

Alcoholism-related changes in the neuro-cognitive habit system

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Keywords: associative learning, goal-directed, automatic, devaluation, alcohol addiction

Hallmarks of addictions, like repetitive behavioural choices that persist despite their negative consequences, are similar to what is conceptualised as ‘habits’ in reward-learning theories. Individuals at risk typically experience progressive loss of control over drug intake, often despite the intention to regain control. Addictions have therefore been suggested to emerge from an imbalance between the habitual, stimulus-driven system and one system related to goal-directed, outcome-driven processes. We investigated alcohol-addicted patients and healthy controls using functional magnetic resonance imaging with an instrumental learning task. The task was designed to study goal-directed responses and their neural correlates under conditions where participants had to overcome previously learned and automatic value-driven responses. In a first phase, participants traded cookies with aliens to gain high, medium or low rewards. In a second outcome-devaluation phase, participants were forced to flexibly change their well-trained behavioural responses in order to still obtain a reward. Results showed that in the training phase, both, alcohol-addicted and healthy participants, decided faster and more accurately when trading cookies worth 100 points compared to cookies associated with 10 points. In the devaluation phase, we observed higher switch costs when high-value stimuli were devalued compared to the low-value ones. This difference was larger in the control group pointing towards an altered interplay between automatic and goal-directed control. In further analyses we will relate these behavioural effects to patterns of brain activation.