**Maguire et al. Taxi Drivers in London**

The aim of the study was to see whether the brains of London taxi drivers would be somehow different as a result of the exceptional training that they have to do to be certified. What is known as "the Knowledge." Taxi drivers in London must undergo extensive training, learning how to navigate between thousands of places in the city. This training is colloquially known as “being on The Knowledge” and takes about 2 years to acquire on average. To be licensed to operate, it is necessary to pass a very stringent set of police examinations. London taxi drivers are therefore ideally suited for the study of spatial navigation. The use of a group of taxi drivers with a wide range of navigating experience permitted an examination of the direct effect of spatial experience on brain structure.

The participants for this study were 16 healthy, right-handed male licensed London taxi drivers. The taxi drivers were compared with the MRI scans of 50 healthy right-handed males who did not drive taxis. The study is correlational in nature as the IV is not manipulated by the researcher. It was also a single-blind study - that is, the researcher did not know whether he was looking at the scan of a taxi driver or a control. There were two key findings of the study. First, the posterior hippocampi of taxi drivers were significantly larger relative to those of control subjects. The second finding was that hippocampal volume correlated with the amount of time spent as a taxi driver.

As this was not a true experiment, cause and effect cannot be established. However, although you might try to argue that those with larger hippocampi might be more spatially talented and thus chose to be taxi drivers, this does not explain the correlation between the size of the hippocampus and the number of years driving. You could also argue that the MRI environment is not ecologically valid - but in this case, the taxi drivers are not being asked to do anything. The technology is simply being used to measure the structure of the hippocampus. The weaknesses of this study come mostly from the sampling bias. However, you could also argue that the target population - London taxi drivers - is predominantly male. But it does make it difficult to generalize the findings. However, the study was well controlled for gender, handedness and age.

**Newcomer et al (1999)**

Aim: The aim of the research was to investigate whether high levels of the stress hormone cortisol interfere with verbal declarative memory.

Procedure

All participants were employees or students at the Washington University Medical Center. All participants were given a clinical interview with a physician. They were excluded from the sample if they were pregnant, had a history of mental illness, had suffered head trauma, or had suffered from any illness that had been treated with corticosteroids. In addition, participants not routinely sleeping during the night hours were excluded to standardized circadian rhythms.

In order to investigate a possible link between cortisol and memory the researchers designed an experiment with three experimental conditions:

Condition 1 – high level of cortisol: The participants in the high level cortisol group were given a tablet containing 160 mg of cortisol on each day of the four-day experiment. This dose of cortisol produces blood levels similar to those seen in people experiencing a major stress event.

Condition 2 – low level of cortisol: The participants in the low level of cortisol group were given a tablet containing 40 mg of cortisol per day. This dose is similar to the amount of cortisol circulating in the blood stream of people undergoing minor surgical procedures such as having stitches removed.

Condition 3 – placebo group: The participants in this condition were given placebo tablets - that is, a tablet that looked like the other tablets but with no active ingredient. This was done in order to have a control group.

Participants were assigned on a matched-pair design for gender and age. The experiment was done under a double-blind control.

All participants were asked to listen to and recall parts of a prose paragraph. This tested their verbal declarative memory. It is known that verbal declarative memory is often affected during long-term stress and the researchers knew from previous studies that cortisol could be involved in memory impairment.

Results



The study seems to clearly indicate an effect of stress related hormones on recall of declarative memory. Errors tended to be of omission rather than commission, indicating that the results are not due to attention impairment, but impairment of recall. In the placebo treated group, paragraph recall performance improved over the course of the four days, most likely do to a practice effect. In contrast, the cortisol treated participants did not show an overall improvement.

The results indicated that high cortisol levels impaired performance in the memory task since the participants who received the highest level of cortisol also showed the worst performance in verbal declarative memory. The effect was not permanent, however. The performance of participants in the high cortisol condition returned to normal after they stopped taking the hormone tablet. According to the researchers, these results demonstrate a clear link between levels of cortisol and remembering. It appears that cortisol interferes with the transfer of short-term memory to long-term memory that takes place in the hippocampus. This makes sense as there are several cortisol receptor sites on the hippocampus.

Evaluation

Since this study was experimental, the researchers could establish a clear cause and effect relationship between the IV and the DV.

The experiment ran over several days and the participants were not in the lab the whole time, so the researchers did not have full control over extraneous variables. In spite of this, there was a clear relationship between the amount of cortisol ingested and the performance on the memory test.

Memorizing a piece of prose is perhaps not the most authentic memory experience. Although it may explain student exam stress, the ability to transfer the results to other situations may be limited.

There are ethical considerations in the study. The participants ingested cortisol which affected their memory negatively. However, the participants had signed an informed consent form and the damage was not permanent.

**Wedekind (1995)**

Evolutionary psychologists argue that our behaviours are the result of natural selection – that is, the behaviours that best served the human gene pool have been passed down from generation to generation. Since mating behaviours are an essential component of how behaviour is inherited, it should be no surprise that why we choose the partners that we do is a major focus of evolutionary psychologists.

Shackelford & Larsen (1997) found that men with less symmetrical facial features were less physically active, manifested more symptoms of depression and anxiety, and reported more minor physical problems – for example, colds, headaches, and gastrointestinal problems. It appears that asymmetrical facial features develop during puberty. It is then that the development of prominent cheekbones and a masculine chin develop as a response to androgen levels. Chronic illness during adolescence can suppress androgen secretion, leading to lower physical attractiveness. Could it be that women somehow “know” this when looking for a partner?

Low (1990) carried out an analysis of 186 cultures and found a strong relationship between the number of parasites that the population is exposed to – what is called pathogen stress – and the number of unmarried men. As pathogen stress increases, the number of unmarried men increases. Buss & Schmitt (1993) found that women in areas of high pathogen stress rate physical attractiveness as much more important in finding a mate than in areas with low pathogen stress. Once again, are women unconsciously assessing the health of a potential mate, considering the effect on potential children?

Claus Wedekind wanted to see if this were true. He chose to study what is known as the Major Histocompatibility Complex, a group of genes that play an important role in the immune system. MHC genes make molecules that enable the immune system to recognize pathogens; in general, the more diverse the MHC genes of the parents the stronger the immune system of the offspring. MHC genes are expressed in codominant fashion– that is, that we inherit the MHC alleles from both of our parents and they are expressed equivalently. It would be beneficial, therefore, to have evolved systems of recognizing individuals with different MHC genes and preferentially selecting them to breed with to maximize immune responses. Evolutionary psychologists argue that our “smell” is the sign of our MHC. Wedekind wanted to see if women are attracted to a man because of his MHC. He did this in his famous “Smelly T-Shirt Study.”

**Procedure**

The aim of the study was to determine whether MHCs would affect mate choice. The sample was made up of 49 female and 44 male students from the University of Bern, Switzerland. Each participant was “typed” for their MHC, and a wide variance of MHCs were included in the sample. It was noted if the women were taking oral contraceptives. The students probably did not know each other – as they were from different courses: women from biology and psychology; men from chemistry, physics, and geography.

The men were asked to wear a T-shirt for two nights and to keep the T-shirt in an open plastic bag during the day. They were given perfume-free detergent to wash clothes and bedclothes, and perfume-free soap for showering. They were asked not to use any deodorants or perfumes, to refrain from smoking tobacco or drinking alcohol, to avoid all spicy foods, and to not engage in any sexual activity.

Two days later, the women were asked to rank the smell of 7 t-shirts, each in a cardboard box with a “smelling hole.” The women were tested whenever possible in the second week after the beginning of menstruation, as women appear to be most odour-sensitive at this time. The women were also asked to prepare themselves for the experiment by using a nose spray for the 14 days before the experiment to support regeneration of the nasal mucous membrane if necessary – as well as a preventive measure against colds or flu. Each woman was also given a copy of Suskind's novel Perfume to sensitize their smell perception.

Three of the seven boxes contained T-shirts from men harboring MHC similar to the woman's own; three contained T-shirts from MHC-dissimilar men; and one contained an unworn T-shirt as a control. Alone in a room, every woman scored the odours of the T-shirts for intensity (range 0-10) and for pleasantness and sexiness (range 0-10, 5 = neutral).

**Results**

Women scored male body odours as more pleasant when they differed from the men in their MHC than when they were more similar. This difference in odour assessment was reversed when the women rating the odours were taking oral contraceptives. Furthermore, the odours of MHC-dissimilar men remind the test women more often of their own actual or former mates than do the odours of MHC-similar men. This suggests that the MHC or linked genes influence human mate choice.



**Discussion**

The study clearly seems to support an evolutionary argument for mate selection in humans. The study has been successfully replicated by Jacob et al (2002). Yamazaki et al. (1976) showed this to be the case for male mice, which show a preference for females of different MHC.

The contraceptive pill seems to interfere with natural mate choice. If the pill changes preferences for familiar as well as unfamiliar body odours, then starting on the pill after developing a relationship could have an influence on the stability of the relationship by influencing odour preference. Further testing of this hypothesis is necessary.

Research shows that couples who suffer from repeated spontaneous abortions often share a higher proportion of their MHC than control couples in many different populations (Beer et al. 1985). Also, newborn babies of such couples often have a reduced birth mass (Reznikoff-Etievant etal. 1991). So the ability to detect MHC could play a key role in a woman’s search for the “best mate.” Of course, such a “decision” is not a conscious one. Consistent with this may be the finding that spontaneous abortions in mice can be experimentally induced by the odour of a male which genetically differs only in his MHC from the fathering male (Yamazaki et al. 1983).

In spite of all the evidence, there are some that argue that the theory is too reductionist – that is, it over-simplifies the behaviour of human mate selection by bringing it down to the MHC – ignoring cognitive and socio-cultural factors.

The design of the study was a double-blind experiment. This means that neither the researchers nor the participants were aware of which t-shirt they were being exposed to at any point in the study. This was done in order to minimize demand characteristics.

The study also met ethical standards as consent was obtained from all participants and they were debriefed. The sample, however, may not be considered representative as the participants were similar in age and culture.