**Cognitive level of analysis**

**Learning outcomes**

**General learning outcomes**

**Outline principles that define the cognitive level of analysis *(for example, mental representations guide behaviour, mental processes can be scientifically investigated)*.**

"Mental representations (pictures, ideas) guide behavior": your behavior is affected by ideas in your head

"Mental processes (memorizing, reasoning, and thinking) can be scientifically investigated": Technology can explore our mental processes

 **Explain how principles that define the cognitive level of analysis may be demonstrated in research (that is, theories and/or studies).**

The "schema theory" explains how people group things together, so that it would be easier for them to recall things, as the groups that the brain sorted things out into. An example is such as what people remember about an office, a schema of an office would be shelves, chairs, computers, files, which are things most people would recall if they were asked to mention about things in an office. This theory would help support the principle that mental representations help guides behavior, because due to schemas that the person remember what they do would be affected by it.

the "multi-store model of memory" done by Atkinson, and Shiffrin: the model shows an easy way of how our memory works (sensory memory, short term memory, and long term memory). The model shows how things are processed, stored in our brain, and how do we recall our memory.   The "working memory model" done by Baddeley, and Hitch (1974): is a improve model that is modified from the "multi-store model", it gives deeper detail of storage and processing of memory, it is able to explain deficits or how much short term memory was affected and lost by a brain damage patient. These two models demonstrates that mental processes can be scientifically investigated.

the case studies of "CW, and HM" also help provides information about the short term memory, and the long term memory. The two cases are similar but not the same, both of them have brain damage, but in different ways so they have different results of memory. The two cases show the difference and distinction between the short term memory, and the long term memory. In HM case he could not recall on his long term memory so he mostly forgets everything in the past, but he is able to learn things, because he stills have his short term memory, so his world is everything that he is doing in his short term memory. On the other hand in Clive’s case he was not affected in the long term memory but instead in the short term. He is able to remember everything that had happen to him, until he had his brain damage. On the other hand he could not learn anything else, because he has problem with his short term memory, so what he could do is only up to when he had the damage happen. The two case studies help support the principle that mental process could be scientifically investigated, because psychologist, and researchers in the case used many scientific equipment to help them with the research on this two case studies.

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

**Experiments**: A method to investigate cause and effect, i.e. what causes certain behaviours (examples of experiments are Bartlett, and Anderson and Pitchert)
Strengths: Controlled environment offers high replicability and low chances for any errors
Weaknesses: Has low ecological validity since tests are done in controlled laboratory environment, not very reliable unless a large it is done on a large sample group (which, in turn, can be very costly and time consuming)

**Case studies:** A detailed study of a single case or group (and example of a case would be the study done on H.M. and Kim Peek)
Strenghts: Provides in insight into unusual phenomenon that occurs very rarely or unethical to replicate (e.g. Clive Wearing or Genie), findings that contradict traditional beliefs can open windows for new ideas and theories, thus, stimulating new researches
Weaknesses: Extremely difficult to replicate (e.g. Kim Peek's study), prone to researcher bias; low in credibility and trustworthiness, however, triangulation can reduce this factor

**Interviews**: 3 types: semi structured, narrative, and focus group
Semi structured: Interview with pre-set list of topics but in which “natural” conversation is attempted
Strenghts: more flexibility, allows more interaction, allows exploration and identification of themes, allows gathering of idiographic data
Weaknesses: places limits on what is asked, time consuming, lacks reliability, difficult to generalize, researcher and subject bias

Narrative: Similar to conversational and unstructured interviews.
Strenghts: high ecological validity/transferability, flexible, ethical (participant feels relaxed), highly individualized and relevant to the individual subject
Weaknesses: lacks reliability and replicability, time consuming, not systematic or comprehensive

Focus group: a form of qualitative research in which a group of people are asked about their attitude towards a product, concept, advertisement, idea, or packaging
Strenghts: efficient, ideas are generated through group which increases depth, inexpensive and flexible, more free and complex answers are provided
Weaknesses: problems with confidentiality,  participants may not be willing to participate actively (some may contribute more than others)

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

Since psychological studies mostly have to deal with people and their way of thinking, certain code of ethic has to be followed in an experiment in order to assure safety of the participants, their state of mind, and personal information.  Common ethical considerations in psychological studies are informed consent, protection from harm, right to withdraw, confidentiality and privacy of the participants, and debriefing after the experiment.  However in some cases this code also has to be violated in order gain accurate data from a study, since a certain degree of deception has to be used to prevent the knowledge of the study from affecting the behavior of the participant as an extraneous variable.  Because the participants are likely to change their behavior in order to fit better with the experiment, causing the experiment to have low ecological validity.  In this sense, the psychologists have to balance out between the accuracy of data that they want receive and their experimental ethic for the result to be acceptable in civilized world.

Loftus Lost in the mall experiment

Summary:

Loftus and Pickrell (1995)

-       24 participants who were presented with four stories from when they were between 4 and 6 years old

* three true stories, and one false.

-       true stories were gathered from speaking to participants' relatives

* stories that were chosen are not traumatic one that would be easy to recall

-       family also provide different circumstances that could possibly have happened, but didn't.  in this case, about being lost in the mall

* provided details of a specific shopping mall and confirmed that it did not happended

-       Participants themselves were told they were involved in a study about their ability to recall **details of childhood memories**. Each participant was first sent a written description of the four events their relatives had outlined - three being real and one fake. They were then asked to write down which events they remembered and more details of the events those events.

-       Then, soon after, participants were interviewed. They were reminded about the four memories and asked to recall as much as they could about them. At a second interview a week later, a similar procedure was followed. At the end of both interviews participants rated the clarity of their memories.

-       It was then revealed to them that one of the memories was false and they were asked to guess which one it was. Of the 24 participants, 5 falsely recalled the made up 'lost in the mall' event as a real memory, although participants understandably found the implanted memory much less clear.

<http://www.spring.org.uk/2008/02/implanting-false-memories-lost-in-mall.php>

Details:

·            University of Washington students recruited different pair of individuals, this includes parent and child pairs, sibling pairs, and the youngest of the pair was 18 years of age.

·            “relatives” have to know about another person childhood experiences

·            subjects were mailed a five page booklet containing instructions and four short stories about their childhood experience

o   4 short stories; 3 were true and 1 was false about getting lost

o   the false stories are always presented in the 3rd position

·            experimenters interviewed relative of each subject and talked about “real” events that occurred between age 4 to 5

o   these events are not traumatic events that subjects would remember easily

·            along with that the relative also provide information about a trip to the mall that subject could have gotten lost this include:

1.     where the family would have shopped when the subject was about 5 years old

2.     which members of the family usually went along on shopping trips

3.     what kinds of stores might have attracted the subject’s interest

4.     verification that the subject had not been lost in the mall at age of 5

o   from the information provided, false events was created

1.     lost for an extended period

2.     crying

3.     lost in a mall or large department about the age of 5

4.     found and aided by an elderly woman

5.     reunited with the family

o   subjects were told they were participating in a study on childhood memories, how people remember one things and others don’t

o   they were asked to complete the booklet sent by writing on each events things they remember from it, if they do not remember the event they were told to write “I do not remember this”

o   after completing the booklet, they were schedule for two interviews

o   FIRST INTERVIEW

o   they were told to tell the experimenter about everything that happened in each event

o   they rated the clarity of their memory using the scale of 1-10 (1 being not clear and 10 being extremely clear)

o   they also rated their confidence on a scale of 1 to 5 that if given more time to think about the event they would remember more detail (1=not confident and 5=extremely confident)

o   SECOND INTERVIEW

o   2 weeks after the first one

o   subjects were asked to remember the four events  and rated their clarity and findings

o   at the end, the were debriefed

Results:

-       68% of the true events were remembered

<http://users.ecs.soton.ac.uk/harnad/Papers/Py104/loftusmem1.pdf>

Ethical considerations

-       no **consent forms** were given which means that participants were **deceived**

-       include implanting false memories into victims

-       **debriefed** in the end

**Cognitive processes**

**Evaluate schema theory with reference to research studies**

A schema is a cognitive framework or concept that helps organize and interpret information, often through the act of stereotyping and generalizing.

Research Studies investigating the schema theory:

Anderson and Pichert (1977): Their study experimented with the technique of manipulating people's schemata by assigning them different perspectives. In the experiment, participants read a passage and were told to pretend to be either homebuyers or burglars.Researchers found that people learned more of the information important to their assigned perspectives (e.g. 'burglars' were more likely to learn that three bikes were parked in the garage). Anderson and Pichert were able to show that a person's perspective had independent effect on their abilities to learn and recall.

Martin and Halvorson (1983): Their study aimed to show how information can be distorted, as a result of preexisting gender schemas. In the experiment, children under 8 were shown pictures of males or females engaged in activities that were either consistent or inconsistent with gender roles, and then were asked to recall them. The children showed distorted memories of role-inconsistent pictures (e.g. a girl sawing wood was remembered as a boy sawing wood). This experiment has explained why younger children often seem to adhere to stereotypes more rigidly than older children.

Evaluation: The Schema Theory is widely recognized, as it is applicable to every individual. As there have been numerous studies based on it, it has achieved a considerable level of credibility and reliability. It was the theory that triggered expansive research and experiments on cognitive psychology. It's disadvantages include the fact that it has not been biologically proven (as a result, psychologists do not know how people acquire schemas in the first place).

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

Theory - Atkinson-Shiffrin’s multi store model Theory

The model views memory as consisting of a series of diverse stages, each with its own unique characteristics. The stages include; Sensory memory, Short term memory, and Long term memory.

Study: The Sperling Study

Sample: Many subjects (Around the same age)

Aim: To prove the existence of iconic memory (Iconic memory is a type of short term visual memory, which involves the ability to store and retrieve previously experienced visual sensations and observations.)

Procedure: Sperling asked subjects in the experiment to look at a blank screen. Then he flashed an array of 12 letters on the screen for one-twentieth of a second, arranged in a pattern. Subjects were then asked to recall as many letters from the image as they could.

Findings: Most could only recall four or five letters accurately. Subjects knew they had seen more letters, but they were unable to name them. Sperling hypothesized that all the letters were registered briefly in sensory iconic memory as an image, but the image faded too quickly because iconic memory is a type of short term visual memory storing information for only up to five seconds*. To test this idea, he conducted another experiment in which he sounded a tone immediately after flashing the image on the screen. A high tone directed subjects to report the letters in the top row, a medium tone directed subjects to report the middle row, and a low tone directed subjects to report letters in the bottom row. Sperling found that subjects could accurately recall the letters in each row most of the time, no matter which row the tone specified.* Methodological Strength: It can explain and prove that human beings store a perfect image of the visual world for a brief moment; before it is discarded from memory.

The strength is that he improved the miller study by focusing more on the existence on iconic memory rather than sensory memory which is very broad.

Methodological Weakness: The first experiment conducted had minor (no sound tone) errors which unable subjects to recall the letters that had seen.

Schema theory

Schema theory was first used by Jean Piaget in 1926 describing about how people have a memory that represent information about the world in the long term memory. This information is concepts that an individual relates a particular object, place, time, or person with another information. Schema helps us to organize knowledge, predict situation, simplify reality, and guides our behaviors.

Schema theory studies:

Bartlett’s experiment on reconstructed memory

The experiment was conducted by testifying how the culture impacts a person’s schema. In the experiment, each participant, from a western culture, read the story “the war of the ghost” and was ask to recall the story one week later. The finding of the experiment shows that participants tend to alter the story to sound more familiar with their own culture. The impact of their schema changes the story “the war of the ghost” from the original Native American story into a northern American style of story. This indicates that schema plays an important role in processing information of people.

The strengths and weaknesses:

        The strength of this experiment was that the experiment effectively indicates how schema plays an important role in human memory and how different people’s schema effect the person’s memory. This shows how the experiment contains validity since it support the schema theory was how it plays a role in a person’s memory processing.

Weakness

        The weakness of this experiment was the lack of its ecological validity. The experiment result can only apply to the western culture since the target group of this experiment was only westerner. The result can not suggest how people, from other culture, schema effects their memory

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

**Define Amnesia and Dementia**

Amnesia:

1.     Partial or total loss of memory

2.     Occurs through ***brain damage***

Dementia:

1.     A gradual decline in cognitive function due to damage or disease in the body beyond what might be expected from normal aging.

2.     Occurs through ***Alzheimer’s disease***

**Outline Brain Damage Biological Factors and How They Affect Amnesia and Dementia**

**Brain damage concepts:**

a)    Localization of function in the brain

i)             The idea that different parts in the brain carry out different functions

b)    Hippocampus

i)             Is found in the limbic system of the brain.

ii)            Is important for long term memory, short term memory and orientation

c)    Anterograde amnesia

i)             Inability to form new memories

d)    Retrograde amnesia

i)             Inability to remember past events

**How amnesia occurs through brain damage:**

1.     The removal of important parts of the brain such as the hippocampus; the hippocampus is important for fulfilling the role of long term memory, short term memory and orientation

a)    An example is **H.M.’s Case**

2.     Contacting a serious virus that can attack the brain; for example “*Herpes simplex encephalitis*” which attacks the brain and destroys the ability to store new memories

a)    An example is **Clive Wearing’s Case**

         Both of these cases result in partial or total loss of memory and therefore results in *amnesia*

**Outline Alzheimer’s Disease Biological Factors and How They Affect Amnesia and Dementia**

**Alzheimer’s disease concepts:**

* The brain of someone suffering from Alzheimer’s is much smaller than a normal brain
* The cerebral cortex shrinks dramatically from the cerebral cortex of a normal brain
* The amount of brain substance in the folds (Gyrus) of the brain also decreases substantially
* The spaces in the folds of the brain (Sulcus) are significantly enlarged
* There are also other changes but overall, people with Alzheimer’s disease have an overall shrinkage of their brain tissue (This shrinkage is gradual however)
* This shrinkage is a result from the disease attacking the brain and it causes gradual damage to the cognitive processes and memory

**How dementia occurs through Alzheimer’s disease:**

         Alzheimer’s disease generally leads to impairment in cognitive and memory function, personality changes, erratic behavior, communication problems and in extreme cases, dependence and loss of control over bodily functions

         There are many stages of the Alzheimer’s disease

         The first stage can last from 2-4 years:

o    In this early stage, sufferers become less energetic and spontaneous

o    They avoid doing something new and unfamiliar

o    They may have difficulty learning, organizing, planning and making judgments

o    May have difficulty perform routine tasks and have linguistic difficulties

o    They can also have unexplained mood swing

o    They become confused more easily and suffer from minor memory loss

o    Nevertheless, these minor disabilities may still be unspotted

         The second stage can last from 2-10 years

o    It is generally the longest stage and by this stage, sufferers are becoming clearly disabled

o    Need assistance with complicated tasks

o    Forget recent events and personal history, confuse past and present, quite a serious memory loss

o    Become disoriented and disconnected from reality, often wander and hallucinate

o    Linguistic problems are more severe and individuals may even invent words

o    May have trouble recognizing familiar people

o    Sleeping difficulties

o    Depression due to realization of worsening condition

o    May no longer be safe alone

         The third and final stage may last from 1-3 years

o    In this stage, the problem becomes severe as the patient reaches his/her final days

o    May become completely dependent and intensive care may be needed

o    May completely lose ability to eat, speak, recognize people and control bodily functions (Bladder control, walking, etc.)

o    Their memory becomes so bad it might even be non-existent

o    Sleep very often

o    May also become vulnerable to other diseases

         As you can see, the cognitive and memory function impairment of the Alzheimer’s sufferers are much more severe and rapid than what would be expected of normal aging, therefore resulting in *dementia*

**Outline How Sleep Deprivation Can Affect Cognitive Processes**

**Sleep**

         Sleep deprivation has been shown to impair many cognitive processes, especially memory

         Sleep deprived people have much more difficulty remembering things, recognizing things and recalling things

         The brain of the sleep-deprived is also not as active as those who are well-rested

         Sleep deprivation also accelerates aging

         During sleep, neuronal connections are being made and remodeled

         Sleep deprivation produces striking changes in glucose tolerance and endocrine function that mimicked many of the signs of aging

         Dr Eve Van Cauter, professor of medicine at the University of Chicago said, "We suspect that chronic sleep loss may not only hasten the onset but could also increase the severity of age-related ailments such as diabetes, hypertension, obesity and memory loss."

         Sleep is also important in consolidating memory

**Supporting Research Studies**

**H.M. Case**

Several studies at the Massachusetts Institute of Technology (MIT) ever since 1966 has confirmed the fact that H.M. is not capable of storing any long-term memory and effectively lives in the past. For instance, H.M. has no idea of his own age or date. He tends to believe that he is 33 years old and the year is around 1930. He is often shocked when he sees his own reflection in the mirror. He also cannot recognize faces and keeps on doing things saying the same things over and over again, not aware that he is repeating himself.

**Clive Wearing Case**

Several studies have been conducted on Clive Wearing, which shows that he has both anterograde amnesia and retrograde amnesia. Wearing remembers very little of his life before 1985, which was when he contacted the disease. Also, due to the fact that he cannot store anything into his long-term memory store, his memory only lasts for 30 seconds (This is how long his short-term memory store can hold information for).

**Alzheimer’s Disease**

In 2000, an American study involved MRI scans on 119 participants who had varying degrees of cognitive impairment. Some were normal, some had cognitive impairment at the time of the scanning while others were already diagnosed with the Alzheimer’s disease. The researchers were 100% accurate in identifying which patients had the disease and which did not and were 93% accuracy rate when distinguishing patients with no symptoms and those with only mild symptoms. This shows how different a brain suffering from diseases such as the Alzheimer’s disease is from a normal brain and how harmful these diseases are.

**Sleep Deprivation**

Many studies have been performed on sleep-deprivation to investigate whether if sleep-deprivation has an effect on the functioning of the brain in general and specifically, its effect on memory. Most of these studies have shown that memory is vastly affected by sleep deprivation in many ways. A study has shown that although sleep-deprived people did not have a problem with face recognition, they did have difficulty remembering the context of the faces. Caffeine did help reduce the feelings of sleepiness and improved memory of the sleep-deprived people but their recalling ability is still much lower than that of the non-sleep-deprived people. Sleep deprivation was also found to increase the subjects’ belief that something is right even if it is actually wrong.

In another set of experiments, the brains of the sleep-deprived and non-sleep-deprived were scanned while they performed complicated tasks. In the first experiment which involved an arithmetic task using the working memory, sleep-deprived participants performed worse and an fMRI scan showed lower activity in the prefrontal cortex compared to those who were well-rested. In the second experiment involving a verbal activity, the sleep-deprived performed worst again but only by a slight margin and the prefrontal areas of the brain remained active while the activity in the left temporal lobe actually increased. In the third experiment which involved an integrated arithmetic and verbal task, the sleep-deprived performed worse yet again with the brain scans showing similar results where there was lower activity in the left temporal region but higher activities in the prefrontal and parietal regions. There was also an increased activity in the areas of the brain that are involved in error monitoring and sustained attention.

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

Cognitive process:

Memory: Schema theory

Social factor:

Poverty: negative effect on memory due to chronic stress, poor nutrition and education

Study:

Evans & Schamberg (2009):

Conducted a long term study of cognitive development in 195 American lower middle class students. Participants measured their levels of stress, such as the amount of stress hormones in the blood and their blood pressure between ages of 9-13. Later, at the age of 17, the researchers measured the participant’s working memory. They were asked to remember a sequence of items. The teenagers who had grown up in poverty averaged about 8.5 items compared to middle class students who averaged about 9.44 items. The birth weight of the participants was controlled along with the maternal education and parenting styles.

Social factor:

Education: Formal education can delay memory decline, schooling teaches memory techniques

Study:

Hall: studied the relationship between formal education and progress of dementia of 117 American subjects by the use of a memory test. The results showed that participants with higher formal education had delayed memory decline than participants with a lower formal education.

Cole and Scribner (1974):

Tested the memory ability of liberian school schildren. The children were expected to remember items on word lists that were organized into different categories. The test was reiterated with the children several times. The children were asked to recall the items freely. If the children used the categories to aid their recall they were expected to recall more words. Children with formal schooling in America and Liberia used this mnemonic which improved their memory of the items. Children without formal schooling however, did not use the categories to aid their recall and subsequently did not remember as much as children who had attended school.

Cultural factor:

Schemas: schemas originating in one particular culture can affect memory.

Study:

Bartlett (1932): asked English participants to read The War of the Ghosts, a Native American folk tale and then later recall the story. Participants relied on schematic knowledge, acquired within their culture, to understand the story which then caused them to alter it from the perspective of a different culture.

Cultural factor: Individualism and collectivism:

Study: Wand and Aydin (2009): suggests that individualism and collectivism may affect the determinants of flashbulb memory. In individualistic cultures, people are viewed as unique with distinctive qualities. In such societies, an individual’s emotions are part of his or her uniqueness. Expressing emotions and sharing them with others is acceptable and encouraging.

In collectivist cultures, identity is defined more by the characteristics of the collective groups to which one belongs. In some collectivist societies, expressing emotion especially negative emotions is usually viewed as dangerous and is not encouraged. Furthermore, collectivist societies do not encourage individuals to focus on their internal states or reflect on their emotional states.

Evaluation:

Evans and Schamberg did not demonstrate a direct relationhsip between stress and memory. However, the relationship has been demonstrated in animal research. Their study has not been replicated.

It is unknown why formal education delays memory decline

Cultures without formal education may use other memory techniques. For instance, some cultures emphasize story telling.

Generalizability: the studies were only conducted in Liberia and United states

Studies are well controlled

Conclusion:

More research is needed, but there is an indication that memory processes can be altered by poverty and education.

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

Evaluate research studies on the reliability of memory

**Kohlers Study of Repressed Memory**

**Aim:** people constantly repress memories, repressed memories are valid

**Subjects:** German; 21 – 51 range of age

**Experiment:** shown a list of 50 words, and asked for the first thing associated with each word. As subjects responded to words, galvanic skin response / GSRs (measure of stress) was recorded. Subjects were tested for their recall of associations immediately and 1 week later.

**Result:** Word associations that produced anxiety in subjects who had strong GSR reactions, tend to forgotten than ones that did not.

**Concludes:** Subjects unconsciously repress word associations that triggers strong GSR, or one that gives more stress - stress or anxiety is source of repression à proves that people unconsciously represses memories that trigger anxiety.

**Loftus and Pickrell of reconstructive memory**

**Lost In the Mall (1995)**

**Aim:** to test whether people constantly have reconstructive memory or not

**Subjects:** general participants

**Experiment:** Participants were presented with three childhood stories from when they were 4-6 years old. The other story was made up, and was about getting lost in the local mall.

**Results:** 5 out of 24 participants claimed to “remember” this made up story

**Concludes:** Participants tend to remember the made up story and this shows the possibility of implanting false memories

**The Bugs Bunny experiment (2002)**

**Aim:** to test whether people constantly have reconstructive memory or not

**Subjects:** 120 participants were involved at various age ranges

**Experiment:** 120 participants were told they were part of an advertising experiment

Group one: read an ad with no mention of cartoon characters

Group two: read the same as placed alongside a Bugs Bunny cutout

Group three: read an ad about Bugs Bunny

Group four: read an ad about Bugs Bunny, alongside a Bugs Bunny cutout

Participants were asked if they met Bugs Bunny and shook his hand

**Results:** One third of participants claimed they had met Bugs Bunny, and shaken his hand

**Concludes:** Participants claimed they had met Bugs Bunny and shaken his hand showed that people tend to imaging memories by themselves and those memories are constructive memories.

  **Bartlett Reconstructive Memory
Aim:** To investigate the effects of unfamiliarity when recalling a folk story
**Subjects:** English Participants
**Experiment:** Participants heard an unfamiliar North American folk tale titled “The war of the Ghosts.” The story uses words and ideas that would not be found in a conventional Western story. 20 hours later participants were asked to recall the story as much as possible, and after that they were asked to repeat and retell the story again many more times.

**Findings:** The story that was retold by participants was all distorted. The more they were asked to retell the story, the more the story started to resemble a Western one. The recalling of the story was distorted because participants retold the story using language and literary techniques that was influenced from their own culture and literary background. The differences that were found included: rationalisations,

omissions, changes in the order, alterations in the importance and distortions of emotions.

**Concludes:** Memory for the folk tale becomes more distorted over time and became less like the original story. By reconstructing the story according to one’s own schema it is remembered easier, but the story itself would be distorted.

**Brown and Kulik Flashbulb Memory (1977)**

**Aim:** To show that events can be remembered in almost photographic detail and that it may become imprinted on the mind
**Subjects:** 80 participants
**Experiment:** Participants were given a series of nine events, such as the assassination of John F. Kennedy. They were asked to recall the circumstances in which they first heard about the event that happened. Participants that claimed to remember the circumstance was asked to recall the episode, rate it on a scale of consequentiality, and indicate their estimate number of times that had rehearsed the event, the type of rehearsal was left unspecified.
**Results:** 99% of the participants recalled the circumstances in which they heard about the assassination of John F. Kennedy
56% of the participants recalled the circumstances in which they heard about the assassination of Robert F. Kennedy
**Concludes:** Participants were able to recall the circumstances of hearing of events that had occurred 8 to 13 years prior.

The studies above are reliable because

Replicability – experiment is simple, easy to be replicated

No Confounding variables

Experiments involved more that one participant

Helps understand the cause of repressed/ reconstructive memory

Support validity of theory

The studies is based on the observation and inferences of psychologist

Science relies on established study and evidence

**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).***
*Define PET, MRI & fMRI****MRI:*** *A non-invasive technique, detailed three dimensional still pictures of the brain by using magnetism, radio waves, and a computer.****fMRI:*** *A non-invasive technique, measures the magnetic action of blood oxygen and thus creates moving coloured images of metabolism in different parts of the brain. Can maeasure brain activity while ur on a task.. it is faster than others.****PET:*** *Detects the metabolism level of injected substances (e.g. glucose) made mildly radioactive with the aid of an X ray scan. Shows which parts of the brain that are most active (that are using up energy) over a period of time. (colored pictures with movements)
Evaluate the technology*

***ADVANTAGES***

*-         fMRI uses non-invasive methods to observe the brain.*

*-         fMRI does not use x-ray nor radioactive materials.*

*-         fMRI provides very detailed images of the brain in different dimensions.*

*-         No preparations are needed before using the fMRI.*

*-         PET scans provide real time images of the brain in action.*

***DISADVANTAGES***

*-         Both the fMRI and PET scans are very expensive to use and maintain.*

*-         fMRI uses magnetic fields to detect metabolism in the brain, which means patients with anything metallic in their body such as pacemakers or metallic tattoos are not able to use it.*

*-         fMRI is not suitable for claustrophobic patients.*

*-         fMRI is not suitable for patients who are uncooperative because the fMRI requires the patient to lie straight down, thus patients who move around too much are not able to use it.*

*-         PET scans require the usage of radioactive materials which is harmful to the body.*

*Give examples of research studies (name & year) where technology was used and how it was used* ***Name:*** *Alzheimer's Disease Neuroimaging Initiative (ADNI) — a project developed by the National Institutes of Health (NIH) in 2004* ***Technology used: MRI/ PET SCANS*
*HOW?:*** *800 adults ages 55 to 90 who volunteered for this experiment is divided into three groups: 200 cognitively normal older people and 400 people with MCI will be followed for 3 years, and 200 people with early AD will be followed for 2 years.The researchers will conduct MRI scans, PET scans, and measurement various biological compounds in blood, cerebrospinal fluid, and urine; and clinical and neuropsychological assessments to track MCI (mild cognitive impairmen) and early AD (alzheimers disease) progression. At the end of the study, the researchers will compare neuroimaging, biological, and clinical information from the participants, looking for the relations among the data to develop standards for tracking the progression of memory decline* ***Findings:*** *The study is 95% done. However, scientists revealed that one of the major AD risk gene, APOE, has been consistently shown to be related with the form of the disease rising later in life that accounts for approximately 95 percent of all cases.****Name:*** *sleep-related consolation of a Visuomotor skill : Pierre Maquet, Sophie Schwartz, Richard Passingham, and Christopher Frith (2003)****Technology used:*** *fMRI****How?:*** *Subjects (participants who lacks sleep/ has sleep) are inserted into the fMRI and the experimenter scans their brains as they perform their tasks (which they have to move the pens with the mirror pads). The experimenter observed that superior temporal sulcus is significantly more active in learning conditions in sleeping subjects.*

|  |  |
| --- | --- |
| *Name of study & year*  | *Florida Alzheimer’s Disease Research (2008)*  |
| *Aim*  | *To find out whether Alzheimer’s can be diagnosed even before the symptoms occur.*  |
| *Procedures*  | *The brain of 260 participants are scanned MRI  and compared to see the difference of atrophy patterns in the brain.*  |
| *Sample*  | *260 people, divided into 3 groups which are:* *-          Prospective people of getting Alzheimer’s* *-          People with mild cases of Alzheimer’s* *-          People with severe cases of Alzheimer’s*  |
| *Findings*  | *-          They found out that the MRI scans were very accurate and that it correctly categorized people into different groups of severity.* *-          They also found out that some people without memory problems with atrophies in the brain, which is an early symptom of dementia.*  |
| *Conclusion*  | *People with MRI scans without brain atrophies are not prospective victims of Alzheimer’s.*  |
| *Evaluations*  | *-          This study is externally valid because it uses all three types of people with or without Alzheimer’s (mild and severe).* *-          Ecological valid because you can compare people with or without Alzheimer’s easily.*  |
| *Practicality*  | *This made me understand alzheimer’s actually starts damaging the brain before the symptoms begin. I am going start becoming more aware of people who have symptoms alzheimer’s and find a way to prevent it (nutrition and etc.)*  |

 **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)?***

**Define emotion:**

Emotion can be defined as any particular feeling that characterized such a state of mind, for example: love, hate, joy etc. Emotions are associated with goal-directed behaviour (motivation), decision making and and communication

***Outline two factor theory***

*Two-factor theory – social psychology – explains that there are 2 factors that affect emotion. The two factors being: physiological arousal (biologic) and attribution (cognitive).  Theory states that without arousal/attribution we are unable to experience any emotions.*

*Physiological arousal – state of high physiological activity – excitement etc.*

*Attribution – appraisal cues in the environment of how we should feel.*

*--External stimuli or situations causes physiological arousal reaction, then cognitions are used to interpret it as an emotion – people experience a feeling then decide what it means (on deciding they depend on their cognition available).*

*Order of emotion components:*

*External stimulus à general physiological arousalà cognitive appraisal of arousal (attribution) à subjective experience of emotion à behavior*

*State supporting research studies (name & year)*

***Schachter and Singer (1962)***

***Aim:*** *To test the two factors theory that emotion comes from a combination of arousal and person’s mind toward the situation.*

***Methods:*** *It is a controlled experiment. At the beginning of the experiment, all participants had an injection of epinephrine which causing them shaky hands, pounding heart, and increasing in breathing.*

***Sample****: 184 male college student that taking psychology at Minnesota University*

***Procedure:*** *There were 195 participants but only 184 participants were agreed to the injection. The participants were injected by a doctor: adrenalin or placebo. A placebo is a saline solution, which had no side effect at all in contrast, the adrenalin increase in blood pressure, heart rate, blood sugar level, respiration rate, and blood flow to the muscles and brain. The adrenaline also decreased in blood flow to skin. The participants were divided into 4 groups: adrenalin ignorant, adrenalin informed, adrenalin misinformed and the control group. Then, the participants were put either in euphoria or anger situation. In euphoria situation, several tasks were designed to entertain and amuse the participants unlike the anger situation, numerous of tasks were performed to annoy the participants.*

***Finding:*** *The researchers had observed all the emotional of the participants through the one-way mirror. The researcher had concluded that in euphoria condition the misinformed participants were the happiest and the informed group felt the least happy. On the other side, the participants that were in the anger condition, the ignorant group felt the angriest and the least is also the informed group. The same conclusion apply to both condition that the participants understood why they felt this way.*

***Dutton and Aron (1974)***

***Aim:*** *To test whether male participants would be arouses by presence of female or walking across a high suspension bridge.*

***Method:*** *The bridge has many features that will arouse the participant such as*

*(a) the bridge tends to tilt, sway and wobble*

*(b) the bridge is very low handrails of wire cable*

*(c) the bridge is 230 ft high and under the bridge are rocks and shallow rapids*

*(d) “control” the bridge is a solid, wood, and further upriver. This bridge is well constructed with heavy cedar, wider and firmer than other experimental bridges. The bridge is only 10 feet above a small and shallow river.*

***Sample:*** *Male that visiting either of two bridge sites who are in between 18 to 35 years old and not accompanied by a female.*

***Procedure:*** *Male participants were asked to meet an attractive female interviewer in the middle of one of the experimental bridges. She gave him questionnaire to answer and on the back page, they were told to write a dramatic story based upon a picture of a woman. Before the participants leaved, the female interviewer gave him a phone number for them to call for further talk.*

***Finding:****Male participants that were on the bridge that is solid, wood and well constructed were more aroused by the height of the bridge. They were likely to confuse their feeling for being inlove. As a result, they were likely to call her back and ask her for a date.*

***Evaluate the theory***

*Strengths*

-          Was the first to emphasize the central role of appraisal in emotions

-          Original study was well controlled and standardized – Schachter and Singer

-          Theory first constucted by Schachter and Singer was further researched by Dutton and Aron (1974) and Zillman and Bryant (1974)

Weakness/Limitations

-          Replicability

-          Ecological Validity – original studies had problems with ecological validity

-          The results of original study does not completely support the theory  à observation in the angry situation was placebo/control subjects were stirred by anger             arousal more than adrenaline informed subjects though according to the theory they are not supposed to.

-           Arguments from other psychologists:

o   Zajonc (1984) argues that cognition and emotion involve separate systems à emotion cannot occur without cognitive appraisal (that you don’t need an arousal).

o   Le Doux’s (1999)research suggests that emotional centres in the brain can receive information directly from the sensory areaswithout conscious appraisa*l.*

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

**Outline of Flashbulb Memory: Reliable process that increases the accuracy of eyewitnesses: a vivid & relatively permanent record of the circumstances in which one learned from an emotionally arousing, significant event**

• termed by Roger Brown & James Kulik
•activated by shocking-unexpected events•affects memory via emotion•great in detail•based on proximity: the nearer, the more vivid the memory•rehearsal is unnecessary•photographic quality (photographic memory)

**Supporting Research Studies :**

* The Assassination of JFK(Brown & Kulik 1977)
* Explosion of space shuttle: Challenger (Neisser & Harsch 1992)
* the death of princess Diana (Davidson & Glisky, 2002; Hornstein, Brown & Mulligan 2003)
* terrorist attack on the world trade center (Candel, Jelicik, Merckelbach & Wester 2003; Talarico & Rubin 2003)

**Evaluation**

* studies shown that some flashbulb memories are inconsistent over a period of time
* evidences prove how flashbulb memory is sometimes inaccurate
* too much arousal may negatively affect memory, altering it ; if the heartbeat rate raises to a certain level
* low in generalization: only applies to shocking and unexpected events
* ecologically valid to a certain extent: real life events lead to the process of flashbulb memory