What the specification says...

Topic Learning Outcomes...

Key Concepts
• The stages of information processing: input; encoding; storage; retrieval; and output
• Types of forgetting: decay; displacement; retrieval failure (lack of cues).
• The structure and functions of the brain and how the brain works in the formation of memories; – how neurological damage can affect memory; the role of the hippocampus on anterograde amnesia; the frontal lobe on retrograde amnesia; and the cerebellum on procedural memory.

Theories/Explanations
The Multi-store Model of Memory:
   The structure and process of the Multi-store Model of memory:
   • sensory store, short-term memory and long-term memory
   • differences between stores in terms of duration, capacity and encoding
   • criticisms of the model including rehearsal versus meaning in memory.

The Multi-store Model of Memory Research Study – an example of the impact, on behaviour, of neurological damage - Wilson, Kopelman and Kapur (2008): Prominent and persistent loss of past awareness in amnesia: delusion, impaired consciousness or coping strategy (the Clive Wearing study).

The Theory of Reconstructive Memory
• The structure and process of the theory of reconstructive memory:
• the concept of schemas
• the role of experience and expectation on memory
• the process of confabulation
• distortion and the effect of leading questions
• criticisms of the model including the reductionism/holism debate.

Reconstructive Memory Research Study – Braun, Ellis and Loftus (2002): study into How Advertising Can Change Our Memories of the Past

Applications

Techniques used for recall
• The use of cues, repetition and avoiding overload in advertisements and the use of autobiographical advertising
• The development of neuropsychology for measuring different memory functions, including the Wechsler Memory Scale.

What is memory?
   The ability of the mind or of a person or organism to retain learned information and knowledge of past events and experiences and to retrieve that information and knowledge

Key Concepts
Learning objectives
The stages of information processing: input; encoding; storage; retrieval; and output.
The Five Stages of Information Processing

Task: Unscramble the stages of information processing

1. Information enters the memory PUNIT
2. Information is changed into a form which the memory can understand CONGDNEIG
3. Information is filed away, ready to be used at a later date AGOSTRE
4. Information is located and taken out of storage TERIAREVL
5. Information is used in some way UPUOTT

- The five stages of information processing suggest that human memory is like a computer

Task: Cover up the information above and fill in the diagram showing the stages of information processing

You may need to define each of the words or identify which process comes before or after another, for this reason we use a Mnemonic to help us remember the order.

Rewrite the Mnemonic that helps recall the order;

Input ➔ Encoding ➔ Storage ➔ Retrieval ➔ Output
You MUST know the correct order!

**Input** - involves information entering the memory from the environment

**Encoding** - Sensory information that is changed so that we make sense of the information. E.G. Words that enter your ears are converted from sound waves.

**Storage** - information is ‘kept’ to use at a later time.

**Retrieval** - ability to recover information from storage.

**Output** – Using the information that has been retrieved - it might mean saying something or writing something down – even simply having a thought

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**Learning objectives**
The structure and functions of the brain and how the brain works in the formation of memories; – how neurological damage can affect memory; the role of the hippocampus on anterograde amnesia; the frontal lobe on retrograde amnesia; and the cerebellum on procedural memory.

Amnesia is a condition which can significantly affects a persons’ ability to recall stored memories or to form new memories. Damage to the brain can cause amnesia and there are two different types;

**Anterograde** – The inability to form new memories

**Retrograde** – The inability to recall memories from the past, after damage.

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**Retrograde Amnesia**
The **hippocampus** is a horseshoe shaped part of the brain which is involved in making new memories. It is part of the limbic system and that memories pass through in order to go into LTM – seen as most important for semantic and autobiographical memories. Damage leads to **anterograde amnesia**.

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The **frontal lobe** is known as the ‘control centre’ it is responsible for the function such as planning, organisation and making judgements. Damage leads to **retrograde amnesia** and Alzheimer’s.
The **hippocampus** is the part of the brain involved in making new memories. Psychologists believe that new memories must pass through here before entering long-term memory. It is especially important for making **semantic** memories (with meaning).

The **cerebellum** is involved in procedural memories, things like how to feed ourselves, or how to walk. Damage to this can lead to the loss of these skills or inability to develop new procedural skills.

**Shade in the hippocampus and cerebellum**
Damage to the hippocampus can lead to Anterograde amnesia, this means new memories cannot be formed as information cannot pass between the short-term and long-term memory. Another type of amnesia is Retrograde amnesia this is where people cannot recall existing memories it is believed this is caused by damage to the frontal lobe. People can experience both Anterograde and Retrograde amnesia.

Task: Explain the difference between Anterograde and Retrograde amnesia (3 marks)

Theories/Explanations; The Multi-store Model of Memory:
Learning objectives;
The structure and process of the Multi-store Model of memory:
- sensory store, short-term memory and long-term memory
- differences between stores in terms of duration, capacity and encoding
You need to be able to talk through the model and how a memory pass through each store/process. The easiest way is to memories the model above and the table of information about each store below;

<table>
<thead>
<tr>
<th></th>
<th>Sensory Store</th>
<th>Short Term Memory</th>
<th>Long Term Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Encoding</strong></td>
<td>5 Senses</td>
<td>Acoustic.</td>
<td>Semantic</td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td>a lot but not for long</td>
<td>7+-2</td>
<td>Unlimited</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>2 Seconds approx.</td>
<td>30 seconds</td>
<td>Unlimited</td>
</tr>
<tr>
<td><strong>Forgetting</strong></td>
<td>Decay</td>
<td>Decay or Displacement</td>
<td>Decay or Retrieval Failure</td>
</tr>
</tbody>
</table>

The Multi-Store Model of Memory

- The multi-store model of memory is a theory which explains how memories may be stored

Task: Complete the diagram showing the multi-store model of memory
Task: Match each key word to the correct description

When a memory trace moves from short term to long term memory

Info from the senses is held here for a very short time

Around 7 (5-9) items can be stored here for up to 30 seconds

Repeating info to prevent decay

Info is replaced by new info

When info is recalled from long term memory

When a memory trace dies out because it has not been rehearsed

An unlimited amount of info lasts forever here

Decay

Short term memory

Retrieval

Rehearsal

Long term memory

Displacement

Transfer

Sensory memory

Task: Explain the differences between the short and long term memory stores (3 marks) Hint: To get full marks you must use a comparison word such as more, less or whereas

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Criticisms of the model including rehearsal versus meaning in memory.

- **Reductionist** – the theory is too simple, it suggests that STM is a single store but other researchers suggested that it is much more complex with separate sections within the STM. Neuropsychology has found that the LTM is also more complex, brain scans have shown the hippocampus is responsible for autobiography memories (life events) where as cerebellum is responsible for procedural memory (how to do things like ride a bike).

- **Deterministic** – the model places to much importance on rehearsal. We don’t need to rehearse information over an over for it to always go from the STM to the LTM – a flashbulb memory (a one-off event like 9/11) can go straight in (we also don’t rehearse taste or smell!)

- **Semantic processing** (thinking about the meaning) lead to a revision of the MSM and Elaborative Rehearsal was added as Schifrin acknowledged its importance. Some information has more meaning and therefore is remembered more deeply.

*Remember: evaluating a model = saying what it cannot explain*

**Task: Fill in the gaps in the criticisms**

- The multi-store model of memory cannot explain i_________ d___________ in memory. It suggests that everyone’s memory is the s___________. However, Kim Peek has a greater memory c___________ (he can remember more items e.g. every telephone dialling code in America) than most people.

- The multi-store model of memory suggests everyone has to r___________ information for it to get to long term memory. However, Kim Peek can remember every piece of m___________ he hears without rehearsal.

- The multi-store model of memory suggests all information has to be rehearsed to get to long term memory. However, we can remember dramatic events like car c___________ without rehearsing them. We can also remember t_______ and s___________ without rehearsing them.

- The multi-store model of memory is too s___________. It suggests that short-term memory is a single store but other research suggests it is more c_________ and can deal with multiple sensory information at one time using separate sections. IE on a day at the spa your brain has to encode the relaxing music, the smell of the oils and the feel of the massage.
Types of forgetting: decay; displacement; retrieval failure (lack of cues).

Decay happens if we don’t pay attention to the information that enters the sensory store or if information isn’t rehearsed in the short-term memory store. Some psychologists also argue memories can decay from the long-term memory store if there is a long time between making and using the memory.

Displacement happens if the capacity of a store is ‘full’, new information will push out old information. It therefore cannot happen to long-term memories as the store is unlimited.

Retrieval failure (lack of cues) is the inability to recall something because the cue needed to trigger the memory is not present. This could be internal or external. Cues are like hints that trigger a memory to be remembered there are different types of cue; context cues are external things like seeing your Psychology book and remembering you were given homework! State cues are internal things like the emotion you were feeling when you learnt something like how happy to are when you understand a complex idea and then remembering the concept when you feel that feeling.

The Multi-store Model of Memory Research Study
An example of the impact, on behaviour, of neurological damage - Wilson, Kopelman and Kapur (2008): Prominent and persistent loss of past awareness in amnesia: delusion, impaired consciousness or coping strategy (the Clive Wearing study).

Aim - To report on the case of CW who suffers from a severe case of anterograde and retrograde amnesia
Method - Longitudinal study (a study that lasts a long time usually years) – Sample CW – Materials were tests and MRI scans.

Neuropsychological assessments
- His verbal fluency and IQ tests found to be within ‘average’ range however CW was an gifted man before his illness so this score is likely to have been poorer that it would have been before the illness.
- His STM was found to be normal but his long-term memory was ‘severely impaired’
- Extremely severe episodic memory deficits, he was unable to recall many details about his life before the illness or create new memories. Always scored zero on delayed recall tasks as couldn’t hold new information.

MRI scans
- Significant abnormalities in the hippocampus but also other areas associated with memory function including the amygdala, mammillary bodies, temporal poles and substantia innominate.
- A second scan 15 years later should little change and also revealed extensive damage to the temporal cortices.
- Damage is greater on the left than the right.
- Was still able to talk, read, write, sight-read and conduct an orchestra.

Auditory Hallucinations
- CW developed auditory hallucinations, thought he could hear music playing. Commonly familiar sounds repeated over and over.
Timeline

Oct 1985 – large parts of his brain destroyed by a virus he was assed by Wilson and STM intact but autobiographical and episodic memory severely damaged, ability to create new memories severely damaged. Some damage to semantic memory

Nov 1985 – IQ test was average, but before he was ‘extremely gifted’. STM normal and LTM still impaired, semantic also impaired (ie scarecrow – a bird that flies and makes funny noises)

1991 – First MRI – abnormalities in the hippocampal formations, amygdala, temporal poles.

2006 – 2nd MRI also revealed damage to temporal cortices

He had a number of assessments over the 21 years CW did not appear to accept he had a problem with his memory. He kept a diary but said he was not consciously aware of writing it.

Results

- Severe brain abnormalities
- Both retrograde and anterograde amnesia
- Complete inability to form new memories
- Decreased performance & verbal IQ
- Some loss of semantic memory
- Severely damaged episodic memory
- CW could still: play the piano, recognise his wife and children, conduct an orchestra, read, write and talk
- Very limited autobiographical (self) memories

Conclusions - CWs sense of self disrupted by his memory disorder. Brain damage can result in both anterograde and retrograde amnesia. Provides support for Multi-store model that STM and LTM have separate stores

Q1. Name 3 areas of CW’s brain that were damaged.
Q2. In what year did the damage happen?
Q3. What caused the brain damage?
Q4. What was CW still able to do?
Q5. What evidence for retrograde amnesia was found in the case study?
Q6. What evidence for anterograde amnesia was found in the case study?

Task Choice – pick one of the below

Create a newspaper article reporting on the case of CW

Write a diary entry as CWs wife explain what happened and how it would have felt to be his wife
Evaluation

- Generalisability - CW is a case study, a very unusual case. Due to the extent of the damage other similar cases had a few differences therefore we may not be able to generalise it to the wider population.

- Consent - He was tested over 21 years and he may not be able to remember the tests they could have caused distress – he may not have truly understood what they were planning on doing and how often.

- Confidentiality - Although he was under CW the researchers did use his full name and gave enough background detail to make it very clear who he is therefore his identity was not kept private.

Further evaluation

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_______________________________________________________________________________________
The Theory of Reconstructive Memory

- the concept of schemas
- the role of experience and expectation on memory
- the process of confabulation

Write down what makes a dog, a dog! You need 5 criteria;

1. 
2. 
3. 
4. 
5. 

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<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
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</tbody>
</table>

The list you originally wrote was made using your schema of a dog;

What is a schema?

War of the Ghosts task
What happened when you recalled the story?

Explain why the people may have different memories of the same event.
Think of an example where this happened to you?

**The role of expectation**

We have to make quick judgements with the enormous amount of information that comes into our brain—our schemas help to deal with this quickly and influence what we expect to happen in certain situations. Our expectations are not always correct—ever heard judging a book by its cover!

Think of one time where your expectations were wrong (for better or worse!)

What happened yesterday lunchtime?

You may have just been a victim of confabulation!

**What is confabulation?**
### Example Board – INCLUDE AN EXAMPLE OF EACH OF THESE BELOW

<table>
<thead>
<tr>
<th>Schema</th>
<th>Making up details to complete a memory, not intentional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience (on memory)</td>
<td>Mental representation of an object/situation.</td>
</tr>
<tr>
<td>Expectation (on memory)</td>
<td>Memories are influenced by events in the past, meaning our recall of a current event may not be entirely accurate</td>
</tr>
<tr>
<td>Confabulation</td>
<td>Memories are influenced by our assumptions, which happen when sensory information is processed quickly.</td>
</tr>
</tbody>
</table>

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### Distortion and the effect of leading questions

Can you remember what Eyewitness testimony is?

Distortion refers to a memory that differs from the event which took place. Memory can be altered (distorted) by simply changing a verb in a question about an event.

Some of the questions asked were leading you to a specific answer which ones were they and did they cause you to get it wrong?
Task - Create a mind map for Reconstructive memory – this can be just words but if you want to include pictures this would make for stronger memories.

Task – Complete the glossary of terms you need for the theory and then complete the gap fill.

You must include:
- Schema
- Confabulation
- Leading Question’s
- Reconstructive memory
- Experience
- Chronological order
- Expectation

**Criticisms of the theory including the reductionism/holism debate.**

Is the theory reductionist? EXPLAIN WHY OR WHY NOT.

EXPLAIN TWO OTHER CRITICISMS OF THIS THEORY
Recnstructive Memory Research Study

Learning objective;
• Braun, Ellis and Loftus (2002): study into How Advertising Can Change Our Memories of the Past

GO TO THE RECONSTRUCTIVE MEMORY PAGE OF OUR WEBSITE AND WATCH THE ADVERT (only 3 minutes)

• What was the purpose of this advert?
• What were the people doing?
• What might this trigger in the people watching this advert?

Experiment 1:

Aim: To see whether autobiographical-focused advertising could directly affect how consumers recall a childhood experience

Hypothesis:
1 - If the advertisement becomes part of how the consumer’s memory is reconstructed, then elements of the images of the advert will appear as part of the memory regardless of whether or not they actually occurred.
2 - If the advertisement causes the consumer to visualise their childhood memory, then the process of imagining the memory will lead consumers to believe they actually shook hands with Mickey (as shown in the advert)

Method:
1. What type of experiment?
2. Which research design?
3. What was the IV?
4. What was the DV?
5. Who was the sample?

Materials: Life Events Inventory questionnaire; Disney resort advert; Questionnaire rating the advert (unfavourable – favourable); Questionnaire rating how involved Pps felt in the ad (using empathy measures); 2 distraction tasks; Questionnaire about Pps personal memories of Disney.

Procedure: Pps randomly assigned to experimental or control group, Week one: Pps given the LEI plus other experimental tasks, Week two: Pps either given the Disney or control ad and asked to visualise themselves in the ad. Then 5 mins to write down how the video made them feel and think, Asked to rate the advert using attitude and empathy measures. 5 minute distractor task. Researcher returns ‘panicked’ saying results from previous week LEI ‘lost’. Pp completed LEI again. Distractor task 15mins. Different researcher gives Pps questionnaire on memories of visiting Disney resort. Pps asked the aim of experiment. (test for demand characteristics).
Results:

- Significantly more Pps in the experimental group showed an increase in their score on the LEI in week two for the critical question (met and shook hands with a favourite TV character).
- Pps in the experimental groups showed significantly more positive change on the LEI (i.e. more convinced the event had happened to them).
- Out of those who had reported visiting the park previously, Pps in the experimental groups reported more positive feelings about Disney and used significantly more of the words used in the advert i.e. magical and cool rides.

Conclusion: Autobiographical advertising can influence how consumers recall their past.

Experiment 2:

Aim: To see whether false information in an advert could make Pps believe the events had happened to them as a child.

Method: Laboratory experiment, Independent measure. Sample of 167 undergraduate psychology students USA (104 F / 63 M).

Materials: The materials were the same as experiment 1 with what amendments?

Advert 1:

Advert 2:

Advert 3:

LEI modified so that critical question was “shaking hands with a cartoon character in a theme park (10 pt scale- definitely did not/definitely did happen

Procedure: Pps given 2 types of false information – 1) they had shaken hands with Bug Bunny (not a Disney character so impossible) 2) they had shaken hands with Ariel (she IS a Disney character but a later additional so they could not have shaken hands as a child). Both experimental and control groups given Disney ads but experimental included false information.

Results:

Ads rated as being ‘more involving. Means scores /8

- Ariel: 4.8
- Bugs Bunny 5.1
- Factual (control): 3.8

Percentage increase in confidence they had shaken hands with the characters (on second LEI)

- Ariel 76%
- Bugs Bunny 78%
- Factual (control) 62%

Conclusion: Autobiographical advertising can make consumers more likely to believe an event happened to them even if it was impossible. Autobiographical advertising can create false memories. Results support the theory of reconstructive memory.
Check your understanding; Homework
  
  Who where the sample in both experiments?
  What was the name of the questionnaire given to pps about their childhood?
  What was the key question on the questionnaire?
  What was the 2 impossible events that was suggested to participants in experiment 2

Evaluation
Were the results generalisable? Why not?

What is ecological validity? Did this study have it? Explain this in detail.

Braun et al's study into autobiographical-focused advertising used independent measure design. Each group took part in just one condition.

Describe one issue with using independent measures design in Braun et al study? (4)
How could Braun et al improve the issue of independent measures design (4)
Applications
Techniques used for recall
• The use of cues, repetition and avoiding overload in advertisements and the use of autobiographical advertising
• The development of neuropsychology for measuring different memory functions, including the Wechsler Memory Scale.

Use your homework to answer the following key questions;

Check your understanding; Flipped Learning Task
a. How and why do advertisers use cues in advertising?
b. Why do advertisers use repetition in advertising?
c. What is overload? What happens when adverts are overloaded?
d. What is autobiographical advertising?
e. Why do advertisers use autobiographical advertising?
Use of cues
The use of cues create a certain context or feeling when advertising products. (links to cue dependent theory) when a customer is in the same situation or emotional state then the advert acts as a trigger and are therefore more likely to buy that product.
If someone in the ad is feeling sad and soup makes them better then when the consumer feels said they will recall the soup and purchase it.
Non-verbal cues are also important – if someone in the advert points or looks at the brand logo it ‘tricks’ us to also look at it as it is human nature to what to see what someone else is seeing.

Repetition
Advertisers use repetition to build familiarity, helps it to stay in LTM and prevents decay.
It also promotes positive feelings as research has shown that consumers can feel negative towards new products simply because they are unfamiliar.
Simply reading the slogan at the end increase the likelihood of it entering and staying in LTM

Avoiding Overload
Overload is the result of too much information entering a memory store (STM) and therefore that information is most likely displaced. It is essential doe adverts to be kept shot and details kept to a minimum to avoid this

Autobiographical Advertising
This is manly used with the ‘baby boomer’ generation born after the WW2 1946-1964. (Braun et al) Nostalgic adverts is thought to remind them of being young and free, such as the holiday truck coca cola advert. This links with positive memories and are therefore more likely to buy it.

Development of neuropsychology for measuring memory functions

Wechsler memory scale - This is a diagnostic tool used by psychologist to evaluate how much brain damage patients have after injury or illness like dementia. It can be used on 16-90. It has 7 subtests for example spatial addition, symbol span and design memory. Results are presented in 5 different sets; auditory, visual, visual working, immediate and delayed memory.