

Brain connections power automatic and conscious behaviour

September 5 2012

(Medical Xpress)—What determines whether you deal with new situations in a flexible manner or simply act out of habit? A team of psychologists have discovered that this is predicted by the strength of specific connections in the brain. It can therefore be seen in your brain whether you act consciously or on automatic pilot. An understanding of this is relevant for the treatment of drug addicts and compulsive patients, for example. Dr Sanne de Wit, Poppy Watson and professor Richard Ridderinkhof from the University of Amsterdam led the research that was funded by NWO. The renowned *Journal of Neuroscience* published the research results on 29 August 2012.

Thanks to our automatic pilot we do not have to consciously perform all of our everyday actions. For example, while cycling to the supermarket you can suddenly notice that you have subconsciously completed part of the route already. The actions that lead you to working on automatic pilot are, however, not always the right ones. That is the case, for example, when you forget to turn off at a junction where you would normally continue to go straight on. Research has now demonstrated that how easily you can deviate from automatic habits when the situation demands it depends on the connections in your brain.

Twenty-three study subjects aged 18 to 26 years took part in a [computer game](#). The [young adults](#) learned to carry out a certain action after a stimulus in order to receive a reward. As soon as they had mastered the various actions, the rules of the game changed. Then some of the actions suddenly lead to penalties instead of reward.

MRI scans demonstrated that the strength of several connections in the brain determined how good the study subjects were in subsequently adapting their behaviour. In study subjects where the [stimuli](#) continued to elicit automatic actions even when these no longer had positive consequences, the connection between the [premotor cortex](#) and posterior putamen was the strongest. However, if the study subject was good at adjusting their behaviour to the new situation then the connection between the ventromedial prefrontal cortex and the nucleus caudatus was stronger. The strongest connection in the brain therefore determines whether you are a creature of habit or act in a more focused manner.

The researchers had previously demonstrated that compulsive patients have a far above average tendency to act on automatic pilot. 'They persist in their compulsive habits despite the negative consequences,' says Sanne de Wit, one of the researchers. 'This automatic pilot can be modified in treatments that are targeted at raising awareness of automatic patterns (such as mindfulness) or indeed at breaking these (such as response prevention).' Future research needs to further unravel the relationship between the brain and automatic behaviour in compulsive patients. 'We think that the balance between the [brain](#) connections is seriously disrupted in compulsive patients. We expect a similar structural disruption in [drug addicts](#) and obese persons. It might well be the case that this disruption results in compulsive behaviour.'

Provided by Netherlands Organisation for Scientific Research (NWO)

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