UNIVERSITY OF EXETER

The mysterious story of self-control

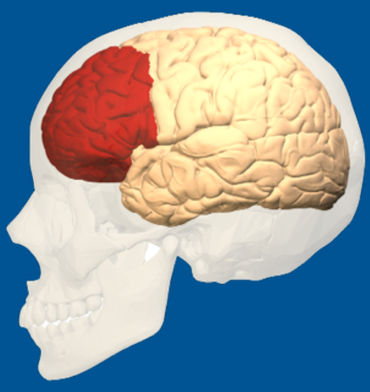
ESRC FESTIVAL OF SOCIAL SCIENCE

What is self-control?

Scientists have always shown great interest in how the human mind controls behaviour. But this has proven one of the most difficult issues to tackle…

Psychologists and neuroscientists attribute adaptive and goal-directed behaviour to 'executive' or 'self-control' functions that organise and monitor lower-level brain processes. These control mechanisms allow people to selectively attend to relevant information while filtering out distracting information, flexibly switch between tasks, inhibit inappropriate response tendencies, adjust strategies after mistakes or bad outcomes, and plan behaviour.

The neural basis of self-control



Early research on self-control focused mostly on behavioural deficits after lesions to the prefrontal cortex. The common finding is that frontal-lobe patients experience problems with organising and regulating their behaviour.

For example, they can become impulsive, and are often unable to respond appropriately to changes in the environment. Since this early work, many experiments have been conducted with a variety of techniques, such as neuroimaging and brain stimulation, to understand how the prefrontal cortex can regulate behaviour.

One of the most intriguing findings is that different subregions of the prefrontal cortex may be involved in different aspects of self-control. Together, they form a self-control 'network' that exerts control over other brain regions.

The rise and fall of self-control

Developmental studies suggest that some of the self-control abilities may mature at different rates during childhood and adolescent development. These changes can be partially linked to the development of the prefrontal cortex.

When people age, certain control functions decline again. A prominent account of ageing proposes that general cognitive functioning becomes impaired because older people have more difficulties with inhibiting irrelevant information.

Self-control in everyday life

Self-control during childhood and adolescence predicts physical health, substance dependence, personal finances, and criminal offending outcomes.

The Marshmallow test has been used to demonstrate this link. In this test, children are offered a marshmallow, but they are told that if they can wait for 15 minutes, they get a second one. This requires strong self-control.

Impairments in self-control

Self-control deficits have been observed in many disorders, including:

- attention deficit/hyperactivity disorder
- obsessive-compulsive disorder
- kleptomania
- schizophrenia
- ....

Impairments in self-control

At the University of Exeter, we study:

Substance abuse

Alcoholism

Bipolar disorder

Overeating

Gambling

Reckless driving

These disorders are associated with huge personal, economic, and societal costs. To give only a few examples:

- The economic & social costs of Class A drug use in England & Wales are estimated at around £15.4 billion in 2003/2004
- Most western nations with developed gambling industries report rates of problem gambling between 0.2 & 3.5%
- In 2008, almost a quarter of adults in England were obese, and in 2004, almost 7% of all deaths in England were attributable to obesity.
- The estimated cost of alcohol harm to the NHS in England is £2.7 billion in 2006/2007.

Understanding the role that reduced self-control plays in these conditions may help us to develop better treatments.

Do you find it hard to resist your urges or temptations?

You are not alone. For example, 64% of UK adults are overweight or obese, largely due to excess calorie intake. However, help is at hand.

University of Exeter researchers, led by Dr. Natalia Lawrence, have developed a simple online computer game that trains people to resist unhealthy snack foods. The game requires people to repeatedly inhibit key press responses to certain images (e.g. of chocolate), whilst responding to other images. This trains people to associate unhealthy foods with 'stopping', and can reduce how much food people eat in the lab.

Now, a study sponsored by the Wellcome Trust and recruiting Exeter 10,000 participants, has found that 40 adults who completed four 10-minute sessions of the training lost a significant amount of weight and ate fewer calories (estimated from food diaries). Intriguingly, the training also appeared to reduce how much the unhealthy 'stop' foods were liked. These effects were observed relative to a control group of 40 adults who completed the same stop vs. go training, but involving pictures of non-food objects (e.g. pens).

On average people eat 35% less crisps after stop training

The research team are now conducting further studies.

For more info and contact information:

http://psychology.exeter.ac.uk

If you would like to participate in experiments:

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