

# Researchers show that culture influences brain cells

**A thumb's up for "I'm good." The rubbing of a pointed forefinger at another for "shame on you." The infamous and ubiquitous middle finger salute for—well, you know. Such gestures that convey meaning without speech are used and recognized by nearly everyone in our society, but to someone from a foreign country, they may be incomprehensible.**

The opposite is true as well. Plop an American in a foreign land and he or she may be clueless to the common gestures of that particular culture. This raises a provocative question—does culture influence the brain"

The answer is yes, reports Istvan Molnar-Szakacs, a researcher in the UCLA Tennenbaum Center for the Biology of Creativity, and Marco Iacoboni, director of the Transcranial Magnetic Stimulation Lab at the Ahmanson-Lovelace Brain Mapping Center of UCLA's Semel Institute for Neuroscience and Human Behavior. Their research appears in the current issue of the journal PLoS ONE and is available online at <http://www.plosone.org/doi/pone.0000626>.

In their study, the researchers wanted to investigate the imprint of culture on the so-called mirror neuron network. Mirror neurons fire when an individual performs an action, but they also fire when someone watches another individual perform that same action. Neuroscientists believe this "mirroring" is the neural mechanism by which we can read the minds of other people and empathize with them.

When it comes to the influence of culture, they found that indeed, the mirror neuron network responds differently depending on whether we are looking at someone who shares our culture, or someone who doesn't.

The researcher's used two actors, one an American, the other a Nicaraguan, to perform a series of gestures--American, Nicaraguan, and meaningless hand gestures, to a group of American subjects. A procedure called transcranial magnetic stimulation (TMS) was used to measure the levels of so-called "corticospinal excitability" (CSE)—which scientists use to probe the activity of mirror neurons.

They found that the American participants demonstrated higher mirror neuron activity while observing the American making gestures compared to the Nicaraguan. And when the Nicaraguan actor performed American gestures, the mirror neuron activation of the observers dropped.

"We believe these are some of the first data to show neurobiological responses to culture-specific stimuli," said Molnar-Szakacs. "Our data show that both ethnicity and culture interact to influence activity in the brain, specifically within the mirror neuron network involved in social communication and interaction."

"We are the heirs of communal but local traditions," said Iacoboni. "Mirror neurons are the brain cells that help us in shaping our own culture. However, the neural mechanisms of mirroring that shape our assimilation of local traditions could also reveal other cultures, as long as such cross-cultural encounters are truly possible. All in all, our research suggests that with mirror neurons our brain mirrors people, not simply actions."

Thus, it appears that neural systems supporting memory, empathy and general cognition encodes information differently depending on who's giving the information—a member of one's own cultural/ethnic in-group, or a member of an out-group, and that ethnic in-group membership and a culturally learned motor repertoire more strongly influence the brain's responses to observed actions, specifically actions used in

social communication.

“An important conclusion from these results is that culture has a measurable influence on our brain and, as a result, our behavior. Researchers need to take this into consideration when drawing conclusions about brain function and human behavior,” said Molnar-Szakacs. The findings, the researchers note, may also have implications for motor skill and language learning, intergroup communication, as well as the study of intergroup attitudes toward other cultures.

Source: University of California - Los Angeles

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