



Name: _____ Date: _____

MEMORY



Learning objectives to be covered for Memory

<u>Learning objective</u>	<u>Completed</u>
<p>Know the structure and process of memory and information processing:</p> <ul style="list-style-type: none"> a) Input b) Processing c) Output d) Encoding e) Storage f) Retrieval 	
<p>Understand the features of short-term and long-term memory, including:</p> <ul style="list-style-type: none"> a) <i>Duration</i> b) <i>Capacity</i> 	
<p>Understand the structure and process of memory through the multi-store model of memory (Atkinson and Shiffrin, 1968) including strengths and weaknesses of the theory:</p> <ul style="list-style-type: none"> a) Sensory store b) The capacity of the short-term memory c) The duration of short-term memory d) The capacity of the long-term memory e) The duration of the long-term memory f) The role of attention in memory g) The role of rehearsal in memory 	
<p>Peterson and Peterson (1959) Short-term retention of individual verbal items Study:</p> <ul style="list-style-type: none"> • Aim • Procedure • Results 	

<ul style="list-style-type: none"> • Conclusion • Evaluation (strengths/weaknesses) 	
<p>Understand retrograde and anterograde amnesia, including:</p> <ol style="list-style-type: none"> a) The term ‘retrograde amnesia’ b) The term ‘anterograde amnesia’ c) The symptoms of retrograde amnesia d) The symptoms of anterograde amnesia 	
<p>Understand the active process of memory through the Theory of Reconstructive Memory (Bartlett, 1932), including strengths and weaknesses of the theory:</p> <ol style="list-style-type: none"> a) How schemas are formed b) How schema’s influence behaviour 	
<p>Bartlett (1932) War of the Ghosts study:</p> <ul style="list-style-type: none"> • Aim • Procedure • Results • Conclusion • Evaluation (Strengths/Weaknesses) 	
<p>Issues and Debates</p> <p>Understand the reductionism and holism debate, including:</p> <ol style="list-style-type: none"> a) The term ‘reductionism’ and ‘reductionist’. b) The term ‘holism’ and ‘holistic’ c) The use of content, theories and research drawn from human memory to explain the reductionism and holism debate. 	



L.O - Know the structure and process of memory and information processing:

- a) Input
- b) Processing
- c) Output
- d) Encoding
- e) Storage
- f) Retrieval

Definitions

- **Input** – Information received from our senses
- **Processing** – Making sense of the information
- **Output** – Our behavioural reaction to the information we receive
- **Encoding** – Turning sensory information into a form that can be used and stored by the brain.
- **Storage** – The retention of information in our memory system.
- **Retrieval** – Recalling the stored memory

Encoding the information

The brain processes the information we receive from our senses, it pays attention to the important information and makes decisions based on it.

We unconsciously or deliberately store some sensory information. This process requires encoding the sensory input into a memory trace that can be stored in the brain, similar to the coding of a computer.

Once encoded, the memory system can store the memory trace for a few seconds or an entire lifetime.

Output

Just like a computer, the brain produces an output. An output for a computer might be the product of a computer programme, such as a printout of a document. For humans, an output is a behavior that is produced. Specifically, for memory, the output is the stored information we retrieve (known as retrieval).



Learning Check!

Write the definitions of the following without looking:

a) Input

b) Processing

c) Output

d) Encoding

e) Storage

f) Retrieval



L.O - Understand the features of short-term and long-term memory, including:

- a) *Duration*
- b) *Capacity*

Definitions

- **Capacity:** The amount of information that can be stored in the short-term memory.
- **Duration:** The length of time information can be stored in short-term memory and long-term memory
- **Encoding:** Turning the information into something we understand

Short-term memory

Capacity:

Around 7 items

Duration: Around 18 seconds

Encoding: Acoustic (sound)

Long-Term memory

Capacity:

Potentially Unlimited

Duration: Few minutes to lifetime

Encoding: Mainly semantic

Learning check!

Cover the top section and try and write down the definitions.

Capacity:

Duration:

Encoding:



L.O - Understand the structure and process of memory through the multi-store model of memory (Atkinson and Shiffrin, 1968) including strengths and weaknesses of the theory:

- a) Sensory store
- b) The capacity of the short-term memory
- c) The duration of short-term memory
- d) The capacity of the long-term memory
- e) The duration of the long-term memory
- f) The role of attention in memory
- g) The role of rehearsal in memory.

Definitions

Rehearse: When we repeat information over and over again to make it stick.

Displacement: When the short term memory becomes 'full' and new information pushes out older information.

Interference: When new information overwrites older information. E.g. when a new phone number takes the place of an old number in your memory.

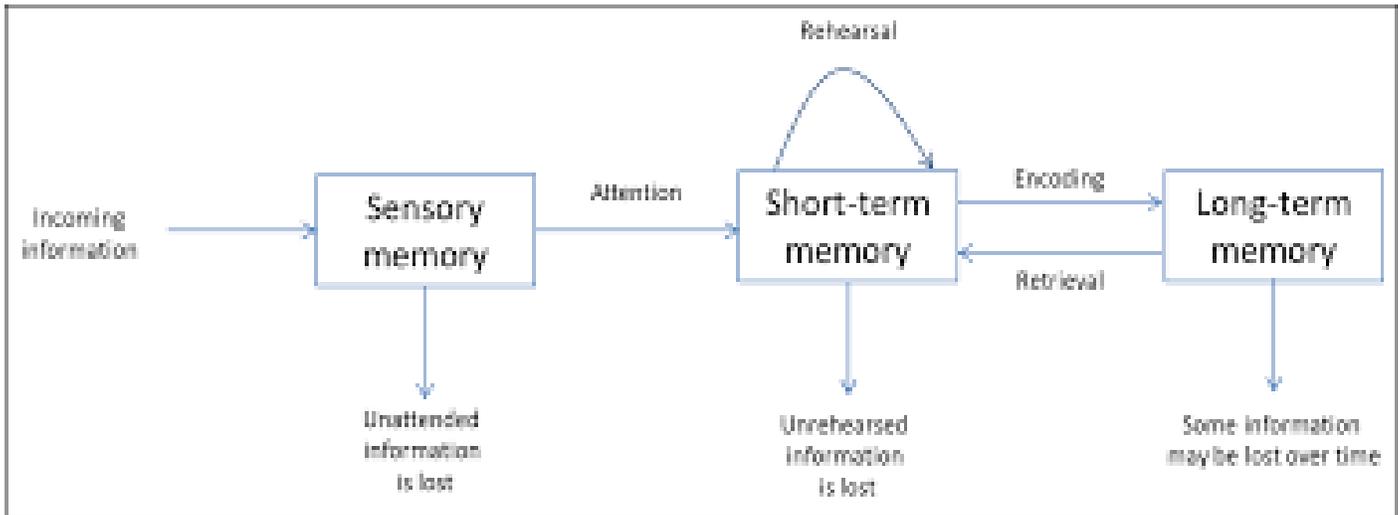
Sensory store

- ▶ We need to pay attention to our environment to register the information.
- ▶ The sensory memory receives all the information from our senses, it gets transferred to our STM if we pay attention, if not, the information decays.

We have different ways of registering the information:

- ▶ Iconic Memory: Visual information (lasts around 1 second)
- ▶ Echoic Memory: Auditory information (sound) (few seconds)
- ▶ Sperling (1963) found the sensory memory had a limited duration (time) but a large capacity (space)

The Multi-Store Model of Memory (Atkinson and Shiffrin, 1968)



Capacity (size)

- Magic number 7. 7 ± 2 items (Miller, 1956)

Duration (time)

- Around 15-30 seconds (Atkinson and Shiffrin, 1971)
- Around 18 seconds (Peterson and Peterson, 1959)
- Atkinson and Shiffrin describe STM and 'Modality free', meaning it can store information from any of our senses.

➤ Role of attention

If we not pay attention to the sensory information than the information will be forgotten. In order for the memory to be maintain, we need to pay attention and process the information.

Role of rehearsal

- Repeating information helps it stay in the STM for longer, if rehearsed for long enough, it will transfer to the long-term memory store.



Why do we forget things?

Information in our **short term memory** can be forgotten through a process known as **displacement**.

This is when new incoming information pushes out older information as we exceed the limited capacity of short-term memory.

Forgetting in long-term memory is thought to be due to a variety of reasons:

- ▶ They might decay as the memory trace is not used
- ▶ May be overwritten by new information (**interference**)
- ▶ Or we may have lost the link to that piece of information.

Evaluation of Multi-store Memory

LBON

Strengths

Lots of evidence

- ▶ There is lots of evidence to support the theory of separate memory stores.
- ▶ Cases of amnesia show how brain injury can damage LTM, whereas STM stays in tact.
- ▶ Other evidence from memory experiments have also shown the distinction between short term and long-term memory



Ben Murdock (1962)

- Ben Murdock conducted an experiment to provide evidence for the multi-store model of memory.
- He discovered the 'Serial Position effect', which is where you recall more information from the beginning (primacy) and end (recency) of a word list. This is because the first few words are rehearsed and go to the LTM and the last few words are still in the STM. The words in the middle get displaced.

Weaknesses

Overstating rehearsal

- The MSM has been criticised for overstating the role of rehearsal as a means of transferring information into long-term storage.
- We not always needs to repeat information to remember it, sometimes we just remember it as it is more meaningful.

Not only one type of LTM

- It is also unlikely that we have one type of long-term memory.
- Cases of amnesia patients demonstrate that while some long-term memories are damaged, others remain intact. E.g. Clive wearing – suffered damage to the part of his memory that stored personal events, such as going to university, but others parts were still intact, such as playing the piano.
- This suggests that we do have one LTM store, but possibly several different types.



Learning check!

1. What are the three different ways of registering information in the sensory store?

- a) _____
- b) _____
- c) _____

2. What is the capacity and duration of the short term memory according to Atkinson and Shiffrin (1968)?

Capacity:

Duration:

3. What is the capacity and duration of the long-term memory according the Atkinson and Shiffrin (1968)?

Capacity:

Duration:

4. What is the role of attention and rehearsal in memory?

Attention:

Rehearsal:



LO: Peterson and Peterson (1959) Short-term retention of individual verbal items Study:

Aim: To test the true duration of short-term memory.

Procedure

1st experiment

- 24 students were tested individually.
- Each student was asked to repeat out loud a set of letters that they had heard.
- The letters were 3 consonants (letters, not vowels) (AKA a trigram).
- Immediately after, they were asked to say out loud a three-digit number read to them by the experimenter, then count backwards in 3's or 4's from that number.
- When signalled by a red light, each student had to recall the trigram eight times. They did this with time delays of 3, 6, 9, 12, 15 & 18 seconds.
- In total the procedure was repeated 48 times using different trigrams.

2nd experiment

- The second experiment asked the participants to do the same tasks, but some were given time to repeat the trigram before counting backwards (silently or vocally).



Results

1st experiment

- ▶ *The results show that the longer each student had to count backwards, the less they were able to recall the trigram accurately.*
- ▶ *When asked to count backwards after the 3 seconds, they remembered over 80% of trigrams correctly.*
- ▶ *After 18 seconds, the percentage or recall was less than 10%.*

2nd experiment

- ▶ *They found that the extra time increased the recall rate because they were able to consolidate the information better.*
- ▶ *It did however show a decrease over time.*

Conclusion

- ▶ *With the participants unable to rehearse the trigrams, the Petersons concluded that information held in our short term memory fades rapidly and only 10% could be recalled after 18 seconds.*



Evaluation

Strengths - SLS

Standardized

- ▶ *The researcher used fixed timings for participants to count backwards from. The research can therefore be said to have good control, using standardised procedures to make sure all participants experience the same process*

Laboratory Experiment – highly controlled.

- ▶ *Highly controlled and took place in a laboratory of Indiana University. As a result, Peterson & Peterson had a high degree of control for **extraneous variables**, which makes their procedure easy to replicate*
- ▶ *They also eliminated noise and other factors that may have had an influence on memory.*

Scientific

- ▶ *This means the study is scientific because it can be replicated and the reliability of the findings can be checked to make sure they were not a one-off result.*

Weaknesses – SPL

Small Sample

- ▶ *Only 24 participants and all students, therefore findings can not be generalizable to a wider population.*

Psychology students

- ▶ *May have seen the model before, therefore may have displayed demand characteristics by changing their behavior to suit the researcher.*

Lacks ecological validity

- ▶ *It also lacks ecological validity as it is in an unnatural environment and unnatural task, therefore findings can not be generalized to a real-life setting.*



L.O: Understand retrograde and anterograde amnesia, including:

- a) The term 'retrograde amnesia'
- b) The term 'anterograde amnesia'
- c) The symptoms of retrograde amnesia
- d) The symptoms of anterograde amnesia

What is amnesia?

- *Even though the capacity of the LTM is potentially unlimited, we still do forget things sometimes.*
- *Some people experience a special type of forgetting called amnesia.*
- *Amnesia is a condition characterised by forgetting or memory loss, particular after a brain trauma.*
- *There are two types of amnesia that affect long-term memory*

a) *Anterograde*

b) *Retrograde*

Anterograde Amnesia

- Anterograde amnesia is the inability to form any new long-term memories following a brain injury.
- A patient with anterograde amnesia can process sensory information there and then, but cannot create any new memories that last longer than a few minutes.
- Their ability to transfer information from the short term memory to the long term memory is damaged.
- Anterograde amnesia affects memory following an accident, so patients can normally retain any information from before the accident.



Retrograde Amnesia

- Retrograde amnesia is where a patient who has suffered a brain injury cannot remember information from before the injury.
- This type of amnesia can be specific to one memory, such as the traumatic incident that caused the injury, or it can be limited to a specific time frame.
- In severe cases, patients can forget who they are and where they come from. It is possible for people with retrograde amnesia to regain some or all of their lost memory.

Case study of HM

- Henry Molaison (often referred to as HM) is a famous case on anterograde and retrograde amnesia.
- He underwent brain surgery to relieve him from seizures associated with epilepsy.
- Unfortunately, he damages part of his brain during the operation and so he could not store any new memories (anterograde amnesia)
- He also had retrograde amnesia as he could recall childhood events but nor experiences a few years before the surgery.



Learning Check!

Tina has recently fallen and sustained a head injury. She can no longer recall where she lives or where she goes to school. Tina can make new memories and remembers what she had for lunch.

What type of amnesia could explain Tina's memory problems? (2)

(remember this is an A02 (scenario) question so don't forget to refer back to Tina)



LO: Understand the active process of memory through the Theory of Reconstructive Memory (Bartlett, 1932), including strengths and weaknesses of the theory:

- a) How schemas are formed
- b) How schema's influence behavior

What is reconstructive memory?

Reconstructive memory is a theory of elaborate memory recall, in which the act of remembering is influenced by various other cognitive processes including perception, imagination, semantic memory, beliefs and schemas.

What are schemas?

- Bartlett stated that our memories are not stored as an exact replication of an event or situation.
- We store a brief outline of the event and then when we try and retrieve the information, we need to elaborate further using our existing knowledge known as our schemas.
- This means that our memories are not exact copies of an event but an interpretation – **an active reconstruction.**

How are schemas formed?

- Our schema's are formed throughout our lives based on our experiences.
- Just as we build language through increasing vocabulary, we build schema's through personal experiences.

How does our schemas influence memory?

- Bartlett tested how our schema's can influence our memory. He found that over time, people recalled pictures and stories differently because they were influenced by their schema.
- Schema's influence our memory and cause us to ignore or change details when we recall them.



In particular Bartlett found that the recall displayed the following:

- **Omissions** – we leave out unfamiliar, irrelevant or unpleasant details when we remember something. Our schema's simplifies the information.
- **Transformations** – Details are changed to make them more familiar and rational.
- **Familiarization** – We change unfamiliar details to fit in with our existing schema.
- **Rationalization** – We add details into our recall to give a reason for something that may not have originally fitted with a schema.

Evaluation of reconstructive memory – PEESU

Strengths

Practical implications

- The theory of reconstructive memory has real world practical implications and helps us understand why memory can become distorted.

Eyewitness Testimony

- An eyewitness to a crime can misremember certain events. Loftus and Palmer found that using different verbs when asking a question gave a difference response.
- When asked "How fast was the going when the cars when they smashed" produced a different response than the word 'colided'.
- So the explanation of reconstructive memory and schema's helps to explain this to ensure to use preventative measure during eyewitness testimony.



Ecologically Valid

- In Bartlett's study, he asks participants to recall the story hours, days or even years later.
- As this is a test of memory reflective of normal event as we regularly try and recall events that happen, his research and therefore his theory can be seen to be ecologically valid.

Weaknesses

Subjective

- Bartlett developed his theory by reading through and interpreting the pictures and stories reproduced by participants. He analyzed each story and picture himself and gave his own interpretation of the material the participants recalled.
- Some would argue that Bartlett's own interpretation may differ from another person's. This would mean that Bartlett's findings could be subjective.

Unscientific

- If the research is considered to be subjective then it is also considered unscientific.
- This would undermine his Theory of Reconstructive memory.
- Bartlett was not particularly scientific in his procedures. He was more interested in each participant's unique memories rather than the use of standardized procedures and controls. *This may weaken the research that was used to form the theory.*



Learning Check!

Ali was loading his shopping into the boot of his car when he heard shouting and a loud bang. The next day he tried to describe the event to his friend.

Explain what Ali might have remembered about the event. Use your knowledge of reconstructive memory in your answer.

(4 marks)

(Remember this is a scenario so this means A02 marks so don't forget to mention Ali in your answer)



L.O: Bartlett (1932) War of the Ghosts study:

Aim(s)

- To investigate whether the memory of a story is affected by previous knowledge.
- To find out if cultural background and unfamiliarity with a story would lead to distortion of memory when it was recalled.
- To test if memory is reconstructive and whether people store and retrieve information per expectations formed by cultural schemas.

Procedure

- Sample: 20 British participants (7 women, 13 men). The participants were not told the aim of the study; they believed they were being tested on the accuracy of recall.
- Bartlett used repeated reproduction, which is where participants hear a story or see a drawing and are asked to reproduce it after a short time and then to do so again over a period of days, weeks, months or years.
- The story used was a Native American story called 'The War of the Ghosts' which was unfamiliar to participants and contained unknown names and concepts. The story content was also unfamiliar. The story was selected because it would test how memory may be reconstructed based on cultural schema.
- Each participant read the story to themselves twice. The first reproduction happened 15 minutes later. There was no set interval beyond this and participants recalled the story at further intervals from 20 hours to almost 10 years.

Results

- Bartlett found that participants changed the story as they tried to remember it. This happened in the early stages (15 minutes) and throughout the further reproductions.
- Overall, the participants preserved the order of events and main themes in the story.
- The reproduction of style was often changed, with reproduction of the story often being transformed.



- Seven of the 20 participants omitted the title and 10 of the participants transformed the title – for example, ‘War-Ghost Story’. Other transformations included changing ‘canoes’ to ‘boats’ and changing the names of the characters.
- Much of the content was rationalised by the participants, who changed material so that it was more acceptable to them (Bartlett called this ‘effort after meaning’), such as ‘the young man did not feel sick but nevertheless they proceeded home’.

Conclusions

- Accuracy in reproduction of the story is an exception rather than a norm of memory. Style, rhythm and precise story construction is very rarely reproduced. ☒ After repeated reconstructions, the form of, and items within, the story become stereotyped and do not change much after this occurs. However, with infrequent reproduction, omission of detail, simplification and transformation continues indefinitely.
- There is a significant amount of interference with the story from reconstructing it. The details are altered to fit the participant’s own tendencies and interests.
- In all recollections of the story, rationalisation reduced material to a form that was more accessible or common to the participant. This could be because the material was initially connected to something else in memory and treated as a representation of this. It reflected the character and individuality of the person recalling the story, and names, places and events were changed to fit with the social group that the participant belonged to.

Evaluation – ERRINN

Strengths

Ecological Validity

Remembering a story is naturalistic as a test of everyday memory than trigrams giving this study ecological validity.



Reliable

Bartlett replicated his procedure using various stories and pictures and found participants had the same result by transforming the words to their own interpretation when remembering. This suggests the findings are reliable.

Real world applications

The theory helps us understand why memory can become distorted. An eyewitness to a crime for example can misremember certain events which may lead to an unreliable account.

Weaknesses

Interpretation may differ/Subjective

Bartlett's own interpretation may differ from another person's; therefore, his findings can have been seen as subjective which would mean it is also unscientific. This would undermine his theory.

No ecological validity

Although recalling an event is natural, the story was not familiar and contained strange words. So the story was not an everyday task or a realistic use of memory overall.

No standardized procedures

Bartlett was more interested in each participant's unique memories rather than the use of standardized procedure. This may weaken the research that was used to form the theory.



Issues and Debates

Understand the reductionism and holism debate, including:

- a) The term 'reductionism' and 'reductionist'.
- b) The term 'holism' and 'holistic'

The use of content, theories and research drawn from human memory to explain the reductionism and holism debate.

Reductionism and Reductionist

Reductionism

The belief that human behavior can be explained by breaking it down into simpler component parts.

Reductionist

A theory or study that describes a behavior by a single, simple explanation can be said to be reductionist.

E.G think of the difference between feminism and a feminist

Why reduce?

- Scientist often reduce complex behaviors into basic parts because it means that we can be more certain that one thing causes another. This help us investigate what causes a behavior.
- For example, if we explain aggression as the result of a certain gene, we can test for the gene to see if someone that has that gene has more aggressive traits than those that don't.



Strength - *Scientific*

Reductionism is a desirable scientific practice and can be appropriate in circumstances where there is a clear, single explanation.

Weakness - *Over simplistic*

However, reductionism can result in an explanation that is over simplistic. It may mean that we ignore other causes of that behavior.

E.g. If we explain aggression just from a single gene, we may miss other social factors that could contribute to aggression, such as upbringing.

Holism and Holistic

Holism

Holism is the opposite of reductionism, so it tries to understand the whole behavior rather than just its parts.

Holistic

When you are holistic, you try and understand the person as a whole. This approach takes into account that many different factors work together to cause a behavior.

e.g. when you make a cake, you need all the ingredients for it to work together for the outcome. Holistic psychologist believes that the whole is greater than only parts of it.



Strength - Uses Qualitative data

Holistic psychologists tend to use qualitative methods to gain greater insight into the causes of behavior and try to understand the whole person and their beliefs.

Weakness –

Difficult to achieve - Holism can be difficult to achieve because understanding the whole individual means investigating lots of variable at the same time.

Unscientific - The findings can only apply to a particular individual; therefore, the finding cannot be generalized.

How does the Reductionism/Holism debate apply to memory?

A01 – Demonstrate knowledge (explain)

- The area of cognitive psychology concerned with memory, and other cognitive processes, is generally regarded to be reductionist.
- Atkinson and Shiffrin's (1968) Multi-store model of memory can be seen as reductionist as it describes our memory as a series of component memory stores with specific functions, such as rehearsal.
- Research using experiments that investigate how memory works can also be regarded as reductionist as experiments tend to isolate variables to investigate, without considering other factors that could also explain the behavior

A03 – Analyze and evaluate (strengths & weaknesses)

- However, Bartlett's work cannot be considered reductionist because of the way he conducted his research.
- Bartlett used qualitative analysis to explore the reconstructive nature of memory by understanding how each individual's schemas influenced their recall of stories and pictures
- He spent considerable time establishing the character and backgrounds of his participants in order to understand how their schemas were formed. E.g. he found out what jobs they had to see if their training and employment might influence how they remembered things.