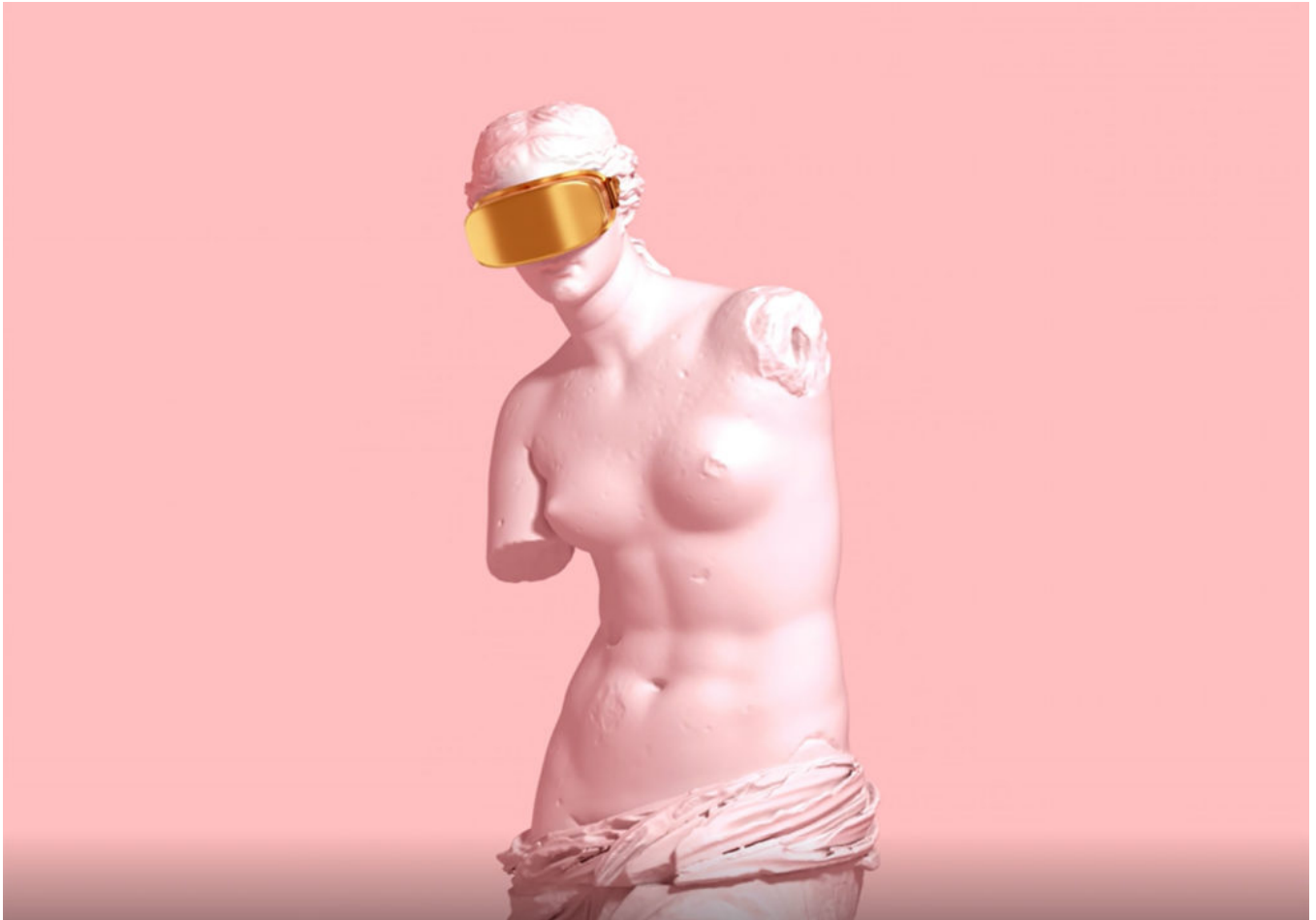


If You'd Love to Create Something, Let It Go

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Quick Take

- The neuroeconomic framework of creativity suggests that acts of invention and artistry may arise from our basic decision-making abilities, requiring countless tradeoffs between the exploration and exploitation of ideas.
- Creative blocks may occur when “mental motion”—the speed and variety of our thoughts—grinds to a halt.
- Boredom is an important signal that a task isn’t fulfilling our needs, but approaching our goals from a new perspective can help reignite our interest.
- Ideas that reveal themselves during mind wandering appear to be just as creative as those we develop intentionally—and significantly more likely to lead to an “aha!” moment.
- Sleeping on a difficult problem can give our brains time to restructure our memories and incubate new ideas.

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There's something uniquely intimidating about a blank Word document or an empty canvas. Either can be filled with any combination of words or images you can imagine, but the act of putting the first "something" where there was nothing can be enough to give even the most experienced creator pause.

Although many artists are haunted by the specter of this kind of creative block, research suggests that the best way to overcome barriers to creativity may be to accept them as part of the process. However, there are nearly as many perspectives on exactly what the creative process is as there are creative pursuits themselves.

In 1926, Graham Wallas, cofounder of the London School of Economics, proposed a four-stage model of creativity consisting of preparation, incubation, illumination, and verification, explained C. Dominik Güss, Sarah Ahmed (University of North Florida), and Dietrich Dörner (Otto-Friedrich Universität Bamberg) in a 2021 *Perspectives on Psychological Science* article. Subsequent psychologists put their own spin on Wallas's model, the researchers added, highlighting the role of motivational factors such as social recognition and curiosity in our artistic and scientific pursuits.

"Curiosity and the desire to think about 'unthinkable' phenomena are essentially motivational processes," Güss, Ahmed, and Dörner wrote. "For a curious person to 'dive into' and explore a new problem domain, a high certainty need has to be paired with a weak competence need."

Many people mythologize creativity, crediting our greatest ideas to the muses and other founts of inspiration beyond our control—but one thing most models of creativity seem to have in common is the view that, under the hood, the cognitive process of creativity isn't all that unique.

"General psychological mechanisms can explain extraordinary acts of creativity," Güss, Ahmed, and Dörner wrote. "This creativity is at the heart of human intelligence, of the ability to invent, solve problems, and adapt to new situations."

In fact, Hause Lin and Oshin Vartanian's (University of Toronto) neuroeconomic framework of creativity, discussed in a 2018 article in *Perspectives on Psychological Science*, suggests that creativity relies on the same cognitive and neural functions that we use to make decisions about everything from which romantic partners to pursue to when we should start job hunting.

"In other words, creativity isn't special or magical, at least in terms of the processes involved—it's just our brains/minds making decisions in a very specific manner," said Lin in an interview with the *Observer*.

Developing creative ideas and solutions to problems requires us to make countless

exploration–exploitation tradeoffs, a concept drawn from foraging theory, Lin said. This theory was originally developed to describe how animals behave when foraging for food: In order to do so efficiently, animals, including humans, must determine when to continue exploiting an area that has provided food in the past and when to risk exploring a new area that may or may not contain food, in case the existing food source becomes depleted.

Foraging theory can be applied to understanding how human animals “forage” for the best ideas.

“Essentially, our framework suggests that when we try to come up with creative ideas and solutions, we also rely on these exploit–explore processes to determine which idea is the most valuable and worth pursuing,” Lin said.

Norepinephrine, in addition to better-known neurotransmitters like dopamine and serotonin, may play a particularly important role in the creative process by enabling the cognitive flexibility necessary to switch between exploring and exploiting ideas, Lin and Vartanain wrote.

Neuroscience also supports the overlap between creativity and other forms of decision-making. A number of studies on everything from how we evaluate music, attractiveness, and color combinations, for example, suggest that these aesthetic experiences activate the same brain regions we use to make financial decisions or choose which food to eat, the researchers wrote. However, further research is still needed to establish this theory—known as the common-currency hypothesis—as scientific fact, they added.

Creative blocks and boredom

Part of what makes creative exploration so exciting is the sense of increased “mental motion” brought about by generating new ideas, wrote Emily Pronin and Elana Jacobs (Princeton University) in a 2008 *Perspectives on Psychological Science* article. Different combinations of the speed and variability of our thoughts have been found to contribute to different emotional experiences, Pronin and Jacobs explained.

“The creative process has been conceptualized as involving the generation of many varied ideas in a short time, thereby allowing rapid associations among them,” the researchers wrote.

This kind of high-speed, high-variability thinking feels good regardless of the quality or content of the ideas we may be generating. Group brainstorming sessions, for example, often result in lower-quality ideas compared to working individually, Pronin and Jacobs noted, but many people report prefer group work because it speeds up their thinking, resulting in a more enjoyable experience.

There is a dark side to mental motion, however, Pronin and Jacobs cautioned. Very high- and very low-speed thinking is characteristic of mania and depression, for example.

We may also experience the same kind of mental motion differently depending on what is making us feel that way. In some instances, low-variability thoughts can be experienced as rumination or repetitive thinking, which are associated with depression, anxiety, and obsessive-compulsive disorder. When we intentionally limit the variability and speed of our thoughts, on the other hand, it can result in a soothing

meditative experience—and when we experience that same quieting of the mind in the middle of an important project, it can result in a creative impasse.

“During such mental blocks, thoughts seem incapable of moving in a particular direction and often feel stuck in a rut,” Pronin and Jacobs wrote. “The unpleasantness of the experience is at least in part related to the mental fixation of thoughts—one’s thoughts do not stop, but they fail to take a new direction.”

But although losing creative momentum is rarely convenient, it’s not the enemy. When reduced mental motion results in feelings of boredom, it can be an important signal that our current pursuit isn’t fulfilling our needs, wrote Erin C. Westgate (University of Florida) in a 2019 *Current Directions in Psychological Science* article.

“Much like pain, boredom may not be pleasant, but it serves an important function,” Westgate explained. “Just as anger tells us when someone has violated important boundaries, boredom alerts us when we are not able to pay attention or find meaning in what we are doing. Boredom’s underlying message? There is no value in continuing the current course of action.”

The simplest solution to boredom, of course, is to go do something more interesting, Westgate acknowledged. When a task simply has to be done, however, there are a number of ways to jump-start our sense of engagement. These can include bringing new cognitive resources to a task by consuming stimulants like coffee, regulating the cognitive demands of the task itself by making it easier or upping the difficulty level, or introducing external stimulation like snacks or music.

The most important step to countering boredom, though, may be to step back and reassess why we are pursuing a goal at all.

“Stifling boredom may work, temporarily, to feel better, but the only lasting solution is to solve the underlying attention and meaning deficits that bored us to begin with,” Westgate wrote.

Wandering into new ideas

When deadlines loom, it may be necessary to use the strategies outlined above to plow through the bog of creative block and boredom to complete the task at hand. When our creative pursuits have a longer runway, research suggests that stepping back from the grind could give our brains time to percolate new ideas in the background.

“It seems like mind wandering may be uniquely helpful for when one has writer’s block, when they’re stumped,” said Jonathan Schooler (University of California, Santa Barbara) in an interview.

Schooler and colleagues Shelly L. Gable and Elizabeth A. Hopper analyzed the creative output of 98 professional writers and 87 physicists in a pair of 2019 *Psychological Science* studies. Participants in both studies shared two-sentence summaries of their most creative idea of the day and what they were doing when they had it, through a nightly email survey for a period of one or two weeks. They also rated how creative and important they thought each idea was, both on the day they had it and three to six months later.

Across both studies, about 20% of participants' most creative ideas occurred during task-independent mind wandering, a state of mind in which we may spontaneously generate ideas when we're not working on or even actively thinking about a problem or project, Schooler and colleagues wrote. Not only did participants perceive these ideas to be equally creative as those they consciously developed, they were also more likely to describe them as "aha" moments that helped them overcome a creative block.

"Even the fact that they are comparable is intriguing," Schooler said. "How many things can you be as successful at accomplishing when you're in the shower as when you're at work?"

The findings support the common wisdom to give our minds a break when struggling to find a solution to a challenging problem, he added. "Find activities where mind wandering can happen, nondemanding things like a walk in nature, a shower. Nature may be particularly helpful for letting these ideas flow."

Although our minds may sometimes stumble into an innovative new idea without much effort on our part, not all mind wandering is created equal, Schooler noted. A 2010 smartphone sampling study by Matthew A. Killingsworth and APS William James Fellow Daniel T. Gilbert (Harvard University), among other research, suggested that more often than not, we wander into unhappy thoughts or memories, stifling our mood.

Writers and other creative individuals do seem more likely to engage in the kind of curious mind wandering—or "mind wondering"—that can spark new ideas, though, Schooler added. The next stage of research on creativity and mind wandering may entail a closer look at how to cultivate this form of positive, productive mind wandering.

"The view is that if you can change the proportion of mind wandering to be more mind wondering, more playful curious thinking of ideas, that may help to strengthen the value of mind wandering in general," Schooler said.

Sleep on it

In fact, a 2019 study in *Psychological Science* suggested that we may not even need to be awake for ideas to keep brewing in the background, a process known as incubation. Our brains have been shown to review our recent experiences while we sleep. Memory reactivation strengthens learning, sweeps away distracting details, and prepares us to make new connections with previous memories, wrote Kristin E. G. Sanders, Samuel Osburn, and APS Fellows Ken A. Paller and Mark Beeman (Northwestern University). This may also allow us to incubate ideas without actively working on them.

"After incubation, people often report having an insight—a solution comes to them suddenly, seemingly from nowhere. In these cases, some unconscious reorganization or restructuring of the problem may have transpired during the intervening period," wrote Sanders and colleagues.

They were able to enhance these sleepy-time insights by playing a unique sound for each puzzle that 57 participants attempted to complete in the lab over a period of 3 days. During daytime testing, participants were given two minutes to solve each puzzle while its audio cue played in the background.

This continued with each new puzzle until the participant failed to solve six puzzles. Each night, a random selection of the sounds from three of the puzzles each participant had failed to solve that day were then played for them while they slept at home. When the participants came back to the lab the next morning, they were 55% more likely to be able to solve these puzzles than to solve the previously failed puzzles that the researchers did not play audio cues for.

“Many people have claimed that sleep has helped them solve a difficult problem,” Sanders and colleagues wrote. “Reactivation may preferentially enhance memory of the problem in a way that allows solvers to creatively forge new links between problem elements as well as between problem elements and relevant prior knowledge.”

As psychological science continues to home in on the everyday cognitive and neurological mechanisms underlying creativity, it's become increasingly clear that sometimes the best way to overcome a creative block may be to just let it go. Take a walk, lie down for a nap, or enjoy a cup of coffee—your brain might just have your next big idea waiting for you when you get back.

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