## Delaying Gratification

More than 40 years ago, Walter Mischel, PhD, a psychologist now at Columbia University, explored self-control in children with a simple but effective test. His experiments using the "marshmallow test," as it came to be known, laid the groundwork for the modern study of self-control.

Mischel and his colleagues presented a preschooler with a plate of treats such as marshmallows. The child was then told that the researcher had to leave the room for a few minutes, but not before giving the child a simple choice: If the child waited until the researcher returned, she could have two marshmallows. If the child simply couldn't wait, she could ring a bell and the researcher would come back immediately, but she would only be allowed one marshmallow.

In children, as well as adults, willpower can be thought of as a basic ability to delay gratification. Preschoolers with good self-control sacrifice the immediate pleasure of a chewy marshmallow in order to indulge in two marshmallows at some later point. Ex-smokers forfeit the enjoyment of a cigarette in order to experience good health and avoid an increased risk of lung cancer in the future. Shoppers resist splurging at the mall so they can save for a comfortable retirement. And so on.

The marshmallow experiments eventually led Mischel and his colleagues to develop a framework to explain the human ability to delay gratification. He proposed what he calls a "hot-and-cool" system to explain why willpower succeeds or fails.

The cool system is cognitive in nature. It's essentially a thinking system, incorporating knowledge about sensations, feelings, actions and goals — reminding yourself, for instance, why you shouldn't eat the marshmallow. While the cool system is reflective, the hot system is impulsive and emotional. The hot system is responsible for quick, reflexive responses to certain triggers — such as popping the marshmallow into your mouth without considering the long-term implications. If this framework were a cartoon, the cool system would be the angel on your shoulder and the hot system, the devil.

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less susceptible to hot triggers. And that susceptibility to emotional responses may influence their behavior throughout life, as Mischel discovered when he revisited his marshmallow-test subjects as adolescents. He found that teenagers who had waited longer for the marshmallows as preschoolers were more likely to score higher on the SAT, and their parents were more likely to rate them as having a greater ability to plan, handle stress, respond to reason, exhibit self-control in frustrating situations and concentrate without becoming distracted.

As it turns out, the marshmallow study didn't end there. Recently, B.J. Casey, PhD, of Weill Cornell Medical College, along with Mischel, Yuichi Shoda, PhD, of the University of Washington, and other colleagues tracked down 59 subjects, now in their 40s, who had participated in the marshmallow experiments as children. The researchers tested the subjects' willpower strength with a laboratory task known to demonstrate self-control in adults.

Amazingly, the subjects' willpower differences had largely held up over four decades. In general, children who were less successful at resisting the marshmallow all those years ago performed more poorly on the self-control task as adults. An individual's sensitivity to so-called hot stimuli, it seems, may persist throughout his or her lifetime.

Additionally, Casey and colleagues examined brain activity in some subjects using functional magnetic resonance imaging. When presented with tempting stimuli, individuals with low self-control showed brain patterns that differed from those with high self-control. The researchers found that the prefrontal cortex (a region that controls executive functions, such as making choices) was more active in subjects with higher self-control. And the ventral striatum (a region thought to process desires and rewards) showed boosted activity in those with lower self-control.

Research has yet to fully explain why some people are more sensitive to emotional triggers and temptations, and whether these patterns might be corrected. However, the recent findings offer an intriguing neurobiological basis for the push and pull of temptation.

## FURTHER READING


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