



Individual differences in empathy: The role of facial expression recognition

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ABSTRACT

We investigated individual differences in empathy and emotion recognition. Emotion recognition was operationalized as accuracy on the six emotions composing Ekman's *Pictures of Facial Affect*. Facets of empathy were measured with the *Empathy Quotient* (EQ) and the empathic concern factor of the *Interpersonal Reactivity Scale*. Two aspects of emotion recognition were investigated: exposure length (50 ms and 2000 ms) and emotion type (fear). Both empathic concern and the EQ were related to accuracy at the brief exposure, however empathic concern accounted for the EQ findings. The EQ was connected to accuracy at the long duration, especially the "social skills" factor. Empathic concern was unrelated to fear recognition, whereas the EQ was highly related. These findings extend previous research by showing that empathy subtype predispositions are differentially related to expression recognition.

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1. Introduction

Accurate recognition of emotional facial expressions is an initial step to empathic responding. The capacity to experience empathy differs amongst individuals: what advantages do more empathic people have in facial expression recognition? Can they better identify emotions from fleeting facial expressions? Are they more adept at detecting certain emotional states, particularly distressing ones that elicit concern? This study examined facets of empathy and their relationship to expression presentation speed and emotion type. Distinguishing empathy subtypes and linking them to theoretically driven facial expression tasks may enrich understanding of empathy processes.

Typically, the empathy construct has been separated into two types: cognitive and emotional (Davis, 1983; Decety & Jackson, 2006). Cognitive empathy refers to imaginatively understanding another person's thoughts, feelings and actions. Emotional empathy is feeling the emotion of another person, but maintaining a compassionate, other-focused perspective. It is characterized by visceral, automatic reactivity (Mehrabian & Epstein, 1972). Social skills have sometimes been included as a component of empathy; inappropriate social responses hinder empathic interactions (Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004; Riggio, Tucker, & Coffaro, 1989). These dimensions are considered independent; for example, deficient cognitive empathy can coexist with elevated emotional empathy (Baron-Cohen & Wheelwright, 2004; Blair, 2005). These independent dimensions may differentially relate to facial expression recognition.

Few studies have directly examined self-reported empathy and facial expression recognition ability. Preliminary research has found positive relationships between self-reported emotional empathy and expression recognition (Martin, Berry, Dobrański, & van Horne, 1996; Riggio et al., 1989; Gery, Miljkovitch, Berthoz, & Soussignan, 2009). In addition, empathy is part of trait emotional intelligence (EI) and EI is positively associated with facial expression recognition (Austin, 2004; Ciarrochi, Chan, & Bajgar, 2001; Petrides & Furnham, 2003). Less is known about cognitive empathy's connection to facial expression recognition. Evidently, self-ratings of cognitive empathy ability are unrelated to actual empathic accuracy, as measured by accuracy in determining the thoughts and feelings of another person after a brief interaction (e.g. Davis & Kraus, 1997; Ickes et al., 2000).

The *Empathy Quotient* (EQ; Lawrence et al., 2004) is a self-report scale that measures empathy multi-dimensionally, with an emphasis on cognitive empathy and social understanding, rather than emotional empathy (Lawrence et al., 2004; Muncer & Ling, 2006). This scale has been linked to better performance on social perception tasks, such as reading mental states from only the eyes (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), and gender judgements based on animated facial movement (Penton-Voak, Allen, Morrison, Gralewski, & Campbell, 2007). Its relationship to recognition of the basic emotional facial expressions has not yet been examined.

Research suggests varying presentation duration speed and targeting specific types of emotions, such as fear, may produce connections between empathy and facial expression recognition (see Clark, McIntosh, & Winkelman, 2008; Marsh, Kozak, & Ambady, 2007; Marsh & Blair, 2008; Martin et al., 1996). These approaches are discussed in more detail below.

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1.1. Rapid recognition and empathy

Recognition of briefly presented facial expressions requires rapid judgment with little conscious effort. Researchers largely agree there are two main levels for interpreting emotional stimuli with different brain pathways: one generates meaning automatically, with minimal cortical input; the other is deliberate and conscious (e.g. Buck & Ginsburg, 1997; LeDoux, 1996). Testing accuracy to briefly presented expressions presumably isolates an important early component of the empathy process, accessing a more instinctive, biological level of emotion processing.

Research has linked accurate recognition of the valence of briefly presented facial expressions to self-reported emotional empathy (Martin et al., 1996). Other research has linked recognition of briefly presented facial expressions to trait emotional intelligence (Austin, 2004; Petrides & Furnham, 2003) and to disorders with cognitive empathy deficits (Clark et al., 2008). The apparent link between rapid recognition of facial expressions and empathy requires clarification: which aspects of empathy are most related? Experiencing emotional empathy often happens automatically and involuntarily; emotional empathy may therefore utilize automatic emotional processing levels more than other empathy subtypes.

1.2. Fearful expression and empathy

Types of emotional expressions are processed in different parts of the brain, indicating they have distinct functions. The fearful expression is a distress cue and the amygdala plays a central role in its interpretation (Adolphs, Tranel, & Damasio, 1998; Phillips et al., 1997; Sato et al., 2002). Compassion for distress cues defines emotional empathy; a link between fear recognition and emotional empathy is therefore plausible.

Empathy's association with fear recognition has not been directly investigated, however a recent meta-analysis links disorders with deficient empathy, such as antisocial personality disorder and psychopathy, with impaired fear recognition (Marsh & Blair, 2008). Similarly, pro-social behaviour is associated with superior fear recognition (Marsh et al., 2007).

If fear recognition and empathy are linked, does the more difficult brief exposure duration accentuate this link? What type of empathy is most related? A predisposition to have compassion for those in distress (emotional empathy) may coincide with better recognition of distress cues, such as fear.

1.3. The present study

Facial expressions were presented to participants at brief (50 ms) and long durations (2000 ms). Empathy was measured with the EQ and the empathic concern subscale of the *Interpersonal Reactivity Scale* (Davis, 1983). Relationships between the EQ and its subscales, empathic concern, exposure length and fearful emotion recognition were explored. We hypothesized the EQ would be associated with deficits at both the brief and long exposure. However, we hypothesized empathic concern would be a better predictor of recognition at brief exposures. We also hypothesized that empathic concern would show a relationship to impaired fear recognition, particularly at the brief exposure.

2. Method

2.1. Participants

A total of 135 participants (98 females, 37 males) were recruited from the psychology department at the University of British Columbia. Ninety-three percent were between the ages of

18 and 23 and all were under 35. Fifty percent were of European heritage and 47% were of Asian heritage.

2.2. Procedure

After providing written informed consent, participants were seated at a desktop computer in a quiet room by themselves. The computer had a Pentium 3 866 MHz processor. The monitor size was 17" and had a resolution of 1024 × 768 with 32 bit color. The refresh rate was 85 Hz.

All responses were collected via the widely-used E-Prime laboratory package (Schneider, Eschman, & Zuccolotto, 2002). The personality questionnaires, control task and emotion recognition tasks were randomly presented. The faces/questions within each task/questionnaire were presented in a set order. The emotion recognition tasks consisted of (1) the brief exposure series: 42 facial expressions appearing for 50 ms (2) the long exposure series: 42 facial expressions appearing for 2000 ms each, and (3) a 50 ms control task (see below). Before each task and questionnaire, instructions appeared on the screen. Participants pressed the spacebar to begin the task. A "+" sign appeared, followed by the expression, followed by a list of emotions. Participants chose an emotion from the list, with no time limit.

2.3. Experimental measures

Emotion recognition tasks. For each facial photo, participants selected the name of the emotion (anger, sadness, happiness, disgust, surprise, fear, or neutral). The two sets of 42 presentations differed only in exposure duration. Based on previous work, our choice for the brief exposure time was 50 ms. This duration was at the tail end of the improvement threshold suggested by Ogawa and Suzuki (1999) and similar to the 56 ms duration employed by Sonnbly-Borgstrom, Jonsson, and Svensson (2003).

Our choice for the extended exposure condition was 2000 ms. This duration yielded a meaningful contrast with 50 ms. The refresh rate on computers determines the exact presentation duration time: hence the precise duration times of 50 ms and 2000 ms were closer to 47 ms and 2008 ms, respectively. Without a mask to stop the stimuli processing time, however, the precise duration was slightly longer.

The facial expressions of adult male and female Caucasians came from the widely-used *Pictures of Facial Affect* photographs (Ekman & Friesen, 1976). These faces showed intense facial expressions depicting the six basic emotions. Neutral facial expressions formed the seventh category.

Each task contained a unique set of faces; there was no overlap within each task, or between the brief and long exposure tasks. Norm data (Ekman & Friesen, 1976) were used to ensure the two emotion recognition sets were of equal discrimination difficulty. Each expression was presented six times, for a total of 42 trials¹ into their final score. Accuracy was scored by the number of expressions answered correctly, out of 42.

50 ms control task. A separate task controlled for individual differences in general perceptual processing capability at 50 ms. Inaccurate responses might indicate problems perceiving stimuli at 50 ms, or maintaining attention. Participants' accuracy was measured on their judgments of 21 additional photos with regard to the orientation of facial features: the facial features were either upside-down or right-side-up. These 21 altered photos were also taken from the *Pictures of Facial Affect* photographs (Ekman & Friesen, 1976).

¹ There were also five practice trials to accustom the participants to the task but these were not calculated.

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