

Selective brain damage modulates human spirituality

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New research provides fascinating insight into brain changes that might underlie alterations in spiritual and religious attitudes. The study, published by Cell Press in the February 11 issue of the journal *Neuron*, explores the neural basis of spirituality by studying patients before and after surgery to remove a brain tumor.

Although it is well established that all behaviors and experiences, spiritual or otherwise, must originate in the [brain](#), true empirical exploration of the neural underpinnings of spirituality has been challenging. However, recent advances in neuroscience have started to make the complex mental processes associated with religion and spirituality more accessible.

"Neuroimaging studies have linked activity within a large network in the brain that connects the frontal, parietal, and temporal cortexes with spiritual experiences, but information on the causative link between such a network and spirituality is lacking," explains lead study author, Dr. Cosimo Urgesi from the University of Udine in Italy.

Dr. Urgesi and colleagues were interested in making a direct link between [brain activity](#) and spirituality. They focused specifically on the personality trait called self-transcendence (ST), which is thought to be a measure of spiritual feeling, thinking, and behaviors in humans. ST reflects a decreased sense of self and an ability to identify one's self as an integral part of the universe as a whole.

The researchers combined analysis of ST scores obtained from brain tumor patients before and after they had surgery to remove their tumor, with advanced techniques for mapping the exact location of the [brain lesions](#) after surgery. "This approach allowed us to explore the possible changes of ST induced by specific brain lesions and the causative role played by frontal, temporal, and parietal structures in supporting interindividual

differences in ST," says researcher Dr. Franco Fabbro from the University of Udine.

The group found that selective damage to the left and right posterior parietal regions induced a specific increase in ST. "Our symptom-lesion mapping study is the first demonstration of a causative link between brain functioning and ST," offers Dr. Urgesi. "Damage to posterior parietal areas induced unusually fast changes of a stable personality dimension related to transcendental self-referential awareness. Thus, dysfunctional parietal neural activity may underpin altered spiritual and religious attitudes and behaviors."

These results may even lead to new strategies for treating some forms of mental illness. "If a stable personality trait like ST can undergo fast changes as a consequence of brain lesions, it would indicate that at least some personality dimensions may be modified by influencing neural activity in specific areas," suggests Dr. Salvatore M. Aglioti from Sapienza University of Rome. "Perhaps novel approaches aimed at modulating neural activity might ultimately pave the way to new treatments of personality disorders."

More information: Fabbro et al.: "The Spiritual Brain: Selective Cortical Lesions Modulate Human Self-Transcendence." Publishing in *Neuron* 65, 309-319, February 11, 2010.
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