

How an Embodied Mind Perspective can Influence the Study of Emotion

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Embodied approaches to studying the mind have received increasing attention over the last decade (e.g. Barsalou, 2008; Damasio, 1999; Lakoff & Johnson, 1999; Niedenthal, 2007). Common to these approaches is the goal of understanding how our processes for perception and action form a basis for our higher-level thoughts and emotions. While there has been a great deal of interest in embodied cognition as a theoretical stance, there have only been hints at the value of this approach to researchers across the cognitive sciences. This symposium is intended to help illustrate how an embodied mind perspective can change the research questions we ask and the ways we interpret results when studying emotion. We present four lines of research, bringing to bear psychophysiological, muscle paralysis, neuroimaging, and behavioral methods. We aim to broaden the discussion on the role of an embodied approach in emotion research and the cognitive sciences more generally.

Jamil Zaki will begin the symposium by presenting research on the physiological mechanisms underlying empathic accuracy. Joshua Davis will then discuss research on the paralyzing effects of Botox on emotional experience. In the third talk, Christian Keyzers will explore the embodied nature of the brain mechanisms by which we understand the emotions of others. Finally, Fritz Strack will discuss the various psychological mechanisms by which bodily actions can influence affect.

Zaki: Shared physiological states and interpersonal understanding

Empathy research has demonstrated that when perceivers and targets share autonomic arousal, perceivers can more accurately recognize those targets' emotions (*empathic*

accuracy). In particular, empathic accuracy has been shown when changes in skin conductance response for both perceivers and targets are correlated over time (known as *physiological linkage*). This finding suggests that embodying the states of others is an important route to interpersonal understanding. We replicated and extended this finding, illustrating how these effects depend on qualities of the target. Targets differ in *emotional coherence* (correlation between targets' arousal and targets' affect ratings), and empathic accuracy is highest when perceivers view targets with greater emotional coherence. Targets whose emotional states are accompanied by congruent bodily states become affectively "readable," partially through facilitating shared arousal. We will discuss these findings and what they reveal about the mechanisms underlying the role of physiological linkage in empathic accuracy.

Jamil Zaki will receive his Ph.D. in Psychology from Columbia University in 2010. His work on empathic accuracy has appeared in *Psychological Science* (Zaki, Bolger, & Ochsner, 2008). He is the recipient of a 2008 Autism Speaks Pre-Doctoral Award.

Davis: The effects of Botox on emotional experience

Prior research suggests that facial expressions are more than outward signals of what a person feels, but can also influence a person's emotional experience. Earlier experiments guided participants to voluntarily pose or inhibit facial expressions. The voluntary nature of these tasks can lead to issues (e.g. participant awareness of the hypothesis, distraction, and various cognitive mediating variables) that can make interpretation of the findings more difficult. We compared participants receiving Botox – to treat facial wrinkles – to those receiving a control treatment. Crucially, Botox injections leave muscles in a state of flaccid paralysis by disrupting neural transmission at the

neuromuscular junction. The control injection (Restylane), by contrast, has no effect on muscle movement. Participants were seen before and after treatment, were tested on reactions to both positive and negative stimuli, and were not aware of the study hypothesis. Under these conditions, Botox was found to have an effect on emotional experience. We will discuss these findings and potential moderating variables, with a focus on what they suggest about the mechanisms by which facial feedback influences emotional experience.

Joshua Ian Davis is Term Assistant Professor in the Department of Psychology at Barnard College of Columbia University. He received a 2007 Young Scholar Award from the American Psychosomatic Society.

Keyers: How our brain embodies the emotions of others

Contemporary psychological models assume that perceiving the emotions of others depends on the processes of emotional contagion and/or of facial mimicry. Here I will show how neuroimaging can test and refine these concepts. I will show that viewing the facial expressions of others activates inferior frontal areas involved in producing similar facial expressions (van der Gaag, Minderaa, & Keysers, 2007). I will show how viewing the positive and negative emotions of others also activate regions involved in experiencing similar emotions (Jabbi, Swart, & Keysers, 2007; Wicker et al., 2003). Finally, using functional connectivity analysis, I will show how sharing the motor program of other people's facial expressions seems to trigger our sharing of their inner states (Jabbi & Keysers, 2008). These findings show that our perception of the emotions of others is a deeply embodied process depending on representations of our own actions and emotions (Keysers & Gazzola, 2006). Finally, I will show how these findings help resolve one of the anomalies of the traditional psychological model: if sharing the facial expressions of others is the cause for feeling their emotions, why does the amount of overt facial mimicry fail to correlate with the amount of emotional contagion and understanding?

Christian Keysers is Scientific Director of the BCN Neuroimaging Center and Full Professor for the Social Brain at the medical faculty of the University Medical Center Groningen. He is a recipient of the Marie Curie Excellence Award.

Strack: Embodiment – Features and Functions

While the phenomenon of embodiment has been frequently demonstrated, its underlying psychological mechanisms have not been sufficiently identified. In my presentation, I shall describe different routes on which physical behavior may influence psychological representations. I shall illustrate these proposals with examples from my own work ranging from influences of facial and postural action to head movements and chewing activities on affective judgments, memory and aesthetic assessments.

Fritz Strack is Professor and Chair in Social Psychology at the University of Würzburg. From 2005-2008, he was President of the European Association of Experimental Social Psychology (EAESP). He holds a 2003 Theoretical Innovation Prize of the Society of Personality and Social Psychology (SPSP), a 2004 Wilhelm-Wundt-Medal of the German Psychological Society, and a 2005 Thomas M. Ostrom Award of the Person Memory Interest Group. Related representative papers include Topolinski & Strack (in press), Strack & Deutsch (2004), and Strack, Martin, & Stepper (1988).

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