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## Surprise Me, Please!

When your body gets something it wants, a pleasure center near the front of the brain buzzes with activity. Now, psychologists have found that this reward region responds more strongly when the pleasurable stimuli it encounters are unpredictable. The results, reported in the 15 April issue of the *Journal of Neuroscience*, may lead to a better understanding of addiction.



**Pop goes the nucleus accumbens.** The brain's pleasure center responds to the unexpected.

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predict. Most of the subjects didn't report noticing a difference between the predictable and unpredictable sequences. But functional magnetic resonance imaging revealed that their brains loved the randomness: Only the unpredictable sequences strongly activated the nucleus accumbens and nearby regions of the brain.

The finding "fits the animal work precisely" says Kent Berridge, a University of Michigan

A key part of this reward circuitry is the nucleus accumbens, a patch of tissue in the forebrain about the size of an almond. When it is experimentally removed from the brains of drug-addicted animals, their cravings cease. In the late 1980s, researchers studying this pathway in monkeys found that it responded more strongly to unexpected, rather than predictable, stimuli. Other brain-imaging studies showed that the nucleus accumbens is active when humans receive a reward, whether drugs, money, or just plain sugar-- but before the new study by Gregory Berns of Emory University and E. Read Montague of the Baylor College of Medicine in Houston, Texas, the role of surprise in activating the region in humans was unknown.

Berns and Montague examined neural activity in 25 people as they were fed 28 teaspoon-sized hits of Kool-Aid and water. Sometimes the slurps of sweet and tasteless liquid were delivered in a simple alternating pattern. Other times, the Kool-Aid came at random intervals that were impossible to

psychologist specializing in reward. Berridge says the next step is examining how the accumbens responds to nonpleasurable cues associated with pleasurable stimuli--like the bell Pavlov rang before feeding his dogs--a question key to the understanding of addiction.

**--JOSH GEWOLB**

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