Facial emotion recognition in 4- to 8-year-olds with autism spectrum disorder: A developmental trajectory approach

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ABSTRACT

The investigation of emotion recognition in autism spectrum disorder (ASD) has both theoretical and practical implications. However, although many studies have examined facial emotion recognition in ASD, some points remain unclear. We therefore studied facial emotion recognition in young children with ASD across a small age range, in order to determine (1) their ability to recognize emotion and (2) the developmental trajectory of this ability. Twenty-two children with ASD aged 4–8 years were compared with typically developing children matched on either chronological age or verbal mental age. We administered three facial emotion tasks: matching, identification, and labeling. Results showed that children with ASD and typically developing children had difficulty with labeling emotions, but not with matching or identifying them. Happiness was the easiest to recognize, and surprise the hardest. The children with ASD did not exhibit delayed onset in the development of facial emotion recognition. To conclude, emotion recognition difficulties in children with ASD primarily concern the recognition of negative emotions and the identification of surprise, as they do in TD groups. This should be taken into account in future research, as well as in the design of future intervention programs.

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1. Introduction

The present study investigated the ability of young children with autism spectrum disorder (ASD) to recognize facial emotions, applying a developmental trajectory approach to a sample with a small age range. ASD is the currently accepted umbrella term for autistic disorder, Asperger's syndrome and atypical autism. Autism is characterized by a core deficit in social interaction (American Psychiatric Association, 2013), and impairments in both the processing of social and emotional information (Baron-Cohen, Tager-Flusberg, & Cohen, 1993; Dawson, Meltzoff, Osterling, Rinaldi, & Brown, 1998; Teunisse & de Gelder, 1994) and facial expression recognition (Dawson et al., 2002; Klin et al., 1999). The expression of emotion plays a crucial role in social interaction. Children's ability to *read* other people's emotional expressions is critical for successful social adjustment and the mastery of social skills (Williams & Gray, 2012).

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Although many studies have investigated facial emotion recognition in people with autism, when Harm, Martin, and Wallace (2010) conducted their review, they found that results in ASD were inconsistent.

Several studies have reported impaired facial emotion recognition in ASD (Celani, Battacchi, & Arcidiacono, 1999; Hobson, Ouston, & Lee, 1988a, 1988b, 1989; Loveland et al., 1995; Uono, Sato, & Toichi, 2011). For example, Uono et al. (2011) investigated facial emotion recognition in 28 individuals aged 9–30 years with mild pervasive developmental disorders (PDDs) including autism and Asperger's syndrome. Participants were matched with controls on chronological age. Materials for the emotional expression recognition task consisted of 48 photographs of facial expressions depicting six emotions. Participants had to select the label that best described the emotion shown in each picture. Results indicated that performances of PDD participants were poorer than those of controls, but only for fear. Participants also performed the shortened version of the Benton Facial Recognition Test, in which they had to match a target face with one of three test pictures of the same person. PDD participants performed more poorly than controls. Other studies, by contrast, have reported no such impairment (Adolphs, Sears, & Piven, 2001; Baron-Cohen, Spitz, & Cross, 1993; Baron-Cohen, Tager-Flusberg, et al., 1993; Castelli, 2005; Grossman, Klin, Carter, & Volmar, 2000). Castelli (2005) demonstrated that children with ASD (mean age = 12.3 years, SD = 2.3) are just as capable as typically developing (TD) children matched on verbal mental age (VMA) of identifying emotions from facial expressions. In the first of three experiments (matching task), participants were shown photographs of six different emotions with three different levels of intensity. Photos of the target emotions were also stuck to six empty boxes. Participants had to place each photograph in the box with the corresponding expression. Results showed that when the children had to match each emotional stimulus with its target emotion, there was no significant difference between the groups. Moreover, happiness was the emotion with the higher correct score, while fear and surprise had the lowest correct scores. In Experiment 2 (naming task), children were shown photographs of six emotions plus one neutral expression, and were asked to name each expression. Again, results indicated that there was no significant difference between the groups. Happiness was the emotion with the higher correct score, and fear the one with the lowest. In Experiment 3 (naming task with different intensity levels), participants were shown photographs of six emotions at two different levels of intensity and were asked to name each expression. Results indicated that there was no significant difference between the groups. Happiness was the emotion with the highest correct score. For their part, Lindner and Rosén (2006) investigated differences in the ability to decode emotion in 14 children with Asperger's syndrome aged 5–16 years. The materials consisted of 80 scenes in a videotape format portraying four emotions (happiness, anger, sadness and neutral) across five modalities (static facial expression, dynamic facial expression, prosody, verbal content, and combined). Participants had to respond by pointing to one of four pictures of emotions with verbal labels. The children with Asperger's syndrome had greater difficulty identifying emotions conveyed by static and dynamic facial expressions and tone of voice than TD children matched on chronological age (CA). Moreover, results indicated that younger children in both groups had greater difficulty identifying anger and sadness than their older counterparts.

Like their TD peers, children with ASD perform better when they are required to recognize basic emotions, such as happiness and sadness, rather than complex ones, such as surprise (Baron-Cohen, Spitz, et al., 1993; Baron-Cohen, 1991; Capps, Yirmiya, & Sigman, 1992; Yirmiya, Sigman, Kasari, & Mundy, 1992). This probably accounts for the difficulty children have recognizing surprise, as this is a more complex emotion that relies on the visual exploration of the eyes. Moreover, surprise is an emotion that requires the use of more complex cognitive processes. In order to recognize surprise and understand this emotion, children must be able to understand that a person approaches a situation with a particular expectation, and if the situation does not match that expectation, then the person will be surprised. This ability is linked to theory of mind, which children with ASD frequently fail to acquire. Children with ASD are also less sensitive to negative emotions, such as fear (Sigman, Kasari, Kwon, & Yirmiya, 1992).

The aim of the present study was to investigate the ability of young children with ASD across a narrow age range to recognize emotional facial expressions, and to explore how this ability develops across a narrow age range. As mentioned previously, inconsistent findings in facial expression recognition in autism may be due to task demands. Moreover, there is a dearth of developmental data. We therefore sought to broaden our comprehension of facial recognition in ASD by adopting a methodology that would allow us to manipulate task demands (matching, identification, labeling) with the same participants. As we also wanted to address developmental issues in ASD, we focused on a limited age range (4 years, 3 months–8 years, 9 months). We set out to answer two questions:

(1) How does the ability of young children with ASD to recognize emotional facial expressions vary according to (a) task and (b) emotion? We predicted that (1) children with ASD would perform as well as matched controls and (2) higher scores would concern happiness and lower scores surprise.
(2) In ASD, what are the developmental trajectories for each task?

2. Method

2.1. Participants

Twenty-two participants with ASD were recruited through local associations in France. All these children had been diagnosed before the age of 4 years, based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V; American Psychiatric Association, 2013). Diagnostic information was also obtained by means of the Autism Diagnostic Interview-Revised