Scientists identify link between size of brain region and conformity

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Every generation has its James Dean: the rebel who refuses to follow the path beaten by their peers. Now, a new study in *Current Biology* has found a link between the amount of grey matter in one specific brain region and an individual's likelihood of conforming to social pressures.

Individuals are presented with many choices in life, from political alignments through to choosing which sandwich to eat for lunch. Their eventual decisions can be influenced by the options chosen by those around them. Although differences in individuals' tendencies to conform to social pressures are commonly observed, no anatomical measure has previously been linked to the likelihood of someone conforming under the influence of their peers.

Now, in research funded by the Danish National Research Foundation and the Wellcome Trust, scientists at New York University, Aarhus University and the Wellcome Trust Centre for Neuroimaging at UCL (University College London) have identified the first such measure to predict how an individual will react to social pressure.

To identify structural measures of the brain that could relate to this trait, the team first measured the volumes of brain regions in 28 participants. This approach involved a technique known as voxel based morphometry, which allows researchers to measure the volume of grey matter (the nerve cells where the processing takes place) from three-dimensional images of the brain provided by magnetic resonance imaging (MRI) scans.

To measure how participants responded to social influence, they were tested to see how their preferences for certain pieces of music changed after being told what authoritative 'music critics' thought about them.

A week prior to testing, each participant listed 20 songs they liked but didn't personally own. On the day of the test, the participants rated their choices out of ten.

Next, the researchers stated that music critics with expert opinions had listened to the participants' choices and had also rated these songs out of ten. The participants then performed a task comparing their choices with unknown music. Following the task, the participants rerated their 20 choices, and the degree to which their opinions differed in light of hearing the critics' ratings served as a measure of conformity under social influence.

Strikingly, only grey matter volume in one precise brain region — the lateral orbitofrontal cortex — was associated with this measure of social influence. The linear relationship between grey matter volume and the tendency of individuals to conform was observed in this particular region in both hemispheres of the brain.

In a previous study, the researchers had looked at the level of activity in the participants' brains when faced with disagreement with the experts. This activity predicted how much influence the experts would have. By comparing the measures in this new study with the previous findings, they were able to show that grey matter volume in the lateral orbitofrontal cortex also predicted how individuals responded when the critics disagreed with their opinions. These findings suggest that the brain region is particularly tuned to recognising cues of social conflict, such as when someone disapproves of a choice, which may prompt the subject to update their opinions accordingly.

Study leader Professor Chris Frith says: "The ability to adapt to others and align ourselves with them is an important social skill. However, at what level is this skill implemented in the brain? At a software (information processing) or hardware (structural) level? Our results show that social conformation is, at least in part, hard-wired in the structure of the brain."

Dr Daniel Campbell-Meiklejohn, first author of the study, explains the implications of their findings: "This opens a new chapter on the social consequences of brain atrophy and brain development. People with damage to this region often display changes of personality and social interaction. This finding suggests that perhaps we should look at how these individuals learn what is important from the expressed preferences of others."

More information: Campbell-Meiklejohn DK et al. Structure of orbitofrontal cortex predicts social influence. *Current Biology* 2012; 22(4): R2

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