Decisions, decisions.
Our brain may make up our minds before we do.

Credit: Digital Vision

Case Closed for Free Will?

By Elsa Youngsteadt
*Science*NOW Daily News
14 April 2008

Coffee or tea with lunch? Which pants to wear to work? Which movie to watch? Your mind might be made up before you know it. Researchers have found patterns of brain activity that predict people's decisions up to 10 seconds before they're aware they've made a choice.

In the 1980s, psychologist Benjamin Libet of the University of California, San Francisco, caught people's brains jumping the gun on consciousness. A few hundred milliseconds before a person thought he or she decided to press a button, brain areas related to movement were already active. The result was hard for some to stomach because it suggested that the unconscious brain calls the shots, making free will an illusory afterthought. But there was room for doubt. The time lag was so short that it might have been an error, and the brain activity might have reflected preparation for a decision rather than the decision itself. "It's possibly the most debated single paper in the whole of neuroscience," says brain scientist John-Dylan Haynes of the Charité-Universitätsmedizin Berlin in Germany.

To settle some of the doubts, Haynes led a team of researchers in a modern redux of the experiment. They asked 14 subjects to lie in a functional magnetic resonance imaging (fMRI) scanner, which allowed the researchers to track more brain regions for longer than Libet had. They instructed the subjects to decide spontaneously whether to press a button on the right or one on the left. The volunteers could decide at their own pace, but they had to report the moment of the conscious choice based on a clocklike device in the scanner.

The researchers scoured the brain for changes that correlated with the final decision. The earliest brain

pattern that coded for a left or right choice was in the frontopolar cortex, right behind the forehead. The pattern predicted a left or right decision with about 60% accuracy and occurred about 10 seconds before the conscious choice, the team reports online this week in Nature Neuroscience. "We weren't expecting this kind of lead time," Haynes says. Even though the predictions weren't perfect, "there's not very much space for operation of free will," Haynes says. "The outcome of a decision is shaped very strongly by brain activity much earlier than the point in time when you feel to be making a decision." Haynes says the group hopes to extend the work to more realistic choices such as what to drink or what game to watch.

Dick Passingham, a cognitive neuroscientist at the University of Oxford in the U.K., says the paper clears up one of the major concerns about the original Libet experiment. "This activity that occurs earlier is ... not just general preparation, it really is a proper decision," he says.

Neurologist Mark Hallett of the U.S. National Institute of Neurological Disorders and Stroke in Bethesda, Maryland, says the study confirms his understanding of free will as a perception rather than a driving force. But he hopes the work may lead to practical applications for patients with schizophrenia or certain movement disorders who feel that their voluntary actions are not a product of choice.

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Letters

- *The paper, while interesting as a piece of neurobiology, has nothing to do with free will. I would have thought it obvious that the great majority of decisions made by the brain have to be well ahead of the speed of conscious processing, or we would likely not make it through busy traffic unscathed. Free will comes in to play, surely, only when there is time to use it: otherwise it is neither free nor will. I dont understand what all the hype is about with this paper; the decisions tested were not reflective, slow, making a series of thoughts about the matter and finally deciding on A v B or C.*

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April 24, 2008

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