Internal choices are weaker than those dictated by the outside world

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The underlying sense of being in control of our own actions is challenged by new research from UCL (University College London) which demonstrates that the choices we make internally are weak and easily overridden compared to when we are told which choice to make.

The research, which is published today in *Cerebral Cortex*, is one of the first neuroscientific studies to look at changing one's mind in situations where the initial decision was one's own 'free choice'. Free choices can be defined as actions occurring when external cues are largely absent - for example, deciding which dish to choose from a restaurant menu.

The researchers asked study participants to choose which of two buttons they would press in response to a subsequent signal, while their brain activity was recorded using EEG (electroencephalogram). Some choices were made freely by the volunteers and other choices were instructed by arrows on a screen in front of them. The volunteers' choices were occasionally interrupted by a symbol asking them to change their mind, after they had made their choice, but before they had actually pressed the button.

First author Stephen Fleming, UCL Institute of Neurology, said: "When people had chosen for themselves which action to make, we found that the brain activity involved in changing one's mind, or reprogramming these 'free' choices was weak, relative to reprogramming of choices that were dictated by an external stimulus. This suggests that the brain is very flexible when changing a free choice - rather like a spinning coin, a

small nudge can push it one way or the other very easily.

"The implication is that, despite our feelings of being in control, our own internal choices are flexible compared to those driven by external stimuli, such as a braking in response to a traffic light. This flexibility might be important - in a dynamic world, we need to be able to change our plans when necessary."

Professor Patrick Haggard, UCL Institute of Cognitive Neuroscience, added: "Our study has two implications for our understanding of human volition. First, our brains contain a mechanism to go back and change our mind about our choices, after a choice is made but before the action itself. Our internal decisions are not set in stone, but can be re-evaluated right up to the last moment. Second, changing an internal choice in this way seems to be easier than changing a choice guided by external instructions.

"We often think about our own internal decisions as having the strength of conviction, but our results suggest that the brain is smart enough to make us flexible about what we want. The ability to flexibly adjust our decisions about what we do in the current situation is a major component of intelligence, and has a clear survival value."

More information: The paper 'When the Brain Changes its Mind: Flexibility of Action Selection in Instructed and Free Choices' is published online ahead of print in *Cerebral Cortex*, doi:10.1093/cercor/bhn252.

Source: University College London