

# CLOA Learning outcomes

## General learning outcomes

Outline principles that define the cognitive level of analysis. (8)

Explain how principles that define the cognitive level of analysis may be demonstrated in research. (8)

Outline (8) - Give a brief account or summary.

Explain (8) - Detailed account including reasons or causes.

### 1. Humans are information processors, mental processes guide our behaviour.

#### Multi-store model (Theorist: Atkinson and Shiffrin)

- The Multi-store model suggests that there are three memory stores.
- Each memory store responsible for a different type of memory.

	Sensory memory	Short Term Memory (STM)	Long Term Memory (LTM)
Input	Sensory stimulus (e.g. visual, audio etc.)	Conversion from Sensory Store through selective attention (choosing to retain the memory)	Encoded from STM Store through rehearsal (repeatedly giving attention to the memory)
Loss	<b>Decay</b> - Loss due to passage of time	<b>Displacement</b> - loss due to replacement of other memories	<b>Interference</b> - rehearsal gets interfered during retrieval
Process	-	Repetitive rehearsal in order to retain the memory	Memory gets stored away in a conceptually indefinitely large store. Retrieved to STM store when needed.
Duration	3 to 5 seconds	1 to 2 minutes	Indefinite
Capacity	-	Limited, around 7 items	Unlimited

#### Glanzer & Cunitz - Primacy and recency experiment (Multi-store model)

[A]	Test primacy-recency effect.
[P]	<ul style="list-style-type: none"> <li>- Participants were asked to read a series of 20 words.</li> <li>- They were then asked to recall the 20 words in any order.</li> <li>- In another variation, a distraction task was performed before recall.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Participants remembered the the first and last few words better.</li> <li>- Results reliably fall into a pattern known as the “serial position curve”.</li> </ul>

[C]	<ul style="list-style-type: none"> <li>- First few words - because they had more time to rehearse the words, encoding them into their long term memory store.</li> <li>- Last few words - because it is still in the short term memory store.</li> <li>- In the variation, the last few words were not recalled because of loss through decay.</li> <li>- Provides evidence for multi-store model of memory.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Low in ecological validity, lab environment</li> <li>- Ignored participant's understanding of the words</li> <li>- Only one culture tested                         <ul style="list-style-type: none"> <li>- Education in some cultures may train students to remember things.</li> </ul> </li> </ul>

2. The mind can be studied scientifically.

**fMRI - Functional Magnetic Resonance Imaging**

- Technology that measures brain activity by detecting associated changes in concentration of oxygen in the blood.
- Deoxygenated haemoglobin is more magnetic than Oxygenated haemoglobin.
- Requires the patient to be still in a small area for a long time.
  - May spark claustrophobia
- People with metal parts on their body cannot use a MRI machine because MRI has a strong magnetic field.
- Different from MRI which only provide a 3D image, fMRI provides a 3D animated model of the brain.

<b><u>Tali Sharot - 9/11 Flashbulb Memory (Flashbulb Memory)</u></b>	
[A]	Investigate upon the existence of Flashbulb Memory.
[P]	<ul style="list-style-type: none"> <li>- 24 witnesses of the 9/11 incident were found from different location of Manhattan as subjects.</li> <li>- Subjects were placed in an fMRI machine.</li> <li>- Subjects were asked to recall the event of 9/11.</li> <li>- Subjects were also asked to recall their summer holiday (for control purpose).</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- People closer to where the event happened (where the World Trade Center was) had a more in-depth recall of the event.</li> <li>- When compared to subject's summer holiday, the level of detail given for 9/11 incident was higher.</li> <li>- Parahippocampal Gyrus (Para-hippo-campal Gy-rus - responsible for LTM retrieval) was relatively inactive when recalling memories from 9/11 when compared to recalling events from summer holiday.</li> <li>- Amygdala (responsible for processing memory of emotional reaction) was relatively more active when recalling memories from 9/11.</li> </ul>

[C]	<ul style="list-style-type: none"> <li>- Different part of the brain was used for different Flashbulb Memory retrieval and general LTM retrieval.</li> <li>- Supports Flashbulb Memory as a different type of memory than LTM.</li> <li>- Collectivist culture - tend to suppress emotion, memory encoded at a shallow level.</li> <li>- Individualist culture - encouraged to express emotion, memory encoded at a deeper level (Levels of processing theory - Craik &amp; Lorkhart).</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Observing the concentration of deoxygenated haemoglobin is an accurate measure for brain activity.</li> <li>- Ecologically valid. Questions were asked about real life situations. <ul style="list-style-type: none"> <li>- May argue that it is still laboratory condition, overtly observing may cause Demand Characteristics.</li> <li>- Pressure under lab conditions may cause alteration of results.</li> </ul> </li> <li>- Possible confirmation bias. <ul style="list-style-type: none"> <li>- No cause-and-effect relationship can be established through the scan.</li> <li>- Relies heavily upon the interpretation of the researcher.</li> <li>- The Amygdala showing response may well be the subject's expression of depressed emotion while recalling 9/11.</li> </ul> </li> <li>- Ethical considerations: Privacy of the subjects may be invaded because the fMRI indicates a general representation of their thought process.</li> </ul>

### 3. Cognitive processes are influenced by social and cultural factors.

#### **Schema theory (Theorist: Frederic Bartlett)**

- Mental representation of knowledge created over time from previous experiences.
  - Childhood experiences
  - Repetitive exposure
  - Reinforcement
- Helps us organize information, guides our action and make predictions of the world.
- Encoding -> Storage -> Retrieval

<b>Frederic Bartlett - War Of The Ghosts study (Schema)</b>	
[A]	<p>Prove that memory is reconstructive and schemas influence recall. Demonstrate role of culture in schema processing.</p>
[P]	<ul style="list-style-type: none"> <li>- Participants were European Americans and Native Americans.</li> <li>- Bartlett ask participants to read a Native American folk story twice.</li> <li>- Then asked them to recite reproduce the story 15 minutes after reading.</li> <li>- No participants knew the aim and purpose of the task.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Native American participants found it easier to reproduce the story.</li> <li>- European American version of the story left out or replaced details related to Native American Culture e.g. Canoe -&gt; Boat.</li> <li>- European Americans filled in the gaps in their memory with their own cultural schema.</li> </ul>

[C]	<ul style="list-style-type: none"><li>- People reconstruct the past by trying to fit it into existing schemas.</li><li>- More complex the information, the more likely elements are forgotten/distorted.</li><li>- People try to find a familiar pattern in experiences, past or new.<ul style="list-style-type: none"><li>- People uses existing schemas to fill in the gaps of their memory, subconsciously.</li></ul></li><li>- Memory, according to Bartlett, is an imaginative reconstruction of experience.</li></ul>
[E]	<ul style="list-style-type: none"><li>- Methodology not sophisticated.<ul style="list-style-type: none"><li>- No IV, DV or Control.</li><li>- Making it difficult to measure or compare outcome.</li></ul></li><li>- Emic approach: Result specific to European American and Native American culture.<ul style="list-style-type: none"><li>- Low potential generalising ability .</li></ul></li></ul>

**Discuss how and why particular research methods are used at the cognitive level of analysis (for example, experiments, observations, interviews). (22)**

**Discuss (22) - A considered and balanced review, including a range of arguments, factors or hypothesis. Opinions and conclusions presented clearly supported by appropriate evidence.**

Research methods

**Research method: Experiments**

How are experiments used?

<b>Frederic Bartlett - War Of The Ghosts study (Schema)</b>	
[A]	Prove that memory is reconstructive and schemas influence recall. Demonstrate role of culture in schema processing.
[P]	<ul style="list-style-type: none"> <li>- Participants were British students.</li> <li>- Participants were presented with a Native American folk story.</li> <li>- The participants were then asked to recite the story multiples times after certain time frames.</li> <li>- No participants knew the aim and purpose of the task.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- The participants' recalled version of the story left out or replaced details related to Native American Culture</li> <li>- e.g. Canoe -&gt; Boat.</li> <li>- The British students filled in the gaps in their memory with their own cultural schema.</li> <li>- Average word count of the recalled story dropped from 330 words to 180 words.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- People reconstruct the past by trying to fit it into existing schemas.</li> <li>- More complex the information, the more likely elements are forgotten/distorted.</li> <li>- People try to find a familiar pattern in experiences, past or new.                             <ul style="list-style-type: none"> <li>- People uses existing schemas to fill in the gaps of their memory, subconsciously.</li> </ul> </li> <li>- Memory, according to Bartlett, is an imaginative reconstruction of experience.</li> </ul>
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<b>Loftus &amp; Palmer - Car crash study (Reconstructive memory)</b>	
[A]	To prove the unreliability of memory.

[P]	<ul style="list-style-type: none"> <li>- 45 students were shown videos of car crashes.</li> <li>- They were then asked a series of questions about the specifics of the car crashes.</li> <li>- The critical question was "About how fast was the cars going when they hit each other?"             <ul style="list-style-type: none"> <li>- The verb "hit" was replaced with "Smashed", "Collided", "Bump" and "Contacted" for different participants.</li> </ul> </li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Those who were asked with "Smashed" averaged the mean speed of 40.8 mph</li> <li>- Those who were asked with "Contacted" averaged the mean speed of 31.8 mph</li> </ul>
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Why are experiments used?

Strengths of Experiment

- Can be repeated, results tend to be more reliable
- Isolation of IV and DV give a clear cause and effect relationship
- Can always be generalised to a certain extent
- Data easily measured
- Controlled environment, removes confounding variable

Weaknesses of Experiments

- Lab environment, low in ecological validity
- May break ethical guidelines
- Lower generalising potential
- [Natural experiment] No control over variables, unpredictable
- Possibility of Demand characteristics

**Research method: Technology**

How are technology used?

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<b>Montague - Neuromarketing study (fMRI)</b>	
[A]	Investigate cognition of consumers' preferences.
[P]	<ul style="list-style-type: none"> <li>- Invited 70 participants to a blind taste test of Pepsi and Coca-Cola.</li> <li>- Participants were asked to rate the two after the blind test.</li> <li>- They were then placed into the fMRI machine for scanning their brain activity.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Pepsi was by far the most preferred drink in the blind test.</li> <li>- The Ventral Putamen, part of the brain's pleasure center, lit up more in the fMRI scans when tasting Pepsi.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- Findings do not match with the general public's preference of Coca-Cola over Pepsi.</li> <li>- fMRI scans (neuroplasticity technology) can be used for identifying consumer preferences.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Sample size not big enough to represent the nation.</li> <li>- Ethical considerations: Confidentiality problems.                             <ul style="list-style-type: none"> <li>- Thoughts and preferences should personal and private.</li> </ul> </li> </ul>

Why are technology used?

Strengths of Technology

- Sometime the only way that data can be retrieved
- High ecological validity
- Data can be easily measured (quantitative data)

Weaknesses of Technology

- Interpretation of qualitative data can be ambiguous
- To an extent, pressure in a lab may cause alteration of results
- Expensive
- Restrictions may apply to different types of scans



**Discuss ethical considerations related to research studies at the cognitive level of analysis. (22)**

**Discuss (22) - A considered and balanced review, including a range of arguments, factors or hypothesis. Opinions and conclusions presented clearly supported by appropriate evidence.**

**Ethical guidelines**

- Informed consent
- Right to withdraw
- Deception
- Debriefing
- Confidentiality/Privacy
- Protection of participants (from mental and/or physical harm)

**The need to break guidelines**

- For research purposes, where there are no other feasible methods
- Demand characteristics (mostly with Deception)
  - Cues in an experiment that tells participants what behaviour is expected

<b>LeDoux - Fear in rats experiment (Biological factors in emotion)</b>	
[A]	Investigate the role of the amygdala.
[P]	<ul style="list-style-type: none"> <li>- Rats were conditioned to feel fear when they hear the sound of a bell.</li> <li>- Assumption that the brain has made a connection between the bell and fear.</li> <li>- LeDoux lesioned the rats to find out which part of the brain made the connection between the bell and fear.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- After several lesions, they removed the Auditory Thalamus.</li> <li>- The rats did not show respond to the bell with fear anymore.</li> <li>- In further studies, they found out that lesions on one site of the amygdala was able to stop blood pressure from rising.</li> </ul>
[C]	This shows that there are biological interactions with emotions.
[E]	<ul style="list-style-type: none"> <li>- Unethical study                             <ul style="list-style-type: none"> <li>- Induced fear in subjects, caused mental harm.</li> <li>- Performed lesioning on subjects, cause physical harm.</li> <li>- Subjects did not have rights to withdraw.</li> </ul> </li> </ul>

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<b><u>Schachter &amp; Singer - Injection study (Two Factor Theory of Emotion)</u></b>	
[A]	Show that both cognition and biological factors interact with emotion.
[P]	<ul style="list-style-type: none"> <li>- 184 male college students participated in the experiment. They were taken to a private room.</li> <li>- The experimenter told them the aim of the experiment was to see "the effect of vitamin injection on visual skills".                             <ul style="list-style-type: none"> <li>- Deception: In actual fact the aim of the experiment was to test the Two Factor Theory of Emotion.</li> </ul> </li> <li>- The participants were given either a placebo shot (with no side effects) or an adrenalin shot.</li> <li>- The effects was increased heart rates, blood pressure, blood sugar level and respiration.                             <ul style="list-style-type: none"> <li>- The effects started showing at 3 minutes and lasted for 10 minutes to an hour</li> </ul> </li> <li>- Participants were put into one of the 4 experimental conditions.                             <ul style="list-style-type: none"> <li>- 1. Adrenalin ignorant - participants with adrenalin were not told of the effects.</li> <li>- 2. Adrenalin informed - participants were informed with the side effects so they were prepared.</li> <li>- 3. Adrenalin misinformed - participants were not informed with the true side effects.</li> <li>- 4. Control - placebo injection without being told what side effects to expect.</li> </ul> </li> <li>- Participants were then assigned either                             <ul style="list-style-type: none"> <li>- Euphoria (feeling of happy) condition - Assistant in the waiting room carried out silly actions to entertain participants.</li> <li>- Anger condition - Assistant in the waiting room annoyed the participant.</li> </ul> </li> <li>- Researchers observed through one-way mirror.</li> <li>- Participants filled in a self appraisal form.</li> </ul>

[F]	<ul style="list-style-type: none"> <li>- Euphoria condition             <ul style="list-style-type: none"> <li>- Misinformed participants were feeling happier than all other groups.</li> <li>- Ignorant participants were the second happiest.</li> </ul> </li> <li>- Anger condition             <ul style="list-style-type: none"> <li>- Ignorant participants felt the angriest.</li> <li>- Placebo participants felt the second angriest.</li> </ul> </li> </ul>
[C]	<ul style="list-style-type: none"> <li>- Participants were more influenced by the assistant because they had no explanation for the emotion high.             <ul style="list-style-type: none"> <li>- Leads to a wrong labeling of the physiological responses.</li> </ul> </li> <li>- Supports the Two Factor Theory of Emotion.             <ul style="list-style-type: none"> <li>- Physiological arousal in different emotion is entirely the same.</li> <li>- We label our arousal according to cognition.</li> </ul> </li> <li>- Cannot fully evaluate the feeling of emotional arousal.             <ul style="list-style-type: none"> <li>- Leading to misattribution</li> </ul> </li> <li>- Influenced by surrounding situation.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Observations and self appraisal of emotion was subjective.</li> <li>- Measurements were rudimentary, only pulse was measured.</li> <li>- Low in ecological validity             <ul style="list-style-type: none"> <li>- Lab experiment, unlikely to have a sudden emotional arousal.</li> <li>- Emotion arousal might be caused by external stimuli (i.e. the other way around).</li> </ul> </li> <li>- Unethical: Induced anger and aggression in participants.</li> </ul>

## Cognitive processes

### Evaluate schema theory with reference to research studies. (22)

**Evaluate (22) - An appraisal by weighing up the strengths and limitations.**

#### **Schema theory (Theorist: Frederic Bartlett)**

- Mental representation of knowledge created over time from previous experiences.
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<b><u>Loftus &amp; Palmer - Car crash study (Reconstructive memory)</u></b>
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**Anderson & Pichert - House buyer/Burglar study (Reconstructive memory/Schema)**

[A]	Investigate if schema processing influences both encoding and retrieval.
[P]	<ul style="list-style-type: none"> <li>- Participants listened to a story about a house that was left empty on thursdays. <ul style="list-style-type: none"> <li>- There were 72 points in this story related to either a House-buyer or a Burglar schema.</li> <li>- These include leaky roofs, damp basements and colour TV, rare coin collection etc.</li> </ul> </li> <li>- Half the participants were asked to read the story from a House-buyer point of view.</li> <li>- The other half were asked to read it from a Burglar point of view.</li> <li>- They then performed a distracting task for 12 minutes before recalling the story.</li> <li>- Then there was another 5 minutes of delay before they recalled the story again. <ul style="list-style-type: none"> <li>- This time half of the participants were asked to recall the story in the other character's point of view.</li> <li>- (e.g. Burglar changes to House-buyer, vise versa)</li> </ul> </li> </ul>

[F]	<ul style="list-style-type: none"> <li>- Participants in changed schema group recalled 7% more points than first recall.</li> <li>- Recall points that were directly linked to new schema increased by 10%.             <ul style="list-style-type: none"> <li>- Recall points linked to previous schema dropped.</li> </ul> </li> <li>- Participants that did not change schema groups recalled less than the first trial.</li> <li>- People encode information which was irrelevant to their prevailing schema.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- Schema influenced both encoding and retrieval</li> <li>- The second schema activated in the second retrieval triggered the recall of the other details of the story             <ul style="list-style-type: none"> <li>- Supports the schema theory because it shows how activating different schemas can trigger different parts of memory</li> </ul> </li> <li>- The participants that encoded with schema 1 were still able to recall specific details for schema 2.             <ul style="list-style-type: none"> <li>- This shows that schema not only influence encoding but also retrieval.</li> </ul> </li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Ecological validity: Low, carried out in lab conditions.</li> <li>- The control established a cause and effect relationship on how schema affect different memory process.             <ul style="list-style-type: none"> <li>- Those who changed and didn't change schemas.</li> </ul> </li> </ul>

#### Strengths of Schema Theory

- Lots of study to support the theory
- Insightful understanding to how people categorize information
- Uncovers memory distortion

#### Weaknesses of Schema Theory

- Describes memory as being reconstructive, but does not show the process
- Formation of schemas cannot be tested
- Too vague

**Evaluate two models or theories of one cognitive process (for example, memory, perception, language, decision-making) with reference to research studies. (22)**

**Evaluate (22) - An appraisal by weighing up the strengths and limitations.**

**Schema theory (Theorist: Frederic Bartlett)**

- Mental representation of knowledge created over time from previous experiences.
  - Childhood experiences
  - Repetitive exposure
  - Reinforcement
- Helps us organize information, guides our action and make predictions of the world
- Encoding -> Storage -> Retrieval

<b>Frederic Bartlett - War Of The Ghosts study (Schema)</b>	
[A]	Prove that memory is reconstructive and schemas influence recall. Demonstrate role of culture in schema processing.
[P]	<ul style="list-style-type: none"> <li>- Participants were European Americans and Native Americans.</li> <li>- Bartlett ask participants to read a Native American folk story twice.</li> <li>- Then asked them to recite reproduce the story 15 minutes after reading.</li> <li>- No participants knew the aim and purpose of the task.</li> </ul>
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[C]	<ul style="list-style-type: none"> <li>- People reconstruct the past by trying to fit it into existing schemas.</li> <li>- More complex the information, the more likely elements are forgotten/distorted.</li> <li>- People try to find a familiar pattern in experiences, past or new.                             <ul style="list-style-type: none"> <li>- People uses existing schemas to fill in the gaps of their memory, subconsciously.</li> </ul> </li> <li>- Memory, according to Bartlett, is an imaginative reconstruction of experience.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Methodology not sophisticated.                             <ul style="list-style-type: none"> <li>- No IV, DV or Control.</li> <li>- Making it difficult to measure or compare outcome.</li> </ul> </li> <li>- Emic approach: Result specific to European American and Native American culture.                             <ul style="list-style-type: none"> <li>- Low potential generalising ability .</li> </ul> </li> </ul>

<b>Loftus &amp; Palmer - Car crash study (Reconstructive memory)</b>	
[A]	To prove the unreliability of memory.

[P]	<ul style="list-style-type: none"> <li>- 45 students were shown videos of car crashes</li> <li>- They were then asked a series of questions about the specifics of the car crashes</li> <li>- The critical question was "About how fast was the cars going when they hit each other?"                             <ul style="list-style-type: none"> <li>- The verb "hit" was replaced with "Smashed", "Collided", "Bump" and "Contacted" for different participants.</li> </ul> </li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Those who were asked with "Smashed" averaged the mean speed of 40.8 mph</li> <li>- Those who were asked with "Contacted" averaged the mean speed of 31.8 mph</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- The phrasing of the question brought a change in speed estimated.                             <ul style="list-style-type: none"> <li>- Due to schema activated by the chose verb.</li> <li>- Shows schema can affect memory.</li> </ul> </li> <li>- Shows the unreliability of reconstructive memory</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Confounding variable: Presumed ability to perceive the velocity of moving object.</li> <li>- Demand characteristics: Participants corrected their original answer according to the chosen verb.</li> <li>- Student sample. not enough to generalise to the mass population.</li> <li>- Ecological validity: Low, car crash was not real, therefore less emotion was involved affecting the level of detail retained.                             <ul style="list-style-type: none"> <li>- Unethical and unfeasible to create real car crashes.</li> </ul> </li> <li>- Forced participants to watch graphic car crashes                             <ul style="list-style-type: none"> <li>- Participants are generally desensitised because of the media</li> <li>- No distress due to watching car crashes reported</li> </ul> </li> </ul>

#### Strengths of Schema Theory

- Lots of study to support the theory
- Insightful understanding to how people categorize information
- Uncovers memory distortion

#### Weaknesses of Schema Theory

- Describes memory as being reconstructive, but does not show the process
- Formation of schemas cannot be tested
- Too vague



**Multi-store model (Theorist: Atkinson and Shiffrin)**

- The Multi-store model suggests that there are three memory stores.
- Each memory store responsible for a different type of memory.

	Sensory memory	Short Term Memory (STM)	Long Term Memory (LTM)
Input	Sensory stimulus (e.g. visual, audio etc.)	Conversion from Sensory Store through selective attention (choosing to retain the memory)	Encoded from STM Store through rehearsal (repeatedly giving attention to the memory)
Loss	Decay - Loss due to passage of time	Displacement - loss due to replacement of other memories	Interference - rehearsal gets interfered during retrieval
Process	-	Repetitive rehearsal in order to retain the memory	Memory gets stored away in a conceptually indefinitely large store. Retrieved to STM store when needed.
Duration	3 to 5 seconds	1 to 2 minutes	Indefinite
Capacity	-	Limited, around 7 items	Unlimited

**Study supporting the Multi-store model theory**

<b>Glanzer &amp; Cunitz - Primacy and recency experiment (Multi-store model)</b>	
[A]	Test primacy-recency effect.
[P]	<ul style="list-style-type: none"> <li>- Participants were asked to read a series of 20 words.</li> <li>- They were then asked to recall the 20 words in any order.</li> <li>- In another variation, a distraction task was performed before recall.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Participants remembered the the first and last few words better.</li> <li>- Results reliably fall into a pattern known as the “serial position curve”.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- First few words - because they had more time to rehearse the words, encoding them into their long term memory store.</li> <li>- Last few words - because it is still in the short term memory store.</li> <li>- In the variation, the last few words were not recalled because of loss through decay.</li> <li>- Provides evidence for multi-store model of memory.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Low in ecological validity, lab environment</li> <li>- Ignored participant's understanding of the words</li> <li>- Only one culture tested                             <ul style="list-style-type: none"> <li>- Education in some cultures may train students to remember things.</li> </ul> </li> </ul>

Theory and study **against** the Multi-store model theory

**Levels of processing theory**

- Argues that there are no such things as LTM or STM stores
- Memory is a by-product of the processing of information

Shallow processing

- Structural processing
  - Physical qualities
- Phonemic processing
  - Sound/audible qualities
- Maintenance rehearsal (repetition), leads to short term retention of information.

Deep processing

- Semantic processing
  - Meaning of the information, understanding
  - Relate to other information
- Elaboration rehearsal (analysis of meaning and logic processes), leads to better recall.

<b><u>Craik &amp; Tulving - Levels of Processing study</u></b>	
[A]	Test the theory of Levels of Processing.
[P]	<ul style="list-style-type: none"> <li>- Participants were presented with 60 words and one of three questions to the words.</li> <li>- The questions were designed to activate different levels of processing.                             <ul style="list-style-type: none"> <li>- e.g. Is the word in capital or small letters? (Structural processing).</li> <li>- e.g. What is the meaning of this word? (Semantic processing).</li> </ul> </li> <li>- Participants were then given a pool of 180 words in which the original 60 words were mixed into.</li> <li>- They had to pick out the original 60.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Participants mostly picked out words that were asked with questions that triggered Semantic processing.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- Shows that Semantic processing can lead to better recall.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Confounding variable                             <ul style="list-style-type: none"> <li>- Serial positioning effect: Words that were at the end of the list will still be in the participant's STM.</li> <li>- Understanding of words: Participants might not understand the words therefore taking longer to rehearse the word.</li> </ul> </li> <li>- Ecological validity: Low, lab conditions.</li> </ul>

### Strengths of Multi-store model

- Displays a basic layout of how memory works
- First model to describe memory processes
- Allowed development

### Weaknesses of Multi-store model

- Reductionist approach to explain memory
- Does not explain what and why do certain information attract attention and encodes into the stores
- STM and LTM stores are more sophisticated than the Multi-Store model suggests (Levels of processing)
- Rehearsal is not enough for encoding complex information into LTM

**Explain how biological factors may affect one cognitive process (for example, Alzheimer’s disease, brain damage, sleep deprivation). (8)**

**Explain (8) - Detailed account including reasons or causes.**

Biological factors

**Brain damage**

<b><u>The case study of Clive Wearing (Brain damage)</u></b>	
Description	<ul style="list-style-type: none"> <li>- Suffered damage in Hippocampus due to a contraction of a virus.</li> <li>- His disease left him with extensive brain damage (parts of his temporal lobes).</li> <li>- Suffers from Retrograde and Anterograde amnesia.</li> <li>- MRI scanning show damage to the hippocampus and some of frontal regions.</li> <li>- Episodic memory and some of his semantic memory are lost.</li> <li>- He can still play piano, conduct music and remember his wife.</li> <li>- He still has his implicit memory including his emotional memory for his wife.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Ecological validity: High, study of a real life case.</li> <li>- Low potential ability to generalise because cases are individual.</li> <li>- Ethics: Patient's name was disclosed under consent.</li> </ul>

- Hippocampus - responsible for encoding and transferral of STM into LTM.
  - When damaged
  - Incapable of creating new long lasting memory (Anterograde amnesia)
  - Incapable of retrieving LTM (Retrograde amnesia)
- Only affected 2 of 4 types of LTM
- Explicit memory
  - Episodic (Affected)
  - Semantic (Affected)
- Implicit memory
  - Still has the capability to play piano showing that his procedural memory was not lost. (Procedural memory)
  - Memories of wife. (Emotional memory)

**Alzheimer Disease**

- Abnormal protein fragments kill brain cells
  - Amyloid plaques
  - Neurofibrillary tangles
- Begin at the Hippocampus, destroying brain cells and connections
  - Making it harder for the retrieval and creation of memory (memory store and creation)
- Damages Medial Temporal Lobe where Explicit Memories are heavily involved in.
- Only affected 2 of 4 types of LTM
- Explicit memory
  - Episodic (Affected)
  - Semantic (Affected)
- Implicit memory
  - Procedural (Not affected)
  - Emotional (Not affected)
- Causing difficulty to speak, understand, recall and regulate motor processes (e.g. heart beat, breathing, eventually causing death).

<b>Hodges et al. - Study of memory of Alzheimer patients</b>	
Description	<ul style="list-style-type: none"> <li>- Measured semantic memory in AD patients with tasks such as naming pictures of animals and objects.</li> <li>- Steady decline in semantic memory observed.</li> </ul>

**Discuss how social or cultural factors affect one cognitive process (for example, education, carpentered-world hypothesis, effect of video games on attention). (22)**

**Discuss (22) - A considered and balanced review, including a range of arguments, factors or hypothesis. Opinions and conclusions presented clearly supported by appropriate evidence.**

**Cultural dimensions (Individualism/Collectivism)**

- Individualist - encouraged to express emotions because it is viewed as unique and shows individual and distinctive qualities.
- Collectivist - discourages the expression of emotions, seen as unimportant and is often disregarded of.

The question can ask for either social **OR** cultural factors, since the studies used here show both social and cultural factors interlinking to affect Memory (using the theory of Cultural Dimensions), they can be used either cases.

<b>Rime et al. - Study on the sharing of emotional experiences</b>	
Description	<ul style="list-style-type: none"> <li>- 20% of Koreans (collectivist country) never shared their emotional experiences.</li> <li>- Compared to only 5% in the US (individualist country).</li> <li>- Suppression of emotional experiences can lead to memory impairment.</li> </ul>

<b>Richards &amp; Gross - Emotion in movie study (Cognitive Costs)</b>	
[A]	Investigate whether the regulation of emotion will affect memory.
[P]	<ul style="list-style-type: none"> <li>- 53 subjects were split into 2 groups</li> <li>- One group was told to suppress their emotion while watching a film about an argument between two parents with the presence of a little girl.</li> <li>- The other group was asked to watch the film.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- The group that was suppressing their emotion throughout the film (regulation of emotion) had poor recall.</li> <li>- Did a natural observation and compared the memory of those who regulate and freely express their emotions.</li> <li>- Those who express their emotions have better memory.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- The Cognitive Cost of regulating emotions took up the capacity for memory encoding.</li> <li>- Not enough attention was paid to watching the film.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Ecological validity was low in the initial experiment, because it was in lab conditions.</li> <li>- Offered a controlled environment, results acted as a reference for their next natural observation.</li> <li>- Repeated experiment in natural conditions, increase in ecological validity.                             <ul style="list-style-type: none"> <li>- Uses previous results as reference because it has not confounding variable.</li> </ul> </li> <li>- Methodology not scientific, makes the assumption that regulating emotion took up the capacity of memory encoding.</li> </ul>

<b>Frederic Bartlett - War Of The Ghosts study (Schema)</b>	
[A]	<p>Prove that memory is reconstructive and schemas influence recall. Demonstrate role of culture in schema processing.</p>
[P]	<ul style="list-style-type: none"> <li>- Participants were European Americans and Native Americans.</li> <li>- Bartlett ask participants to read a Native American folk story twice.</li> <li>- Then asked them to recite reproduce the story 15 minutes after reading.</li> <li>- No participants knew the aim and purpose of the task.</li> </ul>
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[E]	<ul style="list-style-type: none"> <li>- Methodology not sophisticated.                             <ul style="list-style-type: none"> <li>- No IV, DV or Control.</li> <li>- Making it difficult to measure or compare outcome.</li> </ul> </li> <li>- Emic approach: Result specific to European American and Native American culture.                             <ul style="list-style-type: none"> <li>- Low potential generalising ability .</li> </ul> </li> </ul>

<b>Tali Sharot - 9/11 Flashbulb Memory (Flashbulb Memory)</b>	
[A]	<p>Investigate upon the existence of Flashbulb Memory.</p>
[P]	<ul style="list-style-type: none"> <li>- 24 witnesses of the 9/11 incident were found from different location of Manhattan as subjects.</li> <li>- Subjects were placed in an fMRI machine.</li> <li>- Subjects were asked to recall the event of 9/11.</li> <li>- Subjects were also asked to recall their summer holiday (for control purpose).</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- People closer to where the event happened (where the World Trade Center was) had a more in-depth recall of the event.</li> <li>- When compared to subject's summer holiday, the level of detail given for 9/11 incident was higher.</li> <li>- Parahippocampal Gyrus (Para-hippo-campal Gy-rus - responsible for LTM retrieval) was relatively inactive when recalling memories from 9/11 when compared to recalling events from summer holiday.</li> <li>- Amygdala (responsible for processing memory of emotional reaction) was relatively more active when recalling memories from 9/11.</li> </ul>

[C]	<ul style="list-style-type: none"> <li>- Different part of the brain was used for different Flashbulb Memory retrieval and general LTM retrieval.</li> <li>- Supports Flashbulb Memory as a different type of memory than LTM.</li> <li>- Collectivist culture - tend to suppress emotion, memory encoded at a shallow level</li> <li>- Individualist culture - encouraged to express emotion, memory encoded at a deeper level (Levels of processing theory - Craik &amp; Lorkhart).</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Observing the concentration of deoxygenated haemoglobin is an accurate measure for brain activity.</li> <li>- Ecologically valid. Questions were asked about real life situations.             <ul style="list-style-type: none"> <li>- May argue that it is still laboratory condition, overtly observing may cause Demand Characteristics.</li> <li>- Pressure under lab conditions may cause alteration of results.</li> </ul> </li> <li>- Possible confirmation bias.             <ul style="list-style-type: none"> <li>- No cause-and-effect relationship can be established through the scan.</li> <li>- Relies heavily upon the interpretation of the researcher.</li> <li>- The Amygdala showing response may well be the subject's expression of depressed emotion while recalling 9/11.</li> </ul> </li> <li>- Ethical considerations: Privacy of the subjects may be invaded because the fMRI indicates a general representation of their thought process.</li> </ul>



**With reference to relevant research studies, to what extent is one cognitive process reliable (for example, reconstructive memory, perception/visual illusions, decision-making/heuristics)? (22)**

**To What Extent (22) - Consider the merits or otherwise of an argument or concept. Opinions and conclusions should be presented clearly and supported with appropriate evidence and sound argument.**

Reliability of Reconstructive Memory

**Schema and Cultural influences in Reconstructive Memory**

- Mental representation of knowledge created over time from previous experiences.
  - Childhood experiences
  - Repetitive exposure
  - Reinforcement
- Helps us organize information, guides our action and make predictions of the world.
- Encoding -> Storage -> Retrieval

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[E]	<ul style="list-style-type: none"> <li>- Methodology not sophisticated.                             <ul style="list-style-type: none"> <li>- No IV, DV or Control.</li> <li>- Making it difficult to measure or compare outcome.</li> </ul> </li> <li>- Emic approach: Result specific to European American and Native American culture.                             <ul style="list-style-type: none"> <li>- Low potential generalising ability .</li> </ul> </li> </ul>

**False memory influences in Reconstructive Memory**

<b>Loftus - Lost in the Mall experiment (False Memory)</b>	
[A]	Attempt to implant false memory.
[P]	<ul style="list-style-type: none"> <li>- Loftus told participants 4 stories of their own childhood that supposedly were all from members for the family.</li> <li>- In the 4 stories, one of which is false.</li> <li>- The false story describes the participants being lost in a mall at a young age for an extended period of time.                             <ul style="list-style-type: none"> <li>- The mall was based upon participant's actual trips to the mall.</li> </ul> </li> </ul>
[F]	<ul style="list-style-type: none"> <li>- 25% of participants remembered that no such event happened.</li> <li>- Many other participants were able to provide details for the false events.</li> </ul>
[C]	- Loftus concluded that the act of imagining the event created false memory.
[E]	<ul style="list-style-type: none"> <li>- Getting lost in a mall is common.</li> <li>- Prove that false memory can be induced.</li> <li>- Confounding variable: Did not take into account that the participant actually had a similar event happened to them.</li> <li>- Low in ecological validity, lab experiment</li> <li>- Cultural factors.                             <ul style="list-style-type: none"> <li>- LTM store is triggered meaning that emotion must be involved.</li> <li>- Different culture might express different level of emotional arousal.</li> <li>- Can affect the strength of the imagined event turning into a false memory.</li> </ul> </li> <li>- Ethical considerations                             <ul style="list-style-type: none"> <li>- Might cause ethical issues regarding therapy retrieving repressed memory.</li> <li>- Unreliable because therapist can induce false memory into clients.</li> </ul> </li> </ul>

**Two factor theory influences in Reconstructive Memory**

- We first watch what we do and feel and then deduce our nature from this
- **1st factor** - Experience physiological arousal, then try to find a label to explain our feelings (looking at what we are doing and what is happening at the time of arousal).
- **2nd factor** - We decide what we make of the feelings we have.

<u>Schachter &amp; Singer - Injection study (Two Factor Theory of Emotion)</u>	
[A]	Show that both cognition and biological factors interact with emotion.
[P]	<ul style="list-style-type: none"> <li>- 184 male college students participated in the experiment. They were taken to a private room.</li> <li>- The experimenter told them the aim of the experiment was to see "the effect of vitamin injection on visual skills".                             <ul style="list-style-type: none"> <li>- Deception: In actual fact the aim of the experiment was to test the Two Factor Theory of Emotion</li> </ul> </li> <li>- The participants were given either a placebo shot (with no side effects) or an adrenalin shot.</li> <li>- The effects was increased heart rates, blood pressure, blood sugar level and respiration.                             <ul style="list-style-type: none"> <li>- The effects started showing at 3 minutes and lasted for 10 minutes to an hour</li> </ul> </li> <li>- Participants were put into one of the 4 experimental conditions.                             <ul style="list-style-type: none"> <li>- 1. Adrenalin ignorant - participants with adrenalin were not told of the effects.</li> <li>- 2. Adrenalin informed - participants were informed with the side effects so they were prepared.</li> <li>- 3. Adrenalin misinformed - participants were not informed with the true side effects.</li> <li>- 4. Control - placebo injection without being told what side effects to expect.</li> </ul> </li> <li>- Participants were then assigned either                             <ul style="list-style-type: none"> <li>- Euphoria (feeling of happy) condition - Assistant in the waiting room carried out silly actions to entertain participants.</li> <li>- Anger condition - Assistant in the waiting room annoyed the participant.</li> </ul> </li> <li>- Researchers observed through one-way mirror.</li> <li>- Participants filled in a self appraisal form.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Euphoria condition                             <ul style="list-style-type: none"> <li>- Misinformed participants were feeling happier than all other groups.</li> <li>- Ignorant participants were the second happiest.</li> </ul> </li> <li>- Anger condition                             <ul style="list-style-type: none"> <li>- Ignorant participants felt the angriest.</li> <li>- Placebo participants felt the second angriest.</li> </ul> </li> </ul>

<p>[C]</p>	<ul style="list-style-type: none"> <li>- Participants were more influenced by the assistant because they had no explanation for the emotion high.             <ul style="list-style-type: none"> <li>- Leads to a wrong labeling of the physiological responses</li> </ul> </li> <li>- Supports the Two Factor Theory of Emotion.             <ul style="list-style-type: none"> <li>- Physiological arousal in different emotion is entirely the same.</li> <li>- We label our arousal according to cognition.</li> </ul> </li> <li>- Cannot fully evaluate the feeling of emotional arousal             <ul style="list-style-type: none"> <li>- Leading to misattribution</li> </ul> </li> <li>- Influenced by surrounding situation</li> </ul>
<p>[E]</p>	<ul style="list-style-type: none"> <li>- Observations and self appraisal of emotion was subjective.</li> <li>- Measurements were rudimentary, only pulse was measured.</li> <li>- Low in ecologically validity             <ul style="list-style-type: none"> <li>- Lab experiment, unlikely to have a sudden emotional arousal.</li> <li>- Emotion arousal might be caused by external stimuli (i.e. the other way around).</li> </ul> </li> <li>- Unethical: Induced anger and aggression in participants.</li> </ul>

**Discuss the use of technology in investigating cognitive processes (for example, MRI (magnetic resonance imaging) scans in memory research, fMRI scans in decision-making research). (22)**

**Discuss (22) - A considered and balanced review, including a range of arguments, factors or hypothesis. Opinions and conclusions presented clearly supported by appropriate evidence.**

**fMRI - Functional Magnetic Resonance Imaging**

- Technology that measures brain activity by detecting associated changes in concentration of oxygen in the blood.
- Deoxygenated haemoglobin is more magnetic than Oxygenated haemoglobin.
- Requires the patient to be still in a small area for a long time.
  - May spark claustrophobia
- People with metal parts on their body cannot use a MRI machine because MRI has a strong magnetic field.
- Different from MRI which only provide a 3D image, fMRI provides a 3D animated model of the brain.

<b>Tali Sharot - 9/11 Flashbulb Memory (Flashbulb Memory)</b>	
[A]	Investigate upon the existence of Flashbulb Memory.
[P]	<ul style="list-style-type: none"> <li>- 24 witnesses of the 9/11 incident were found from different location of Manhattan as subjects.</li> <li>- Subjects were placed in an fMRI machine.</li> <li>- Subjects were asked to recall the event of 9/11.</li> <li>- Subjects were also asked to recall their summer holiday (for control purpose).</li> </ul>
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**PET scan - Positron Emission Tomography scan**

- Requires the injection of radioactive substance.
  - Of which emits gamma ray received by the scanner.
- Monitors glucose and metabolism.
- Produces colour map of the brain activity.

<b><u>Mosconi - Alzheimer longitudinal study</u></b>	
[A]	To find the earliest signs of Alzheimer's disease in the brain.
[P]	<ul style="list-style-type: none"> <li>- Kept track of 53 normal subjects for over 9 to 24 years</li> <li>- Scanned them using a PET scanner (measures metabolic rate)</li> </ul>
[F]	- Those who had reduced metabolic rate in the Hippocampus developed into Alzheimer disease.
[C]	<ul style="list-style-type: none"> <li>- Shows that technology can pick up initial signs of brain deterioration.</li> <li>- Using technology can provide accurate results.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Ethical consideration: Causes physical harm in subjects             <ul style="list-style-type: none"> <li>- Injection of radioactive substance is bad for the body</li> </ul> </li> </ul>

**MRI - Magnetic Resonance Imaging**

- Technology that measures brain activity by detecting associated changes in concentration of oxygen in the blood.
- Deoxygenated haemoglobin is more magnetic than Oxygenated haemoglobin.
- Requires the patient to be still in a small area for a long time.
  - May spark claustrophobia
- People with metal parts on their body cannot use a MRI machine because MRI has a strong magnetic field.

<b>Maguire et al. - Taxi driver study</b>	
[A]	Investigate the function of Hippocampus in spacial memory.
[P]	<ul style="list-style-type: none"> <li>- Participants were 16 mentally and physically healthy right handed male taxi drivers.                             <ul style="list-style-type: none"> <li>- Age range from 32 to 62.</li> </ul> </li> <li>- Controls were 50 mentally and physically healthy right handed male.                             <ul style="list-style-type: none"> <li>- Age range and distribution was similar to the taxi drivers.</li> </ul> </li> <li>- Participants and controls were scanned with the same MRI machine.</li> <li>- The amount and density of the grey matter in the hippocampus (which translates into the processors) was counted.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Taxi drivers have a significantly larger hippocampus.</li> <li>- The volume of the hippocampus correlates with the amount of time as a taxi driver.</li> </ul>
[C]	MRI can be used to detect the active areas of the brain.
[E]	- Observing the concentration of deoxygenated haemoglobin is an accurate measure for brain activity.

**Strengths of Technology**

- Sometime the only way that data can be retrieved
- High ecological validity
- Data can be easily measured (quantitative data)

**Weaknesses of Technology**

- Interpretation of qualitative data can be ambiguous
- To an extent, pressure in a lab may cause alteration of results
- Expensive
- Restrictions may apply to different types of scans

## Cognition and emotion

**To what extent do cognitive and biological factors interact in emotion (for example, two factor theory, arousal theory, Lazarus' theory of appraisal)? (22)**

**To What Extent (22) - Consider the merits or otherwise of an argument or concept. Opinions and conclusions should be presented clearly and supported with appropriate evidence and sound argument.**

### Components in Emotion

1. Physiological changes E.g. arousal of the automatic nervous system and endocrine system that are not conscious.
2. Subjective feelings of a person's emotion (e.g. happiness).
3. Associated behaviour e.g. smiling or running away.

### Biological interaction

#### **Neurobiological contribution to emotion (Theorist: LeDoux)**

- Two routes from sensory stimulus to Amygdala
1. Fast route - Thalamus to Amygdala
    - Less logical thought process
    - Causes an instinctive motor response
    - Heavily influenced by the emotional arousal
  2. Slow route - Thalamus > Cortex > Hippocampus > Amygdala
    - Analyses stimuli to give suitable reaction
    - Logic process took over instinctive emotional responses

<b>LeDoux - Fear in rats experiment (Biological factors in emotion)</b>	
[A]	Investigate the role of the amygdala.
[P]	<ul style="list-style-type: none"> <li>- Rats were conditioned to feel fear when they hear the sound of a bell.</li> <li>- Assumption that the brain has made a connection between the bell and fear.</li> <li>- LeDoux lesioned the rats to find out which part of the brain made the connection between the bell and fear.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- After several lesions, they removed the Auditory Thalamus.</li> <li>- The rats did not show respond to the bell with fear anymore.</li> <li>- In further studies, they found out that lesions on one site of the amygdala was able to stop blood pressure from rising.</li> </ul>
[C]	This shows that there are biological interactions with emotions.
[E]	<ul style="list-style-type: none"> <li>- Unethical study                             <ul style="list-style-type: none"> <li>- Induced fear in subjects, caused mental harm</li> <li>- Performed lesioning on subjects, cause physical harm</li> <li>- Subjects did not have rights to withdraw</li> </ul> </li> </ul>



Cognitive interaction

**Theory of Appraisal (Theorist: Lazarus)**

- A thought must occur before one experiences any emotion or physiological responses.
  - People make an appraisal of the situation.
  - Then they act according to the interpretation/appraisal of situation.
- What they are suppose to feel that best fits the situation.
- **Primary appraisal** - Evaluation of the nature of the threat. e.g. "am I going to die?"
- **Secondary appraisal** - Evaluation of possible ways to cope with the situation. e.g. "how should I feel and react?"
- Positive emotions emerges if appraisal assesses potential benefit
- Negative emotions emerges if appraisal assesses potential harm

<b><u>Spiesman et al. - Audio track interfering with emotion</u></b>	
[A]	Prove the Theory of Appraisal can interfere with emotion.
[P]	<ul style="list-style-type: none"> <li>- Participants were shown a documentary of an unpleasant traditional ritual.</li> <li>- There were three groups of participants.</li> <li>- Group 1: Trauma group                             <ul style="list-style-type: none"> <li>- They were shown the documentary with a soundtrack that emphasized the pain.</li> </ul> </li> <li>- Group 2: Denial group                             <ul style="list-style-type: none"> <li>- They were shown the documentary with a soundtrack which suggested that the ritual was joyful and happy.</li> </ul> </li> <li>- Group 3: Intellectualisation group                             <ul style="list-style-type: none"> <li>- They were shown the documentary with a soundtrack that gave an anthropological interpretation of the ritual.</li> </ul> </li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Participants reacted more emotionally in the Trauma group when compared with the other two.</li> <li>- Because they evaluated the situation (painful soundtrack).</li> <li>- Thought it was appropriate to display negative emotions because situation showed potential harm.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- Shows that through appraising the situation, different emotions can be displayed with the same stimuli.</li> <li>- Hence showing the Theory of Appraisal (cognition) can interfere with emotion.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Ecological validity: Low, lab conditions.</li> <li>- Controlled environment, removes confounding variable.</li> </ul>

Both Cognitive and Biological interaction

**Two Factor Theory of Emotion - Schachter & Singer**

- We first watch what we do and feel and then deduce our nature from this
- **1st factor** - Experience physiological arousal, then try to find a label to explain our feelings (looking at what we are doing and what is happening at the time of arousal).
- **2nd factor** - We decide what we make of the feelings we have.

<u>Schachter &amp; Singer - Injection study (Two Factor Theory of Emotion)</u>	
[A]	Show that both cognition and biological factors interact with emotion.
[P]	<ul style="list-style-type: none"> <li>- 184 male college students participated in the experiment. They were taken to a private room.</li> <li>- The experimenter told them the aim of the experiment was to see "the effect of vitamin injection on visual skills".                             <ul style="list-style-type: none"> <li>- Deception: In actual fact the aim of the experiment was to test the Two Factor Theory of Emotion</li> </ul> </li> <li>- The participants were given either a placebo shot (with no side effects) or an adrenalin shot.</li> <li>- The effects was increased heart rates, blood pressure, blood sugar level and respiration.                             <ul style="list-style-type: none"> <li>- The effects started showing at 3 minutes and lasted for 10 minutes to an hour</li> </ul> </li> <li>- Participants were put into one of the 4 experimental conditions.                             <ul style="list-style-type: none"> <li>- 1. Adrenalin ignorant - participants with adrenalin were not told of the effects.</li> <li>- 2. Adrenalin informed - participants were informed with the side effects so they were prepared.</li> <li>- 3. Adrenalin misinformed - participants were not informed with the true side effects.</li> <li>- 4. Control - placebo injection without being told what side effects to expect.</li> </ul> </li> <li>- Participants were then assigned either                             <ul style="list-style-type: none"> <li>- Euphoria (feeling of happy) condition - Assistant in the waiting room carried out silly actions to entertain participants.</li> <li>- Anger condition - Assistant in the waiting room annoyed the participant.</li> </ul> </li> <li>- Researchers observed through one-way mirror.</li> <li>- Participants filled in a self appraisal form.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- Euphoria condition                             <ul style="list-style-type: none"> <li>- Misinformed participants were feeling happier than all other groups.</li> <li>- Ignorant participants were the second happiest.</li> </ul> </li> <li>- Anger condition                             <ul style="list-style-type: none"> <li>- Ignorant participants felt the angriest.</li> <li>- Placebo participants felt the second angriest.</li> </ul> </li> </ul>

[C]	<ul style="list-style-type: none"> <li>- Participants were more influenced by the assistant because they had no explanation for the emotion high.             <ul style="list-style-type: none"> <li>- Leads to a wrong labeling of the physiological responses</li> </ul> </li> <li>- Supports the Two Factor Theory of Emotion.             <ul style="list-style-type: none"> <li>- Physiological arousal in different emotion is entirely the same.</li> <li>- We label our arousal according to cognition.</li> </ul> </li> <li>- Cannot fully evaluate the feeling of emotional arousal             <ul style="list-style-type: none"> <li>- Leading to misattribution</li> </ul> </li> <li>- Influenced by surrounding situation</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Observations and self appraisal of emotion was subjective.</li> <li>- Measurements were rudimentary, only pulse was measured.</li> <li>- Low in ecologically validity             <ul style="list-style-type: none"> <li>- Lab experiment, unlikely to have a sudden emotional arousal.</li> <li>- Emotion arousal might be caused by external stimuli (i.e. the other way around).</li> </ul> </li> <li>- Unethical: Induced anger and aggression in participants.</li> </ul>

Biological interaction

- Increase in adrenaline lead towards a physiological arousal.
- Increased heart rate, respiration.

Cognitive interaction

- Attributing physiological responses to emotion arousal due to situational stimuli.
- Labeling of physiological responses.

**Evaluate one theory of how emotion may affect one cognitive process (for example, state-dependent memory, flashbulb memory, affective filters). (22)**

**Evaluate (22) - An appraisal by weighing up the strengths and limitations.**

**Theory of Flashbulb memory (Theorist: Brown and Kulik)**

- Special kind of emotional memory associated with highly emotional and detailed recall of the event.
- Encoded into the brain like a photo, hence Flashbulb.
- *Neisser* suggests that flashbulb memory is just memory that is rehearsed over and over again in to LTM.
  - Thinking about the event, reconsidering the event, telling the event.
- Special neural mechanism triggering an emotional arousal because the event was unexpected/ extremely important.
- Emotional events are better remembered - the Amygdala.
- Link to Episodic memory and Emotional memory.

Essential components of Flashbulb Memory

- Emotional impact
- Relevance to oneself
- Consequence in one's life

<b><u>Tali Sharot - 9/11 Flashbulb Memory (Flashbulb Memory)</u></b>	
[A]	Investigate upon the existence of Flashbulb Memory.
[P]	<ul style="list-style-type: none"> <li>- 24 witnesses of the 9/11 incident were found from different location of Manhattan as subjects.</li> <li>- Subjects were placed in an fMRI machine.</li> <li>- Subjects were asked to recall the event of 9/11.</li> <li>- Subjects were also asked to recall their summer holiday (for control purpose).</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- People closer to where the event happened (where the World Trade Center was) had a more in-depth recall of the event.</li> <li>- When compared to subject's summer holiday, the level of detail given for 9/11 incident was higher.</li> <li>- Parahippocampal Gyrus (Para-hippo-campal Gy-rus - responsible for LTM retrieval) was relatively inactive when recalling memories from 9/11 when compared to recalling events from summer holiday.</li> <li>- Amygdala (responsible for processing memory of emotional reaction) was relatively more active when recalling memories from 9/11.</li> </ul>

[C]	<ul style="list-style-type: none"> <li>- Different part of the brain was used for different Flashbulb Memory retrieval and general LTM retrieval.</li> <li>- Supports Flashbulb Memory as a different type of memory than LTM.</li> <li>- Collectivist culture - tend to suppress emotion, memory encoded at a shallow level</li> <li>- Individualist culture - encouraged to express emotion, memory encoded at a deeper level (Levels of processing theory - Craik &amp; Lorkhart).</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Observing the concentration of deoxygenated haemoglobin is an accurate measure for brain activity.</li> <li>- Ecologically valid. Questions were asked about real life situations. <ul style="list-style-type: none"> <li>- May argue that it is still laboratory condition, overtly observing may cause Demand Characteristics.</li> <li>- Pressure under lab conditions may cause alteration of results.</li> </ul> </li> <li>- Possible confirmation bias. <ul style="list-style-type: none"> <li>- No cause-and-effect relationship can be established through the scan.</li> <li>- Relies heavily upon the interpretation of the researcher.</li> <li>- The Amygdala showing response may well be the subject's expression of depressed emotion while recalling 9/11.</li> </ul> </li> <li>- Ethical considerations: Privacy of the subjects may be invaded because the fMRI indicates a general representation of their thought process.</li> </ul>

<b>Harsch &amp; Neisser - Challenger study (Flashbulb Memory)</b>	
[A]	Evaluate the theory and the existence of Flashbulb Memory.
[P]	<ul style="list-style-type: none"> <li>- Study was done based upon the "Challenger" Space Shuttle incident.</li> <li>- 24 hours after the incident, subjects were asked about what they remembered.</li> <li>- Similar questions on their memory of the event was asked after 3 years.</li> <li>- They were also asked to rate their confidence with their accuracy of recall.</li> </ul>
[F]	<ul style="list-style-type: none"> <li>- 3 of 44 students had perfect recall.</li> <li>- 25% had completely inaccurate memory.</li> <li>- 40% of the subjects had distorted memory. <ul style="list-style-type: none"> <li>- Possibly influenced by post-event information.</li> </ul> </li> <li>- Subjects were confident with the accuracy of their recall.</li> </ul>
[C]	<ul style="list-style-type: none"> <li>- Challenges the existence of Flashbulb Memory.</li> <li>- Could just be reconstructive memory.</li> </ul>
[E]	<ul style="list-style-type: none"> <li>- Assumed that Flashbulb Memory was created.</li> <li>- Only relied upon questionnaires to determine whether the memory was Flashbulb.</li> <li>- Only students were used, reduced its potential in generalisation.</li> </ul>

<b>Scholck et al. - OJ Simpson study (Flashbulb Memory)</b>	
[A]	Investigate how memory distort over time.
[P]	<ul style="list-style-type: none"> <li>- College students were asked how and where they were when they heard the verdict of the case of OJ Simpson.</li> <li>- They were then asked to recall after:                             <ul style="list-style-type: none"> <li>- 3 days</li> <li>- 15 months</li> <li>- 32 months</li> </ul> </li> </ul>
[F]	<ul style="list-style-type: none"> <li>- 15 months - Answers were fairly close to those after 3 days.                             <ul style="list-style-type: none"> <li>- 11% contained major inaccuracy.</li> </ul> </li> <li>- 32 months - Lots of details forgotten.                             <ul style="list-style-type: none"> <li>- 29% recalled accurately.</li> <li>- 40% had distortion in recall.</li> </ul> </li> </ul>
[C]	- Challenges the existence of flashbulb memory.
[E]	<ul style="list-style-type: none"> <li>- Assumed that Flashbulb Memory was created.</li> <li>- Only relied upon questionnaires to determine whether the memory was Flashbulb.</li> <li>- Only students were used, reduced its potential in generalisation.</li> </ul>

#### Strengths of Flashbulb Memory

- Study to prove that a different area of the brain is active when recalling Flashbulb Memory.
- Explains why memory with higher level of emotional connection is remembered better.
- Studies that disproves FBM failed to show immediacy between the event and the subject.
  - May not have triggered FBM.

#### Weaknesses of Flashbulb Memory

- Plenty study that disproves the existence of Flashbulb memory.
- Better recall may be due to multiple rehearsals.