

Temptation in the Neurons

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Lack of self-control is at the root of many personal and social ills, from alcoholism to obesity. Even when we are well aware of the costs, many of us are simply unable to curb our desires and control our impulses. Indeed, so daunting is this psychological challenge that an estimate four in every ten American deaths is attributed to self-control failure of one kind or another.

Yet many other people do succeed at self-regulation, all the time and seemingly with ease. Why is that? Why, in the face of everyday temptation, do some individuals fail miserably while others coast by unscathed?

Psychological scientists have been puzzling over this problem for years, but the answer remains elusive. Recently, researchers in the U.S. and Europe have been taking a different approach. They have been trying to integrate different disciplines, and different investigative strategies, to see if this approach might illuminate the dynamics of desire and self-control. Among those scientists is the University of Cologne's Wilhelm Hofmann, who with colleagues has been combining neuroimaging and experience sampling, searching for brain markers that predict whether people give in to their desires (or resist) in daily life. Hofmann discussed some of this ongoing work this week in Amsterdam, at the first International Convention of Psychological Science, a meeting organized specifically to share such innovative cross-disciplinary research.

It's difficult to study individual desire and self-discipline, because many self-reports are biased and unreliable. To get around this obstacle, Hofmann and his colleagues used an fMRI scanner to observe subjects' brains as they viewed appetizing foods—desserts, fast foods, and so forth. Specifically, they recorded neural activity in the volunteers' nucleus accumbens, or NAcc, a region of the forebrain associated with pleasure and reward. They also recorded neural activity in the inferior frontal gyrus, or IFG, while volunteers were performing a self-control task. The IFG plays an important part in inhibiting action.

The scientists wanted to see if neural activity in these two brain regions predicted actual desire and self-regulation in these volunteers' daily lives. So after the brain scanning was completed, the scientists gave the subjects Blackberries, which they used for a week of experience sampling: Each day, the scientists signaled the subjects every two hours, or seven times a day, and had them complete a short survey. They reported on any desires they might have experienced in the previous half hour, the strength of those desires, their resistance to the desire, and finally, whether they had given into the desire and eaten—and if so, how much.

The idea was to see if neural markers for desire and resistance, taken together, could identify individuals who are more likely to give in to temptation to eat, hour by hour. And they did, clearly. Neural reactivity in the NAcc in response to tempting snacks and sweets—this brain activity significantly predicted the strength of subjects' desire for food, their failure to control their desires, and even how much they ate.

Additionally, those who recruited the IFG when faced with a self-control task—these subjects were less likely to succumb to temptation in daily life—and they also ate less.

These findings demonstrate the importance of individual differences in how people experience and respond to everyday temptation. These differences—how well or poorly individuals exert control in the face of temptation—appear to arise from brain mechanisms for both reward processing and regulation of responses. It's not just that people with self-control problems respond abnormally to food cues, and it's not just that they fail to inhibit their actions—it's apparently both. These abnormalities—and their neural signatures—may very well underlie other appetites and addictions, including binge drinking, compulsive gambling and risky sex.

Wray Herbert is reporting this week from the first International Convention of Psychological Science in Amsterdam.