

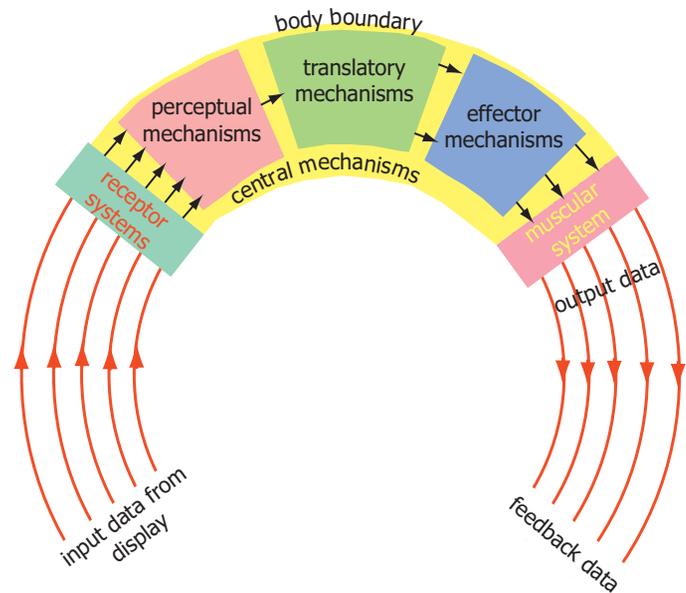
## CHAPTER 7 – INFORMATION PROCESSING

Text between pages 93 and 99, answers to questions on page 99 of the text book.

1) Improvement in performance of a skill can be better understood by reference to the processes involved. Figure 7.15 shows Whiting's information processing model.

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

figure 7.15 – Whiting's model



**Answer**

- *Perceptual mechanisms:* the part of the brain which makes sense of the surroundings.
- And gives this information meaning.
- *Translatable 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 translatable mechanism.

- c) Identify **three** factors which might help a performer with his or her perceptual mechanisms. 4 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.

- 2) 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. 5 marks

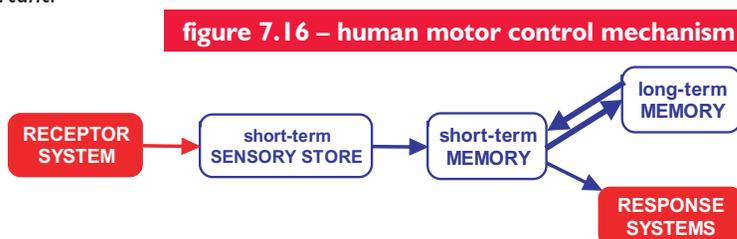
**Answer**

- **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.

- 3) a) Using figure 7.16 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**

- 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.

- 4) 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**.

- 4) 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.

- 5) 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.

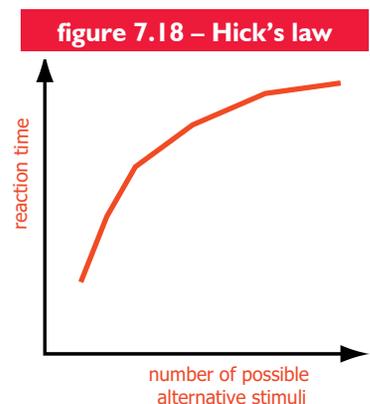
**Advice given:**

- 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 7.18.
- 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.

5) d) What factors could affect response time in any game or sport?

4 marks

**Answer**

- **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.

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

4 marks

**Answer**

- A motor programme is a set of movements stored in the long-term memory.
- Movements are so well-learned they are almost automatic.
- One decision can stimulate the onset of a programme.
- Examples: a basketball dribble, throwing a ball, cycling.

*How can a programme become a subroutine?*

- The programme is so well-learned, habitual or overlearned.
- That it becomes part (subroutine) of a more complex movement.
- For example, a basketball dribble becomes a subroutine of the lay-up shot.

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

**Answer**

*Closed loop control contributes via:*

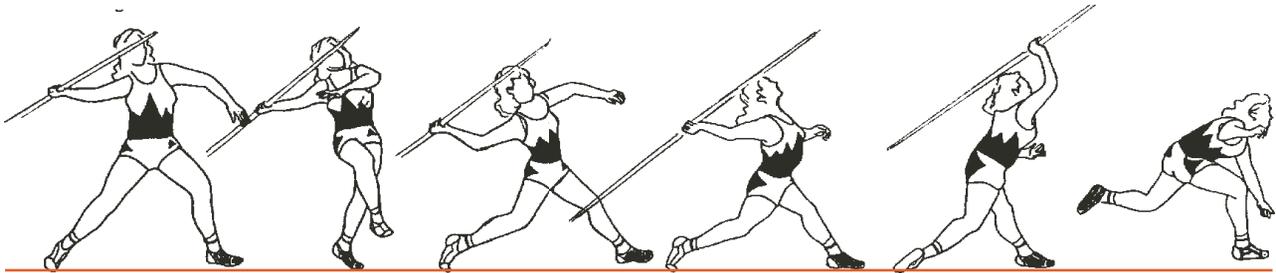
- **Proprioception** or intrinsic feedback gives information about errors or correct movements.
- This information can then be used to correct errors or reinforce correct movement.
- Information is sent via the command mechanism or effector mechanism for muscular control.
- There has to be little conscious attention during closed loop control.

*Explanation of use of subroutines to open loop control:*

- Well-learned **subroutines** linked together to produce a finely balanced skill.
- Contribute to the autonomous phase of learning due to the fact that the skill is well-learned.
- And little intervention is required from a coach.
- Little feedback is required (except for final knowledge of results or performance) because the skill is performed automatically.
- Hence open loop control, and the motor command to perform the skill produces the movement with very little feedback during the movement itself.

- 7) a) Looking at figure 7.17, list **six** major subroutines of the executive programme for throwing. 6 marks

**figure 7.17 – a javelin thrower**



### Answer

List six from the following:

- Grip on implement.
- Initial body, arm, feet and head position.
- Action of right leg (right handed thrower).
- Action of trunk during throw.
- Action of right arm during throw.
- Sequence of legs - trunk - arm during throw.
- Position and action of left side, leg and arm before delivery.
- Position of head and eyes (view) during delivery.

- b) 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.