Using emotional cues in a discrimination learning task: Effects of trait emotional intelligence and affective state

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ABSTRACT

Individuals may differ in their ability to learn the significance of emotional cues within a specific context. If so, trait emotional intelligence (EI) may be associated with faster cue learning. This study ($N = 180$) tested whether trait EI predicts faster learning of a critical cue for discriminating "terrorists" from "non-terrorists", using virtual-reality heads as stimuli. The critical cue was either facial emotion (positive or negative), or a neutral feature (hat size). Cognitive ability and subjective state were also assessed. Participants were faster to learn with an emotive cue. Surprisingly, high trait EI was correlated with poorer performance, especially early in learning. Subjective distress was also associated with impaired learning to emotive cues.

1. Introduction

Emotional cues are ubiquitous and their detection appears to serve an adaptive function in many situations. For example, current societal concerns with terrorism highlight the potential importance of processing emotional cues. Signs of anxiety may betray a terrorist or criminal to a security agent or a concerned citizen. Thus, Ahmed Ressam, the so-called "Millennium Bomber," was detained by a suspicious customs inspector at Port Angeles, Washington, who noticed behavioral signs of anxiety (Bernton, Carter, Heath, & Neff, 2002, June 23–July 7). Clearly, individual differences in emotion perception may support the detection of social threat.

However, it is unlikely that competence in such instances reflects only emotion perception. Indeed, Porter, Campbell, Stapleton, and Birt (2002) state that the belief that signs of nervousness are reliable cues to deception is widespread, but erroneous. Porter et al. (2002) suggest that the flexible use of the cues provided by the target person is critical; reliance on a single, fixed cue does not allow accuracy in detection. For example, a nervous air passenger might simply fear flying. In addition, receiving feedback and training has been found to improve detection (Porter, Woodworth,

& Birt, 2000). Taken together, these observations suggest that learning to use cues flexibly may be important for detection.

The use of emotional cues, especially facial cues (Ekman, O'Sullivan, & Frank, 1999), in detecting threat may be just one example of the use of emotional cues to make social discriminations. Processing of emotional cues is generally important in judging whether others are likely to be helpful or antagonistic (e.g., Carter & Pelphrey, 2008). Importantly, the way that we categorize others based on their emotion may depend on the context. For example, an angry face may be perceived as threatening in a dark alley, but as a sign of solidarity among people at a political rally protesting an injustice (e.g., Iyer, Schmader, & Lickel, 2007). A recent review of experimental studies of context and emotion perception (Barrett, Mesquita, & Gendron, 2011) demonstrates the sensitivity of perception to other emotional stimuli presented concurrently, as well as to perceiver and cultural factors.

There may be individual differences in the ability to learn the significance of emotional displays within a specific context. However, previous personality studies have focused more on basic emotion perception (e.g., Bänziger, Grandjean, & Scherer, 2009) than on use of affective cues in learning. The general aim for the present study was to explore the possibility that the new construct of emotional intelligence (EI: Mayer & Salovey, 1997) contributes to speed of learning the significance of emotional cues.

The remainder of this introduction is structured as follows. First, we briefly review studies of individual differences in discrimination

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learning and identify their limitations for studying individual differences in learning with emotional cues. Second, we introduce the concept of EI, identify learning abilities and processes as a possible facet of the concept, and hypothesize that EI may be associated with faster learning of the significance of emotional cues. Third, we introduce the possibility that EI may have indirect effects on learning that are mediated by subjective affective states.

2. Emotion and discrimination learning

Discrimination of concepts that may be distinguished by one or more cues on the basis of trial-and-error learning is one of the older subfields of cognitive psychology (Bruner, Goodnow, & Austin, 1956). Considerable research (e.g., Close, Hahn, Hodgetts, & Pothos, 2010) suggests that concept discrimination may reflect either the learning of an explicit rule, or learning to make similarity judgments based on exemplars or prototypes (or some hybrid process). For example, a security agent might learn a rule for identifying suspicious characters (e.g., "reports feeling calm" AND "perspires heavily"), or the agent might evaluate, perhaps unconsciously, the similarity of the person to representations in memory of individuals who proved to be criminals. More generally, dual-process theories of learning (Dienes & Perner, 1999) distinguish explicit from implicit processes, which are unconscious. Studies of the neuroscience of learning (reviewed by Poldrack and Packard (2003)) show that probabilistic classification learning is more sensitive to damage to brain areas supporting implicit learning (e.g., caudate nucleus, putamen) than to medial temporal lobe lesions associated with explicit learning deficits.

In line with dual-process theories, individual differences in learning may depend on whether processing is explicit or implicit. In emotion research, studies of tasks such as the Iowa gambling task have contributed to interest in implicit learning processes (Toplak, Sorge, Benoit, West, & Stanovich, 2010). The Iowa task requires the respondent to choose between decks of cards that differ in their pay-offs over extended sequences of trials. Intelligence test scores are only weakly associated with performance on the Iowa gambling task (Toplak et al., 2010) and other implicit tasks (Gebauer & Mackintosh, 2007), with conditions linked to affective functioning (such as depression) shown to be more predictive (Cella, Dymond, & Cooper, 2010; Nakano et al., 2008). However, such tasks deliver only neutral stimuli. It remains unclear what traits might predict learning with emotional stimuli, and whether there are traits that relate selectively to learning with emotional cues but not with neutral cues. The next section makes the case that EI may relate to individual differences in learning the implications of emotional cues.

3. Emotional intelligence and the processing of emotive stimuli

EI is the hypothesized ability to successfully identify, understand, and manage emotion in oneself and others. It implies competencies for emotional awareness, interpersonal sensitivity, facilitation of decision-making, mood regulation, and managing the outcome of emotional encounters (Mayer & Salovey, 1997). A major fissure in the field is between researchers who treat EI as a mental ability, to be measured by objective tests (e.g., Mayer, Salovey, & Caruso, 2004), and those who see EI as a set of personality traits that enhance emotional functioning (e.g., Petrides, Furnham, & Mavroveli, 2007). Petrides et al. propose that this "trait EI" can be measured by questionnaires that rely on self-reports of emotional functioning. We have provided conceptually-oriented critiques of trait EI elsewhere (e.g., Roberts, MacCann, Matthews, & Zeidner, 2010). In this article, we focus on the capacity of trait EI measures

to predict learning and emotional response over and above conventional ability and personality measures.

Most commonly, studies of EI and information-processing have focused on perception of emotion, with rather mixed outcomes. Trait EI scales predict rapid identification of morphed emotional expressions (Petrides & Furnham, 2003), and neural responses to fearful facial stimuli (Killgore & Yurgelun-Todd, 2007). Other studies have failed to confirm strong associations between trait EI and emotion perception (e.g., Austin, 2005; Fellner et al., 2007). Ability measures for EI may have better validity as predictors of information-processing than questionnaire measures. However, Roberts et al. (2006) failed to find reliable associations between ability measures of EI and objective tests of emotion perception. A limitation of typical emotion perception studies is that the facial stimuli lack context. EI may relate to context-bound skills for handling emotive events (Roberts, Zeidner, & Matthews, 2007), consistent with Mayer et al.'s (2004) identification of emotional facilitation of thought as one of four branches of EI. Specifically, emotionally intelligent individuals may be faster to learn the significance of emotional cues within a given context, such as is exemplified in security operations and jobs that require high emotional labor.

There is little direct evidence on the role of EI in learning in emotive contexts. The development of various practical Social–Emotional Learning (SEL) programs shows that various skills can be taught effectively (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011), but it is typically unclear how training in social–emotional skills changes processing of emotive stimuli (Goetz, Frenzel, Pekrun, & Hall, 2005). However, it is plausible that training directed towards interpersonal challenges such as resolving interpersonal conflict and dealing with sexual advances requires learning of how to interpret the emotions of another in a specific context (e.g., anger does not necessarily imply personal hostility, while expressions of affection may have more than one motive).

A recent conceptual analysis of the processing supporting emotional competencies and skills (Fiori, 2009) suggests that EI may be related to both conscious, controlled processing, and unconscious automatic processing. Consistent with the present approach, Fiori (2009) states that: "The ability to use the right emotion knowledge in the right place at the right time is an important characteristic of high-EI individuals" (p. 36). Fiori (2009) identifies several qualitatively different forms of automatic processing that may contribute to performance in contexts including preconscious processes that may contribute to basic competencies in perceiving facial emotion. Of relevance here is what Fiori (2009) calls "automatized" (as opposed to automatic) processes, which are unconscious processes that are learnt through practice. Importantly, automatized processes may be sensitive to contextual information. Barrett et al. (2011) characterized the influence of contextual information on emotion perception as routine and effortless. Thus, it is plausible that EI is associated with an ability for relatively rapid automatization of routines for handling emotive stimuli in specific contexts.

To test this hypothesis, we designed a novel task in which facial-emotive stimuli were used as the cues in a discrimination learning task. Participants were required to learn through trial and error whether or not facial emotion was indicative of terrorist status. We used this discrimination in part because it provides an immediate affective context, in that people typically (and often correctly: Beck, 2002) attribute negative emotions to terrorists. We manipulated the relevance of emotion across conditions, creating contexts in which emotion was or was not relevant to the discrimination. It was expected that emotionally intelligent individuals would recognize the relevance of emotional cues more quickly than those low in EI. In particular, high EI should facilitate overcoming any bias towards attributing terrorist status to persons displaying negative emotion. At the same time, it is emphasized that the task was not intended to be an analogue of security operations; it is best seen