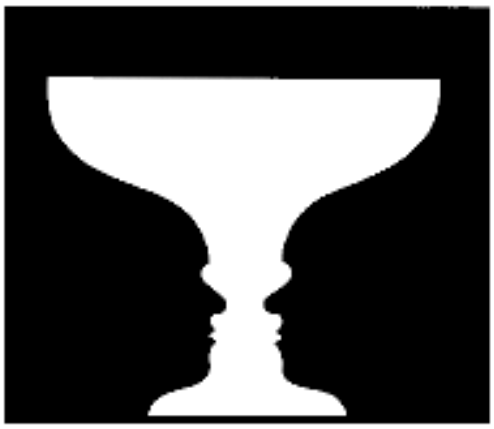
Higher Human Biology
Unit 3 Notes
Perception and Memory

Perception

- Perception is the process by which the brain analyses and makes sense of incoming sensory information.
- A person's perception of their environment can depend on information from many sense organs, although only visual perception will be studied.
- There are three areas of perception:
  - segregation of objects
  - perception of distance
  - recognition

1. Perception – segregation of objects

- The 'figure-ground' phenomenon allows objects to be distinguished (segregated) from their background or from one another and the shape of the object to be deduced
- For example, we can see words on printed paper as the 'figure' and the paper as the 'ground'.



- The 'figure-ground' perceptual organisation is often used in advertising.

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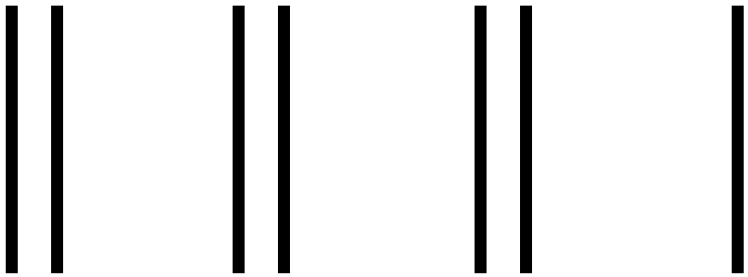
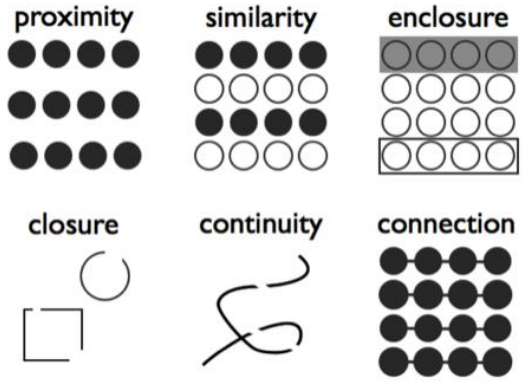
- During perceptual organisation, the brain will typically organise visual stimuli into coherent, organised patterns and groups rather than into separate parts.
- For example, the image below shows 7 lines but the brain tends to perceive this as three groups of 2 lines (plus an extra line).



The brain can organise objects in a number of ways



2. Perception of distance

- The distance of objects from the eye can be determined using visual cues, such as:
  - relative size
  - superimposition
  - relative height

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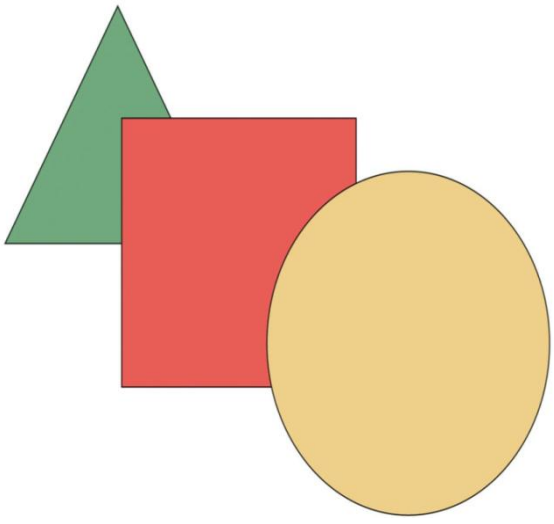
A. Relative height

- Objects which are further away from the eye are perceived to be smaller in size.

As the road appears to reduce in size, this indicates its increasing distance from the eye.

B. Superimposition

- When an object partially blocks the view of another, it is perceived to be closer to the eye than the object which is blocked.



Due to superimposition, the circle is perceived to be the closest object.

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C. Relative height

- When the base of an object in the field of view appears higher than the base of another, it is perceived to be further away.

In this image, the base of clear nail varnish is lower than that of the red and so appears closer to the eye.

Note: this also displays the effect of relative size.

Binocular disparity

- Each eye looks at an object from a slightly different position relative to the other eye.
- Due to this, there is a slight disparity (or difference) between the image each eye forms.
- The closer the object is, the greater the disparity between the two images.
- The two images are merged into one in the brain and produce a binocular image which allows us to better judge depth and distance.

Perceptual constancy

- The size of the image an object makes on our retinas will change as it moves closer or further away.
- We do not perceive the object as increasing or decreasing in size although it may become closer or the angle at which we view it may change, the object has size constancy.

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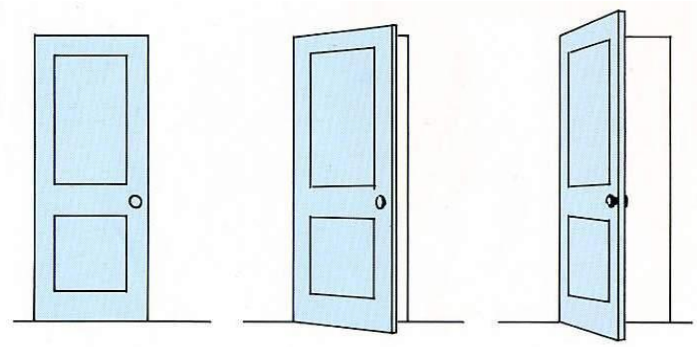
- Our perception of the size of an object as being constant is partly due to past experience and stored knowledge, as we remember **the size of familiar objects.**
- Perceptual constancy also applies to the **shape of objects**.
- We still perceive an objects shape as constant even when the angle at which we view it changes.
- For example, the shape of the door below appears to change but we are aware that its shape is actually constant.



3. Recognition

- Object recognition is the ability to perceive an objects physical properties, such as shape, colour and texture.
- The shape of an object, particularly its outline, is more important than colour or texture when recognising an object.
- During early learning, we use view and touch an object to establish its shape and use this to initially distinguish objects; this information is then stored in our long-term memory.
- When we perceive a shape, our brain subconsciously attempts to match it with a shape description which is already stored in the brain. If the shape is familiar, it is matched to a memory and the object is recognised.
- If the shape is not matched then the brain can match it to previously experienced objects which may have a similar shape and infer that the objects are related in some way.

Recognition – perceptual set

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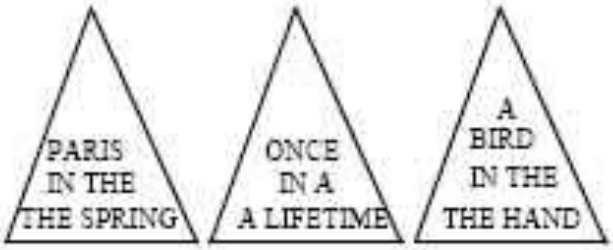
- The tendency of a person to perceive certain aspects of available sensory information and ignore others is known as perceptual set.
- This is influenced by expectation, context or past experience.

<u>Expectation and context</u>

- When the following diagram is covered up in different ways it affects the way we perceive it. This is due to the context in which we are exposed to it and what we expect to see.

<u>Past experience</u>

- Expectations are typically linked to past experience.
- The example below contains a writing error which most people typically overlook due to expectation and past experience.



- If a group is shown pictures of mammals, some which include rodents, they will see a rat in the ambiguous image below.
- If shown pictures of men, some which include bald men with glasses, they will see a man in the image.

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- The tendency of a person to perceive certain aspects of available sensory information and ignore others is known as perceptual set.
- This is influenced by expectation, context or past experience.

Memory

- Memory is the capacity of the brain to store information, retain it and retrieve it as and when required.
- Memories include past experiences, knowledge and thoughts.
- All information which enters the brain passes through sensory memory and enters the short term memory.
- Information can then be transferred to the long term memory (LTM) or is discarded.

1. Sensory memory

- Sensory memory retains all visual and auditory input but for a very short period of time, only 1 or 2 seconds.

2. Short term memory (STM)

- Short term memory (STM) has a limited storage capacity or 'memory span' holding about seven items of information for roughly 30 seconds.
- The information in the STM must be passed to the long term memory or it will be lost by:
  - displacement – the pushing out of 'old' information by new information
  - decay – the breakdown of the 'memory trace'

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A. Rehearsal

- Items can be maintained within the short term memory for longer periods of time through rehearsal.
- Rehearsal involves repeating a piece of information many times, either silently or aloud.
- This also helps to transfer this information to the long term memory (LTM).

B. Chunking

- 'Chunking' is the term given to the organisation of many pieces of information into smaller chunks of information.
- *e.g. the area code for Glasgow is 0141. Individually, this can be thought of as four pieces of information but chunking allows us reduce this to one piece of information.*
- Grouping many pieces of information into smaller chunks allows us to improve our short term memory span.

C. Serial position effect

- When information is viewed in a sequence, the first and last few pieces of information are remembered best. This memory pattern is known as the serial position effect.
- The first few pieces of information are remembered as there has been enough time for rehearsal, and the information has been transferred to long term memory.
- The middle pieces of information are quickly forgotten because the short term memory is crowded with information.
- The last pieces of information are remembered because they have not yet been displaced from the STM.

- Advertisers pay more for the first and last advert slots to take advantage of the serial position effect.

D. <u>Working memory</u>

- Working memory is an extension of the STM.
- It allows us to actively process information while it is held in the STM and allows us to carry out simple cognitive tasks, such as counting.
- e.g. allows you to picture your home and count the number of doors within.

3. Long term memory (LTM)

- The long term memory is thought to be able to hold an unlimited amount of information.
- In order for information to be transferred from the STM to the LTM, information must be encoded (converted to a form that the brain can process and store).

Encoding

- *The quality of the memory depends on the attention given to the encoding it.*
- *Information can be encoded using:*
  - *shallow encoding, such as repetition, or*
  - *elaborative encoding, such as linking with previous memories, which is considered as a deeper form of encoding.*

- Information can be transferred to the LTM successfully by:
  - rehearsal
  - organisation
  - elaboration of meaning

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R O E

NB - Repetition and Grouping Not accepted instead of Rehearsal and Organisation

A. Rehearsal

- Rehearsing a piece of information helps to extend the length of time it is retained within the STM.
- Rehearsing also facilitates the transfer of information from the STM to the LTM.

B. Organisation

- Organising information into logical groups or categories makes it more easily transferable into the LTM.

C. Elaboration of meaning

- Elaboration allows us to make information easier to transfer and store in the LTM by building it into a bigger 'story'.
- For example, the name of a person is much more likely to be transferred to the LTM if it is associated with mental images, personality, experiences and smells, such as their perfume/aftershave.

- Information which is stored in the LTM should be able to be retrieved.
- To aid retrieval, information is stored in categories e.g. family, holidays, etc.
- Retrieval is also aided by 'contextual cues', these are signals or reminders relating to the conditions which were present at the time the memory encoded into the LTM.

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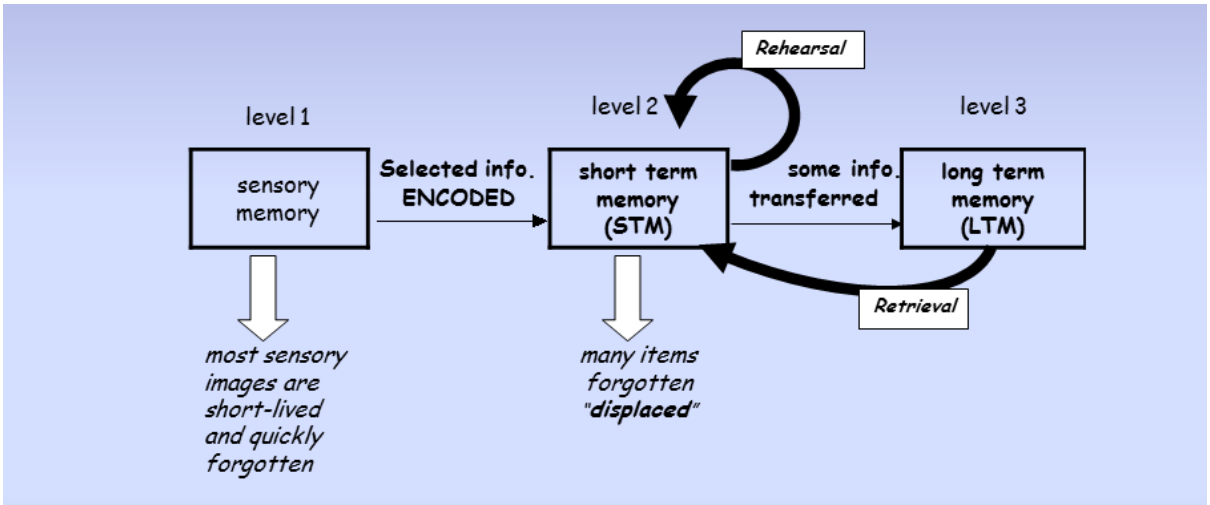
- The more elaborate and detailed the memory, the more easily it is retrieved.

Memory overview

- The link between the sensory, short term and long term memory is shown in the diagram below:



Location of memory in the brain

- Different types of memories are stored in different areas of the brain.

Episodic and semantic memory – 'remembering that…'

- Episodic memory is the recall of personal facts, experience and events.
- Semantic memory is the recall of general knowledge, non-personal facts and concepts.
- Both episodic and semantic memories are stored in the cerebral cortex.

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Procedural memory – 'remembering how to…'

- Procedural memory contains information on how to perform particular skills, such as motor skills (e.g. how to swim) and mental skills (e.g. how to read).
- Procedural memories are stored within the motor cortex.

Emotional memory

- Emotional memories are formed as a result of positive or negative associations with particular stimuli.
- Emotional memories involve links between the cortex and limbic system.

Spatial memory

- Spatial memory holds a record of our environment and its spatial orientation.
  - i.e. where the fridge is in your kitchen.
- Spatial memory is stored within the limbic system.

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Type of memory	Location within the brain
Episodic and semantic	Cerebral cortex
Procedural	Motor area of the cerebral cortex
Emotional	Cerebral cortex and limbic system
Spatial	Limbic system