

GCE PHYSICAL EDUCATION

PE2 UNIT GUIDE

Content Title: Information Processing

Key points

- Information processing models
- Knowledge of different stages of the information processing model

- **MODELS** – Information processing theory likens the way in which the human brain processes information relating to skill acquisition, to the way in which a computer operates. Welford (1968) was the first psychologist to apply the information processing approach to skill acquisition. He saw it as having three stages: input of information (perception); throughput (decision making); and output (response). It allows sport psychologists to break down skills and skill acquisition to their component parts.

A variety of models are shown below in Practical Application.

- **SENSORY INPUT** – this is simply information entering the body from the senses e.g. you see the goalkeeper move off the goal line. It is what you do with this information that is important in terms of sporting performance.
- **PERCEPTION** – this occurs in the brain, and is the process by which the sensory input is given meaning i.e. interprets the information and identifies the elements that are important e.g. whether the fact that the goalkeeper has come off the goal line can be exploited. This recognition and interpretation relies on previous experience and the memory of that experience to help make a decision of what to do. Perception consists of THREE elements:
 - **DETECTION** – this is the process by which the brain identifies that a stimulus is present. In sport there is usually more than one stimulus – it is vital that we attend to the correct stimulus. Beginners often attend to the wrong stimulus, and that is why their decision-making is often poor.
 - **COMPARISON** – is what happens when we attend to something we have sensed. The brain processes this information by comparing it with previous experiences that have been stored in our memory.
 - **RECOGNITION** – this occurs when we find a match in our memory of a similar stimulus. The information is then perceived.
- **SELECTIVE ATTENTION** – the brain can only cope with a certain amount of information i.e. it has limited attention capacity. It is important that the brain selects the correct information to attend to. In the cognitive stage of learning coaches/teachers can help pupils by changing the visual display e.g. using a two coloured ball in cricket so that it is easier to see spin. When the learner reaches the autonomous stage of learning, many parts of performance become automatic, so they do not need to attend to those parts. They will then have spare attention capacity so they are able to attend to more elements.

- **MEMORY** – There are THREE aspects to memory:
 - **SHORT TERM SENSORY STORE** – All information from the senses passes through the short-term sensory store (STSS). Information is only kept for ONE second. If the information is not attended to (not considered important), it is lost.
 - **SHORT TERM MEMORY** – this is sometimes called the working memory. It lasts for between 20-30 seconds before we lose the information and can, as a rule retain 5-9 items. This capacity can be increased by ‘chunking’ i.e. grouping the information. If this information is practised or rehearsed then it passes to the long-term memory (LTM).
 - **LONG TERM MEMORY** – this is a store of past experiences and has a limitless capacity and once stored in the LTM the information is not forgotten. However, it is often difficult to retrieve or recall!
- **DECISION MAKING** – our perceptual ability provides us with the information we need to make decisions about what to do next in a task. This information will come from our memory, but might be intrinsic i.e. information from our muscles (proprioception) e.g. an experienced gymnast performing a vault will know when to open out to land safely. Or it can be extrinsic i.e. from what we see e.g. seeing that a lob in tennis is too short so deciding to execute a smash.
- **REACTION TIME, RESPONSE TIME, MOVEMENT TIME AND PSYCHOLOGICAL REFRACTORY PERIOD** – a coach/teacher will try to improve decision making by helping the performer to make decisions quicker, by improving reaction time and developing the performer’s ability to anticipate the moves of an opponent. **Reaction time** is the amount of time between a stimulus and the first movement initiated in response to the stimulus. There are **two** types of reaction time:
 - **Simple reaction time** – this is the time taken between a single stimulus and one response e.g. response to a starter’s gun.
 - **Choice reaction time** – this is the time between one of several stimuli and the response to this chosen stimulus e.g. waiting to receive a badminton serve – there are several possible responses that could be made to the stimulus of the shuttlecock.

The more choices a person has, the more information that needs processing, the longer it takes to process the information, so the slower the reaction time. This is known as **Hick’s Law**. This is very significant for sports performers as they should always try to keep their opponent guessing about what they are going to do i.e. providing a number of stimuli, as this will slow their opponent’s reaction time. Another concept linked to reaction time is the **Psychological Refractory Period (PRP)**. This refers to the time taken to react, once an individual has realised that he/she has responded in an incorrect way and wants to change their response. It refers to the time taken to respond to the second stimulus, after the first stimulus has occurred. The PRP is the time taken to change your mind. It explains why a performer is unable to quickly respond to a dummy or fake.

Movement time is the time between starting and finishing a movement.

Response time is the time between the first presentation of the stimulus to the completion of the movement.

$$\text{RESPONSE TIME} = \text{REACTION TIME} + \text{MOVEMENT TIME}$$

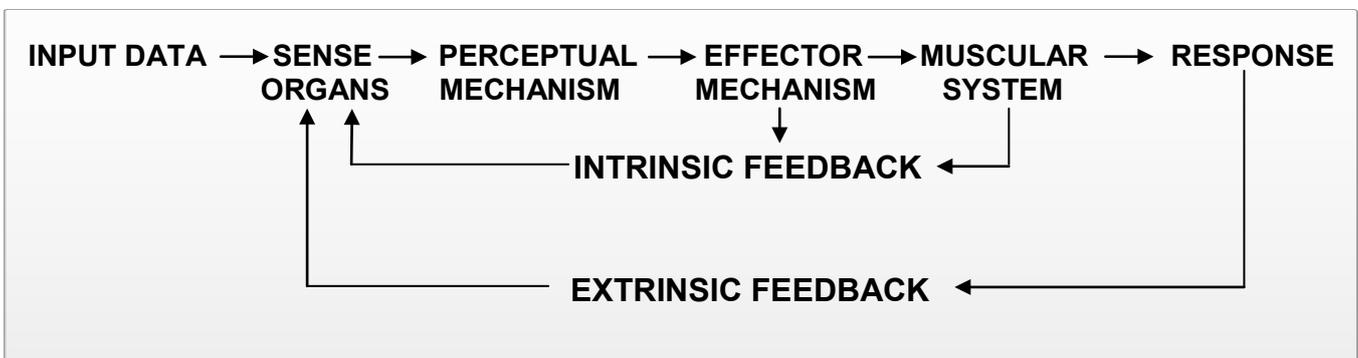
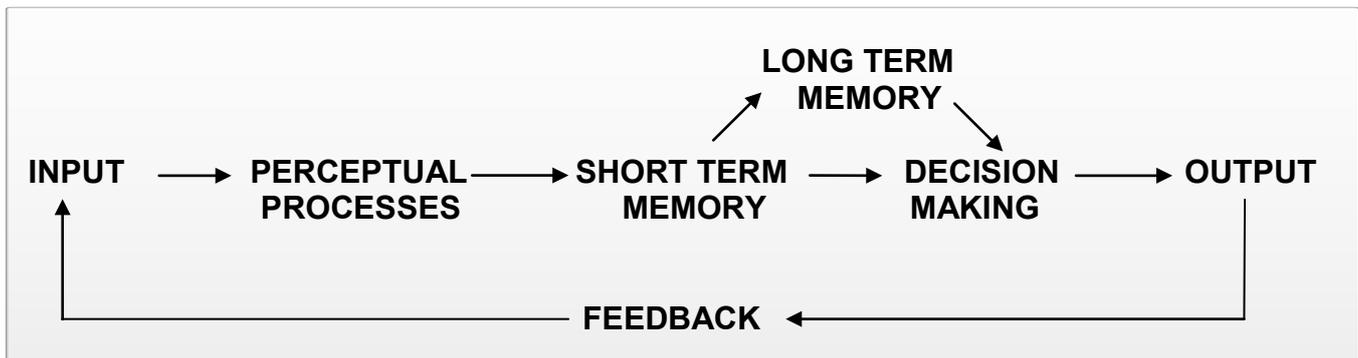
- **FEEDBACK** – this involves using the information that is available to the performer either during or after performing a skill to alter future performance. Feedback is essential for learning to take place. Feedback can take many forms, but most simply it can be categorised as INTRINSIC or EXTRINSIC. **Intrinsic feedback** comes during the movement from your

senses e.g. sight, hearing and is perceived by the performer e.g. you hear when you hit a tennis ball with the frame of your racket. It can also be from kinaesthetic feedback i.e. the feel of the movement. **Extrinsic feedback** comes from external sources, and is an important part of coaching. It comes in TWO forms – KNOWLEDGE OF PERFORMANCE and KNOWLEDGE OF RESULTS. **Knowledge of performance** is information about the performance e.g. how well the movement was executed rather than the end result. **Knowledge of results** is a type of terminal (after completion of movement) feedback that gives the performer information about the end result.

- **FUNCTION FEEDBACK** – feedback **motivates, reinforces and informs** performers. It motivates as information concerning success or failure can be motivational. It reinforces as positive reinforcement increases the chance of the performer repeating the performance. It informs as feedback can provide information about errors and therefore, can help in error correction.

Practical Application/Explanation

TWO DIFFERENT VERSIONS OF THE INFORMATION PROCESSING MODEL:



HOW KNOWLEDGE OF INFORMATION PROCESSING CAN BE USED BY TEACHERS/COACHES:

ASPECT OF INFORMATION PROCESSING MODEL	STRATEGY
SENSORY INPUT/ SELECTIVE ATTENTION	Change visual display e.g. use bigger ball. Reduce the cues so learner not overloaded. Ensure basic skills are well learned to free up spare attention capacity. Reduce anxiety.
MEMORY	Provide lots of practice. Use phrases and sayings that will help learners to remember key points e.g. clean palm, dirty neck in shot putt. Make sessions exciting/unusual as this makes them more memorable. Do not move on too quickly.
DECISION MAKING	Use variable practice so that learners experience a range of different situations, building up their long-term memory to enhance decision-making.
REACTION TIME	Give learners information about important cues to watch for to help anticipate opponents' actions. Practice!
FEEDBACK	Use informational/technical feedback wisely, so that performer does not become too dependent on it.

Top Tips:

Remember that information processing underpins all other aspects of skill acquisition.



Exam Style Questions

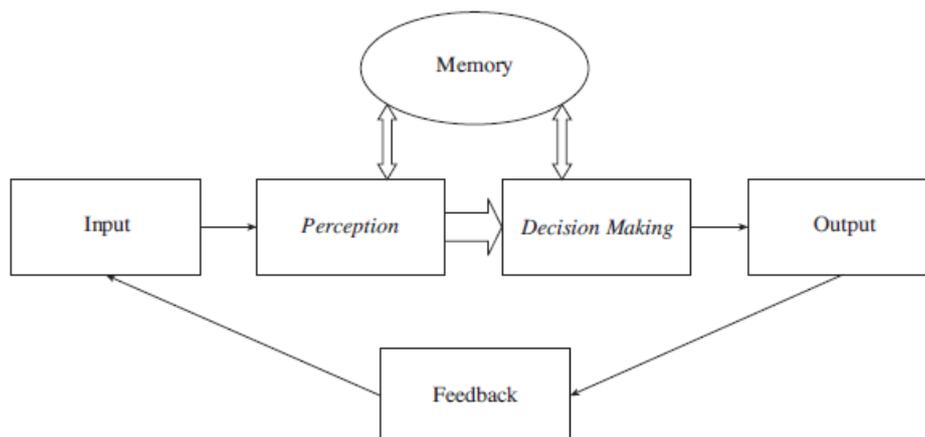
1. **Figure 2** shows the final phases of a sprint start.



Using Figure 2, explain the concepts of reaction time and response time.

[4]

2. 'Decision making in the information processing model.'



(i) Using a specific skill, explain the role of perception and memory in the decision making process. [4]

(ii) Explain the strategies a coach or teacher might use to improve the retention of information by a performer when learning new skills. [3]

[3]