Biological Psychology 98 (2014) 43–49

Contents lists available at ScienceDirect

Biological Psychology

journal homepage: www.elsevier.com/locate/biopsycho

Emotion response coherence: A dual-process perspective☆

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ARTICLE INFO

Article history:
Received 29 April 2013
Accepted 5 November 2013
Available online 14 November 2013

Keywords:
Emotion
Response coherence
Automatic responses
Reflective responses
Dual-process theories

ABSTRACT

Emotions are widely thought to involve coordinated responses across multiple responses (e.g., experiential, behavioral, and physiological). However, empirical support for this general "response coherence" postulate is inconsistent. The present research takes a dual-process perspective, suggesting that response coherence might be conditional upon response system (i.e., automatic versus reflective). In particular, we tested the hypothesis that response coherence should be maximal *within* each system and minimal *across* the two systems. To test this prediction, 36 participants underwent an anger provocation while two relatively automatic (anger accessibility and physiology) and two relatively reflective (anger experience and instrumental behavior) responses were measured. As predicted, coherence was found within the automatic and reflective systems, but not across them. Implications for emotion response coherence, dual-process frameworks, and the functions of emotions are discussed.

1. Introduction

A central postulate of many emotion theories is that emotions involve coordinated changes across experiential, behavioral, and physiological responses (e.g., Averill, 1980; Ekman, 1992; Frijda, Ortony, Sonnemans, & Clore, 1992; Lazarus, 1991; Levenson, 1994; Scherer, 1984; Tomkins, 1962). This general *response coherence* postulate is often associated with an evolutionary perspective on the function of emotions. By imposing coherence across the various components of an emotional response, emotions are thought to prepare the organism for the actions required to respond optimally to environmental demands (e.g., Ekman, 1992; Levenson, 1994; Plutchik, 1980).

Despite the centrality of this postulate, empirical evidence for response system coherence is surprisingly inconsistent, with some research providing support in favor of response coherence and other research failing to support it. To reconcile these inconsistent findings, the present study proposes and tests a dual-process framework of emotion response coherence, suggesting two largely independent systems: an automatic (relatively unconscious, fast, and efficient) and a reflective (relatively conscious, deliberate, and effortful) system. According to this account, response coherence should be maximal *within* each system and minimal *across* the two systems.

1.1. Response coherence

Studies investigating the degree of coherence among emotion components are not only relatively rare, they "provide for the greater part at best limited support" (Reisenzein, 2000, p. 2) for the assumption of response coherence. Associations among the different emotion components are often weaker than expected (e.g., Bonanno & Keltner, 2004; Mauss, Wilhelm, & Gross, 2004; Reisenzein, 2000; Ruch, 1995), non-existent (e.g., Jakobs, Fischer, & Manstead, 2001; Mauss et al., 2004; Reisenzein, Bördgen, Holtbernd, & Matz, 2006), or even negative (e.g., Buck, 1977). These inconsistencies across studies have led some psychologists to argue that the coherence postulate may be overstated or even completely unfounded (Barrett, 2006; Bradley & Lang, 2000; Fridlund, 1994; Lang, 1988; Reisenzein, 2000).

☆ *Author Note*: This research was supported by a Fulbright grant from the Netherlands American Commission for Educational Exchange (NACEE) and a travel grant from the Netherlands Organization for Scientific Research (NWO)assigned to the first author and by a fellowship within the Postdoc-Program of the German Academic Exchange Service (DAAD) awarded to the second author. We thank Tania Davila, the Stanford Psychophysiology Lab, and Yael de Liver for their helpful comments.

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http://dx.doi.org/10.1016/j.biopsycho.2013.11.003

At the same time, discarding the coherence postulate entirely is not consistent with the research that has identified at least some degree of coherence among responses (e.g., Bonanno & Keltner, 2004; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005; Sze, Gyurak, Yuan, & Levenson, 2010). One solution to this tension is that coherence may not be an all-or-none feature of emotions. Rather, different degrees of coherence might be found for different types of responses. Indeed, when differentiating among different types of responses, some systematic differences in coherence emerge.

The strongest associations are typically found between experience and behavior (e.g., Fischer and Roseman, 2007; Zeelenberg & Pieters, 2004). In contrast, associations between physiological responses, on the one hand, and experience and behavior, on the other, are more modest or non-existent (e.g., Borkovec, Stone, O'Brien, & Kaloupek, 1974; Grossman, Wilhelm, Kawachi, & Sparrow, 2001; Mauss, Wilhelm, & Gross, 2003; Mauss et al., 2004, 2005; Weinstein, Averill, Opton, & Lazarus, 1968). Thus, coherence has been typically found between experience and behavior, whereas lesser or no coherence has been found between physiological responses and other responses. What principle could account for these response-specific patterns of coherence? In the next section, we propose that dual-process frameworks might explain systematic differences in coherence across different responses.

1.2. Dual-process frameworks and response coherence

Dual-process frameworks assume that psychological responses are a joint function of two largely independent systems, one automatic and the other reflective. Automatic responses are relatively unconscious, fast, and efficient, while reflective responses are relatively conscious, deliberate, and effortful. Both systems are thought to play in concert to promote adaptive behavior, including emotions (Bargh & Ferguson, 2000; Baumeister, Vohs, DeWall, & Zhang, 2007; Kahneman & Frederick, 2002; Lieberman, 2007; Smith & DeCoster, 2000; Smith & Neumann, 2005; Strack & Deutsch, 2004). More specifically, dual-process frameworks assume that the automatic system activates behavioral schemata through spreading activation, which originates mainly from perceptual input. One of the greatest advantages of the automatic system is that it is not only fast but also requires little or no cognitive effort and has a low threshold for processing incoming information. The reflective system, in contrast, generates declarative knowledge by assigning perceptual input to a semantic category (e.g., Evans and Stanovich, 2013; Strack & Deutsch, 2004). It is thought to operate relatively slowly and to involve relatively greater effort.

Research – mainly from the field of social cognition – supports the idea of two independent systems. For example, there is (a) psychometric evidence that automatic and reflective aspects of the same construct are distinct (e.g., Cunningham, Preacher, & Banaji, 2001; Greenwald & Farnham, 2000; Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Nosek & Smith, 2007; Payne, Burkley, & Stokes, 2008); (b) neurological evidence that implicit and explicit measures correspond to distinct cognitive processes and do not simply constitute different measurement modes (Cunningham, Johnson, Gatenby, Gore & Banaji, 2003; Cunningham et al., 2004; Phelps et al., 2000); and (c) empirical evidence showing that implicit and explicit measures both have different domains of predictive potency (Dijksterhuis & Nordgren, 2006; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Taken together, evidence supports two independent systems: an automatic and a reflective system.

We propose that one can apply this dual-process framework to understand emotion response coherence. This idea leads to the prediction that coherence should not be an all-or-none feature of emotions. Rather, coherence should be conditional on the system of the involved emotional response. Relatively automatic responses should cohere with one another and relatively reflective responses should cohere with one another. However, responses across the two systems should cohere to a lesser degree with one another.

Although existing research, as noted above, appears to be generally consistent with the notion of two independent systems of coherence, very little research to date has directly tested this idea utilizing multiple measures from within the automatic and multiple measures from within the reflective system. That is, although previous research on response coherence has typically examined several indicators of the reflective system (usually self-reported emotional experience and behavior), it has typically only examined physiological responding as the sole indicator of the automatic system. In addition, for some emotional responses it is not entirely clear to what extent they are relatively more automatic or reflective (Smith & Neumann, 2005). For example, in most studies testing the coherence postulate, facial expressive behavior was measured (e.g., Bonanno & Keltner, 2004; Fernández-Dols & Crivelli, 2013; Mauss et al., 2005; Reisenzein, 2000; Reisenzein et al., 2006; Reisenzein, Studtmann, & Horstmann, 2013). Facial behavior can occur in a relatively automatic or reflective mode (e.g., Baumeister et al., 2007; Ekman, 1972). Therefore, and in light of the goal of the present study, we included behavior that is evidently more at the reflective end of the continuum (hostile evaluations of the experimenter; see also below). To test the idea that coherence is conditional upon response system (automatic versus reflective), multiple measures from each system are necessary. The present research provided such data.

1.3. The present study

The present study tested the hypothesis that response coherence should be maximal *within* each system and minimal *across* the two systems. We examined emotional responses in the context of anger because anger involves pronounced responses in all emotional components (Mauss, Cook, & Gross, 2007; Reisenzein, 2000). To induce anger, we used a well-validated anger provocation procedure (Mauss, Cook, & Gross, 2007; Stemmler, Heldmann, Pauls, & Scherer, 2001). We assessed two automatic (anger accessibility and physiological responses) and two reflective (self-reported experience and instrumental behavior) anger responses.

First, concerning the automatic system, we assessed anger accessibility by means of a lexical decision task (cf. Bargh & Ferguson, 2000; Niedenthal & Setterlund, 1994). In this task participants have to decide as fast as possible whether a given letter string is or is not a word, with some words being anger-related. These lexical decisions occur relatively fast and do not depend on the individual having the intention or awareness to evaluate the content of the words, and thus constitute relative automatic responses. Additionally, we assessed physiological responses by measuring mean arterial blood pressure, a key response in the context of anger (Stemmler et al., 2001). People are generally relatively unaware of these bodily responses, and they are relatively difficult to control (Edelmann & Baker, 2002; Katkin, 1985; Pennebaker, 1982). Physiological responses thus constitute relatively automatic responses.

Second, concerning the reflective system, we assessed subjective experience of an emotion, which was measured with participants' self-reported anger experience. These emotion experiences were considered to be reflective responses, as they are controllable (e.g., Mauss, Cook, Cheng, & Gross, 2007) and by definition subject to introspection. Our second measure of the reflective emotional system was instrumental anger behavior, which was measured by obtaining participants' anonymous evaluations of the person who angered them. Participants were led to believe that their evaluations could have disadvantageous effects for the career of their object of anger. This behavior was therefore