

Brain region linked to introspective thinking

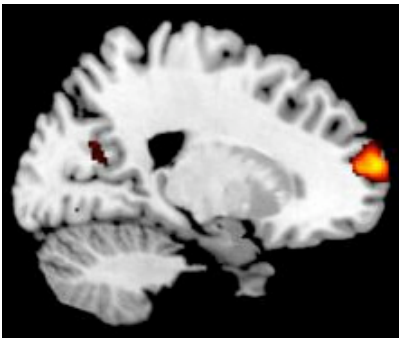
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Courtesy of the American Association
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A specific brain region is larger in people who are good at turning their thoughts inward and reflecting on their decisions, a new study suggests.

This process of “thinking about your thinking,” called introspection, is a key part of human consciousness. But scientists have noted plenty of variation in peoples’ abilities to introspect.

The study is to be published in the Sept. 17 issue of the research journal *Science*.



A cross-section of the brain showing activity in the anterior prefrontal cortex, highlighted in yellow and red. This region was correlated with introspective accuracy in a new study. (Image © *Science*/AAAS)

“We want to know why we are aware of some mental processes,” while others proceed without awareness, said Stephen Fleming of University College London, one of the authors.

“There may be different levels of consciousness, ranging from simply having an experience, to reflecting upon that experience. Introspection is on the higher end of this spectrum. By measuring this process and relating it to the brain we hope to gain insight into the biology of conscious thought.”

The brain region found to be apparently linked to introspection is the called the anterior prefrontal cortex, right behind our eyes, said the scientists, who were led by researcher Geraint Rees of the university. The “gray matter” in this region tends to be larger in people with greater introspective ability, they explained. Gray matter consists of the types of brain cells chiefly known for processing information, called neurons.

Also linked to introspection is the “white matter” connected to this brain region, the investigators said. White matter consists of nerve fibers, thread-like extensions of neurons which link the cells to each other so that signals can pass between them.

It remains unclear how the relationship between introspection and the two types of brain matter really works, Rees and colleagues said. The findings don’t necessarily mean that all people with more gray matter in the anterior prefrontal cortex have more introspective thoughts, but they do establish a correlation, they stressed.

Rees and colleagues designed a test of introspective abilities in which 32 participants were shown two screens, each containing six patterned patches. One screen, though, contained a patch that was slightly brighter than the others. The researchers asked the participants to identify which screen contained the brighter patch, and then to rate how confident they felt about their final answer.

By working with the participants, the investigators adjusted the task to each person’s skill level, until they all performed equally well. But their performance still varied in the accuracy with which they judged their own decisionmaking. This was taken as a measure of introspective ability.

It's unknown whether these differences are innate or a result of learning, the investigators noted. Also unclear is the nature of the mental computations and biological processes behind introspection.

Still, the finding may help scientists understand how certain brain injuries affect the ability to reflect on one's own thoughts and actions, Fleming said. With such an understanding, it may eventually be possible to tailor appropriate treatments to patients, such as stroke victims or those with serious brain trauma, who may not even understand their own conditions.

"Take the example of two patients with mental illness—one who is aware of their illness and one who is not," said Fleming. "The first person is likely to take their medication, but the second is less likely. If we understand self-awareness at the neurological level, then perhaps we can also adapt treatments and develop training strategies for these patients."