

Empathy for others' pain rooted in cognition rather than sensation

June 14 2016



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The ability to understand and empathize with others' pain is grounded in cognitive neural processes rather than sensory ones, according to the results of a new study led by University of Colorado Boulder researchers.

The findings show that the act of perceiving others' [pain](#) (i.e., empathy for others' pain) does not appear to involve the same neural circuitry as experiencing pain in one's own body, suggesting that they are different interactions within the [brain](#).

"The research suggests that empathy is a deliberative process that requires taking another person's perspective rather than being an instinctive, automatic process," said Tor Wager, the senior author of the study, director of the Cognitive and Affective Neuroscience Laboratory and Professor of Psychology and Neuroscience at CU-Boulder.

A study detailing the results was published online today in the journal *eLife*.

Empathy is a key cornerstone of [human social behavior](#), but the complex neural interactions underlying this behavior are not yet fully understood. Previous hypotheses have suggested that the same [brain regions](#) that allow humans to feel pain in their own bodies might activate when perceiving the pain of others.

To test this idea, the researchers compared patterns of brain activity in human volunteers as they experienced [moderate pain](#) directly (via heat, shock, or pressure) in one experimental session, and watched images of others' hands or feet being injured in another experimental session. When volunteers watched images, they were asked to try to imagine that the injuries were happening to their own bodies.

The researchers found that the [brain patterns](#) when the volunteers observed pain did not overlap with the brain patterns when the volunteers experienced pain themselves. Instead, while observing pain, the volunteers showed brain patterns consistent with mentalizing, which involves imagining another person's thoughts and intentions.

The results suggest that within the brain, the experience of observing someone else in pain is neurologically distinct from that of experiencing [physical pain](#) oneself.

"Most previous studies focused only on the points of similarity between these two distinct experiences in a few isolated brain regions while ignoring dissimilarities. Our new study used a more granular analysis method," said Anjali Krishnan, the lead author of the study and a post-doctoral research associate in the Institute of Cognitive Science at CU-Boulder while the research was conducted. She is currently an assistant professor at Brooklyn College of the City University of New York.

This new analysis method identified an empathy-predictive brain pattern that can be applied to new individuals to obtain a brain-related 'vicarious [pain score](#),' opening new possibilities for measuring the strength of activity in brain systems that contribute to empathy.

The results may open new avenues of inquiry into how the brain regions involved in empathy help humans to relate to others when they experience different types of pain. Future studies may also explore the factors that influence one's ability to adopt another's perspective and whether it might be possible to improve this ability.

More information: Anjali Krishnan et al, Somatic and vicarious pain are represented by dissociable multivariate brain patterns, *eLife* (2016). [DOI: 10.7554/eLife.15166](https://doi.org/10.7554/eLife.15166)

Provided by University of Colorado at Boulder

Citation: Empathy for others' pain rooted in cognition rather than sensation (2016, June 14) retrieved 27 April 2024 from

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