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Neuropsychology shines torch through corridors of the mind

Hit the TV. The way it breaks down offers clues as to how it works. For example, you'll never find that a thump causes the screen to selectively stop displaying women, because there's no mechanism in the machine that exclusively supports the transmission of female images. Cognitive neuropsychologists pursue a similar approach with the human brain, except of course they don't kick people, but rather they study patients with a brain damaged through some other misfortune.

A new study focuses on the way the brain represents knowledge and facts about the world - what psychologists and linguists call semantics. Faye Corbett and colleagues compared the deficits shown by eight patients with semantic dementia - a form of neurodegenerative brain disease that affects the front region of the temporal lobes - and seven stroke patients with semantic aphasia. The stroke patients had damage either to the left, frontal part of their brains, or to the junction where the temporal and parietal cortices meet.

Superficially, the two groups of patients have remarkably similar impairments. They struggle to find the correct words to refer to things, and their factual knowledge and comprehension of words also seems affected. However, with the help of an extensive battery of tests, Corbett's team have shown that there are striking differences in the way the two patient groups are affected - a finding that helps further our understanding of the way the brain supports language and knowledge.

The patients with semantic dementia performed consistently across tests. So, if they struggled with a word on one test, such as matching a picture to the word hammer, then they would also struggle when they were asked to mime the use of a hammer, or if they were asked to match a picture of a hammer to another object with a similar function. Moreover, the rarer a word, the more likely these patients were to have a problem. Altogether their performance suggests that they are progressively losing their core knowledge about objects.

By contrast, the performance of the patients with semantic aphasia was inconsistent. They'd perform well on a simple task, such as pointing to a picture of a hammer when prompted with the word, but they'd struggle as soon as a task was made more complicated - for example, involving pairing objects by their function, or by action. Moreover, the rarity of a word didn't predict whether these patients would have a problem.

This difference between the groups was particularly striking when it came to miming object use. The patients with semantic dementia could either do this for an object or they couldn't. By contrast, the aphasic patients would get some of the mime correct, but would then perform an inappropriate action, as if they were suddenly using a different type of object.

The researchers think the overall picture shown by the two groups of patients reveals that the semantic system of the brain is comprised of at least two components - a core representation of knowledge, and an overall control system that navigates through the corridors of the mind finding and comparing meanings. Core knowledge is subserved by the frontal area of the temporal lobes, which is the region afflicted by the disease process in semantic dementia, whilst the cognitive control component is subserved by the prefrontal cortex and the temporo-parietal junction, which are the areas, which when damaged, lead to semantic aphasia.

"We propose that semantic dementia patients have damage to core amodal semantic representations, whereas patients with semantic aphasia have a more general executive impairment that leads to difficulty controlling activation within the semantic system in a flexible, task appropriate fashion," the researchers said.


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If you're a university student, you'll be all too familiar with the looming coursework deadline. You'll know how tempting it is to keep putting the essay off until tomorrow, but then tomorrow comes and Jeremy Kyle has a guest on who's in love with her neighbour's dog, so you put it off again. Perhaps you fear receiving a bad mark, but you also reason to yourself that it doesn't matter. Your plan, once you graduate and get a job, is to change gears, really show what you can do.

If this sounds like you, it could be time to take note. A new study, rare for its longitudinal design, has shown that students who found reason to avoid work-related tasks at university, and who were pessimistic about their chances of success, were more likely, 10, 14 and 17 years later, to report feeling disengaged from their job, and were more likely to report experiencing work-related burnout.

Katriina Salmela-Aro and colleagues recruited 292 students and had them complete the “success expectation scale” and the “task-avoidance scale” and then followed them many years later and asked them to fill in measures of work burnout and work engagement.

Turning the results the other way around, students who were optimistic and focused at university tended to be more engaged in their working lives and to avoid burnout. The researchers said that so-called "achievement strategies" are more modifiable than personality traits and that there could therefore be value in university interventions that promote optimistic strategies and reduction in task avoidance.

“No previous study has examined how achievement strategies contribute over longer time periods or examined the consequences they have for people's working life and career adaptation,” the researchers said.


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Football players who rush penalty kicks are less likely to score

Taking a penalty in an international football competition must be one of the most tense moments an athlete can face. Even though the odds are stacked against the goal-keeper, the world’s best attacking stars often underperform. In psychological jargon - they choke.

According to a new analysis of all the penalty shoot-outs held in previous World Cups, European Championships and the UEFA Champions League, issues of timing appear to be crucial to the success or not of a penalty kick. Sports psychologist Geir Jordet and his colleagues have found that, on average, the less time a player takes to respond to the referee’s whistle before running towards the ball to take the penalty, the more likely they are to fail to score.

The researchers say the finding is consistent with the idea that choking is a form of "self-regulatory breakdown". In other words, an intense threat to our reputation can cause so much distress that we do whatever we can to end the situation as quickly as possible, even if taking this action is harmful to our performance.

A snap-shot of the results reveals that players who took less than 200ms to respond to the ref's whistle scored, on average, just under 57 per cent of the time. By contrast, players who took more than a second to respond, tended to hit the back of the net just over 80 per cent of the time, on average.

It was a similar story for placement of the ball on the penalty spot, with the players who spent longer placing the ball also tending to be more likely to score, although this trend didn't reach statistical significance.

The researchers also looked at aspects of timing imposed by the referee. In this case, the pattern of results went in the other direction. For example, players were less likely to score if the penalty was delayed by the referee instructing them to reposition the ball. So whereas a player rushing is detrimental to performance, a referee slowing down the situation also seems to be harmful. This certainly chimes with Steven Gerrard's account in his autobiography of his penalty miss at the 2006 World Cup: "I was ready. Elizondo [the referee] wasn’t. Blow the whistle! F***ing get a move on, ref! ... Those extra couple of seconds ... definitely put me off”.

The researchers said their findings should be treated with caution given that some of the sample sizes for some of the conditions were small, and given that this was a retrospective analysis and interpretation of past events, rather than a controlled experiment. However, they concluded that: "short self-imposed times and long externally imposed waiting times accompany low performance” and that referees [should] therefore “make sure that they offer equal temporal conditions for all shooters, by giving the ready signal at the same points in time for everyone”.

Jordet, G., Hartman, E., & Sigmundstad, E. (2009). Temporal links to performing under pressure in international soccer penalty shootouts Psychology of Sport and Exercise, 10 (6), 621-627
http://dx.doi.org/10.1016/j.psychsport.2009.03.004

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Empathic people remember your smell

If you're an empathic person, able to tune into other people's feelings, then the chances are you've also got a keen sense of what other people smell like! We've known for some time that the brain areas involved in empathy and recognising facial emotions partially overlap with the brain areas associated with smell. Wen Zhou's and Denise Chen's new finding shows that this overlap extends to behavioural performance.

Forty-four female university students were twice tasked with smelling three t-shirts and picking out the one that belonged to their room-mate. The t-shirts had been carefully prepared - worn overnight for an average of eight hours, after the owner had used scent-free toiletries for the previous two days.

Based on their performance, the students were arranged in three groups: 21 of them failed both times to pick out the correct t-shirt; 10 of them picked the correct t-shirt once; and 13 of them picked the correct t-shirt both times. The key finding was that the students who both times identified their room-mate's t-shirt by its smell also tended to excel at a test of identifying facial emotional expressions, and at a test of empathy in which they had to say how someone would feel in a range of different situations.

The students' confidence in their choices of t-shirt showed no association with their actual performance, thus suggesting that the ability to identify a room-mate's smell appeared to be implicit.

Further analysis showed that it was specifically the students' skill at using smell for "social" purposes that was linked with empathy. General keenness of smell and the ability to name a range of different odours were not linked to empathy in any way. The intensity and pleasantness of the t-shirt smells were also unrelated to the students' ability to identify their room-mates.

"To our knowledge, this study provides the first empirical evidence of the behavioural connection between a sensory system and emotional processing," the researchers said. "The behavioural findings reported here suggest that sociochemical signals may tap into a broader network of social cognition and emotion, and that similar underlying mechanisms may regulate sociochemosensory and emotional competencies."


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Nearly everyone seems to carry a mobile phone these days. What if social scientists could exploit this technology to spy on our social behaviour: who we speak to and who we spend time with? It turns out they already are. Nathan Eagle, named recently as a leading young innovator by Technology Review, and his colleagues, have published one of the first studies into social network analysis using spy software loaded onto Nokia smartphones.

For nine months, Eagle's team recorded data from the phones of 94 students and staff at MIT. By using blue-tooth technology and phone masts, they could monitor the movements of the participants, as well as their phone calls. Their main goal with this preliminary study was to compare data collected from the phones with subjective self-report data collected through traditional survey methodology.

The participants were asked to estimate their average spatial proximity to the other participants, whether they were close friends, and to indicate how satisfied they were at work.

Some intriguing findings emerged. For example, the researchers could predict with around 95 per cent accuracy who was friends with whom by looking at how much time participants spent with each other during key periods, such as Saturday nights.

There were also discrepancies between the two data sets. For example, participants tended to overestimate how much time they spent with friends, and underestimate how much time they spent with non-friends. Also, the accuracy of the self-report proximity data tended to peak over the previous seven days (at which point it correlated highly with the phone records), but then it's accuracy tailed off. This provides useful information about the validity of survey records over time, and an interesting insight into people's memories for their social interactions.

As regards satisfaction at work, it turned out that people who were in closer proximity to their friends during work time, tended to be happier at work, whilst participants less happy at work tended to make more phone calls to friends during work hours.

"Data collected from mobile phones have the potential to provide insight into the underlying relational dynamics of organisations, communities and potentially societies," the researchers said.


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New insights into amputation desire

In the late Summer of 1997, the surgeon Robert Smith deliberately amputated the healthy lower left leg of his patient, 38-year-old Kevin Wright, who had been yearning for this outcome since childhood.

Back in the 90s, Wright's condition was judged to be a form of body dysmorphic disorder - a psychiatric diagnosis characterised by an irrational belief that there is something defective with a body part. Before now, there has been little systematic research with patients experiencing amputation desire, but in a new study, Olaf Blanke and colleagues have reported the results of extensive interviews they've conducted with 20 such patients. Blanke's findings have led his team to speculate that rather than being a form of body dysmorphic disorder, amputation desire might be more accurately construed as a neurological syndrome, related to a dysfunction in the way the body is represented in the fronto-parietal circuits of the brain - a condition they've labelled "body integrity identity disorder".

Supporting their account, Blanke's team point to the fact that 75 per cent of the interviewed patients specifically wanted their left leg amputated, or if they wanted both legs amputated, then the desire was predominantly for the left leg (which is represented and controlled by the right hemisphere of the brain).

Moreover, 13 of the participants reported abnormal sensations in the body part they wanted removed, including tingling and numbness, loss of sensitivity, the feeling that the limb belongs to someone else, or that it is already absent (almost like an inverted form of phantom limb syndrome). These were not delusions because the patients knew that in reality, the limb was theirs and was there. Crucially, however, these kinds of abnormal sensations are sometimes reported by patients with damage to the fronto-parietal cortex.

Contrary to the body dysmorphic diagnosis, none of the patients thought their limb was defective, nor were they embarrassed by it.

"Collectively, our data suggest that amputation desire might be conceptualised as chronic asomatognosia [lack of awareness of a body part] or a negative form of the phantom limb phenomenon," the researchers said, adding that the condition appeared to have much in common with gender identity disorder, which is associated with a desire to change sex. However, the researchers cautioned that there is a need for more in-depth neurological examinations with a larger sample of patients.

Several other curious findings emerged. For example, there appeared to be a sex difference in amputation desire. Whereas 12 of the 17 male patients desired the amputation of a single limb, the three female patients all wished for multiple amputations - one wanted all her limbs removed, one wanted to lose two legs and an arm, and the other wanted both legs truncated.

Among the patients' descriptions of their amputation desire were the following typical accounts: "It [the leg] feels foreign and it does not belong to me", "I should not have been born with my legs", and "My leg is somehow too much, I am not connected to my body".

http://bpsoc.publisher.ingentaconnect.com/content/bpsoc/jnp/2009/00000003/00000002/art00003

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Movies like Elizabeth I can help students learn history

It's late one Friday afternoon with "double history" looming. But you arrive at class and your prayers are answered: the teacher says that for today's lesson you're going to be watching the popular film Elizabeth I. According to a new study, not only will this ease you comfortably into the weekend, the experience could significantly improve your retention of the associated course text. With one caveat. The teacher must point out in advance where the film deviates from the true historical record.

Andrew Butler and colleagues presented dozens of undergrad students with short, accurate passages of text about a historical event or situation. Some of these passages were accompanied by five minute clips from relevant historical movies, including Elizabeth I and The Last Samurai. Each film clip included a factual accuracy that matched the text, and one inaccuracy.

Crucially, when the students were tested a week later, their memory for a fact in the text was improved by about 50 per cent if they'd also seen a film clip portraying the same information. The students also rated text as more interesting if they'd watched an associated film clip.

What about the effects of inaccuracies in the film clips? It depended on what kind of warning students were given about the inaccuracies. With no warning or a general warning, students asked a question about a fact that was misrepresented in a film clip tended to give an answer mistakenly based on the film information, rather than the text. However, a specific warning about the inaccuracy in a film clip eradicated these kind of errors.

A follow-up study with 54 more students replicated these findings and showed that when students mistakenly relied on inaccuracies in film clips, they often showed misplaced confidence in the accuracy of their answers, sometimes misattributing the source of the false information to the text rather than the film.

"The current study clearly shows that watching popular history films has both positive and negative effects on the learning of associated texts," the researchers said. One the one hand, they can "increase learning and interest in the classroom," but on the other hand, historical inaccuracies in films can have detrimental effects. "One potential solution," Butler's team advised, "is for educators to provide students with specific warnings regarding the misinformation present in popular films prior to showing them in the classroom."


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