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Winning responses to near-misses: Research provides insight into compulsive gambling

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Why do people gamble if they know that the house always wins? Researchers at the University of Cambridge argue that near-misses, where the gambler narrowly misses out on the jackpot, may provide part of the answer.

Although the gambler loses their bet on a near-miss, where the slot machine reel stops one position from the 'payline', the researchers found that near-miss outcomes make people want to carry on gambling and caused brain activity in areas that normally process winning money.

The study, published today in the journal *Neuron*, scanned the brains of 15 people while they gambled on a computerised slot machine that delivered occasional 50p wins. These wins caused responses in brain areas that are known to process natural rewards like chocolate, and also drugs linked with abuse. The researchers showed that near-misses (for example, two cherries and an orange but the not the three cherries necessary for a win) also elicited activity in this brain reward system.

In a second experiment performed outside the scanner, volunteers rated the near-miss events as unpleasant but simultaneously rated their desire to continue the game as higher after a near-miss. Previous research has shown that gamblers play slot machines with near-misses for longer than machines rigged with no near-misses.

The research, which was funded by the Economic and Social Research Council and the Responsibility in Gambling Trust, found brain activity

to near-misses in the striatum and insula cortex of the brain. These areas are thought to be involved in drug addiction, and receive input from the brain chemical dopamine (a neurotransmitter which plays a role in 'reward').

Gambling is a widespread form of entertainment in Britain, but some individuals become problem (or 'compulsive') gamblers who lose control over their gambling. The symptoms of problem gambling (e.g. cravings, and betting larger sums of money over time) are similar to the symptoms of drug addiction, but it is not well understood exactly how behaviours (like gambling) can become addictive.

This new research found that volunteers who showed a greater response to near-misses in the insula also tended to score higher on a questionnaire containing statements that are endorsed by problem gamblers (e.g. "Losses when gambling are bound to be followed by a series of wins."). The authors suggest that the functioning of the insula region may change as gambling becomes addictive.

Dr Luke Clark, lead author of the study, said: "Gamblers often interpret near-misses as special events, which encourage them to continue to gamble. Our findings show that the brain responds to near-misses as if a win has been delivered, even though the result is technically a loss.

"On games where there is some skill involved, like target practice, it makes sense to pay attention to near-misses. However, on gambling games where the wins are random, like slot machines or roulette, near-misses do not signal your future success. Importantly, our volunteers in this study were not regular or problem gamblers, and so these findings suggest that the brain may naturally respond to near-misses in this way."

More information: The paper 'Gambling Near-Misses Enhance Motivation to Gamble and Recruit Win-Related Brain Circuitry' will be

published in the 12 February 2009 edition of *Neuron*.

Source: University of Cambridge