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Models and methods of emotional concordance

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ABSTRACT

Theories of emotion generally posit the synchronized, coordinated, and/or emergent combination of psychophysiological, cognitive, and behavioral components of the emotion system – emotional concordance – as a functional definition of emotion. However, the empirical support for this claim has been weak or inconsistent. As an introduction to this special issue on emotional concordance, we consider three domains of explanations as to why this theory–data gap might exist. First, theory may need to be revised to more accurately reflect past research. Second, there may be moderating factors such as emotion regulation, context, or individual differences that have obscured concordance. Finally, the methods typically used to test theory may be inadequate. In particular, we review a variety of potential issues: intensity of emotions elicited in the laboratory, nonlinearity, between- versus within-subject associations, the relative timing of components, bivariate versus multivariate approaches, and diversity of physiological processes.

1. Introduction

Explicitly or implicitly, almost all models of emotion rely on the idea that (a) there are multiple components in the emotion response system, chiefly physiological, cognitive (appraisal), expressive, and behavioral; and (b) emotion is identified by some degree of coordination among these components (Barrett & Campos, 1987; Darwin, 1872; Ekman, 1992; Fogel et al., 1992; Gross, 2007; Lang, 1994; Lazarus, 1991; Levenson, 1994; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005; Quas, Hong, Alkon, & Boyce, 2000; Rosenberg & Ekman, 1997; Scherer, 2005; Sze, Gyurak, Yuan, & Levenson, 2010; Tomkins, 1962). Indeed, the issue of emotional concordance features prominently in early theories of emotion (Cannon, 1927; Darwin, 1872; James, 1884, 1894) and continues to this day with modern, comprehensive models reflecting the latest research (Damasio, 1998; Frijda, 2007; Gross & Thompson, 2007; Matsumoto & Ekman, 2009; Ortony, Clore, & Collins, 1988; Sander, Grandjean, & Scherer, 2005). The canonical fear response, for example, should be a synchronized combination of a threat appraisal, fearful facial affect, elevated sympathetic arousal, and an urge to flee the threatening situation. In this way, emotion is conceptualized as a dynamic, mutual amplification of components of the emotion system to create an adaptive and coherent response to one's current circumstances.

There is one non-trivial problem that has dogged this conceptualization of emotion for more than a century: poor empirical support. Concordance has been weakly supported by the data, at best, but often not supported, with some research even showing evidence for the opposite, *discordance* or negative associations (Adelmann & Zajonc, 1989; Hastings et al., 2009; Lang, 1968; Mauss & Robinson, 2009; Mauss, Wilhelm, & Gross, 2004). Moreover, the file-drawer problem may be particularly relevant to examinations of concordance and the inconsistent results in the literature could be the tip of an iceberg of null findings that never make it to an editor's desk. The purpose of this special issue is to shed a concentrated light on this perennial problem with a group of papers addressing various aspects of the concordance of physiological responses with each other and other emotion system components. To introduce this issue, we review subtle differences between conceptualizations of concordance and provide a range of explanations as to why concordance may not have the expected empirical support.

2. What do we mean by 'concordance'?

Emotional concordance has gone by various names over the years, including concordance (Nesse et al., 1985; Wilhelm & Roth, 2001), response system coherence (Ekman, 1992; Mauss et al., 2005), organization of response tendencies (Lazarus, 1991; Levenson, 1994) or response components (Scherer, 1984; Witherington, Campos, & Hertenstein, 2001), or response component syndromes (Averill, 1980; Reisenzein, 2000). We prefer the term concordance – and the opposite, discordance – rather than other terms (e.g., coherence, convergence, organization, synchrony) and their respective opposites. Concordance and discordance are clear and precise terms that delineate the two possibilities of combinations of emotional processes. Divergence

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is inappropriate because it incorrectly suggests that that response components are "moving away" from each other. Incoherence lacks precision and has a negative connotation that would not work for this context. Disorganization implies a haphazard coordination among components. Synchrony can be used to describe both temporally positive and negative associations among components and asynchrony is simply a lack of that synchrony. Using the term discordance is also favorable because it can be used effectively in combination with these other terms to describe more fine-grained aspects of emotional processes. For example, certain discordant emotional responses can be evaluated as coherent (e.g., suppressing expression) or incoherent (e.g., disorganized). Thus, although the use of a single term may occlude these important distinctions, we argue that concordance–discordance is the best over-arching framework. However, in the future it may be optimal for the field to create a more multi-dimensional conceptualization that combines these important features. For example, Bulteel et al. (2014) distinguish two types of concordance: pattern and synchrony.

Regardless of the terminology, the lack of empirical support has inspired more nuanced conceptualizations of the coordination among emotion system elements. One approach has been to identify the relations among components to be a loose coupling (Lang, 1988) or probabilistically weak (Bradley & Lang, 2000). Other caveats involve associating concordance with only relatively strong emotional responses (Russell, 2003; Scherer, 1984). Still others argue that discordance may be the norm rather than the exception due to regulatory efforts to disrupt emotional processes (Butler, Gross, & Barnard, 2014; Dan-Glauser & Gross, 2013; Lanteigne, Flynn, Eastabrook, & Hollenstein, 2012). Here, we explore a range of possible explanations for the limited support for emotional concordance grouped into three broad categories: (1) theories should reflect the data and be revised; (2) moderating factors have not been sufficiently considered; and (3) methods have been inappropriate.

3. Why is there limited support for concordance?

Theory. The first and most obvious explanation would be that the theoretical premise behind concordance is wrong (Barrett, 2006; Bradley & Lang, 2000; Fridlund, 1997; Reisenzein, 2000). Barrett (2006) most recently and forcefully makes the argument that progress in understanding emotions is impeded by the pervasive assumption that there are "natural kinds" of emotions comprised of a set of "characteristic property clusters". The search for emotion-specific concordance – a unique combination of physiological, behavioral, and cognitive components for each "natural kind" of emotion – has been a fool's errand. Instead, "[r]ather than beginning with an abstract, theoretical construct (e.g., anger) that we try to identify in human behavior, perhaps we could concentrate our empirical efforts on identifying which observables (e.g., cardiovascular changes, facial expressions, startle responses, electroencephalographic recordings, subjective experience, conscious thoughts) are implicated across instances of emoting and observe, rather than prescribe, their relationships in varying circumstances and time frames." (Barrett, 2006, p. 48). Thus, from this perspective concordance is still seen as important, yet only as a bottom-up process through which we can discover functional combinations via inductive rather than deductive inquiry.

This bottom-up approach has also been advocated by emergent accounts of emotion (e.g., Lewis, 2005). Coan (2010), for example, makes a compelling argument that there has been a problematic reliance on latent variable approaches for the examination of what is generally agreed is an emergent process. With a latent approach, indicators of emotions (e.g., physiological, cognitive, behavioral) all reflect an underlying emotion process and are reasonably interchangeable. The conceptual underpinning of such an approach is that there is a latent process, emotion, which is manifest in various ways in body, behavior, and felt experience. In contrast, and more consistent with theoretical claims, emergent approaches model these components as interacting elements in a dynamic system from which emotion arises (Coan, 2010; Lewis, 2005). Thus, one reason why evidence for concordance has been inconsistent could be the traditional application of latent models for a putatively emergent process.

It also makes a difference which components of the emotion system are selected for tests of concordance. For the vast majority of investigations, this is done with estimates of paired associations (e.g., correlations). With these pairings, associations between self-reported experience and behavioral expression have been the strongest, while pairings that include physiological variables have been the most inconsistent (e.g., Fischer & Roseman, 2007; Mauss et al., 2005; also see Evers et al., 2014). A second kind of pairing is across various physiological measures (Bulteel et al., 2014; Gentsch et al., 2014), which has yielded the full spectrum of results: negative, positive, and null (Kreibig, Wilhelm, Roth, & Gross, 2007; Mauss et al., 2005). At least two issues stem from this component pairing approach. First, the reliance on paired associations for what is, at minimum, a three-component process (e.g., physiology, appraisals, behavior) reflects methodological limitations rather than a strong theoretical prediction that concordance should be bivariate (Bulteel et al., 2014; Lanteigne et al., 2012). Second, it could be argued that associations within a particular domain of emotion components, such as physiology, do not really capture the spirit of the concordance question by excluding the experiential, cognitive, or behavioral aspects of emotional response.

Another question is whether concordance should occur in the same way for all situations. First, as argued by Evers et al. (2014), there may be at least two levels of processing which would reflect different possibilities for concordance. Rapid, automatic concordance may not be functionally comparable to reflective processes that occur at longer time scales. Second, the means by which emotions are elicited may be important. Receptive or passive experience of emotional content (e.g., films) is often asocial and can be contrasted to active, social or generative experiences that induce emotional arousal. Finally, there are diverse ways to operationalize concordance. For example, the overall pattern of responsivity across domains captures a different aspect of concordance than the relative synchrony of dynamic processes (Bulteel et al., 2014).

Moderators. Another set of reasons for why concordance has been elusive is the relative neglect of important moderators of emotion processes. For example, because emotions are situation-specific adaptations, context may be a focal rather than peripheral aspect of concordance. The Ortony, Clore, and Collings (OCC) model (Clore & Ortony, 2013; Ortony, Clore, & Collins, 1988), for example, asserts that emotions cohere around situations rather than just being constrained by context. Thus, the missing ingredient in the list of emotion components is the situation itself and the relative neglect of this ingredient is partly responsible for limited evidence in support of concordance.

As argued by Butler et al. (2014), the concordance problem may stem from the relative neglect of regulatory processes in emotion theory and research. With the inclusion of neural processes into modern accounts of emotions, the separation of emotional processes from cognition or regulation has become untenable (Lewis, 2005; Thompson, Lewis, & Calkins, 2008). That is, at no point during an emotional process is regulation not occurring. Emotion regulation covers a wide array of processes and most of these target specific emotion components over others (e.g., suppression of expression, re-appraisal, relaxation to modulate physiological arousal). More generally, the down-regulation of emotion is the top-down, negative feedback counterpart to the