

Why humans believe that better things come to those who wait

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New research reveals a brain circuit that seems to underlie the ability of humans to resist instant gratification and delay reward for months, or even years, in order to earn a better payoff. The study, published by Cell Press in the April 15 issue of the journal *Neuron*, provides insight into the capacity for "mental time travel," also known as episodic future thought, that enables humans to make choices with high long-term benefits.

"Humans normally prefer larger over smaller rewards, but this situation can change when the larger rewards are associated with delays," explains lead study author, Dr. Jan Peters from the Department of Systems Neuroscience at the University Medical Center Hamburg-Eppendorf in Germany. "Although there is no doubt that humans discount the value of rewards over time, in general, individuals exhibit a particularly significant ability to delay gratification."

Several models have been proposed to explain the [neural basis](#) of assigning relative value to multiple rewards at different points in time (also known as "intertemporal decision making") in humans. However, many questions remain unanswered, and the [brain regions](#) and mechanisms involved in this process are unclear. Dr. Peters, and coauthor Professor Christian Büchel, used [functional magnetic resonance imaging](#) (fMRI), neural coupling analyses, and extensive behavioral paradigms to examine the interactions between episodic future thought and intertemporal decision making.

Human subjects had to make a series of choices between smaller immediate and larger delayed rewards while [brain activity](#) was measured with fMRI. Importantly, in addition to this standard control condition, the participants were presented with "cues" that referred to real subject-specific future events planned for the respective day of reward delivery. The researchers observed that the more the cues induced spontaneous episodic imagery, the more subjects changed their preferences toward patient, future-minded [choice behavior](#).

Further, the neuroimaging data revealed that signals in the anterior cingulate cortex (ACC), a part of the [brain](#) implicated in reward-based decision making, and functional coupling of this region with the hippocampus, linked with imagining the future, predicted the degree to which forward thinking modulated individual preference functions.

"Taken together, our results reveal that vividly imagining the future reduced impulsive choice," concludes Dr. Peters. "Our data suggest that the ACC, based on episodic predictions involving the hippocampus, supports the dynamic adjustment of preference functions that enable us to make choices that maximize future payoffs."

More information: Büchel et al.: "Episodic Future Thinking Reduces Reward Delay Discounting through an Enhancement of Prefrontal-Mediotemporal Interactions." Publishing in *Neuron* 66, 138-148, April 15, 2010. [DOI:10.1016/j.neuron.2010.03.026](https://doi.org/10.1016/j.neuron.2010.03.026)

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