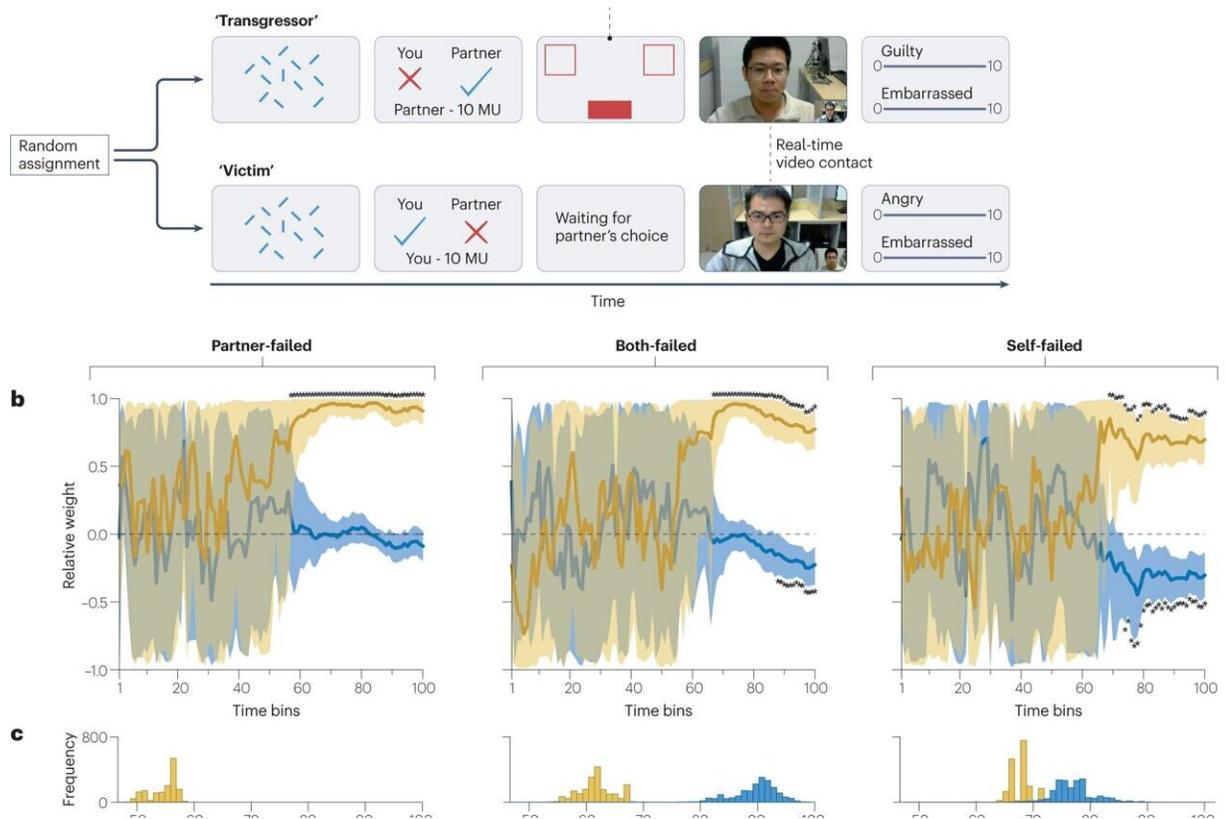# Researchers propose a holistic framework for studying social emotions

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Approach and avoidance motivations following interpersonal transgression. a, In this study, a transgressor participant and victim participant completed a visual search task together. Failure in this task by either participant resulted in monetary loss to the victim. When a monetary loss was incurred, the transgressor was asked to make a binary choice between giving more monetary compensation to the victim and a higher probability of engaging in video contact with the victim at the end of the trial (approach-oriented option) or giving less monetary compensation to the victim and a lower probability of video contact (avoidance-

oriented option) by moving a mouse cursor to the preferred option. Participants then rated the intensities of guilt and embarrassment (transgressor) or anger and embarrassment (victim) they felt at the moment. b, The curves reflect the moment-to-moment relative weights of monetary compensation (yellow) and probability of video contact (blue) on the final choice. Positive values indicate bias towards the option with more compensation and higher probability of video contact. Shading indicates the 95% confidence interval. The amount of compensation drove transgressor choice regardless of their responsibility (self-failed, both-failed or partner-failed). However, the influence of avoiding contact with the victim became stronger as the transgressor's responsibility for the outcome increased. c, The distribution of the earliest significant time point (the moment from which the approach or avoidance motivation started to significantly influence the final choice; P Nature Reviews Psychology (2024). DOI: 10.1038/s44159-024-00285-1

The crucial role of social emotions in our lives and in society cannot be overstated. Empathy, guilt, embarrassment, pride and other feelings we experience in the context of other people govern and motivate how we act, interact and the countless decisions we make. This is why a more holistic approach, one that integrates the various ways these emotions are studied, is necessary to gain insight and address gaps in knowledge. That's according to researchers from UC Santa Barbara, New York University School of Medicine and East China Normal University.

"I think researchers are realizing more and more that there needs to be some change, and a holistic understanding has become a popular idea in the field," said UC Santa Barbara social psychologist Hongbo Yu, the lead author of a paper that appears in the journal *Nature Reviews Psychology*.

Social emotions are complex, and according to the paper, multiple psychological and neurocognitive processes might be acting

simultaneously during social interactions, requiring a framework that can analyze these emotions along different dimensions.

There are three major domains of empirical research on social emotions in psychology and cognitive neuroscience, the authors assert. One examines why these emotions exist and their role in survival and reproduction. Another investigates the cognitive operations and psychological processes behind social emotions, looking for rules that determine which emotion one feels and at what intensity. The third measures how biological processes in the brain and body give rise to these emotions.

These domains correspond easily with a framework advanced by late 20th-century neuroscientist David Marr. He proposed a three-level analysis approach to studying cognitive processes, with a computation level that in the case of social emotions would examine goals and functions, or why the emotions exist, an algorithm level that looks at underlying cognitive operations, and an implementation level that looks for evidence of these emotions in the body.

Originally formulated for visual processes, the framework has since been applied to a variety of areas that require the processing of complex information.

In this way, the researchers say, it becomes possible to connect external stimuli to internal processes and vice versa, or to tease apart inherent processes from context-dependent ones.

"It's important because changes in a process at one level may change the process at another level," Yu said. "And there are dependencies and constraints across levels."

Take guilt, for instance, the moral pain experienced at having harmed

someone else. Without knowing its adaptive purpose (the computation level)—for instance, the maintenance and repair of important relationships—it becomes a challenge to design experiments that create the context for that emotion, Yu said.

"With the guidance of a clear understanding of the goal, we can then design a game in which the participants interact in real-time," he added. In the context of social emotions, he added, real-time interaction is particularly important, rather than tasks that require participants to imagine situations that could elicit the feeling (in this case guilt) but not the necessity or opportunity to follow through on the social aspect of the emotion (such as restore the relationship). "The psychological and the brain processes that engage may be different than when there is an actual interaction."

From there, suggest the researchers, investigators could analyze the emotions that arise using mathematical models in combination with neuroimaging techniques to understand the psychological and brain processes in a more quantitative and precise manner (algorithm), as well as the biological signals (implementation).

"There are many different measures and tools for different brain processes, and they all have different tradeoffs between their temporal precision and spatial precision," Yu added, "so researchers need to find the best approach for their research question."

Implementing this framework will take a little work, Yu said. Currently, researchers in the field tend to specialize in one or two domains, and social psychology in general—and social emotions in particular—have relied mainly on verbal theory and verbal hypothesis. This framework, according to the researchers, can not only add levels of precision to future studies but also shed new light on existing evidence. "We may be able to confirm previous verbal hypotheses, or perhaps resolve conflicts

between multiple hypotheses," he added.

"What we propose is that first we need to have more conversations," said Yu, who as a cognitive neuroscientist dwells primarily on the implementation level of the framework. But he has seen the potential gain of incorporating computational modeling, and has found his horizons broadened when studying the goals and functions of social emotion.

"I think researchers with more expertise at different levels should pay attention, and be open-minded with other researchers," he said.

More information: Hongbo Yu et al, A levels-of-analysis framework for studying social emotions, *Nature Reviews Psychology* (2024). [DOI: 10.1038/s44159-024-00285-1](#)

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