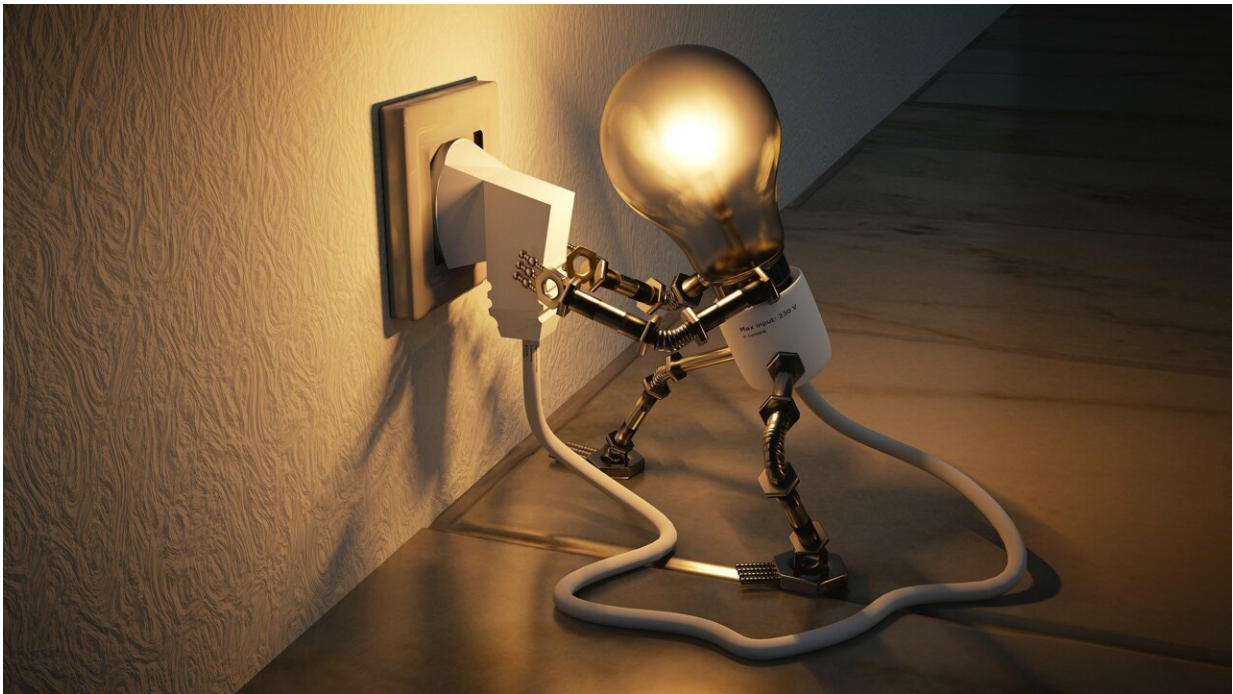


# Motivation depends on how the brain processes fatigue

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How do we decide whether or not an activity which requires work is 'worth the effort'? Researchers at the University of Birmingham & University of Oxford have shown that the willingness to work is not static, and depends upon the fluctuating rhythms of fatigue.

Fatigue—the feeling of exhaustion from doing effortful tasks—is

something we all experience daily. It makes us lose motivation and want to take a break. Although scientists understand the mechanisms the [brain](#) uses to decide whether a given [task](#) is worth the effort, the influence of fatigue on this process is not yet well understood.

The research team conducted a study to investigate the impact of fatigue on a person's decision to exert effort. They found that people were less likely to work and exert effort—even for a reward—if they were fatigued. The results are published in *Nature Communications*.

Intriguingly, the researchers found that there were two different types of fatigue that were detected in distinct parts of the brain. In the first, fatigue is experienced as a short-term feeling, which can be overcome after a [short rest](#). Over time, however, a second, longer term feeling builds up, stops people from wanting to work, and doesn't go away with short rests.

"We found that people's willingness to exert effort fluctuated moment by moment, but gradually declined as they repeated a task over time," says Tanja Müller, first author of the study, based at the University of Oxford. "Such changes in the motivation to work seem to be related to fatigue—and sometimes make us decide not to persist."

The team tested 36 young, healthy people on a computer-based task, where they were asked to exert physical effort to obtain differing amounts of monetary rewards. The participants completed more than 200 trials and in each, they were asked if they would prefer to 'work' – which involved squeezing a grip force device—and gain the higher rewards offered, or to rest and only earn a small reward.

The team built a [mathematical model](#) to predict how much fatigue a person would be feeling at any point in the experiment, and how much that fatigue was influencing their decisions of whether to work or rest.

While performing the task, the participants also underwent an MRI scan, which enabled the researchers to look for activity in the brain that matched the predictions of the model.

They found areas of the brain's [frontal cortex](#) had activity that fluctuated in line with the predictions, while an area called the [ventral striatum](#) signalled how much fatigue was influencing people's motivation to keep working.

"This work provides new ways of studying and understanding [fatigue](#), its effects on the brain, and on why it can change some people's motivation more than others" says Dr. Matthew Apps, senior author of the study, based at the University of Birmingham's Centre for Human Brain Health. "This helps begin to get to grips with something that affects many patients lives, as well as people while at work, school, and even elite athletes.

**More information:** Tanja Müller et al, Neural and computational mechanisms of momentary fatigue and persistence in effort-based choice, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-24927-7](#)

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