

Brain scanner predicts your future moves

[Click to Print](#)

18:00 13 April 2008

[NewScientist.com news service](#)[Ewen Callaway](#)

Long before you decided to read this story, your brain may have already said "click that link".

By scanning the brains of test subjects as they pressed one button or another – though not a computer mouse – researchers pinpointed a signal that divulged the decision about seven seconds before people ever realised their choice. The discovery has implications for mind-reading, and the nature of free will.

"Our decisions are predetermined unconsciously a long time before our consciousness kicks in," says John-Dylan Haynes, a neuroscientist at the Bernstein Center for Computational Neuroscience in Berlin, who led the study. It definitely throws our concept of free will into doubt, he adds.

This is by no means the first time scientists have cast doubt on conscious free will. In the early 1980s, the late neuroscientist Benjamin Libet uncovered a spark of brain activity three tenths of a second before subjects opted to lift a finger. The activity flickered in a region of the brain involved in planning body movement.

But this region might perform only the final mental calculations to move, not the initial decision to lift a finger, Haynes says.

Brain decides

Haynes's team delved deeper into the brain with a technique called functional magnetic resonance imaging (fMRI) that can measure brain activity while a subject carries out a task.

In this case, 14 volunteers lay in a brain scanner and were told to tap a button with a finger of the left or right hand whenever they felt the urge.

While the subject waited to make a choice, a screen flashed a random letter every half second. After a subject finally pushed a button, they were asked to indicate which letter had on the screen at the moment the decision was made. There is usually half second a lag between thought and action, Haynes says.

When Hayne's team later analysed the fMRI scans, they found that the prefrontal cortex – a part of the brain that is involved in thought and consciousness – lit up seven seconds before the subjects pressed the button.

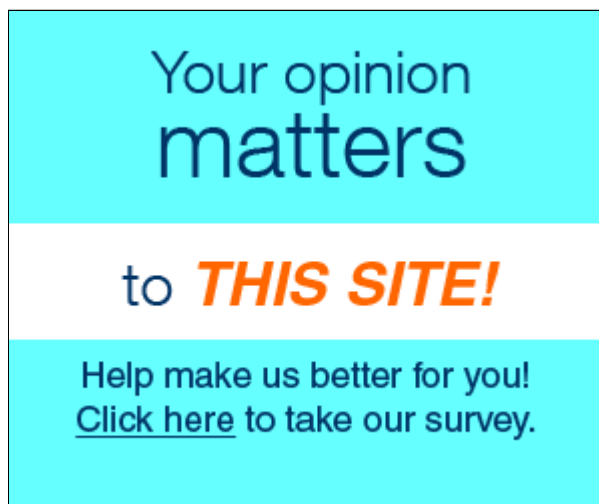
Unconscious will

By deciphering the brain signals with a computer program, the researchers could predict which button a subject had pressed about 60% of the time – slightly better than a random guess.

"It seems that the brain is making the decision before the person themselves," he says.

Although we make some choices in a heartbeat, Haynes thinks his experiment captures the dawdling tempo of daily life.

"In most cases, we decide internally in a self-paced way: 'Now I want to get some orange juice' or 'I'm



going to get some apple juice instead'," he says

Our brains might pick beverages long before we realise, but Haynes thinks such decisions are still a matter of choice. "My conscious will is consistent with my unconscious will – it's the same process," he says.

Mind-reading

Chris Frith, a neuroscientist at University College London, also questions whether the experiment puts a dagger in the concept of free will.

Getting volunteers to lie in brain scanner and waiting to press a button could affect their brain activity in way normal decision-making doesn't, he says.

And what if we don't like our brain's decision? Experiments to test whether a choice can be reversed are in the works, Haynes says. "We can't rule out that people might be able to change their minds."

Anticipating a person's decision might one day find use in devices that wire our brains directly to a machine, he adds. A mind-reading car might anticipate lane changes and turns well before the driver ever knows his intentions.

"It's good if the technology knows what the user is going to want – potentially before the user even knows what they are going to want," he says.

Journal reference: *Nature Neuroscience* (DOI: [10.1038/nn.2112](https://doi.org/10.1038/nn.2112))

The Human Brain - With one hundred billion nerve cells, the complexity is mind-boggling. Learn more in our cutting edge *special report*.

Related Articles

The subconscious mind: Your unsung hero

<http://www.newscientist.com/article.ns?id=mg19626321.400>

01 December 2007

Could quantum effects explain consciousness?

<http://www.newscientist.com/article.ns?id=mg19626264.000>

23 October 2007

Determining free will

<http://www.newscientist.com/article.ns?id=mg19526162.100>

11 August 2007

Mind Time: The temporal factor in consciousness by Benjamin Libet

<http://www.newscientist.com/article.ns?id=mg18224485.700>

22 May 2004

Sex, brains, robots and Buddhism: looking for free will

<http://www.newscientist.com/article.ns?id=mg17823944.300>

10 May 2003

Weblinks

John-Dylan Haynes, Bernstein Center for Computational Neuroscience

<http://www.bccn-berlin.de/People/haynes>

Chris Frith, UCL

<http://www.fil.ion.ucl.ac.uk/Frith/>

FMRI, Wikipedia

http://en.wikipedia.org/wiki/Functional_magnetic_resonance_imaging

[Close this window](#)

Printed on Fri Apr 25 22:08:05 BST 2008