

CHAPTER 5: Memory models

Practice questions - text book pages 93 - 94

- 1) Identify the three main receptor systems used by a performer in sport. Where is the filtering mechanism found in an information processing model? Explain what happens with information as it passes through this mechanism. 8 marks

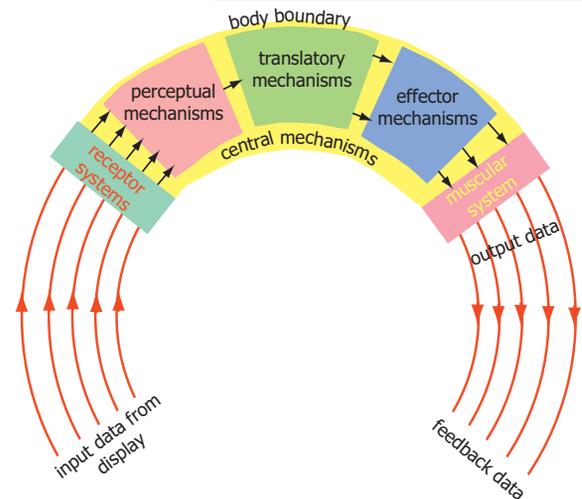
Answer:

- **Visual** - sight.
- **Auditory** - hearing.
- **Proprioceptors** - touch or feeling about body position.

The filtering mechanism is found:

- In the **short-term sensory store (STSS)**.
- Helps with selective attention.
- Makes irrelevant information **redundant**.
- Helps to concentrate effort on **information** that is important.
- Information is grouped together (**chunking**) so that an individual can remember several chunks of information rather than individual items.
- **Linking** aspects of a particular skill together will see skill as a whole, once learned.

figure 5.23 – Whiting’s model



- 2) Identify and describe the three elements of perception. 3 marks

Answer:

- **Detection**: recording the stimulus.
- **Comparison**: comparing present information with past information stored in the memory.
- **Recognition**: locating a familiar cues or signals within the memory system.

- 3) Improvement in performance of a skill can be better understood by reference to the processes involved.

Figure 5.23 shows Whiting’s information processing model.

- a) Explain the meanings of the terms: perceptual mechanism, translatory mechanisms, and effector mechanisms, and relate these terms to stages in the Whiting model. 5 marks

Answer:

- **Perceptual mechanisms**: the part of the brain which makes sense of the surroundings.
- And gives this information meaning.
- **Translatory mechanisms**: the part of the brain whose purpose is to select relevant information.
- From the total information received via the senses from the surroundings.
- **Effector mechanisms**: the part of the brain whose purpose is to set in motion the appropriate neuromuscular sequences to activate the skill.
- They send messages to the limbs and muscles ready to perform the skill.

- b) The diagram also shows five arrows entering the perceptual mechanism and only one leaving. What is the name given to this process and why is it necessary? 4 marks

Answer:

- **Selective attention**.
- The purpose of this mechanism is to filter out **unnecessary information**.
- Many items of information are received by the perceptual mechanisms of sight, hearing, touch, but only some of these are relevant to the learning situation.
- This process is that of focusing on **relevant** information.
- It is necessary to **filter** out irrelevant information because there is too much information arriving for the limited capacity of the translatory mechanism.

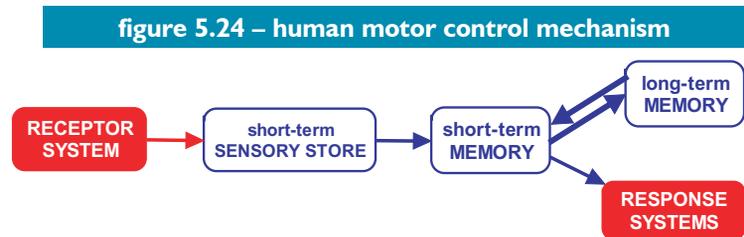
3) c) Identify three factors which might help a performer with his or her perceptual mechanisms.

3 marks

**Answer:**

- High **quality** of instruction.
- **Expectation** of certain stimuli.
- Vividness or **intensity** of relevant stimulus.
- **Unusual** or contrasting stimulus.
- **Arousal** or alertness of performer.

4) a) Using figure 5.24 representing the human motor control mechanism, explain what is meant by short-term memory and long-term memory. 2 marks



**Answer:**

- Long-term and short-term memories are part of the multi-store model of memory.
- All information passes through STM.
- STM uses information **immediately** if presented within about **1 minute**.
- LTM has almost **limitless capacity**.
- LTM stores information over a **long period of time**.
- LTM stores are used if information is over **1 minute** old.

b) How can information be retained in the long-term memory?

4 marks

**Answer:**

4 marks for four of:

- Through **repetition** of the stimulus, **practice** or **overlearning**.
- Through having **meaning** or **relevance** to the performer.
- Information is **novel**, **unusual** or **unique**.
- Stored here if **associated** with another piece of stored information - known as **chunking** in which information is organised in groups.
- Link information to **past experiences**.
- If stimuli are **emotionally intense**, **exciting**, **enjoyable** or **interesting**.
- If information is perceived to be **important**.
- **Reward** or **reinforce** success.

5) What is meant by Hick's Law? Illustrate your answer by plotting a graph which represents this theory.

How can performing a dummy move affect an opponent's response? 7 marks

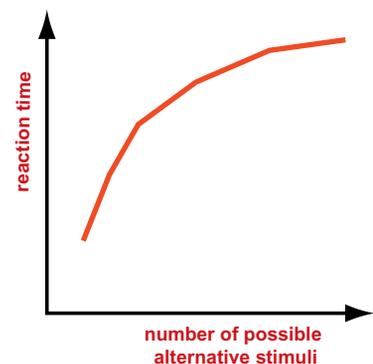
**Answer:**

- The **more choices** a person has, the more information needs processing.
- And the longer it takes to process the information, the **slower** the **reaction time**.
- See the graph in figure Q5.1.

A dummy move:

- A dummy move affects an opponent's response due to the affecting the **psychological refractory period** which occurs, when after an **initial stimulus** (which may cause a reaction), there is a presentation of a **second stimulus**.
- The opponent processes and responds to the first stimulus and **does not have the time to react** to the presentation of the second stimulus.

**figure Q5.1 – Hick's law**



- 6) a) Using the example of a table tennis player receiving a serve, what information would be held in the short-term sensory store and for how long?

4 marks

**Answer:**

- Information held would be local and **temporary**.
- Pertaining to the **immediate surroundings** of the player and his or her opponent.
- This would be retained for up to **one to four seconds** or sooner if the display changes.
- And **new more relevant** information replaces it.
- Examples would be from: position of the ball, placement of opponents hands or bat, placement of opponent relative to table.

- b) Name and describe the purpose of the process by which information is transferred from the short-term sensory store to the short-term memory.

4 marks

**Answer:**

- The process is called **selective attention**.
- And is caused by the individual selecting from the many (thousands) of bits of information which flow through the short-term sensory store each second.
- Those items which are **relevant**.
- And **avoiding items** which would **distract** the player (such as the crowd, other movements behind the ball).
- An example could be the retaining of the ready position of the opponent once the serve has begun.

- 7) a) Explain the difference between reaction time, movement time and response time?  
 What advice would you give to a sprinter to cut down on reaction time at the start of a race? 4 marks

**Answer:**

- **Reaction time** = time between onset of stimulus and the initiation of the response.
- **Movement time** = time it takes to complete the movement required by the stimulus.
- **Response time** is reaction time plus movement time, hence it is the time between the onset of the stimulus and the completion of the response.

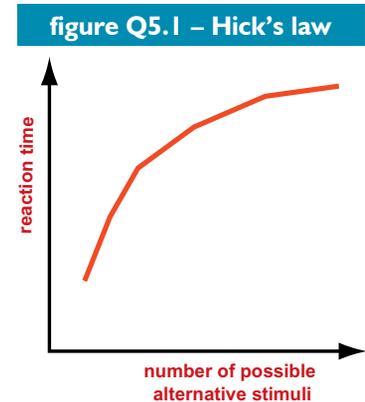
**Advice given:**

- Coach **concentration** or focusing.
- Teach **mental rehearsal**.
- **Lower arousal** level of athlete via cognitive or somatic strategies.
- **Ignore external stimuli** other than the starting gun (this is selective attention).
- Teach strategies of driving from the blocks or **practise responding** to the gun.

- b) Sketch and label a graph to illustrate Hick's Law.  
 How does the number of choices available to a performer affect his or her performance? 4 marks

**Answer:**

- See the figure Q5.1.
- As the number of **choices increases**, the **time** taken to respond **increases**.
- The more choices available, the **longer** it takes to decide between them which is relevant.
- Before reaction can occur.



- c) When taking part in a badminton game, the shuttle occasionally hits the netcord during a rally, and the receiver has to adjust his or her return shot. This causes a delay before the final response can be made. What is this delay called and explain why it occurs? 4 marks

**Answer:**

- The delay is called the **psychological refractory period**.
- This **slows down** the processing of the response because the first stream of information (speed and direction of shuttle) is interrupted.
- A second stream of information is then begun (new speed and direction of shuttle after the netcord).
- The process of reaction is then **started again** - hence a **delay** in response.

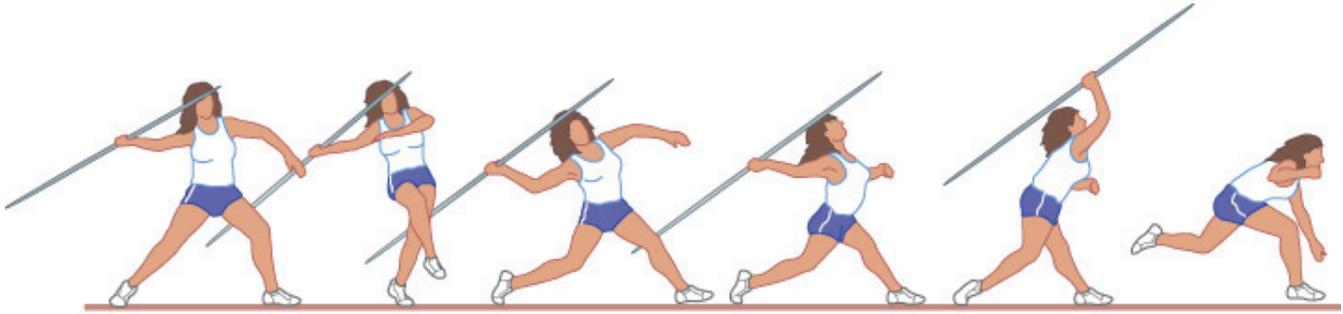
- d) What factors could affect response time in any game or sport? 4 marks

**Answer:**

*4 marks for four of:*

- **Number of choices** to be made during the response process.
- Whether the skill is open, complex or externally paced.
- Whether there are a number of sequential (one after the other) stimuli (the psychological refractory period).
- **Distractions** or ability to selectively attend or focus on the stimulus.
- Spectator distractions, social inhibition or presence of significant others.
- Age or gender.
- Level of personal fitness, health or body type or shape (somatotype), length of neural pathways (whether the athlete is tall or short for example).
- **Past experience**, presence of motor programmes, the level of skill, the level of ability.
- **Environmental factors** such as weather, state of playing surface or court or the state of personal kit or shoes.

figure 5.25 – a javelin thrower



- 8) a) Looking at figure 5.25, using examples from javelin throwing, identify four items of information stored as schema. 4 marks

**Answer:**

- **Knowledge of the environment.** For example, knowing how far away you are from the basket before you shoot in basketball.
- **Response specifications.** For example, knowing what you have to do to score.
- **Sensory consequences.** For example, what the movement feels like as you are shooting.
- **Response outcomes.** For example, the end result which would be either success or failure.

- b) Comparing the skills of throwing the javelin and taking a free throw at basketball, explain how the skills are related using schema theory. 4 marks

**Answer:**

- **Knowledge of initial conditions** (of the environment) - awareness of the foul line and the need to complete the throw behind it (javelin), awareness of side line again with the need to complete the throw outside the court proper (basketball).
- **Knowledge of response specifications** - knowing that you have to throw as far as possible into the field (javelin), knowing that you have to throw to a colleague on the court (basketball).
- **Knowledge of sensory consequences** - the feeling of the movement of throwing (both).
- **Knowledge of response outcomes** - distance thrown (javelin), correct receipt of the ball by colleague (basketball).

- c) Briefly explain how the analysis of skills will influence a coach in organising training for javelin throwing as compared with basketball free throw. 4 marks

**Answer:**

- The breaking down of the skill into **subroutines** will enable the coach to analyse the movements objectively.
- And thereby set a **programme for practice** of the individual subroutines.
- As drills or **individual skill practices** which are made **separately**.
- Which would then be incorporated into the **motor programme** as a whole.

- 9) a) Explain, using a sporting example, how the use of selective attention depends on an athletes' level of ability.

3 marks

**Answer:**

*2 marks for two of how the use of selective attention depends on an athletes' level of ability.*

- An experienced performer can **focus totally** on an important aspect of his or her skill
- Which excludes **irrelevant** stimuli.
- Parts of the skill are performed **automatically**.
- Which gives the good performer spare **additional capacity**.
- To enable the performer to attend to **new elements** of a skill.
- In contrast, a **novice** performer will need to be **guided** and coached to **ignore irrelevant cues**.
- And **directed** to **relevant cues** that are important to the information being received.

*1 mark for example:*

- For example, a novice performer may not be able to predict a dummy move as a player sidesteps left and right in rugby.
- Whereas an experienced performer has the playing experience to predict future events from early signals or past events.

- b) How can a coach improve an athlete's selective attention.

3 marks

**Answer:**

*3 marks for three of:*

- Athlete told to **ignore** any irrelevant cues.
- Focus on improving **cue recognition**.
- Raise motivation and **arousal** levels.
- Use of **mental rehearsal** to improve selective attention.
- Increasing **intensity** of the stimulus.
- Use of **language** to attend to relevant cues.
- Use **past experiences** from long-term memory store.

- 10) During sporting situations it may be necessary to process information using memory systems. 15 marks

What are the features and functions of the working memory?

**Answer:**

5 marks for 5 of:

- The **working memory** is part of **short-term memory** which is concerned with immediate conscious **perceptual** and **linguistic** processing.
- **Selective attention** is used to sort out **relevant** bits of information that enter short-term memory.
- Short-term memory has a very **large capacity**, but **minimal** storage time (**duration**).
- So short-term memory **filters** out irrelevant information.
- Any **irrelevant** stimuli is ignored and **lost**.
- Enabling performer to switch attention.
- **Relevant** bits of information are processed enabling task to be **accomplished**.
- Or it can be stored in the **long-term memory** for future use.

figure 5.26 – soccer player's attack



Using figure 5.26 how can a single recall schema assist the attacking player to decide on his next move?

**Answer:**

5 marks for five of:

- Recall schema theory says that motor programmes can be modified by taking in information **while a skill** is being performed.
- Recall schema will include knowledge of the playing surface, playing conditions (flood-lit) and the position of the defender in figure 5.26
- Further inputs would be adjustments of direction.
- And speed of the ball he is about to kick.
- This would be performed without feedback.

What strategies could the player use to improve his memory system?

15 marks

**Answer:**

5 marks for five of:

- **Educate** the performer about the details of the skill.
- **Explain** what to do and how to do it.
- The more **practice** that can be done to a correct technical model, the better the recall schema will be formed and the better the immediate performance.
- Ensure that **input** is clear and uncluttered.
- **KISS** – keep it simple stupid.
- Carefully **separate similar skills** to enable performer to distinguish between them.
- **Organise** the process of skill learning to ensure that information is meaningful.
- Be **brief** and not overload the short-term memory which can only hold small amounts of data.