

# Neural mechanism supports survival in an uncertain world

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A new study uncovers a pivotal role for the human frontal lobe in the promotion of behavioral flexibility during voluntary choice. The work, published by Cell Press in journal *Neuron*, presents a critical new neural mechanism that supports the decision to adapt or maintain behavior when change is not explicitly instructed by the external environment.

Previous work has shown that the frontopolar cortex (FPC) is involved in memory and multitasking and is active when human subjects switch between tasks. "Typically such experiments provide participants with explicit instructions about when to switch from one task to another," explains senior study author Erie D. Boorman from the Department of Experimental Psychology at the University of Oxford. "However, in everyday life organisms must often determine what to do in the absence of explicit cues. It is not clear whether or how the FPC contributes to the control of behavior when humans freely select between tasks."

Boorman and colleagues examined activity in the FPC while human subjects voluntarily selected between two actions during a simple decision making task. Specifically, subjects switched between one of two possible actions on the basis of the expected values of reward associated with the actions. Importantly, the subjects did not receive any instructions that signaled a behavioral change. The expected value of each action was based on the probability that it would yield rewards if chosen, which subjects estimated based on recent outcomes.

The researchers observed that the FPC kept track of evidence in favor of

switching to the alternative course of action. Further, immediately prior to a switch in behavior, the FPC exhibited a distinct pattern of connectivity with the parietal cortex, an area of the brain that is known to be active during cued behavior switching. "This suggests that when the FPC has recruited sufficient evidence to support a behavioral switch, it engages the parietal cortex to implement the switch," offers Dr. Boorman.

This study provides the first evidence that the human FPC performs specific computations that support decision making and behavioral flexibility during voluntary choice. "Our findings illustrate that the FPC is not just active when a change in behavior occurs but continually tracks the long-term evidence accrued to support a switch in behavior during decisions and intervals between trials," says Boorman. "Essentially, the FPC tracks how green the grass is on the other side."

Source: Cell Press ([news](#) : [web](#))

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