

THE BIOLOGICAL APPROACH

Assumptions:

- 1) Psychology should be seen as a science and, therefore should also be studied in a scientific manner
 - 2) Behaviour can be largely explained by biology for example genes, inheritance and hormones/neurotransmitters
 - 3) The human genome has evolved over millions of years to adapt behaviour to the environment, and so most behaviours will have an adaptive/evolutionary purpose
- Reductionist!!

Biological psychology is the study of the biology of behaviour; it focuses on the nervous system, hormones, and genetics. It examines the relationship between the mind and the body, neural mechanisms, and the influence of heredity on behaviour.

The biological approach believes that behaviour is a consequence of our genetics and physiology. It is the only approach that examines thoughts, feelings and behaviour from a purely physiological standpoint.

The **comparative method** is the method that states that different species of animal can be studied and compared. This can help in the search to understand human behaviour.

Physiology is how the nervous system and hormones work, how the brain functions, and how changes in structure and/or function can affect behaviour. For example, we could ask how prescribed antidepressants affect behaviour by looking at their interactions with the nervous system and various neurotransmitters.

The biological approach also looks at the role of **genes** and **evolution**.

- ★ **Evolution** - the process of natural selection of offspring which have inherited characteristics that make them most likely to survive.
 - ★ **Genes** - inherited instructions that are passed on from parent to child that control our development and influence some aspects of our thinking, behaviour and emotions, such as our personality and intelligence. One way this can happen is by affecting brain function by influencing brain architecture.
- ! *Theories within the biological approach support nature over nurture, however, it is limiting to describe behaviour solely in terms of either nature or nurture, and attempts to do this underestimate the complexity of human behaviour. It is more likely that behaviour is due to an interaction between nature (biology) and nurture (environment). For example, individuals may be predisposed to certain behaviours, but these behaviours may not be displayed unless they are triggered by factors in the environment. This is known as the diathesis-stress model.*

CORE STUDY #1: CANLI ET AL. 2000 (AMYGDALA ACTIVATION & MEMORY)

Aim:

- To investigate whether the amygdala is sensitive to varying degrees of emotional intensity to external stimuli and whether the level of intensity enhances memory.

Hypotheses:

There were 2 main hypotheses for this study:

- 1) Images that have a higher emotional intensity will lead to greater amygdala activation and thus greater memory recall later on
- 2) Higher amygdala activation will enhance memory

Background:

Previous studies used fMRI scans to identify areas of the brain that have specific functions. A previous study, also conducted by Canli (1999), showed that participants who had strong amygdala activation in response to a set of emotional stimuli showed superior memory for that stimuli later on. However, Canli (2000) suggested that since the previous study was an independent measures design, there may have been other explanations for the findings.

Method:

Participants

- 10 right-handed, healthy women
 - ↳ Women were chosen because it was thought that they would be more likely to report intense emotional experiences and show more physiological reactions to stimuli.
 - ↳ They were all right-handed because that meant that they all mainly used the left side of their brain (their left hemisphere) → this was done to standardise the sample

Design

- A laboratory experiment
- A repeated measures design
- The IV was the intensity of emotional arousal and rating given on the scale
- The DV was the degree of amygdala activation and subsequent memory recall

Procedure

- The participants were presented with 96 scenes while in the fMRI scanner.
 - ↳ All 96 scenes were from the 'International Affective Picture System' stimuli set.
 - ↳ For the scenes used the valence ratings ranged from 1.17 (highly negative) to 5.44 (neutral). The order of scenes was randomised (to help overcome order effects).
- Each picture was presented for 2.88 seconds and there was an interval of 12.96 seconds where they viewed a fixation cross.
 - ↳ During this, participants had to indicate their emotional arousal by pressing a button with their right hand.
 - ↳ They had to choose from 4 buttons on a scale of 0 (not emotionally intense at all) - 3 (extremely emotionally intense).
- To measure activity in the brain, fMRI data was collected by an fMRI scanner, which is used to measure blood-oxygen-level-dependent contrast.
- Contrast imaging observes the different areas of the brain which are found active at any given time.
- 3 weeks later, participants were tested in an unexpected recognition test.
 - ↳ They viewed the 96 scenes from the previous test as well as 48 foils (newly added).
 - ↳ The foils were selected to match the previous scenes' valence ratings.
 - ↳ Participants were asked to judge whether they had remembered it, felt it was familiar, or forgotten it.

Results

- The correlation between participants' intensity rating and valence: -0.66 .
- The correlation between participants' intensity rating and arousal: $+0.68$.
 - ↳ Participants' ratings of emotional intensity reflected the valence and arousal of the stimuli.
- Amygdala activation was significantly correlated with higher ratings of individually experienced emotional intensity.
 - ↳ The follow-up memory task showed that memory performance was better for scenes rated "highly emotionally intense" than for scenes rated less emotionally intense.
- Left amygdala activation predicted whether the stimuli would be forgotten, appear familiar, or would be remembered.

Conclusion

- The amygdala is sensitive to individuals' experienced emotional intensity of visual stimuli, and the activity of the left amygdala during memory encoding is predictive of memory.

Evaluation

A strength of this study is that it is highly replicable. This is because it was conducted in a controlled laboratory environment with standardized procedures such as using the same 96 images for each participant and using the same fMRI machine for each participant. This means another researcher can simply get another group of participants and repeat the procedure exactly and compare and test the results for accuracy. This allows the findings of the study to be tested, therefore increasing the validity of the study.

Another strength of this study is that it is highly reliable. This is because the study collected quantitative, objective data through scientific methods like fMRI scans and numerical scales. This means that the results were not subject to interpretation and thus free from researcher bias. This increases the validity of the results of the study.

A weakness of this study is that it used a very small sample size. This is because it used a small sample size of only 10 right-handed women, and so the results cannot be generalised to a larger population of people of different genders. The small sample size also increases the chances that the results may have been impacted by participant variables. This reduces the results of the study because they cannot be applied to a wide variety of people.

Another weakness of this study is that it lacks ecological validity and mundane realism. This is because it was done in a controlled laboratory environment with standardised procedures and the participants had to rate their levels of arousal on a scale while looking at scenes inside an fMRI machine, which are not normal circumstances for people to feel and report emotion. Because of this, the results cannot be applied to reality which reduces their validity.

Issues and Debates

- **Nature vs. Nurture:** The findings of this study support the nature side of this debate because they investigate the underlying biological processes that go into experiencing emotions.
- **Individual vs. Situational:** the scores varied between participants showing that individual factors play a role in experiencing emotions e.g. one participant may have rated a scene 2 out of 3 while another may have rated it 0.

CORE STUDY #2: DEMENT & KLIETMAN 1957 (DREAMS)

Aim

The general aim was to explore the connection between eye movements and dream experiences.

There were 3 specific aims:

1. Does dream recall vary between REM and NREM sleep stages?

2. Is there a positive relationship between estimated dream duration and REM period length?
3. Do eye movements relate to the content of dreams?

Hypotheses

1. A significant correlation exists between REM sleep and the occurrence of dreaming.
2. A positive correlation can be observed between the estimated duration of dreams and the length of REM periods.
3. There is a significant connection between patterns of eye movements and the content of dreams.

Background

Aserinsky (1955), a student of Kleitman, discovered that individuals awakened from REM sleep were more likely to report vivid, visual dreams compared to those awakened from NREM sleep. This research also revealed the alternating sleep stages involving REM and NREM. Dement and Kleitman then went on to question whether there is a correlation between sleep stages and dreaming (mainly REM sleep) and a correlation between eye movements and dream content.

They used a range of tools in their study:

- **EEG** (electroencephalogram): Monitors cyclical changes in brain activity during sleep by placing electrodes around the skull.
- **EOG** (electrooculogram): Tracks eye movements during sleep using electrodes positioned around the eye area.

The two stages of sleep involved were:

- **REM** (Rapid Eye Movement): A sleep stage associated with vivid dreaming.
- **NREM** (Non-Rapid Eye Movement): A different sleep stage.

Method

Participants

- Nine participants were recruited through opportunity sampling, consisting of 7 males and 2 females. The initial group of 5 participants underwent a detailed study, while an additional 4 participants were included to corroborate the results.
- Among the primary participants, 5 individuals spent between 6 and 17 nights in the lab, experiencing approximately 50 to 77 awakenings. The remaining 4 participants spent 1 to 2 nights in the lab and experienced 4 to 10 awakenings. Each participant was identified by their initials.

Design

- Laboratory experiment: employed distinct methods to investigate each research objective.
- Approach 1 employed a natural experiment with a repeated measures design.
 - └ The independent variable (IV) was whether participants woke up from REM or NREM, while the dependent variable (DV) focused on whether they could recall a dream.
- Approach 2 utilized a true experiment within a correlational study framework, also adopting a repeated measures design.
 - └ The IV involved waking participants after 5 or 15 minutes into REM sleep, and the DV centred on participants' estimates of dream duration (5 or 15 minutes). A correlational analysis was employed to validate participants' estimated dream duration and the word count in their dream narratives.
- Approach 3 involved a natural experiment with a repeated measures design.
 - └ The IV in this case pertained to participants' eye movement patterns, and the DV revolved around the content of their dreams.

Procedure

- Participants arrived at the laboratory before their usual bedtime and maintained their regular diet, with the exception of refraining from caffeine to avoid alertness and alcohol to prevent drowsiness on the day of the study.
- They slept in a dark, quiet room equipped with 2 EOG electrodes near their eyes and 2/3 EEG electrodes attached to their scalps.
- A doorbell was used for standardization to randomly wake participants up from REM or NREM sleep.
 - └ All participants returned to sleep within 5 minutes.
- In Procedure 1, participants were woken up at various times to assess their dream recall during both REM and NREM sleep.
 - └ Dream narratives were recorded on a tape recorder to eliminate researcher bias. Participants were asked whether they had a dream, and if so, they documented it. Dreams were only considered if the recall was clear.
- Procedure 2 - Participants were awakened either 5 or 15 minutes into their REM sleep and subsequently attempted to estimate the duration of their dreams.
 - └ Following their estimations, the word count of the dream narratives they provided was tabulated.
- Procedure 3 - Participants' eye movement direction was monitored using EOG, and they were awakened to report their dreams.

Results

- All subjects consistently experienced REM sleep every night, with individual variations in REM patterns. Nonetheless, each participant exhibited a regular REM pattern.

- On average, there was a 92-minute interval between different dreams, with a range spanning from 70 to 104 minutes.
- The average length of REM sleep was 20 minutes, with a range of 3 to 50 minutes, and it tended to be longer later in the night. Bursts of rapid eye movements occurred in sequences of 2 to 100.
- Participants awakened from NREM sleep typically returned to NREM sleep, while those awakened from REM sleep generally transitioned to NREM sleep (though sometimes returning to REM sleep to complete the final phase).

Results 1:

- L Awakenings from REM sleep resulted in a dream recall rate of 79.6%, whereas awakenings from NREM sleep yielded a dream recall rate of only 7%.
- L Waking participants within the first 8 minutes of completing their REM period led to the recall of 5 out of 17 dreams. In contrast, waking participants after 8 minutes resulted in the recall of just 6 out of 132 dreams.

Results 2:

- L The estimation of REM duration was remarkably accurate, with a high accuracy rate of 88% for 5 minutes and 78% for 15 minutes.
- L A positive correlation existed between REM duration and the length of dream narratives. A total of 152 dream narratives were collected, but 26 were excluded due to poor recording, leaving a final count of 126 narratives.

Woken 5 minutes into REM sleep		Woken 15 minutes into REM sleep	
51 tests		60 tests	
Correct	Incorrect	Correct	Incorrect
45	6	47	13

Results 3:

- L Vertical eye movement occurred while standing at the base of a towering cliff and operating a hoist.
- L Horizontal eye movement was observed in a scenario where two individuals engaged in a tomato-throwing exchange.
- L Both vertical and horizontal eye movements were evident during conversations with people in close proximity.
- L Little or no eye movement was detected when participants were either gazing at distant objects or fixated on a particular item.

Conclusions

- Dreams exclusively take place during REM (Rapid Eye Movement) sleep. Dreams reported during NREM (Non-Rapid Eye Movement) sleep are essentially remnants of prior REM episodes.
- The duration of dreams and the lengths of REM periods are remarkably similar, suggesting that dreams unfold in real time rather than as instantaneous events.
- Eye movements are reflective of the dreamer's focus and surroundings in the dream, emphasizing their non-random nature.

Evaluation

A strength of this study is that it is highly replicable. This is because it was conducted in a controlled laboratory environment with standardized procedures such as using the same doorbell sound for each participant and using the same EEG and EOG machines for each participant. This means another researcher can simply get another group of participants and repeat the procedure exactly and compare and test the results for accuracy. This allows the findings of the study to be tested, therefore increasing the validity of the study.

Another strength of this study is that it is highly reliable. This is because the study collected quantitative, objective data through scientific methods like EEG and EOG scans. The test was also standardised, with the same machines and doorbell sounds being used for each participant. This means that the results were not subject to interpretation and thus free from researcher bias. The participants were also not told the sleep stages they were woken up in so they could not change their answers, and so the results were free from social desirability and demand characteristics. This increases the validity of the results of the study.

A weakness of this study is that it used a very small sample size. This is because it used a small sample size of only 9 people, out of which only 5 underwent detailed study. Because of this, the results cannot be generalised to the wider population of individuals. The small sample size also increases the chances that the results may have been impacted by participant variables. This reduces the results of the study because they cannot be applied to a wide variety of people.

Another weakness of this study is that it lacks ecological validity and mundane realism. This is because it was done in a controlled laboratory environment with standardised procedures and the participants had to report their dreams to researchers and sleep under monitored conditions where they were woken up every five/fifteen minutes, which are not normal circumstances for people to sleep in. Because of this, the results cannot be applied to reality which reduces their validity.

Issues and Debates

- **Nature vs. Nurture:** The content of dreams is influenced by our experiences, representing a product of nurture. Conversely, the capacity to dream is inherent, stemming from nature.

CORE STUDY #3: SCHACTER & SINGER 1962 (TWO-FACTOR THEORY OF EMOTION)

Aim

- To examine the Two Factor Theory of Emotion
- Investigate whether individuals resort to cognitive factors to explain their feelings when presented with physiological arousal devoid of context.

Background

Cognition refers to the mental processes involved in acquiring and processing information, while emotion represents the body's adaptive response to specific situations. Additionally, metacognition entails reflecting on one's thinking processes.

Cognition plays a crucial role in interpreting our physiological state, enabling us to label our emotional reactions. During instances of physiological arousal, key physiological indicators such as increased heart rate, respiration rate, dilated pupils, and the release of adrenaline come into play.

The Two-Factor Theory of Emotion, developed by Schachter and Singer, posits that emotional experiences are a product of both physical arousal and cognitive interpretation, forming the most coherent understanding of an individual's circumstances.

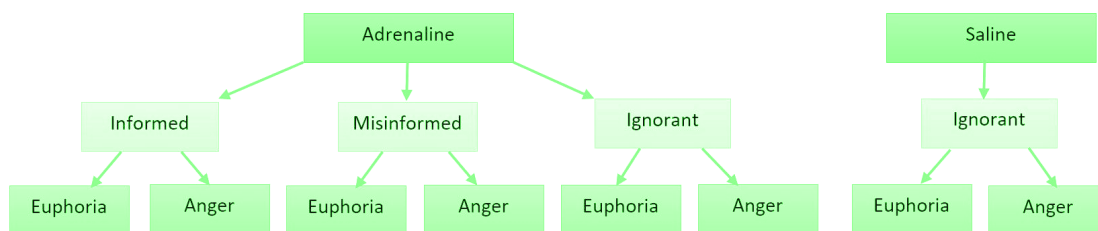
Method

Participants

- 185 male college students enrolled in an introductory psychology course at the University of Minnesota participated.
- Participants received course credit in exchange for their involvement.
- Health records were reviewed in advance to confirm the safety of the injection.
- Self-selecting sampling was the method used for participant recruitment.

Design

- Standardized laboratory experiment
- All participants were exposed to the same controlled environment and provided scripted responses by the same confederate
- Independent measures design
- Independent Variables:
 - └ Level of knowledge regarding injection symptoms (informed, misinformed, or ignorant).
 - └ The emotional state induced after the injection (euphoria or anger). Notably, a control group received a saline solution injection instead of epinephrine.
- Dependent Variables:
 - └ Observational data was collected by two observers discreetly observing participants through a one-way mirror during the period of emotional arousal. The observers assessed the extent to which participants exhibited euphoric or angry behaviours.
 - └ Self-reports were administered to participants after the emotional arousal, providing further insights into their emotional experiences.



Procedure

- Participants were informed about a vision test involving the 'Suproxin' vitamin supplement.
- Informed consent was obtained.
- Participants were actually injected with adrenaline or a placebo.
- Side effects occurred 3-5 minutes after injection and lasted an hour.
- Experimental Conditions:
 - └ Informed: Correct side effect information - "Your hand will start to shake."
 - └ Misinformed (Control): Incorrect side effect information - "Your feet will feel numb."
 - └ Ignorant: Told no side effects information.
- Introduction of Stooze:
 - └ After the injection, the doctor left and a stooze was introduced as another participant.
 - └ Both claimed to have taken Suproxin and would wait for absorption.
 - └ Emotional states: Euphoria (positive) or Anger (negative).
 - └ Stooze is unaware of which condition the participant is in.
- Euphoria Condition:
 - └ Access to a stationary, playful interaction.
 - └ Criteria for 'initiates new activity' specified as activity outside the stooze's set behaviour and one the participant had never seen before.

- L Examples of initiated activities: opening the window, paper basketball, and hula hooping.
- o Anger Condition:
 - L Participants were told to wait 20 minutes and complete a questionnaire that involved very personal questions about the participant (e.g. "How often do you have intercourse").
 - L Stooze instructed to create anger in the room by saying things like "this really irritates me" when responding to the questionnaire
 - L Comments intensified with personal questions. The stooze crumpled up the questionnaire at the end and left.

Results

- ★ Participants:
 - o 1 refused injection, 11 excluded due to suspicion, 5 excluded for no arousal.
 - o Total: 169 participants.
- Adrenaline participants are more sympathetically aroused (pulse rate, self-rating) than those in the placebo condition.
- The misinformed group only participated in the euphoria condition.
- Adrenaline raised pulse rate, while placebo decreased it.
- The euphoric misinformed group reported the highest happiness.
- The informed group reported the lowest happiness.
- Anger-ignorant participants reported the highest anger.
- The placebo group reported the second highest anger.

Conclusion

- Arousal with no explanation leads to labelling based on available cognition.
- Arousal with an explanation reduces reliance on available cognition.
- Past emotional triggers impact current emotions.

Ethics:

- o All participants gave consent and the injection was carried out by a trained doctor
- o Deception was necessary to prevent demand characteristics and improve study validity.

Evaluation

A strength of this study is that it is highly replicable. This is because it was conducted in a controlled laboratory environment with standardized procedures such as using the same stooze for each participant and using the same scripted responses for the stooze for each participant. This means another researcher can simply get another group of participants and repeat the procedure exactly and compare and test the results for accuracy. This allows the findings of the study to be tested, therefore increasing the validity of the study.

Another strength of this study is that it is highly reliable. This is because the study collected quantitative, objective data through questionnaires. The test was also standardised, with the same stooze being used for each participant. This means that the results were not subject to interpretation and thus free from researcher bias. The participants were also not told the conditions they were in so they could not change their behaviours, and so the results were free from social desirability and demand characteristics. This increases the validity of the results of the study.

A weakness of this study is that it used a limited sample size. This is because it used a small sample size of only male university students, so the results cannot be generalised to the wider population of females or non-university individuals. The results may also have been influenced by individual differences because different people react differently to adrenaline (as can be seen when 5 displayed no arousal at all). This reduces the validity of the study.

Another weakness of this study is that it lacks ecological validity and mundane realism. This is because it was done in a controlled laboratory environment with standardised procedures and the participants had to report their arousal to researchers and complete a questionnaire under unnatural conditions (where a stooze behaved in a certain way), which are not normal circumstances for people to feel emotion. Because of this, the results cannot be applied to reality which reduces their validity.

Issues and Debates

- **Nature vs. Nurture:** Emotional responses were influenced by both nature (hormone levels) and nurture (experiences).
- **Individual vs. Situational:** there are situational factors that impact emotional expression and labelling (the stooze and the euphoria or anger condition), but individual factors like the extent to which participants were influenced by the stooze also play a role.