

Individual differences in altruism explained by brain region involved in empathy

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The junction (yellow) between the parietal and the temporal lobes, in which the relative proportion of gray matter is significantly positively correlated with the propensity for altruistic behavior. Credit: University of Zurich

What can explain extreme differences in altruism among individuals, from Ebenezer Scrooge to Mother Teresa? It may all come down to variation in the size and activity of a brain region involved in appreciating others' perspectives, according to a study published in the July 12th issue of the journal *Neuron*. The findings also provide a neural explanation for why altruistic tendencies remain stable over time.

"This is the first study to link both [brain anatomy](#) and [brain activation](#) to human [altruism](#)," says senior study author Ernst Fehr of the University of Zurich. "The findings suggest that the development of altruism through appropriate training or social practices might occur through changes in the [brain structure](#) and the neural activations that we identified in our study."

Individuals who excel at understanding others' intents and beliefs are more altruistic than those who struggle at this task. The ability to understand

others' perspectives has previously been associated with activity in a brain region known as the temporoparietal junction (TPJ). Based on these past findings, Fehr and his team reasoned that the size and activation of the TPJ would relate to individual differences in altruism.

In the new study, subjects underwent a brain imaging scan and played a game in which they had to decide how to split money between themselves and anonymous partners. Subjects who made more generous decisions had a larger TPJ in the right hemisphere of the brain compared with subjects who made stingy decisions.

Moreover, activity in the TPJ reflected each subject's specific cutoff value for the maximal cost the subject was willing to endure to increase the partner's payoff. Activity in the TPJ was higher during hard decisions—when the personal cost of an altruistic act was just below the cutoff value—than during easy decisions associated with a very low or very high cost.

"The structure of the TPJ strongly predicts an individual's setpoint for altruistic behavior, while activity in this brain region predicts an individual's acceptable cost for altruistic actions," says study author Yosuke Morishima of the University of Zurich. "We have elucidated the relationship between the hardware and software of human altruistic behavior."

More information: Morishima et al.: "Linking Brain Structure and Activation in Temporoparietal Junction to Explain the Neurobiology of Human Altruism." *Neuron*
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