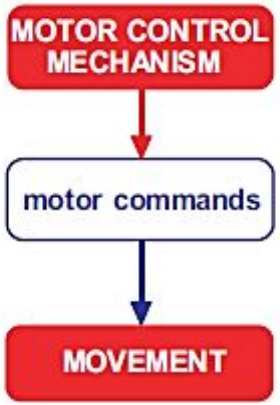
- The answer lies in:

"does the motor program contain all the information needed to carry out the action from start to finish or are continuous adjustments made to the movement based on response-produced feedback."

Open Loop Control

Types of motor control and their impact on movement skill acquisition and competence in physical activity

figure 103 – open loop control



Open loop control

Open loop control (see figure 103) applies to executive programmes whose subroutines are:

- **Simple** and **well-learned**.
- **Automatic** (no conscious thought is necessary).
- Particularly relevant to the **autonomous phase** of learning.
- They are then completed **rapidly** without time for feedback.
- Apply to **closed and self-paced** skills.
- Examples are the tennis serve and a discus throw.

utilized when skills are well learnt

utilized when skills are executed quickly

skills are completed without feedback

all the information for one movement is sent in a single message to the effectors

it will depend on task difficulty and/or level of skill of the performer

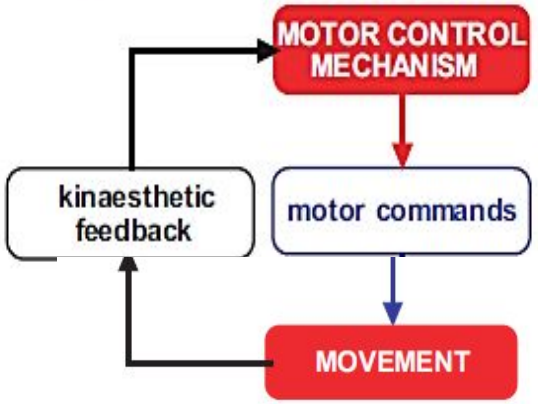
Closed loop control – Adams theory

Closed loop control

Closed loop control (see figure 104) applies to:

- **Ongoing movements** in which only **part** of the information necessary to complete a movement is sent to effector organs (neuromuscular system).
- The remaining information is sent following **feedback** via **kinaesthesis**.
- Information about balance and body position can be used to allow the performer to change balance and body position **during** a movement.
- Examples are riding a bike and performing a gymnastic move or a complex dive.

figure 104 – closed loop control



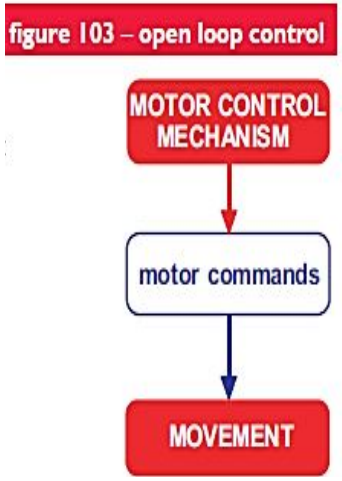
closed loop is when a skill uses feedback throughout its execution

errors are detected and adjustments are made ‹for example juggling – a performer detects that there is a change in trajectory and adjusts their movements to match›

a memory trace is formed in the performer's long-term memory which tells them what to do – that is, the motor programme

a perceptual trace is then generated as they perform and this is compared to the memory trace

Using sporting examples, discuss motor programmes from open loop perspectives.

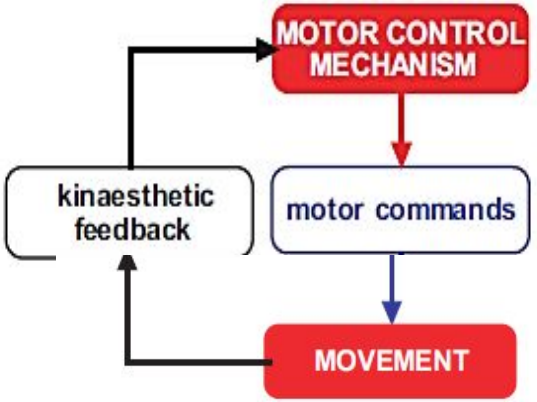


- This theory suggests that when a skill is being learned an overall plan/program of that skill is built up in long-term memory; **MEMORY TRACE**
- Skills are built up in a hierarchical or schematic way *i.e.* the executive program is made up of a number of (sub) routines, which consist of small routine units;
- The program is ordered sequentially / it is able to tell the muscles in what order to produce the appropriate subroutines *e.g.* learning a skill means practicing the skill so that the subroutines are properly sequenced and coordinated and also become increasingly automated and subconscious;
- Once this skill is learned, open loop theory suggests that it can be put into action without feedback being used to control the movement;
- Knowledge of results is used only at the end of the movement to give the learner feedback on the outcome;

Using sporting examples, discuss motor programmes from closed loop perspectives.

- motor program is structured in the same way (as open loop) but its commands can be countermanded/reversed by the need to correct errors;
- kinesthetic/internal feedback is used;
- closed loop movement control is more effective with skills requiring slower limb movements or movements taking place over longer periods of time;
- it is suggested that performers are continually moving between open and closed loop control;
- short-term memory compares with the long-term memory, if the match is good the movement continues;
- short-term memory compares with the long-term memory, if there is a mismatch the learner tries to correct the error;

figure 104 – closed loop control



5.2.13 Outline the role of feedback in information processing models

- **Feedback** is the term we use to describe information resulting from an action or response. This feedback can be intrinsic or extrinsic.

  - **Intrinsic feedback** is available to the performer without outside help. We can see the results of our actions without anyone needing to tell us what happened. The feel of a movement is intrinsic by definition.

  - **Extrinsic feedback** is information that is provided for us by someone or something else. This can be a coach or teacher. It could be a stopwatch or tape measure. This feedback can be concurrent, being given during performance, or terminal, given after completion of the performance.

5.2.13 Outline the role of feedback in information processing models

- There are two major forms of feedback, knowledge of results (KR) and knowledge of performance (KP).
  - KR is post-response information concerning the outcome of the action.
  - KP consists of post-response information concerning the nature of the movement.
  - The most obvious form of KR is visual. We see the end product of our action. In some cases, however, we need outside help to be able to make sense of our actions.

A long jumper needs to have the distance they jumped measured in order to have KR. Similarly, a track athlete will need to know the time that they ran.

5.2.13 Outline the role of feedback in information processing models

- The most obvious type of KP is the "feel" of the movement or, to be more technical, knowledge of the sensory consequences.
- Interestingly KP can be both concurrent, such as the feel of a movement while doing it, or terminal, feedback from a coach about how we moved.
- It can also be from video or film.
- An issue that concerns the giving of feedback is whether it should be positive or negative.
- Positive feedback can be telling someone that he or she has done well. It can, also, be what we call **prescriptive feedback**

    - The coach tells the learner how to improve performance by saying "Do it this way".

5.2.13 Outline the role of feedback in information processing models

- Negative feedback concentrates on errors. Sometimes coaches point out errors and then follow up with prescriptive feedback.
- Prescriptive feedback has been shown to be effective following either a negative or positive approach.
- However, negative feedback often includes “Don’t do it like that” or “You got it wrong, you did this and shouldn’t have”.
- This type of feedback can be very demotivating and is also of little use to beginners, as they need prescriptive information.

5.2.14 Outline the role of feedback in the learning process

- Feedback can be a great motivator.
- We all like praise, in particular praise from those whom we perceive as being important.
- The failure of coaches to praise good performance can have disastrous effects on the athlete's self-confidence.
- It can also give learners the false impression that they are not improving when in fact they are.

- However, overdoing the giving of praise can have negative effects.
- If all the athletes hear is "well done", "great" and "brilliant" then these words either come to mean nothing or become so familiar to the learner that, in fact, they are not perceived by them at all.

5.2.14 Outline the role of feedback in the learning process

- With regards to learning, the main factor is that the performer improves.
- As we saw above, beginners need prescriptive feedback. They need to be told what to do in order to improve performance.
- As they improve and increase their knowledge of the activity, all they require is KR.
- If they are making an error, they can resolve the problem themselves by comparing what is happening now with the store of knowledge they hold in their LTM.
- So we say that they now require **descriptive feedback.**