IB Psychology SL

Biological Approach

Studies Review Guide – Student Developed

**Antonova et al (2011)**

In a study by **Antonova et al** (2011), researchers demonstrated that blocking acetylcholine receptors in the brain can affect spatial memory tasks in humans. In their study, they used a sample of twenty healthy male adults, with a mean age of 28 years old. The study used a double-blind procedure and participants were randomly allocated to one of two conditions. They were injected with either Scopolamine or a placebo.

The participants were then put into an fMRI where they were scanned while playing the "Arena task."  This is a rather complex virtual reality game in which the researchers are observing how well the participants are able to create spatial memories.   The goal is for the participants to navigate around an "arena" with the goal of reaching a pole. After they have learned where the pole is located, the screen would go blank for 30 seconds.  During this time, the participants were told to actively rehearse how to get to the pole in the arena. When the arena reappeared, the participant was now at a new starting point in the arena. The participants would have to use their spatial memory to determine how to get to the location of the pole.

The procedure was repeated three to four weeks later, each participant received the other treatment.

The researchers found that when participants were injected with scopolamine, they demonstrated a significant reduction in the activation of the hippocampus compared to when they received a placebo. It appears that acetylcholine could play a key role in the encoding of spatial memories in humans, as well as in rats. (From online text, John Crane’s InThinking IB Psychology)

**Bailey & Pillard (1991)**

**Procedure and results**

The role of genetics in the study of human behaviour has been very influential. Prior to research that indicated that sexual orientation may have its roots in our genetic coding, homosexuality was considered a mental illness. In some countries and states within the USA, homosexuality was illegal.  
  
Bailey & Pillard’s (1991) study is one of the more frequently cited studies of the genetic basis of sexual orientation. It is important to understand how the study was done and why the study is rather problematic.

The researchers recruited monozygotic (MZ) and dizygotic (DZ) twins as well as adoptive brothers through gay publications. All of the participants in the sample were voluntary and male. All twins in the study were raised together – which means that we can reasonably assume that the environment was highly similar.

The sexual orientation of relatives was assessed either by asking relatives directly or when this was impossible, asking the gay participant who had volunteered for the study.

In addition, the researchers used questionnaires to assess the participants’ level of **Childhood Gender Non-conformity** (CGN). Childhood gender nonconformity is a phenomenon in which pre-pubescent children do not conform to expected gender-related patterns, and/or identify with the opposite gender. Gender non-conformity in children can have many forms, reflecting various ways in which a child relates to his or her gender. These behaviours include, but are not limited to:

* Cross-gender clothing and grooming preferences;
* Playing with toys generally associated with the opposite sex;
* Preference for playmates of the opposite sex;
* Identification with characters of the opposite sex in stories, cartoons or films.

Bailey & Pillard found that 52% of MZ twins were both self-identified homosexuals, 22% of DZ twins were so, and 11% of non-related adopted brothers were so. A later study showed that non-twin brothers had a rate of 9.2%. This evidence shows that the more closely genetically linked a pair is, the more likely they both are to exhibit gay or straight tendencies.

The researchers found that the participants’ self-reported history of childhood gender non-conformity did not predict homosexuality in any of the three samples. Thus, childhood gender nonconformity does not appear to be correlated with the development of homosexuality. However, monozygotic pairs were very similar in their level of childhood gender nonconformity.

**Evaluation**

* The fact that it is not a random sample means that the study is open to **ascertainment bias** (see below). As a result, the sample is not representative.
* The study relies on **self-reported data**. Even zygosity was determined by asking the participants. So, a person could say that his twin was MZ, but there was no evidence provided to verify this. Often the sexuality of the brother was reported by the gay twin, but without verification from the brother.
* The participants were asked to report on their level of Childhood Gender Non-conformity.  There is the problem that this information is **retrospective** in nature - that is, they are trying to recall what their behaviour was like as children. Memories are open to distortion, especially as the stereotype of the "gay child" may influence their perceptions of what they were like as children.
* The **construct** of homosexuality is difficult to standardize. It is difficult to know what exactly it means to be "homosexual" and whether it would be interpreted equally by all who answer the questionnaires.
* The sample sizes of such studies tend to be very small. There is a limited number of MZ and DZ twins.  And they limited the sample to males. And then they had to look for those sets of male twins where at least one brother was self-identified as gay.  This is a limited pool and thus questions the **generalizability** arise.
* There is the question of **reductionism**. Although genetics may play a role in our sexual orientation, the question is to what extent do environmental influences also play a role in our sexual orientation?  Most probably our sexual orientation is not attributable to a single gene, nor solely to biological factors.  It is most probably an interaction between biological and environmental factors.

**Going further**

**Ascertainment bias**: This is a problem in many twin studies which hope to establish a genetic link for behaviour. The fact that all of the people who contacted the researchers already had a gay member of the family, skews the data.

To understand this better, think about doing a study on the primary sex ratio in humans. If we asked all the women present to report the number of male and female siblings in their family, the women will report collectively a higher ratio of females. This method of data collection would be biased towards families in which there is at least one woman (themselves), includes many families in which they are only-children, and excludes families with no female and multiple males. So, by using a sample where everyone already has one gay male in the family, the sample is no longer representative. (From online text, John Crane’s InThinking IB Psychology)

**Caspi et al (2003)**

Diathesis-stress theories- predicts that an individual’s reaction to stressful events depends on their genetic makeup

Gene-environment reaction- if an individual has a specific genotype, interaction with the environment may cause the gene to be expressed

5-HHT- Serotonin transporter gene

The aim of the study was to determine if there is evidence for a gene-environment interaction for a mutation of the serotonin transporter gene (5-HHT).

Caspi had a sample of 847 New Zealand 26-year old’s that had been assessed for mental health on every other year basis until 21. The participants were then divided into 3 groups based on their 5-HHT alleles, with group 1 having two short alleles, group 2 having one short and one long, and group 3 having two long, with 43% having the shorter alleles, and the mutation involves the two shorter alleles. The participants filled out a questionnaire asking about stressful life events between the ages 21 and 26 and assessed for depression.

The results showed that people who had inherited one or more short versions of the allele showed more symptoms of depression and suicidal ideation in response to the stressful events, with the effect being the strongest for people with 3 or more stressful events. The inheriting of the genes alone was not enough to lead to depression, but the stressful life events interacted with the genes to increase the likelihood to develop depression.

To evaluate, the study is correlational, so no cause and effect can be determined, along with the assumption that serotonin causes depression. The salience could have been a factor, with the participants remembering stressful events easier leading to a tendency towards depression. The study is a holistic, and not a reductionist approach, acknowledging the interaction between biological and environmental factors in depression. Along with these, recent studies have not been able to show similar results and some participants who did not carry the mutation developed depression, eliminating the theory that gene expression alone can cause depression. (Submitted by Alex)

**Baumgartner (2008)**

Oxytocin: a bodily hormone that is made in the hypothalamus and then transported to and secreted by the pituitary gland. fMRI Scan: A functional magnetic resonance imaging scan that uses MRI technology to detect changes in blood flow to different parts of the brain.

The aim of the study is to investigate the role oxytocin plays with trust in human relationships and interactions.

49 participants were recruited and separated into 2 groups: -Group 1: Participants were given a placebo nasal spray. -Group 2: Participants were given a nasal spray that contained the hormone oxytocin. -An fMRI scan was done on each of the participants after having taken the placebo or the oxytocin nasal spray. -The participants were then asked to play the 'trust game', a social game used by neuroscientists and economists to study social interaction. -In this game, there are 2 players, an investor and a trustee. -Player 1, the investor, is given a certain amount of money to begin and must decide whether to keep their sum of money or invest it in Player 2, the trustee. If the money is invested, it is tripled. Then, it is up to the trustee whether to share the new tripled sum of money with the investor or keep it all. In this game there is a potential risk and potential reward if the investor gives the money to the trustee. -The participants were told to be the investors and play multiple rounds of the game, at first playing with different human trustees and then playing with a computer program that acted as the trustee. -After a few rounds of the experiment with the human and computer trustee, the participants were taken aside for a feedback session and informed by the experimenter that 50% of their decisions had resulted in a poor outcome. This meant that the trustee had decided not to share the newly tripled sum of money with them. -The participants then continued acting as investors and playing more rounds of the game with the human and the computer program trustee. -The experimenters recorded the decisions made by the participants in all rounds by taking note as to whether they chose to take the risk by giving their money to the trustee or not.

-Group 1 participants that had been given the placebo spray were more likely to avoid investing their money with the human and computer program trustee after they were informed in the feedback session that 50% of their decisions to take risks had resulted in a poor outcome. -Group 2 participants that had been given the nasal spray with oxytocin continued to invest their money at very similar rates with the human trustees after the feedback session as they had been prior to it. However, this was not the case when the participants were playing the 'trust game' with the computer program.

-These results support the idea that the hormone oxytocin is directly related to facilitating trust in human relationships. -However, this trust does not seem to apply in non-human interactions as the experiment did not show that the group given the oxytocin nasal spray continued to trust the computer program after having the feedback section. (Submitted by Alex)

**Dragnaski Et Al (2004)**

* Key vocab
* Neuroplasticity – the ability of the brain to change its neural structures in order to adapt to change
* Neural pruning – the process by which extra neurons and synaptic connections are eliminated
* Description
* This study is a study of neuroplasticity that demonstrates how repeated actions lead to the growth of neural networks and then the cessation of that activity can lead to neural pruning
* Aim
* The aim of the study was to see if learning a new skill, in this case it is juggling, would have an effect on the brains of participants
* Method
* The participants were 21 volunteer females and 3 volunteer males between the ages of 20 and 24. They all were non-jugglers at the start of the study, and each had an MRI scan to serve as a base rate from grey matter and brain structure.
* Participants were allocated to one of two conditions, jugglers or non-jugglers. Those who learned juggling were taught a three-ball cascade juggling routine. Once they mastered this routine, they had another MRI scan. After this scan they were told not to juggle anymore, and three months later, they had one last scan. The non-juggling group was the control.
* To understand the MRI scans, the researchers used voxel-based morphometry (VBM) to see the differences in neural density and grey matter in the brains of those in both groups.
* Results
* The jugglers showed a larger amount of grey matter in the mid-temporal area in both hemispheres, which is an area associated with visual memory. When the experimental group stopped juggling and had their third scan, the grey matter was seen to decrease.
* The non-jugglers had no change in their grey matter.
* Evaluation
* The study used a pre-test and post-test design to show neural density differences.
* The study was experimental, helping argue for a cause and effect relationship.
* The sample size was small, so data may not be reliable.
* The study has potential problems with internal validity as the participants were in their home environments for a good part of the study. (Submitted by Nabiha)

**HM: Milner (1966)**

* Key vocabulary
* Retrograde amnesia – memory before a certain time diminished
* Anterograde amnesia – unable to create new memories
* Episodic knowledge – memory for events
* Semantic knowledge – general knowledge of the world
* Working memory – part of short erm memory that is concerned with immediate conscious perceptual and linguistic processing
* Procedural memory – memories in the form of motor skills
* Description
* Milner carried out this study to study the role of the hippocampus on memory formation
* Aim
* The aim of this study was to understand the effects that surgery had on HM, who was a patient that had surgery to remove tissue form the medial temporal lobe and hippocampus to stop his seizures.
* Method
* To understand the effects, Milner carried out method triangulation:
* Psychometric testing: IQ tests
* Interviews with HM and family
* Cognitive tests: memory tests and learning tasks
* MRI scans
* Results
* It was understood that HM couldn’t acquire new episodic knowledge or semantic knowledge due to being unable to transfer information from the STM to LTM.
* He had a cognitive map in his mind because researchers found he could remember his house and draw a floor plan of it.
* He had a capacity for working memory sine he could do normal tasks.
* He had procedural memories, he could mow a lawn and was able to improve skills, despite not remembering the skill.
* The hippocampus played a large role in learning and forming memories.
* Implicit memory has several stores, such as procedural and emotional.
* The medial temporal region is not site of permanent storage, since Hm had memories from before storage.
* Evaluation
* This was a longitudinal case study
* There is high ecological validity
* Milner’s research meet high ethical standards of consent, confidentiality, and protection from harm. (Submitted by Nabiha)

**Maguire (2000)**

**Aim:** Investigate whether neuroplasticity occurs in London cab drivers, who must memorize 25,000 street names, landmarks, restaurants and hotels in order to earn a cab license

**Procedure:**A sample of 16 healthy, right-handed London cab drivers had their brains scanned using an MRI, and this was compared with MRI scans of 50 non-cab driving right-handed males of the same average age.  MRI uses magnets to track the flow of oxygenated blood in the brain, revealing brain structure.  The cab drivers had been driving for various lengths of time, ranging from 1.5 to 42 years.

**Results:**The posterior (rear) of the hippocampus was significantly larger in the taxi drivers, while the anterior (front) of the hippocampus was larger in the control group.  Furthermore, there was a positive correlation between years of experience driving a taxi and the size of the posterior of the hippocampus.

**Conclusion:** The hippocampus is the region of the brain associated with memory, and the posterior is believed to be related to spatial memory and navigation.  Experienced cab drivers develop a "mental map" of London, involving thousands of streets and landmarks.  This causes an increase in the posterior of the hippocampus.

**Evaluation**:

* This study involved comparing two seperate groups of participants, with no random assignment into different conditions.  Therefore, the results are correlational, and it cannot be concluded with certainty that driving a cab *caused* changes in the hippocampus.  It is possible that cab drivers already tended to have a bigger hippocampus even before they started driving.
* On the other hand, the study did find a correlation between years of taxi driving experience and size of the hippocampus.  This finding strongly suggests that the hippocampus did develop over time as a result of constantly navigating London's streets

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* The precise role of the posterior and anterior of the hippocampus remain speculative.  Although it is believed that the posterior of the hippocampus is linked to spatial navigation, more research is needed to confirm this.

(from https://ibpsychmatters.com/neuroplasticity)

**Harris & Fiske (2006)**

**Background information**

Research by Wheeler & Fiske (2005) found that when looking at photos of someone from an out-group, in this case when white students look at photos of a black male, there is a neurological response when categorizing someone as a member of an out-group.  That response includes the activation of the amygdala as well as the pre-frontal cortex.  From an evolutionary point of view, it makes sense that we perceive out-groups as a threat, but then can use our pre-frontal cortex, which is responsible for social cognition, to evaluate the threat and then mediate the response of the amygdala.

However, not all stereotypes about out-groups are the same - and they do not all present the same level of threat to the in-group.

The **stereotype content model** (**SCM**) is a theory proposed by Susan Fiske that stereotypes possess two dimensions: warmth and competence. Social groups are perceived as warm if they do not compete with the in-group for the same resources and they are considered competent if they are high in status - that is, economically or educationally successful. Thus, lack of competition predicts perceived warmth and status predicts perceived competence.

According to this model, Fiske proposed four types of stereotyping:

|  |  |  |
| --- | --- | --- |
|  | **Low competence** | **High competence** |
| **High warmth** | Paternalistic stereotype | Admiration |
| **Low warmth** | Contemptuous stereotype | Envious stereotype |

**Procedure and results**

Harris & Fiske wanted to observe the role of the prefrontal cortex and the amygdala in reacting to what they called "extreme out-groups" - that is, homeless and addicts. The researchers wanted to see the biological correlates of a "contemptuous stereotype."

The sample was made up of 22 Princeton University undergraduates. The group was randomly allocated to two conditions - with 10 participants seeing images of people and 12 seeing images of objects.

Before being put into the scanner, participants used a computer screen to practice rating a series of neutral photos for each of the four emotions: pride, envy, pity, disgust. This was done as a control to make sure that the participants understood the nature of the task.

Once in the fMRI, participants were shown six sets of ten photographs. These photos included people with disabilities, rich businessmen, older people, American Olympic athletes, and homeless people. The participants were shown a response screen after each image and then, using a joystick, were asked to choose which of the four emotions that they felt toward the image that was just displayed.

The researchers found that regardless of the emotion that was chosen, the participants in the "objects" group did not show any activity in the medial prefrontal cortex. However, in the images of people, this part of the brain was active.  Or, at least in most cases.

Harris & Fiske found that there was a clear difference in brain activity when participants rated pictures of addicts or homeless people; in addition to activation of the amygdala, their brains set off a series of reactions associated with disgust. The *insula* was activated, which is usually a response to non-human objects such as garbage and human waste. Perhaps even more surprising, the part of the brain that is activated when we think about other people or ourselves – the medial prefrontal cortex – was *not* activated. In other words, in the case of the homeless, their brains did not react to them as people.

This study indicates that SIT may be overly simplified and that there are other factors that may play a role in our reaction to an out-group rather than simply the fact that they are not members of our in-group. Perceptions of a threat to the in-group's resources as well as the out-group member's status may play a role in our perception of the out-group and how our brain reacts.

**Evaluation**

The study is a **true experiment**. The participants are randomly allocated to one of two conditions - viewing objects or people. It appears that when we view other people, our medial prefrontal cortex is active, but not when observing objects.  However, in this experiment, there is another finding.  Within the group that saw two different types of "people images" - e.g. addicts vs. Olympic athletes, it was found that there was a difference between the emotion experienced towards marginalized groups and emotions towards other groups. This was within the one group, so this is more of a repeated measures design for this one group.  This shows the complexity of this study.

In addition, there is the question of cause and effect. Cause and effect *is implied* by the use of a true experiment.  However, it is unclear here to what extent marginalized groups *cause* the activation of the insula.  It is a learned response or is this a. natural response? As the sample size for this one group is also very small (10), it would be inappropriate to make a statement of definitive causality.

The study makes use of an fMRI which is an expensive piece of equipment.  As a result, **the sample size is small** to keep the cost down.  This means that the sample is not large enough to make a generalization. In addition, more research needs to be done to test the reliability of the study.

The **sample is also biased**.  First, the students were all Americans. Although the brain should respond the same way in all cultures, we cannot rule out learned cultural responses which may influence brain activity. In addition, the sample is made up of participants from Princeton University.  This may indicate a certain level of intelligence and/or socioeconomic status which may have influenced their behaviour.

The fMRI does not allow for demand characteristics.  This means that we can rule out this confounding (extraneous) variable in the results.

The study gives support to research of both Social Identity Theory and stereotyping; it appears that our brain categorizes people and responds differently, depending on their group.  However, the study did not look at the response of homeless people to other homeless people.  Therefore, it is not absolutely possible to state that the brain response is a result of observing a member of an out-group. (From John Crane’s InThinking IB Psychology, <https://www.thinkib.net/psychology/page/28459/harris-fiske-2006>)

**McGaugh & Cahill (1995)**

· Key theories/vocabulary: adrenaline - hormone that activates “fight or flight” response by activating the amygdala, which the emotional component of the brain

· Aim: to determine the role of emotion on the creation of memories

· Method/Procedure: Participants were divided into two groups: one group saw 12 slides presenting a boring story in which a woman and her son visit the father in a hospital and witness a disaster preparation drill, while the other group saw 12 slides presenting a traumatic story in which a boy who had his feet reattached after they were severed in a car accident. Two weeks later, participants were tested on their ability to recall the story through a multiple choice test with three answer options per question. A follow-up study was then done and the procedures were repeated, except this time the group that heard the “traumatic story” were given a propranolol beta-blocker to prevent activation of the amygdala, the emotional component of the brain.

· Results: In the original study, participants who heard the “traumatic story” were better able to recall the story including details. In the follow-up study, those that received the beta-blocker did not perform any better than those that did not. Thus, it was concluded that the amygdala plays a role in memory formation linked to emotional arousal.

· Evaluation: Researchers were able to block adrenaline - allows for establishment of cause-and-effect relationship; can be applied to PTSD patients; low ecological validity; can be easily replicated; high internal validity. (Submitted by Christine)

**Newcomer et al (1999)**

· Key theories/vocabulary: verbal declarative memory - also known as explicit memory, it consists of memories that can be consciously recalled; cortisol - stress hormone

· Aim: to determine whether high levels of cortisol interferes with verbal declarative memory

· Method/Procedure: Participants were matched based on age and gender to 3 different conditions: one condition was given high levels of cortisol through a pill, the second condition was given low levels of cortisol also through a pill, and the third condition received a placebo pill. Participants were instructed to listen to and recall prose paragraphs. Every day they were given different paragraphs but they all had the same level of difficulty. They were tested before taking cortisol to establish a baseline as well as 1 day, 4 days, and then 6 days after consuming the cortisol pills.

· Results: Participants who received the highest level of cortisol had the worst performance in verbal declarative memory. The effect of the cortisol, however, was not permanent since the memory of the high cortisol participants returned to normal after discontinuing the consumption of the cortisol pills. Thus, it was concluded that high levels of the hormone cortisol interfered with recall. Moderate levels of cortisol, on the other hand, assisted recall. This can be explained by the fact that there are cortisol receptor sites on the hippocampus, which are responsible for the transfer of info from short term memory to long term.

· Evaluation: can establish cause-and-effect relationship; baseline test was established which prevented the confounding variable of individual differences; no control over possible extraneous variables; not easily generalizable since memorizing prose piece is not an authentic memory experience; ethical considerations considering the ingestion of cortisol. (Submitted by Christine)

**Rogers & Kesner (2003)**

    Relevant Vocabulary

* Acetylcholine: A neurotransmitter found in high concentrations in the hippocampus
* Scopolamine: A blocker for the neurotransmitter acetylcholine
* Placebo Injection: An injection of saline solution given to one group as a control

    Aim:

* Determine the role of acetylcholine in the encoding of spatial memory

    Procedure/Method

* Rats were given time to acclimate to a Hebb Williams maze so that they would not be afraid of the new environment
* The rats were randomly allocated to one of two conditions: receiving an injection of scopolamine or receiving a placebo injection directly to the hippocampus
* The number of errors made in moving through the maze in the first five trials of Day 1 was compared with the number of errors made in the last five trials of Day 1 in order to test the encoding of spatial memory
* The number of errors in the first five trials of Day 2 was compared to the number of errors made in the last five trials of Day 1 in order to test the retrieval of spatial memory

    Results

* The group that had received the injection of scopolamine took significantly longer to complete the maze and made a significantly larger number of mistakes in the last five trials of Day 1, but there was no difference in the ability to retrieve already-created memories on Day 2

    Evaluation

* Confounding variables were avoided through carefully controlled environment conditions and the use of a control
* The study takes a reductionist approach to understanding memory, so it is difficult to draw a clear relationship between acetylcholine and the encoding of memory because memory is much more complex
* Raises questions about the extent to which animal research can be generalized to humans (Submitted by Adara)

**Ronay Von Hippel (2010)**

* Aim: to see if evolutionary factors affect men's behavior when skating in front of females.
* The methods:43 participants were assigned to a male experimenter condition and 53 were assigned to a female experimenter condition. Skateboarders were asked to choose one easy trick and one difficult trick they had not yet mastered which they attempted 10 times each with a female or male present. Attractiveness of the female was established by 20 independent male raters. Saliva samples were collected at the conclusion of the experiment to monitor testosterone levels.
* Field experiment
* IV: presence of male or female participant
* DV: Changing levels of testosterone in response to risk taking
* The results: Male participants took greater risks on the difficult tricks in the presence of the female experimenter. Testosterone levels were significantly higher among men who skateboarded in front of the female experimenter as predicted. It was suggested that increased risk-taking in front of the female experimenter was partially mediated by increased testosterone levels.
* The evaluation: Young men take greater physical risks when in the presence of an attractive woman. Researchers also suggest that the prefrontal cortex affects higher levels of testosterone leading to higher risk-taking behavior which may have an evolutionary origin to attract a mate. (Submitted by Isabella)

**Rosenzweig,Bennet and Diamond (1971)-**

* Aim:  To investigate whether environmental factors such as a rich or an impoverished environment affect development of neurons in the cerebral cortex.
* Method: Rats were placed in either an enriched environment or an impoverished condition. The enriched had 10-12 rats in a cage provided with different stimulus objects to explore and play with. This group also received maze training. The impoverished condition had each rat in an individual cage so isolation and no stimulation. The rats typically spent 30 to 60 days in their respective environments before they were killed so the researchers could study changes in brain anatomy.
* Results: The anatomy of the rats were different based on their environment. The brains of enriched rats had increased thickness and higher weight of the cortex. Enriched rats had developed more acetylcholine receptors in the cerebral cortex an important neurotransmitter in learning and memory.
* Evaluation: The experiment was highly controlled so can be reliable with a cause and effect relationship. Weakness includes that it was an animal model and may be difficult to generalize to humans. Also rats were killed. This study does show that brain plasticity is assumed to follow the same pattern as seen in the rats where environments are subject to social stimulation. (Submitted by Isabella)

**Wedekind et al Study (1995)**

Theory: Women choose men who have different MHC genes than they have when choosing mates

Key Vocabulary:

· MHC- also known as the major histocompatibility complex, which are genes that encode surface proteins

Aim: To see whether human body odors and female preferences for them are dependent on a persons MHC - genes.

Procedure:

· 49 female participants and 44 male participants were tested to identify their MHC genes.

· They were then all asked to wear a shirt that was 100% cotton.

· They had to wear them for 2 days straight and then the females were asked to smell the shirts on the 3rd day and rate them from 1-10 on how pleasant they were.

· Were restricted from using perfumes or eating specific foods which could influence their smell.

Results: Women preferred men with dissimilar immune systems or MHC - genes to their own.

Evaluation:

· It was not very generalizable to a larger population size as only students were tested.

· The experiment was well controlled, so we can be sure that it was the persons natural odor that was judged and not anything other than this. (Submitted by Hailey)

**Weissman et al Study (2005)**

Theory: Depression found in older generations would be the result of depression found in younger generations

Key Vocabulary:

· Longitudinal study- a study that’s performed or observed over a number of years

Aim: To measure the likelihood of children having depression based on the presence or absence of depression in their parents and grandparents

Procedure:

· Measured over a 20 year period, looking at families with high and low risk of depression.

· Original sample of high-risk depressed participants came from an outpatient clinic with specialization in the treatment of mood disorders.

· The low risk depressed participants cane from the local community. Data was collected from clinicians, blind to past diagnosis of depression or data collected in previous interviews.

· Children were later evaluated by two experienced clinicians with one being a child psychiatrist and the other a psychologist.

Results: Found high rates of psychiatric disorders in the grandchildren with two generations of major depression.

Evaluation:

· Increased reliability of study since it was longitudinal (Submitted by Hailey)

**Sharot et al (2007)**

· Key theories/vocabulary: flashbulb memories – vivid memories of particular moments

· Aim: to determine the biological factors involved in flashbulb memories

· Method/Procedure: The experiment was a quasi-experiment that was held 3 years after the 9/11 terrorist attacks in Manhattan. The sample was made up of New Yorkers that were in Manhattan on the day of the attack. They were put into an fMRI and were presented with word cues on a screen. The words were associated with the attacks, such as “summer” and “September.” As they recalled the event, their brain activity was inspected. Following the brain scans, participants were instructed to rate the vividness, detail, confidence in accuracy and arousal of their memory as well as to write a description.

· Results: Half of the participants had what is classified as “flashbulb memories.” Those who described more detail also reported that they were closer to the World Trade Center than other participants. Amygdala activation positively correlated with flashbulb memories, suggesting that personal experience is critical in activating the mechanisms necessary for the making of vivid memories.

· Evaluation: correlational – does not establish cause-and-effect relationship; low ecological validity; low chance of demand characteristics; does not explain flashbulb memories from TV or Internet; small, culturally biased sample size (individualistic cultures more likely to have flashbulb memories than collectivistic cultures) (Submitted by Christine)

**Zak (2009)**

· Key theories/vocabulary: permissive effect – has a certain affect on a behavior but is not the sole cause for it; counter-balanced repeated measures design – participants returned a couple of weeks after doing the procedure for the first time to repeat the procedure

· Aim: to study the effect of testosterone on a male's generosity and sense of aggression

· Method/Procedure: All participants were male. First, a baseline test for testosterone was determined for each participant. They then were allocated to one of two conditions: to rub a testosterone gel on their shoulders or a placebo gel. Their testosterone levels were then measured again the morning after to determine how much their testosterone levels had increased. The participants were then instructed to play an online Ultimatum game in which they had to decide whether they could be generous to another player with

money he controlled or stingy. However, stingy offers could be rejected by the other player. Rejected offers would result in both players losing their money. Participants returned after four weeks to repeat the procedure, but this time received the other gel instead. This made the experiment a counter-balanced repeated measures design.

· Results: The participants were 27% stingier when they were in the testosterone gel condition. This suggests that men with naturally high testosterone levels are more likely to be selfish and punish others for not following social norms. In addition, testosterone seems to have the opposite effect as oxytocin, a hormone that promotes social bonding.

· Evaluation: repeated measures design eliminated individual differences; participants did not suspect the conditions and thus there was a low chance of demand characteristics; the procedure was counter-balanced – eliminated order effects; reductionist in explaining human aggression and generosity; low ecological validity (Submitted by Christine)

**Zhou et al. (2014)**

* Aim: to investigate the correlation between pheromones and human sexual behavior (gender recognition)
* The methods: 96 participants (24 heterosexual women, 24 heterosexual men, 24 gay men, 24 lesbian women) were asked to smell cloves, there were 3 different conditions for the cloves. Condition 1: cloves mixed with androstadienone (pheromone found in male sweat and semen). Condition 2: cloves mixed with estratetraenol (pheromone found in female urine). Condition 3: regular cloves (control group). Participants were then asked to watch an animation of a stick figure walking and identify its gender.
* The results: In condition one, heterosexual women and gay men (people attracted to men) were more likely to identify the stick figure as male.In condition two, heterosexual men and lesbian women (people attracted to women) were more likely to identify the stick figure as female.
* The evaluation: Has high population validity but was reductionist with small number of participants. As heterosexual women and gay men perceived the stick figure as more masculine when exposed to androstadienone, whereas heterosexual men and lesbian women perceived the stick figure as more feminine when exposed to estratetraenol, the research suggests that pheromones can communicate gender depending on gender of attraction. (Submitted by Isabella)