

Impulsivity and Cognitive Distortions in Pathological Gambling

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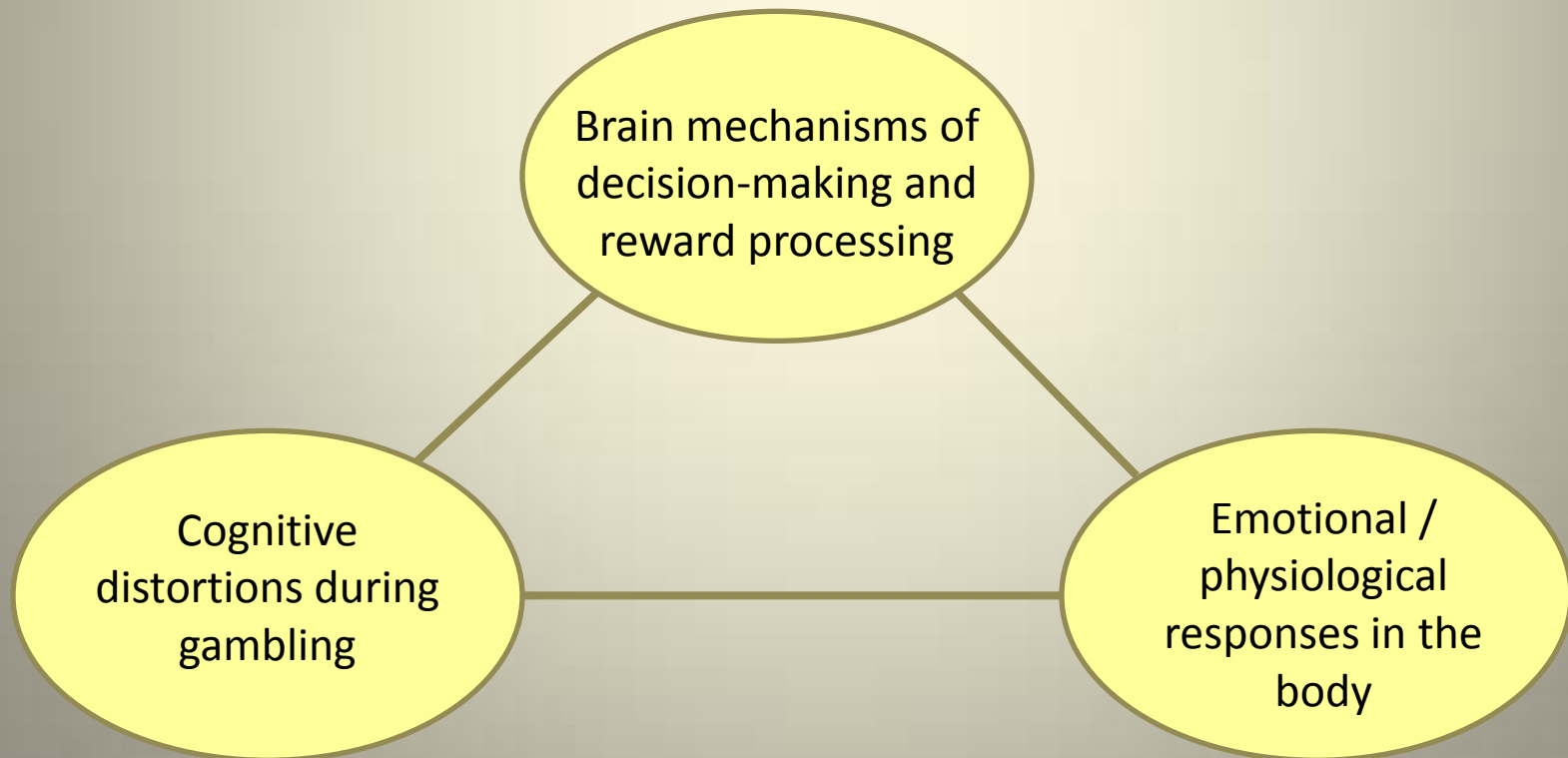
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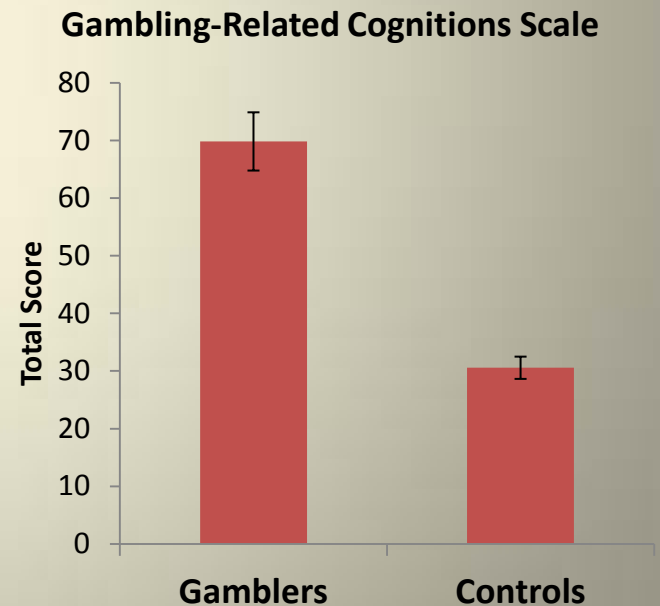
The Psychology of Gambling

1. How do we explain the prevalence of gambling if people understand that 'the house always wins'?
2. How does gamble become dysfunctional (addictive?) in a minority?



The Cognitive Approach to Gambling

- Gamblers experience distorted processing of probability and randomness, such that they overestimate their chances of winning
- Distortions elevated in problem gamblers
- Two basic types:
 - 1) Sequential predictions based on independence of turns
 - 2) Mistaken appraisals of skill due to perceived personal control



The 'Gambler's Fallacy' in Simulated Roulette



Simple task:

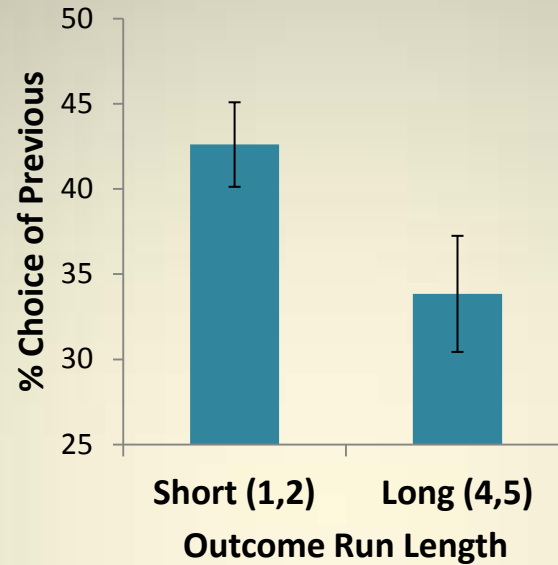
- Guess RED or BLACK
- Then, rate your confidence

Black, Black, Black, Black →
“RED!”

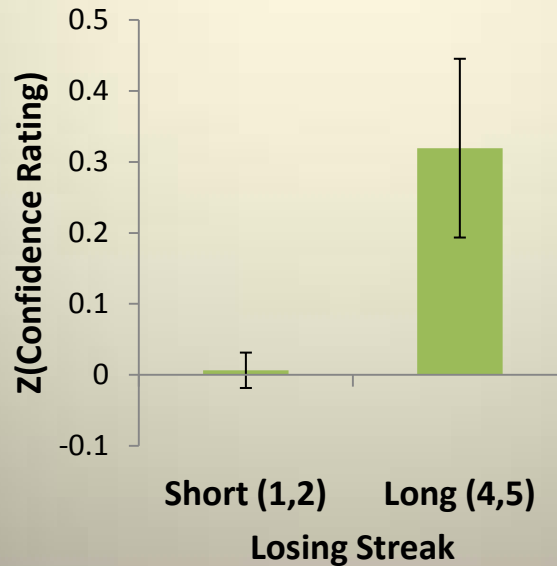
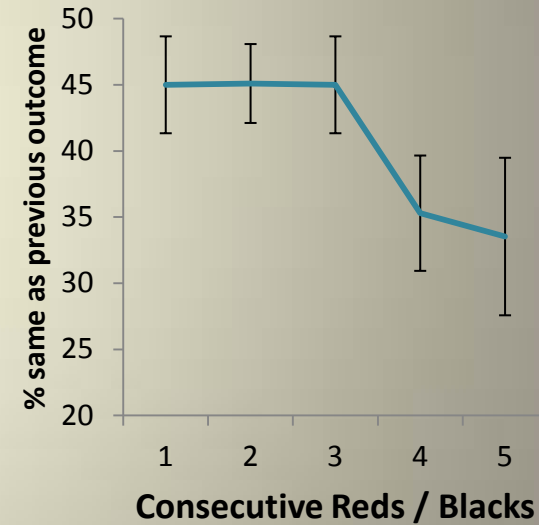
(i.e. negative recency)

The 'Gambler's Fallacy' in Simulated Roulette

Choose red after



Choose red after



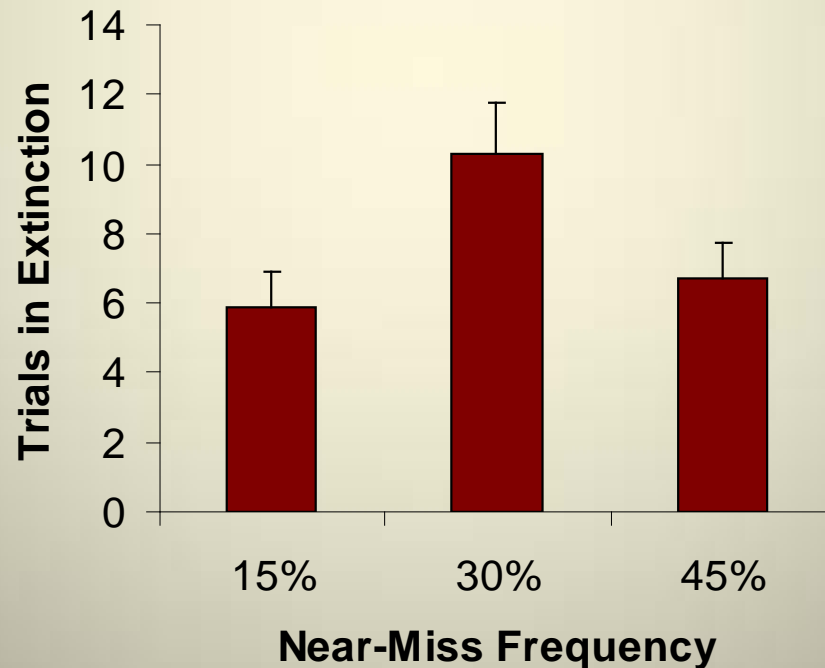
Confidence after Loss Loss

Confidence after Loss Loss Loss Loss



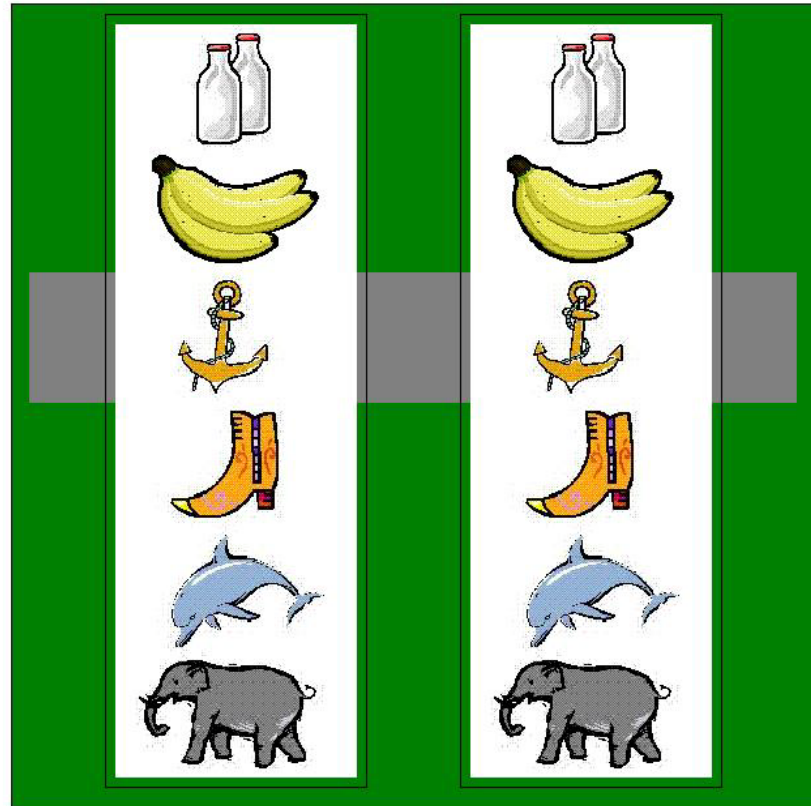
Near-Misses

“A special kind of failure to reach a goal, one that comes close to being successful”
(Reid 1986)



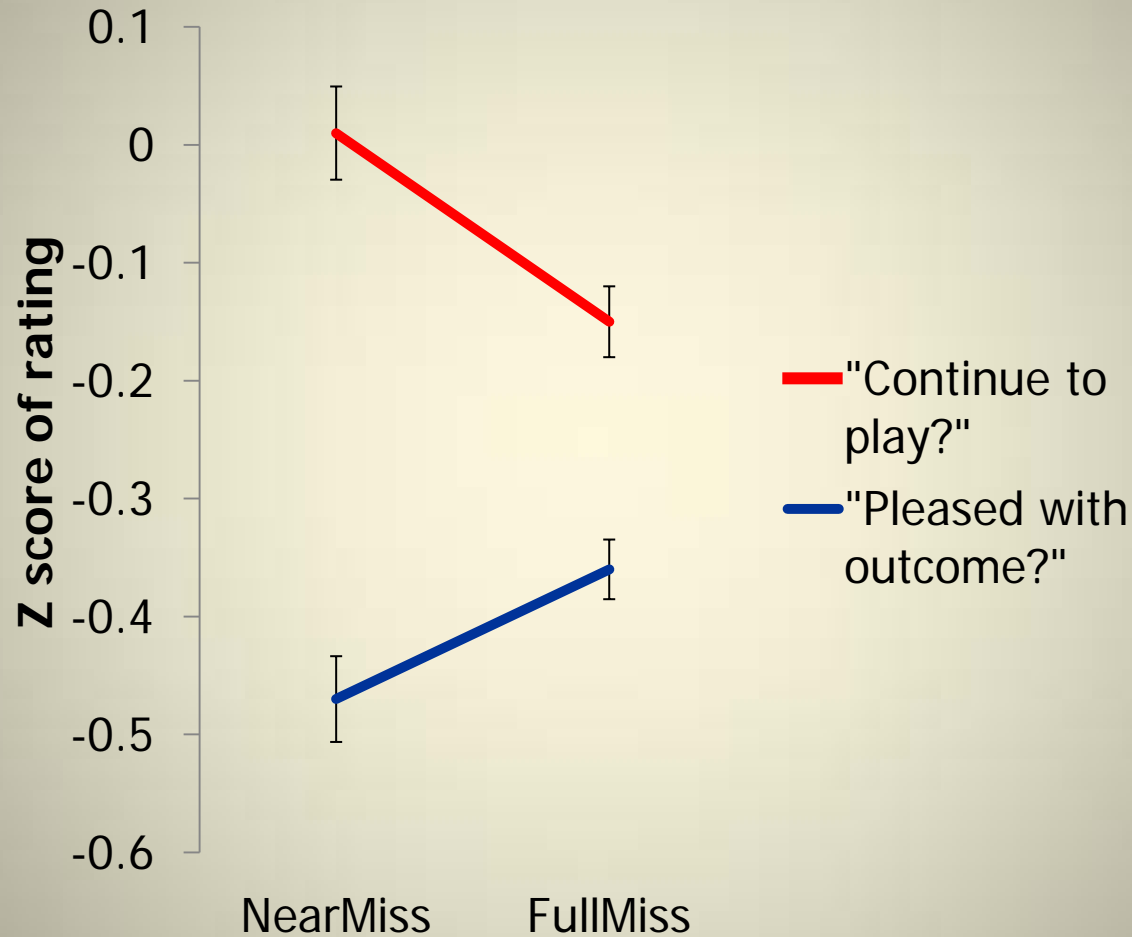
Near-Misses in a Simulated Slot Machine

*Pick A
Shape*



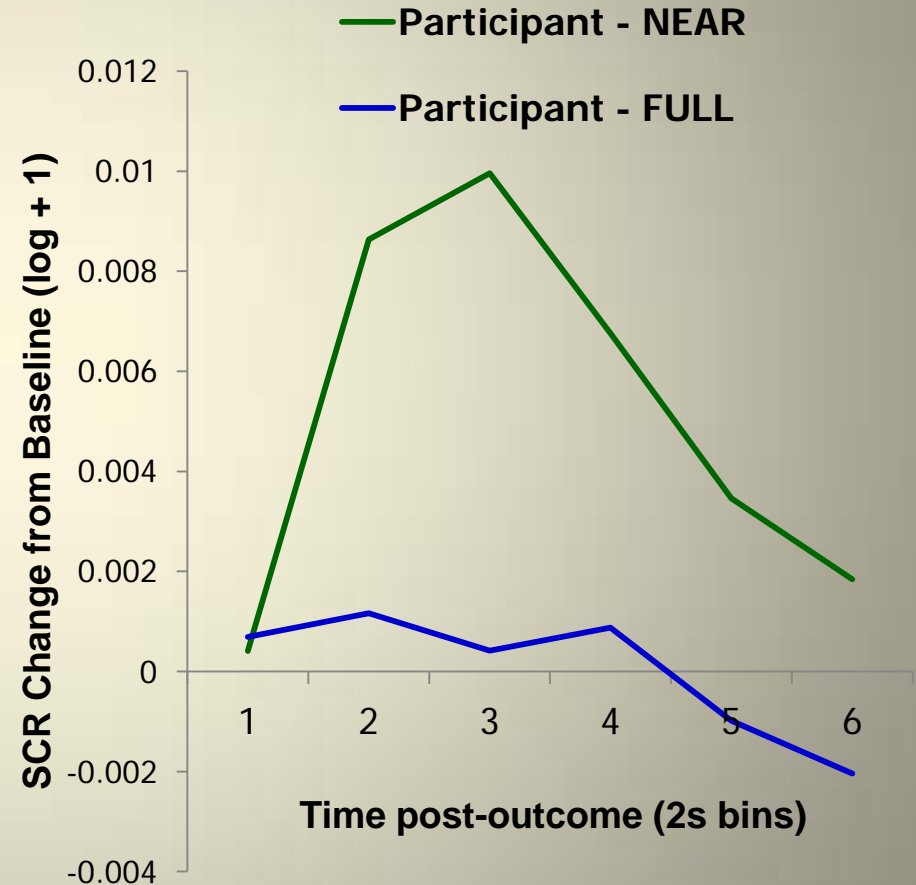
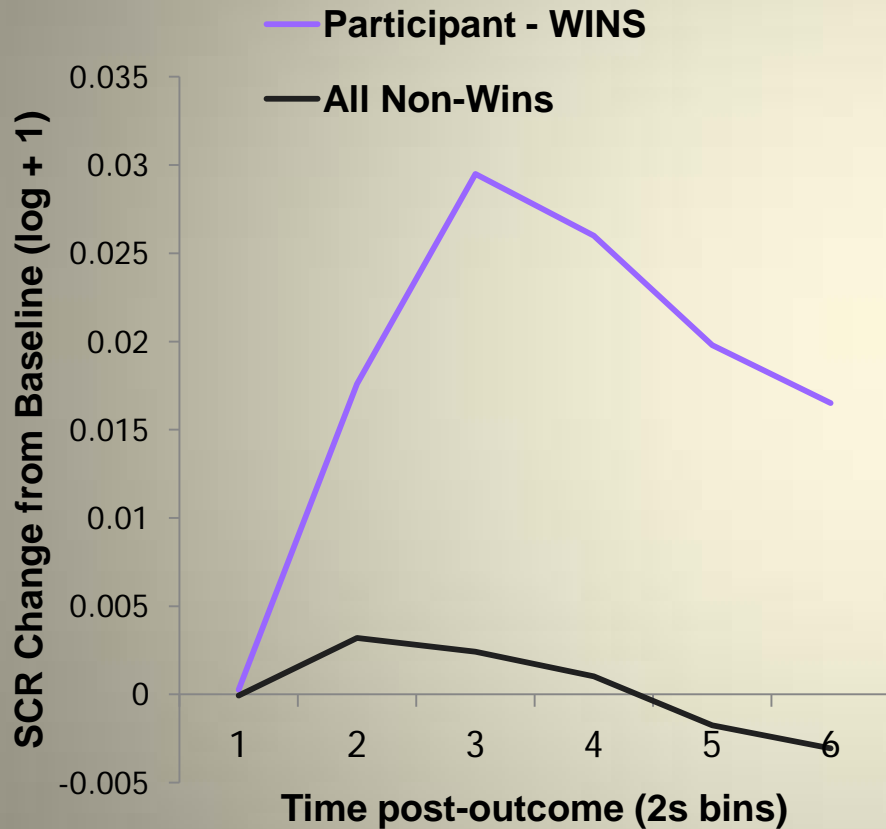
Selection - Anticipation - Outcome

Subjective Differences between Near-Misses and Full-Misses



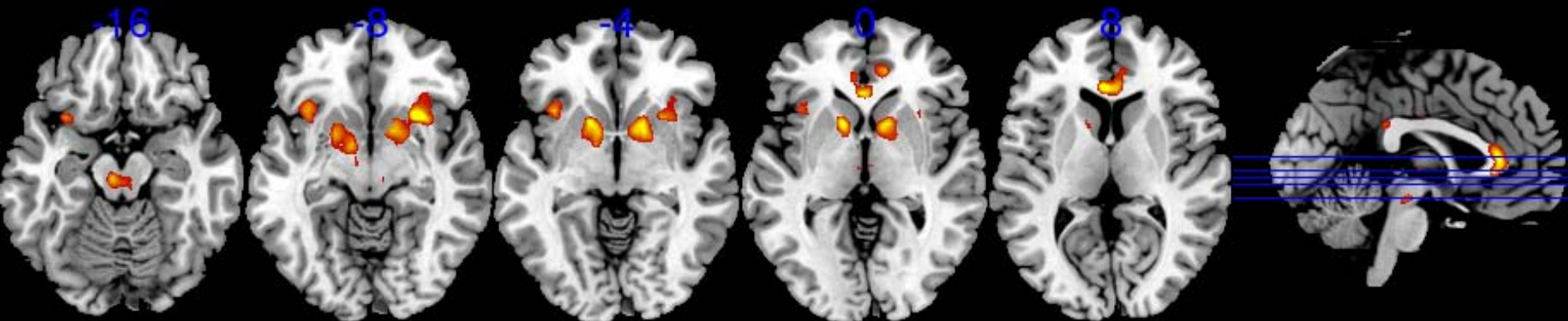


Arousal Responses to Wins and Near-Misses



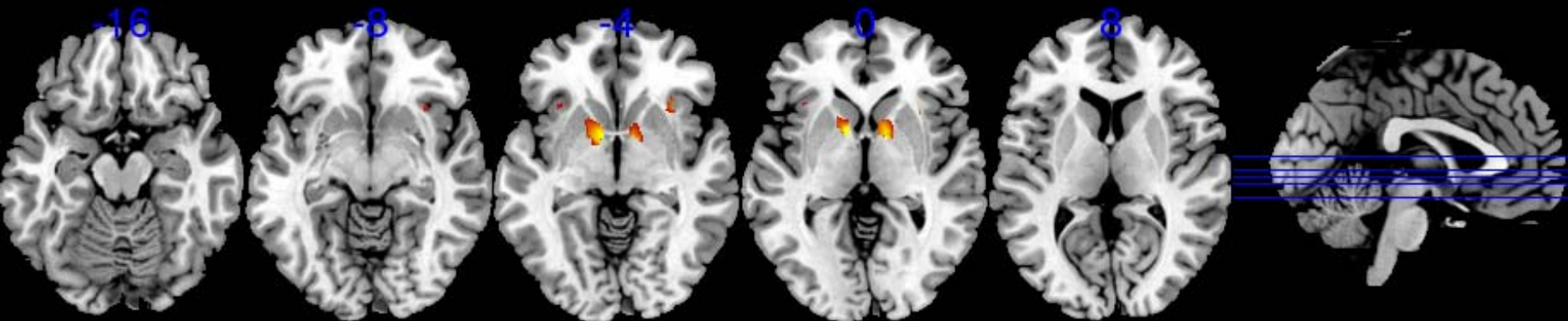
fMRI Responses to Wins and Near-Misses

A WINNING OUTCOMES minus ALL NON-WIN OUTCOMES



Dopaminergic Midbrain Anterior Insula Ventral Striatum mPFC

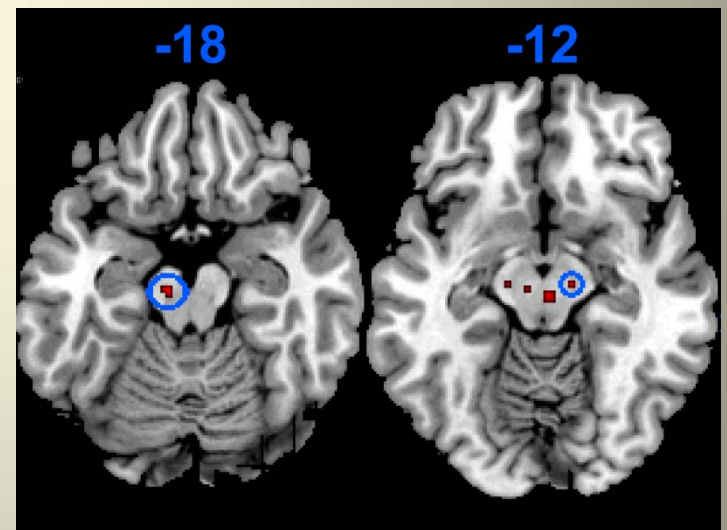
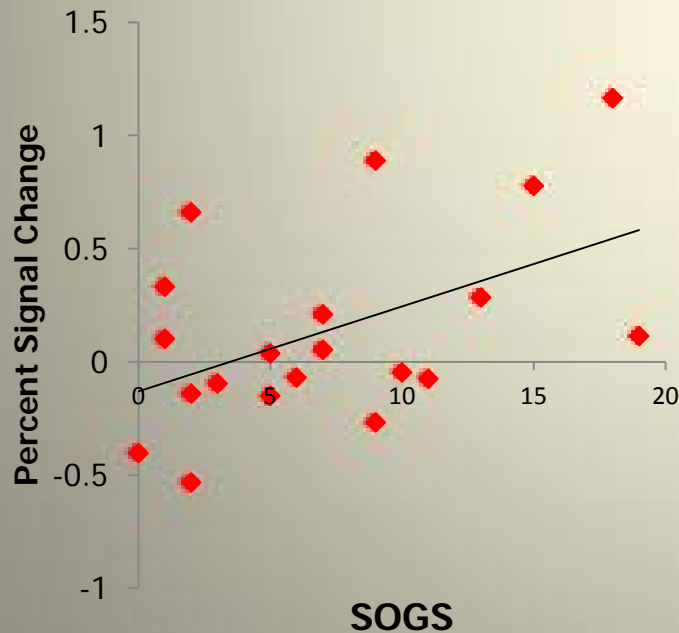
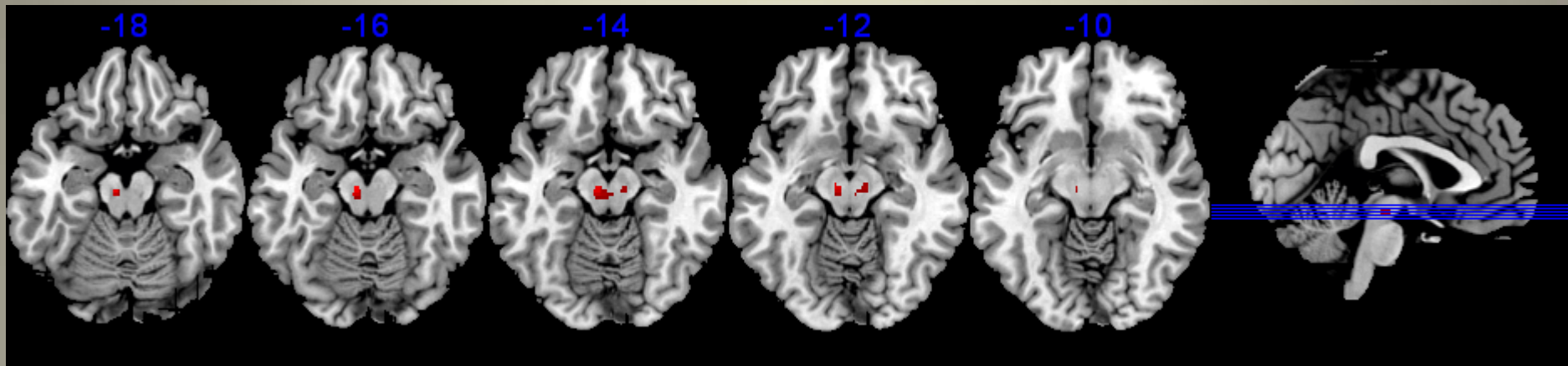
B NEAR-MISS OUTCOMES minus FULL-MISS OUTCOMES



P<.001 uncorr

Clark et al (2009 Neuron)

Gambling Severity predicts Near-Miss Activity in Midbrain



re-smoothed at 4mm

Chase & Clark (2010 J Neurosci)

'Close only counts in horseshoes and hand grenades'



Horseshoes

Game of skill

Near-misses provide indication of skill acquisition, and thus likelihood of future success

Should be valued by brain reward system



Fruit machine

Game of chance

Near-misses provide no indication of future success

Should be ignored by brain

Griffiths (1993), Reid (1986)

Conclusions

- Gambling distortions can be elicited in healthy individuals in a laboratory environment (Gambler's Fallacy, effects of near-misses)
- Near-miss outcomes are experienced as unpleasant but invigorate gambling behaviour
- Wins and near-misses are associated with phasic changes in peripheral arousal
- At a neural level, near-misses trigger anomalous activation in components of the brain reward system: VS, insula, vmPFC.
- The size of these near-miss responses predicts susceptibility to gambling distortions in healthy volunteers (insula) and severity of gambling involvement in regular gamblers (midbrain)
- No evidence for changes in (baseline) dopamine D2 receptors in PG, but correlations with impulsivity

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