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A holistic framework for studying social emotions

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. Which 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 creates 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 in 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.

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