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## Emotion differentiation in autism spectrum disorder



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### ABSTRACT

Autism spectrum disorder (ASD) is commonly associated with reduced ability to recognize emotions in others. It is less clear however, whether ASD is also associated with impaired knowledge of one's own emotions. In the current study we present a first examination of how much knowledge individuals with ASD have about their emotions by investigating their ability to differentiate between emotions. Across two lab tasks that measured to what extent and how people differentiate between their own feeling states and semantic emotion terms, results showed that ASD individuals differentiated less than typically developing individuals. Yet, both groups of participants similarly categorized emotions according to previously established theoretical categories. These findings indicate that while both give similar meaning to emotions, individuals with ASD make less subtle distinctions between emotions. With low levels of emotion differentiation being linked to reduced well-being, these findings may help to better understand the high prevalence of internalizing problems associated with ASD.

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## 1. Introduction

Autism spectrum disorder (ASD) has been associated with impairments in the processing of own and others' emotions (Kanner, 1943). So far, empirical research has mainly investigated the difficulties individuals with ASD have in recognizing and processing the emotions of others. In the current study we aimed to examine their knowledge of their own emotions, focusing on the ability to differentiate between different emotional states.

### 1.1. Emotions in ASD

It is commonly accepted that ASD is associated with difficulties in emotional understanding. One of the most influential theses in this respect states that individuals with ASD show impairments in theory of mind (ToM). Specifically, they have difficulties in attributing mental states such as intentions and beliefs to others (Baron-Cohen, 1995; Baron-Cohen, Tager-Flusberg, & Cohen, 1993, 2000). Indeed, a vast array of empirical studies shows that ASD is related to difficulties in understanding the emotions of others. For example, ASD is associated with difficulties in inferring and differentiating

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emotional states from others' facial expressions (Harms, Martin, & Wallace, 2010; Pelphrey et al., 2002), body movements (Atkinson, 2009; Hubert et al., 2007; Philip et al., 2010), and vocal stimuli (Philip et al., 2010; For a review on other emotion related problems in ASD, see Begeer et al., 2008). However, there is growing evidence that ASD is also related to deficits in the awareness of the 'psychological self', or 'theory of *own* mind', suggesting that individuals with ASD are at least as impaired at recognizing their own mental states as at recognizing the mental states of others (Frith & Happé, 1999; Williams, 2010). However, much less is known about how individuals with ASD perceive and differentiate their own emotional states. Yet, as we argue below, knowledge about one's own emotional world is important to consider because of its role in psychological health.

### 1.2. Emotion differentiation

In the past decade, a line of research has emerged which focuses on the extent to which individuals understand or have knowledge of their own emotions, investigating their ability to differentiate between different emotional states (Barrett, Gross, Christensen, & Benvenuto, 2001). This ability is labeled emotion differentiation, and can be observed by looking at how people describe how they feel in response to different emotion-eliciting events (Barrett et al., 2001). The ability to make fine-grained distinctions between emotional states appears to have adaptive value and plays an important role in psychological well-being. It reflects knowledge about the specific antecedents and consequences involved in our emotional life, and the ability to apply this knowledge in emotional situations, leading to differentiated and adaptive emotional responding and regulation. Indeed, higher emotion differentiation is found to be related to a more differentiated use of emotion regulation strategies (Barrett et al., 2001), lower levels of alexithymia (Erbas, Ceulemans, Pe, Koval, & Kuppens, in preparation) and depression (Demiralp et al., 2012; Erbas et al., in preparation), higher self-esteem, and lower levels of neuroticism (Erbas et al., in preparation). Since individuals with ASD seem to suffer from lower psychological well-being, as evidenced by high rates of depression, anxiety and other internalizing problems (Kuusikko et al., 2008; Simonoff et al., 2008; Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006), and indeed seem to be less effective in regulating their emotions (Laurent & Rubin, 2004; Rieffe et al., 2011; Samson, Huber, & Gross, 2012), research on emotion differentiation can be of great potential help in clarifying possible mechanisms underlying this reduced well-being.

### 1.3. Emotion differentiation and ASD

As far as we know, emotional differentiation abilities have not yet been directly examined in ASD. There are, however, reasons to assume that ASD may be characterized by low levels of differentiation. First, this would dovetail with the general assumption of ToM accounts of the disorder that it involves difficulty in recognizing mental states. Second, there is also indirect empirical evidence that ASD may be characterized by lower emotion differentiation. A study by Rieffe and colleagues suggests that ASD involves less knowledge of one's own emotions, by showing that individuals with ASD more often than typically developing individuals claim not to feel an emotion in response to emotional stimuli, and acknowledge fewer different emotional perspectives in a multiple emotions task (Rieffe, Meerum Terwogt, & Kotronopoulou, 2007). Furthermore, studies on the relationship between alexithymia and ASD suggest that individuals with ASD have more difficulties identifying and describing the emotions they experience (Berthoz & Hill, 2005; Hill, Berthoz & Frith, 2004; Samson et al., 2012). Finally, another study by Rieffe and colleagues showed that in individuals with ASD, various aspects of emotional awareness were negatively related to internalizing symptoms (Rieffe et al., 2011), underlining the importance of further exploring the emotional knowledge of individuals with ASD. However, research on alexithymia and emotional awareness uses direct self-reports to assess emotion differentiation, and the question is to what extent people (with or without ASD) are able to directly report on their ability to differentiate between different emotional states (Dunning, Heath, & Suls, 2004; Kashdan, Ferssizidis, Collins, & Muraven, 2010).

### 1.4. The current study

In a multi-method study, we aim to provide the first examination of whether individuals with ASD differentiate less between their own emotions compared to individuals without ASD. Next to complementing previous findings relating ASD to difficulties in perceiving emotional states in others, documenting such difficulties regarding one's own emotions would additionally suggest a potential mechanism behind the lower psychological well-being associated with ASD, given the important role emotion differentiation seems to play for various aspects of psychological health.

Specifically, we will investigate whether individuals with ASD have an impaired ability to differentiate between their emotions, compared to that of typically developing (TD) individuals, using a task that has recently been developed to measure emotion differentiation objectively in a lab setting using standardized stimuli (Erbas et al., in preparation). In this task, participants report how they feel in response to a number of emotional stimuli and the covariation between different emotions is taken as a measure of emotion differentiation (Barrett, 1998; Kashdan et al., 2010; Pond et al., 2012; Tugade, Fredrickson, & Barrett, 2004). However, a low level of emotion differentiation on this task can also be an indication of less semantic knowledge about emotions in general, and not necessarily an inability to differentiate between one's own emotional states. Therefore, additionally we will examine whether individuals with ASD show lower ability to differentiate between discrete emotion terms, and whether this conceptual emotion knowledge is related to the degree to which they

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