

# Toward a Microdevelopmental, Interdisciplinary Approach to Social Emotion

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## Abstract

Social emotions about others' minds, for example, admiration for virtue and compassion for social pain, play a critical role in interpersonal relationships, motivation, and morality. However, historical biases toward studying emotions as automatic reactions generated within a solitary individual limit our ability to study emotions about others' minds, which are inherently complex, social, and subjective. Here, I argue that a microdevelopmental approach, that is, considering these emotions as dynamic, context-dependent mental constructions actively organized from simpler cognitive and affective psychological components, may help to overcome the difficulties of studying these emotions by providing new perspectives on: reliably inducing these emotions; parsing the ensuing experiences into component psychological processes organizing over time; and relating these component processes to patterns of brain activation.

## Keywords

admiration/compassion, brain, dynamic development, social emotion

The neurobiology of social emotions is of great interest, as understanding the neural systems underlying these complex mental phenomena can shed new light on the nature of human social interaction and morality (Haidt, 2008). Especially intriguing and scientifically elusive are emotions about others' quality of mind, such as admiration for another person based on that person's virtuous accomplishments or compassion for another's psychological pain in relation to her distressing social circumstances. These emotions can profoundly inspire us, sometimes motivating our most significant life-course decisions. They can also incite a strong desire to help or harm others, or gratitude for our own good circumstances (Algoe & Haidt, 2009). They are the stuff of religions, of wars, of philosophical debates over the meaning of life, and are arguably among the pinnacle adult human achievements. But their psychology is much less well studied than that of basic emotions, and their neurobiology remains largely elusive. How can we study these important emotions scientifically?

Some of the major difficulties in studying social emotions about others' minds stems from their inherent complexity, subjectivity, and from the fact that they often play out on a longer time scale than simpler emotions. Unlike basic emotions and social

emotions that pertain to others' more immediate actions or circumstances, for example compassion for the physical pain of another person's broken leg or admiration for another's skillful performance (Immordino-Yang, McColl, Damasio, & Damasio, 2009), social emotions about another's quality of mind are based in evaluations of cumulative actions or circumstances, but do not themselves pertain directly to specific actions or circumstances. That is, these emotions are not directly about what someone did or what happened to them, but are about the kind of mind state a person has as evidenced by what they did or because of their interpretation of what happened. To appropriately induce these emotions requires knowing about a person's accumulated actions and circumstances, recognizing and reflecting on the implications of the subset of actions and circumstances that are meaningful for inferring the broader picture of the person's quality of mind, and constructing out of those deliberations an appropriate emotional reaction. Put another way, these emotions motivate actions, but they are not themselves directly about actions. Instead, a person's actions imply a mind state; the onlooker's emotion is in response to this mind state. Because of this, these emotions require extensive evaluative and inherently subjective processing about the experience of living and acting in the social world.

## Historical Biases against the Study of Complex, Subjective Emotion States

Part of the reason that these emotions' complexity and subjectivity confounds scientists can be traced, I would argue, to historical biases in psychology toward describing the mind in linear, static, context-independent terms (Fischer & Bidell, 2006). For example, both basic and appraisal models of emotion emphasize the automaticity of emotional behaviors, and describe emotions as organisms' coherent, packaged responses to invariant classes of environmental stimuli (Gendron & Barrett, 2009). However, the inherent subjectivity and complexity of emotions about others' minds makes it impossible to reliably map these psychological processes in one-to-one correspondence with environmental stimuli or with packages of behavior. It is not that these emotions are not systematic or coherent, nor is the problem that they do not pertain reliably to classes of situations or behaviors. Rather, the difficulty stems from the iterative, nested cycles of subjective and episodic processing involved in the induction and experience of these emotions. In these emotions, the emotionally competent stimulus (Damasio, 1994/2005) is in fact not in the world, but is itself a knowledge state conjured from past experiences, themselves subjectively perceived and recorded, about what we suppose is happening in another person's mind, as indexed indirectly by our perception of their circumstances and actions.

How can we reconcile all this subjectivity and complexity to make these emotions accessible to scientific scrutiny? Rather than trying to fit these emotions into a traditional, linear model of the form: stimulus→appraisal→emotional response→emotional feeling (or experience), in this article I argue that these emotions represent knowledge structures so complex and subjective that we may better consider them as *microdevelopmental* phenomena. In a microdevelopmental approach (i.e., developmental over the short term), a person is viewed as actively constructing increasingly complex mental behavior and meaning, in essence organizing his mind state, by hierarchically coordinating pieces of mentally represented information, including social, cognitive, affective and episodic information, into context-specific functional skills. These skills comprise the various component processes of a traditionally conceived emotional reaction, for example, appraisal, emotion, feeling (cf. Damasio, 1994/2005), but represent dynamically fluctuating abilities for understanding and acting in the world (Fischer & Bidell, 2006; Fischer & Immordino-Yang, 2002).

### Experiencing Admiration for Virtue, an Example of a Microdevelopmental Emotion

Consider the following unfolding description that one experiment participant, "Amy," provided in response to learning about a true story meant to induce admiration for virtue. In the story, a young blind woman, despite being the only blind student of 30,000 at her university, learns fluent Tibetan language by ear, invents a computerized Tibetan Braille system to translate texts, and travels

into the mountains of Tibet to open a school for blind children, to which she dedicates her life (for details, see Immordino-Yang et al., 2009, Supplementary Information). As the experimenter shares the story, she engages Amy in an intersubjective exchange, gradually revealing information in a sequence that facilitates Amy's construction of a complex understanding. As they proceed, Amy's eyes widen and her mouth opens, her breaths become slow and deep, her posture erect. She makes repeated eye contact with the experimenter, nodding and silently mouthing interjections like "wow." The story ends with the experimenter asking Amy how the protagonist makes her feel, to which she responds:

Extremely impressed because she went above and beyond. I think I also just respect her for not only helping herself out of her own situation and making the best of it, but trying to help other peoples' situations as well, especially those who are less fortunate. [long pause] I found the story very motivational, too.

The experimenter then probes what Amy means by "motivational," and Amy continues:

It kind of makes me reflect upon my own life and realize that considering that I haven't had as extreme, like, uncontrollable circumstances as a lot of these people [whose stories are featured in the experiment]... it makes me realize, well if they can do that despite, like, whatever hardships they have then I definitely should be making more of my resources in my life.

As we can see, this young woman does not proceed directly from appraising the story protagonist's quality of mind to one unified, packaged emotional response that we could label "admiration for virtue," although it is clear from her words (e.g., "extremely impressed") and actions (e.g., wide eyes, open smiling mouth) that this story strongly moves her. Instead, Amy begins by appraising the story protagonist's actions in relation to her (the protagonist's) own needs and to the needs of less fortunate people, which results in Amy feeling "respect" for the protagonist. This transforms to motivation and introspection; following a prompting question from the experimenter, she compares her own situation to the difficulties that must have faced the protagonist, considers the implications for the protagonist's mind of having overcome these difficulties, and uses this standard to judge her own life. Toward the end of the quote, as Amy mentally coordinates the components of her reaction by relating her life to that of the protagonist, she builds an understanding that transcends her reaction to this particular story and offers a more general, abstract assessment of her life in relation to those of the multiple protagonists' stories she had learned about over the course of the experimental interview. This assessment is constructed from her various component feelings and thoughts about the protagonists, the world, and herself.

### From Complex Emotions to Psychological Primitives

In approaching these emotions as intersubjective psychological processes dynamically organizing over the course of a social exchange, the participant's unfolding emotion is exteriorized,

and we gain a window into her thought processes. This window allows us to analyze not only the component psychological parts of her conscious experience (roughly akin to “psychological primitives,” Barrett, 2009a) but the relationships among these parts, and the processes by which she mentally represents these relationships. This approach is consistent with a constructionist approach in that the emotion is built out of smaller pieces that are not themselves emotional per se (Barrett, 2009b), but seeks to specify how the process of constructing the emotion is context-dependent, fundamentally subjective, and involves dynamic cycling between simpler and more complex knowledge and feeling states in accordance with the context and other sources of psychological variability. For example, in response to questions about how they feel after hearing an emotional true story, Amy and other experiment participants spontaneously reported visceral sensations (e.g., “[I have an] overall warm feeling”; “I feel like my insides clench”), motivated states (e.g., “he makes me want to do great things!”; “I wish I could help her”), perspective-taking (e.g., “I can put myself in his shoes”), simpler social emotions (e.g., “I’m a little ashamed,” “she makes me jealous”), heightened self-awareness (e.g., “It makes me wonder about my own life”) and others. The total sum of these states dynamically self-organizing over the time course of the emotion can be described as both a person’s understanding and experience of the emotion.

Taking a microdevelopmental, dynamic approach to emotions about others’ minds has several advantages. First, it would allow scientists to study the affective and cognitive aspects of these emotions under the same framework. Rather than a cognition causing an emotion, which in turn shapes ensuing cognition, scientists could analyze a person’s psychological processes as sets of interrelated thoughts and feelings about the world and the self that fluctuate with the context, in essence, as sets of dynamic conceptual structures (Fischer & Bidell, 2006) that evolve in response to the changing internal (visceral and neural) and external (social and physical) circumstances (see Barrett, Mesquita, Ochsner, & Gross, 2007 for a discussion of evolving processes). Second, rather than attempting to standardize the emotion experience, for example to make all instances of admiration for virtue look and feel exactly the same, scientists would be able to study both variability and stability in these processes by mindfully controlling various aspects of the context while leaving the participant free to build her own meaning. Understanding the variability in these processes, that is the psychological, neurological, visceral, social and physical conditions that precipitate changes in a person’s understanding and experience, would contribute to knowledge of cultural biases, personal circumstances and biological predispositions, and would allow us to build more accurate predictions and models about how these emotions may influence thought and behavior in real-life contexts outside the laboratory. Analyzing the sources of variability, rather than denying that individual and context-dependent predispositions and fluctuations exist, would help scientists manage the trade-offs between reliability and validity that are inherent in research about subjective phenomena like emotions.

## From Psychological Primitives to Neurobiological Correlates

The third benefit of a microdevelopmental approach derives from uncovering the stability within the variability in these emotions, because these stable processes would be good candidates for investigation of neural correlates. Using Barrett’s taxonomy (2009a), a microdevelopmental approach to parsing these emotions into component mental representations and their relationships in effect carves these complex subjective emotion states from “complex psychological categories” into “psychological primitives” that are likely to correspond to particular, although functionally defined and perhaps partially overlapping, neural systems. For example, one candidate for a psychological primitive with a discernable neural basis might be the visceral sensations that many experiment participants report (Keltner & Haidt, 2003), which likely correspond to activation in somatosensory systems like the anterior insula (Craig, 2002; Singer & Lamm, 2009). Carving these emotions into psychological primitives using a microdevelopmental approach is useful because it suggests a path toward productive interdisciplinarity, helping to forge mappings between the psychological constructions comprising these emotions and the distributed neural networks that underlie them.

A few studies of the neurobiology of social emotion have begun to move in this direction under the guise of studying emotion experience (e.g., Eisenberger, Lieberman, & Williams, 2003). For example, in our recent study of the neural correlates of varieties of admiration and compassion (Immordino-Yang et al., 2009), participants spent over two hours in a one-on-one interview with the experimenter discussing their feelings about a series of true-life stories chosen for their powerful admiration or compassion-inducing content. Participants then viewed reminder versions of the crux of each story during a functional magnetic resonance imaging (fMRI) scan with simultaneous psychophysiological recording. During the scan, participants were asked to become as emotional as possible about each story and to report on the real-time strength of their emotion using button presses. Data analysis involved identifying instances of strong, clear admiration or compassion during the videotaped prescan interviews (corroborated in postscan interviews). fMRI trials corresponding to stories to which the participant expressed a clear reaction during the interviews, and during which the participant reported being strongly emotional (via button press), were included in the blood oxygen-level dependent (BOLD) analysis. Psychophysiological data were used to identify the time window of the emotion response during scanning.

The above experiment was, in Barrett’s terms, an attempt to map a “complex psychological category” onto its “neural reference space,” and allowed us to test general hypotheses about the recruitment of neural systems related to homeostasis, somatosensation and consciousness during the feeling of different varieties of two complex social emotions. However, this is admittedly a fairly coarse goal, and leaves unanswered more detailed questions about the psychological time course of these complex emotions and the corresponding neural processes. For

example, many participants spontaneously reported a strong sense of motivation or inspiration in response to the stories meant to elicit admiration for virtue, or alternatively they reported introspecting about the moral meaning of their own life decisions. During the feeling of compassion for social pain, many participants reported feeling gratitude for their own good circumstances. How might these psychological components of the emotion construction process be related to various patterns of neural activation and connectivity in our BOLD fMRI data? While we can speculate, the current method leaves such detailed questions unanswered. A microdevelopmental, interdisciplinary approach could move us toward answering such questions by providing a framework for analyzing participants' unfolding descriptions of their feelings and experiences into component psychological processes and relating these to corresponding cortical and subcortical neural activation patterns associated with attention, prospection, perspective-taking, emotion regulation, episodic memory, somatosensation, consciousness, homeostasis and others.

### Into the Future: Rigorous Methods for the Study of Complex, Subjective Emotions

Despite their important functions in human relationships and moral systems, complex social emotions about others' minds have been relatively neglected in the history of emotion research. This can largely be traced to traditional conceptions of emotion-related mental processes as linear, automatic, mental and behavioral reactions that can be directly induced through exposure to classes of stimuli and directly measured through behaviors such as facial expressions, body postures/actions and psychophysiological changes. While social emotions about others' minds *do* involve the induction of a reaction to another person's mental circumstances, and *do* precipitate characteristic changes in mental and physical behavior, the inherent complexity and subjectivity of the induction and reaction processes suggest that it may be more fruitful to conceive of these emotions as dynamic, microdevelopmental, psychological constructions than as linear chains of automatic appraisals and reactions.

Before ending, a word about the use of subjective report as a source of data is in order. Although it is certainly well documented that people's subjective reports may not accurately reflect the contributions of nonconscious processing, assuming that participants in social emotion experiments are willing and able to accurately report their conscious experiences, their reports will necessarily reveal important information about their subjective experience of the emotion state. This, of course, is not the whole picture. But,

it provides a frame within which to study the nonconscious aspects of the emotion, from body language, to psychophysiological changes, to nonconscious cognitive and affective processing, to neural activation patterns. After all, the neurobiological evidence is only as good as the psychological and behavioral evidence that we have to correlate with it; one cannot study something if one does not know when or how it is happening. If we wish to understand the most high-level, complex, subjective workings of the human social mind, we must be willing to conduct studies of the most high-level, complex, subjective and social mental phenomena. By developing interdisciplinary methods that allow us to creatively investigate these phenomena across multiple levels of analysis, including mind, behavior and brain, as well as models to relate these levels of explanation, we can make headway in studying subjective experiences—the emotions people have and the meaning they make of them—and the implications of these experiences for real-life beliefs, decisions and actions.

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