

Language and culture may influence how our brains process emotional faces

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Body language and the understanding thereof is a crucial part of communication. It is often assumed that humans can innately recognize other's emotions, but there is growing evidence that the ability to

decipher these emotions is not instinctive but shaped by people's culturally shared understanding of emotions.

A team of scientists in the US decided to investigate how cultural upbringing and access to emotion category words, which categorize and facilitate access to a complex set of emotional ideas, experiences, and responses stored in our memory, impact how we perceive others' emotional facial expressions.

"Here we show that access to emotion category words like 'disgust' differentially alters how [brain regions](#) interact with one another when people perceive emotions on others' faces. Importantly, this effect depends on one's cultural upbringing," said Dr. Joseph Leshin, a researcher at Northeastern University and the study's first author.

"Our findings contribute to growing evidence that emotional facial expressions are not universally produced and understood," added senior author Dr. Kristen Lindquist, a neuroscientist at the University of North Carolina, Chapel Hill, where the data for the *Frontiers in Psychology* study was collected.

A trigger for emotion recognition

Two participant groups—Chinese individuals, born and raised in mainland China, but now living in the US, and non-Hispanic white Americans who were born and raised in the US—were recruited for the study. While undergoing fMRI, both groups viewed actors pose expressions for 'disgust' and 'anger' as they are typically displayed by white North Americans. Over four blocks, the participants viewed expressions that were either preceded by the relevant emotion category word or a non-word control text.

"When primed with the word 'disgust' before viewing the corresponding

facial expression, immigrants from mainland China showed decreased functional connectivity in brain regions related to semantic processing, visual perception, and social cognition," Leshin said.

"Whereas white American participants tend to perceive wrinkling of noses and scowls as evidence that someone else is disgusted, Chinese participants are less likely to clearly associate those facial muscle movements with disgust. Thus, their brains were likely working harder to disambiguate the meaning of posed disgusted facial muscle movements," explained Lindquist.

Critically, presenting Chinese participants with the English language cue "disgust" prior to viewing wrinkled noses and scowls changed how their brains processed those expressions. White American participants did not show the same differences in brain connectivity in the emotion word vs. control text conditions, likely because the facial expressions are familiar to them.

These findings suggest that seeing an English emotion category word before seeing the corresponding facial expression may help Chinese participants to understand the meaning behind the culturally-relative expression better. This also seems to apply even when the emotion is not central to a culture, as is the case with the notion of "disgust" in Chinese culture, the researchers added.

Understanding how people wear their hearts on their sleeves

The researchers said that their findings should be interpreted in light of some limitations, for example, the modest sample size and the fact that the participant groups and the emotion category words used in this study do not represent the full spectrum of cultural or emotional diversity.

A starting point for future research could be investigating whether similar differences can be found among cultures that are more similar to one another than China and the US. Even subtle cultural differences could lead to variations in neural processing of emotions, the researchers said. To date, there is relatively little work that focuses on subcultures within the same country, for example within the US or China.

A further field of application of the team's findings lies in artificial intelligence.

"Our study suggests that AI tools designed to read emotions from faces must account for cultural variation to avoid misinterpretation of people's expressions and highlights the need for culturally informed AI," Leshin concluded.

More information: Language Access Differentially Alters Functional Connectivity During Emotion Perception Across Cultures, *Frontiers in Psychology* (2024). [DOI: 10.3389/fpsyg.2023.1084059](https://doi.org/10.3389/fpsyg.2023.1084059)

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