

Keeping one's eyes on the goal -- despite stress

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Stressed people fall into habits and their behaviour is not goal-directed. That the neurotransmitter norepinephrine plays a decisive role here is now reported in the *Journal of Neuroscience* by scientists from Bochum led by Dr. Lars Schwabe (RUB Faculty of Psychology). If the effect of norepinephrine is stopped by beta blockers, the stress effect does not occur. "The results may be important for addictive behaviours, where stress is a key risk factor" said Schwabe. "They are characterised by ingrained routines and habits."

In a previous study, the Bochum researchers had already found that stress affects goal-directed behaviour during a learning task. Now they explored how these negative effects can be prevented. Schwabe and his colleagues subjected half of the participants to a [stressful situation](#). Beforehand, the researchers administered the drug [propranolol](#), a beta blocker, to part of the stressed group. This occupies certain receptors and thus prevents norepinephrine from working. The remaining subjects took a [placebo pill](#).

Then, all the subjects learned that they received cocoa or [orange juice](#) as a reward if they clicked on certain icons on the computer. After this learning phase, the participants were allowed to eat either as many oranges or as much chocolate pudding as they wanted. "That weakens the value of the reward" explained Schwabe. "For someone who eats chocolate pudding, the cocoa loses its appeal. And someone full of oranges has less craving for orange juice." In the subsequent test series, non-stressed subjects who had eaten chocolate pudding clicked less

frequently on the icons which led to a reward of cocoa. Non-stressed participants who had previously eaten oranges opted less for symbols that were associated with orange juice.

The behaviour of the stressed subjects who had been administered a placebo tablet was completely different. Regardless of what they had eaten, they continued to choose both the symbols associated with orange juice and with cocoa. So they stayed in their habits. The behaviour of the stressed subjects in the beta-blocker-group, on the other hand, was just as goal-directed as that of the subjects who had experienced no stress. If they were full of chocolate pudding, for example, they rarely chose the symbols which led to a reward of cocoa. This result demonstrates that norepinephrine mediates the effect of stress and that [beta blockers](#) can avert the negative consequences of stress. The study was funded by the German Research Foundation and the RUB's Rectorate programme.

More information: L. Schwabe, O. Höffken, M. Tegenthoff, O. Wolf (2011): Preventing the stress-induced shift from goal-directed to habit action with a beta-adrenergic antagonist, *Journal of Neuroscience*, [doi: 10.1523/JNEUROSCI.3304-11.2011](#)

Provided by Ruhr-University Bochum

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