

The Possibility and Peril of using multimodal physiological approaches to measure Academic Emotion, Race and Gender Bias, and Motivation.

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Section 1: (492 words)

The purpose of this session is to answer the following questions:

How can we leverage multimodal physiological approaches to address critical issues within education?

What are the consequences of extending models of emotion using multi-modal physiological approaches?

What are the best practices for using multimodal physiological approaches to understand academic emotions?

In 2017, our research team presented a workshop at SCIPIE that introduced physiological research tools and techniques, affording researchers additional methods to study existing models of emotion. After two years of utilizing these tools, we aim to update some of the practical and theoretical issues we have encountered and overcome (Villanueva et al., In Press, Husman et al., 2019).

Academic emotions models theorize multiple coordinated components: affective, cognitive, motivational, expressive, and peripheral physiological processes (e.g. Pekrun, 2016).

Historically, many of these mechanisms have been assessed via self-reports (e.g., Frenzel, Pekrun, Dicke, & Goetz, 2012), relying on subjective representations of the conscious and unconscious mind (Pekrun & Böhner, 2014) limiting a holistic understanding of academic emotions. To address this limitation, psychological researchers have begun to consider a variety of multimodal approaches that complement self-reports with techniques based on image analysis, biology, and physiology (e.g., Harley, Jarrell, & Lajoie, 2019).

There has been an increasing interest in the use of multimodal data and an adaptation of theories of emotion and emotional regulation in response to the increased sensitivity and objectivity of these measures (Harley, Pekrun, Taxer & Gross, 2019). The use of physiological biomarkers have the potential to address the interplay between race, ethnicity, culture, and emotion through conscious and nonconscious processes (Urda & Bruchmann, 2018). Multimodal physiological data can help us understand cultural phenomena such as implicit bias (Greenwald & Krieger, 2006), white fragility (DiAngelo, 2018), and stereotype threat (Steele & Aronson, 1995) without self-report bias (Semmer, Grebner, & Elfering, 2003). Researchers have leveraged multimodal approaches to better understand the role of physiological arousal in moderating police responses to perceived threats from white and black targets (Akinola & Mendes, 2012) and the sustained physiological effect of race-related trauma on black students (Richman & Jonassaint, 2008) and

race-effects of mentoring on intersectional women (Villanueva et al., 2019).

Combining multimodal physiological approaches to study academic emotions has several consequences. First, connecting physiological biomarkers to academic emotions engages a long-standing debate on the relation between cognitive and biological processes (e.g. Shot, 1979; Kemper, 1980). To employ multimodal methods will also require researchers to match the specific aspect of arousal of interest, state, mood, trait, or a combination of these. For example, the immediacy of electrodermal phasic signal is likely more appropriate for measuring state emotions. Cortisol measures, however, may reflect mood states as they are slower to react. We will explore the match between measure and arousal type in this session.

Finally, situating emotion at least in part to a physiological response carries philosophical consequences regarding how we conceptualize and situate agency within the individual at the expense of other theoretical models (e.g. Foucault, 2012/1975).

Section 2:

200 word summary of how sessions will actively engage participants and involve them in the presentation (not required for posters or individual papers).

The session will be conducted in a workshop style format. We will provide a demonstration of commercially-available and portable devices (e.g., Empatica E4) designed to measure heartrate and electrodermal arousal. We will also demonstrate the most common salivary collection procedures. We will then discuss the variabilization of the EDA and salivary data. Salivary and

EDA data can be modeled through area over the curve, magnitude of response, intensity of response, or speed of recovery.

After the discussion of issues regarding timing, technological limitations of the sensors, resource requirements of salivary sample collection, and variabilization we will use structured discussion format to explore questions regarding the nuts and bolts, concordance and discordance between existing models of achievement emotions and physiological measures, the opportunities and limitations to apply these methods to critical questions regarding race and gender bias as well as the philosophical implications of this application. These discussions will be facilitated by critical friends Skorodinsky, Zvoch, Linnenbrink-Garcia, and Graham. Participants have the opportunity to explore approaches to their own research studies.

Timeline:

Introduction: 10 min

Nuts-and-Bolts: 30 min

Discussion: Utilizing multimodal physiological approaches to address critical issues in education
20 min

Discussion: The consequences of using multimodal physiological approaches: 20 min

(200)

Please include 2-4 keywords that identify your presentation. *

Keywords must be separated with commas.

Academic emotions, physiological arousal, critical theory, multimodal data

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