



Facial emotion recognition in children with autism and their typically developing Peers

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Abstract

Facial emotion recognition was investigated in children with autism and their typically developing peers. Participants consisted of 8 children who were previously diagnosed with High Functioning Autism (HFA). HFA is defined by a significant impairment in all three areas of the DSM-IV diagnostic triad of social, behavioral, and communicative, deficits (American Psychiatric Association, 2000) without co-occurring mental retardation. Eight control participants were matched on chronological and a standard score equivalent of Verbal Mental Age. No significant differences were found between groups in terms of chronological age and IQ. Participants were tested in the multi media room, where a video tape was attached to the television set. Results indicated that typically-developing children were able to correctly identify "sad", "anger", and "fear" stimuli earlier than children with autism. For "happy" stimuli, participants with autism were able to identify each expression as accurately as the control children for all emotions except for "fear."

Key Words; Facial emotion recognition, Children with autism, typically developing peers

Introduction

Autism is a disorder characterized by impairments in social and communicative behavior and a restricted range of interests and behaviors. Although there is great variability in symptom severity and intellectual functioning among individuals diagnosed with the disorder, all individuals with autism have difficulties in social interaction such as use of eye contact, engaging in reciprocal interactions, and responding to the emotional cues of others. Basic impairments, such as lack of attention to others and failure to orient to name, often appear within the 1st year of life (Werner, Dawson, Osterling, & Dinno, 2000). By age 2 to 3, impairments are evident in social orienting, eye contact, joint attention, imitation, responses to the emotional displays of others, and face recognition (Dawson, Carver, et al., 2002; Dawson, Meltzoff, Osterling, Rinaldi, & Brown, 1998; Dawson, Toth, et.al., 2004; Mundy, Sigman, Ungerer, & Sherman, 1986; Sigman, Kasari, Kwon, & Yirmiya, 1992).

The ability to recognize and accurately interpret nonverbal social cues, such as detecting emotion from facial expressions, is critical for effective social communication. Facial affect communicates internal emotional states and serves as a vital source of information in reciprocal social exchanges. Children's ability to recognize facial expressions develops prior to the first two years of life (Nelson, 1987), and matures with age depending on the emotion (Durand, Gallay, Seigneuric, Robichon, & Baudouin, 2007; Herba, Landau, Russell, Ecker, & Phillips, 2006; Widen & Russell, 2008). By 5 years of age, typically developing children recognize happiness and sadness with adult accuracy; and by 11 years of age, children recognize more complex emotions such as fear, anger, neutrality, and disgust (Durand et al., 2007). However, the ability to accurately detect emotion is not evenly distributed across children and may be one factor that accounts for awkward social interactions.

Numerous studies reported significantly lower performance on emotion recognition tasks for individuals with ASD compared to their typically developing (TD) controls. This is true for both children and adults with ASD: all age groups show difficulties in recognizing and labelling facial expressions (Pelphrey et al. 2002; Tantam et al. 1989). Exploring whether impaired facial expression processing occurs for all basic emotions or only for single emotions in particular, Humphreys et al. (2007) tested adults with autism with an emotion identification task and detected considerable differences between groups for all emotions. Discrepancies were most apparent for fear, disgust, and happiness. In a study with children with autism Wright et al.

(2008) identified anger and happiness as the most challenging emotions to be recognized from a face.

From the time when autism was first identified (Kanner, 1943), emotional deficits have been a primary diagnostic criterion. Many studies have examined the ability of both children and adults with autism to recognize common categories of facial expression (e.g. Hobson, 1986; Weeks & Hobson, 1987; Hobson et al., 1988; Ozonoff, Pennington, & Rogers 1990; Capps, Yirmiya, & Sigman, 1992; Davies, Bishop, Manstead & Tantam, 1994; Gepner, Deruelle, & Grynfeldt, 2001). Despite this impressive body of literature, it remains unclear to what extent deficits in the ability to perceive facial expression contributes to the difficulties individuals with autism have regarding social interactions. In fact, it is still unclear whether individuals with autism truly have a deficit in recognizing emotional expression in faces. Some studies suggest the ability is intact (e.g Braverman, Fein, Lucci & Waterhouse, 1989; Davies, Bishop, Manstead, & Tantam, 1994; Gepner, Deruelle, & Grynfeldt, 2001; Ozonoff, Pennington, & Rogers, 1990), while others suggest it is impaired, relative to controls (Dawson, Meltzoff, Osterling & Rinaldi, 1993; Gepner, de Schonen, & Buttin, 1994; Hobson, 1986 ; Hobson et al.,1988; Loveland et al. 1997; MacDonald et al. 1989; Sigman, Ungerer, Mundy, & Sherman, 1987; Teunisse & de Gelder, 2001). One possible reason for mixed results in autism emotion recognition research are methodological differences across studies. Studies have used different experimental procedures including sorting, matching, and identification. These methodological differences have led to several debates in the literature (e.g. Celani, Battacchi, & Arcidiacono, 1999).

One of the reasons these methodological issues are important is because, with some matching tasks used, it may be possible for individuals with autism to use compensatory strategies by matching on a simple perceptual cue as opposed to a true recognition of facial expression (Celani et al, 1999). A similar concern was raised by Baron-Cohen, Spitz, & Cross (1993) in discussing the finding that individuals with autism were able to perceive both happy and sad expressions but not surprise. It may be that happy and sad are perceived by simple distinctive, differences in the mouth, whereas surprise may require more attention to the overall face, including the eyes. Attention to only one feature, such as the mouth, can be accomplished using simple featural processing, while simultaneous multiple-feature processing may require a more configural or holistic approach.

The present study hypothesized that

- 1- There will be differences in ability to recognize facial expression of the emotion “sad” between participants with autism and controls.
- 2- There will be differences in ability to recognize facial expression of the emotion “angry” between participants with autism and controls.
- 3- There will be differences in ability to recognize facial expression of the emotion “afraid” between participants with autism and controls.
- 4- There will be differences in ability to recognize facial expression of the emotion “happy” between participants with autism and controls.

Methods

Participants

Participants consisted of 8 children who were previously diagnosed with High Functioning Autism (HFA) . HFA is defined by a significant impairment in all three areas of the DSM-IV diagnostic triad of social, behavioral, and communicative, deficits (American Psychiatric Association, 2000) without co-occurring mental retardation. High functioning children were chosen for this study because this allows for the examination of impairments that are specifically associated with autism rather than with mental retardation (Minshew, Goldstein, & Siegel,

1997). The age range of seven to nine was chosen in order to fill a gap in the literature; no face processing data exists regarding children in this age group. Diagnosis of HFA was confirmed by administration of the Autism Spectrum Disorder Evaluation Inventory (Adel Abdulla, 2006). Eight control participants were matched on chronological and a standard score equivalent of Verbal Mental Age. No significant differences were found between groups in terms of chronological age and IQ.

Materials

Approximately 30 digital videos were made of males and females ranging in age from 18-50 years. These photos modeled the facial expressions of “happy”, “sad”, “anger”, and “fear.”

Procedures

Participants were tested in the multi media room, where a video tape was attached to the television set. In order to ensure that participants could accurately identify the facial expressions of happy, sad, anger, and fear, a pretest was given using 12 stimuli (three of each emotion). All participants accurately identified 100% of the pretest stimuli. Following pretest, participants were given the following instructions prior to the test phase. “This is a game where you are going to look at people’s faces and try to guess what they are feeling. You are going to see movies of people’s faces, and your job is to tell me how that person is feeling. First you are going to see a yellow ball on the screen and you need to look at the ball very closely, because the movies are going to be really fast...like this (snap fingers), and then you won’t see them anymore. For each face you can choose from these (present iconic faces): “happy”, “sad”, “anger”, “fear”, or “none.” OK? Let’s practice first. In some of the movies it will be easy to tell what the person is feeling, like this one (present sample “happy” clip,), and some of them are going to be hard, like this one (present sample “happy” clip). Ready to start?”

Participants were then shown the video clips of each emotion in randomized order. After all clips were seen, each of the successive photos were shown, with randomization within each level. After the (approximately) two second presentation of a clip, the screen went blank. At that point, participants were asked to identify the emotion they thought they saw on the clip. They were presented with papers (i.e. “smiley faces”) of “happy”, “sad”, “anger”, “fear”, or “no emotion.”

Results

1- H1: There will be differences in ability to recognize facial expression of the emotion “sad” between participants with autism and controls.

Results indicated that control participants were significantly better than participants with autism at recognizing featural cues of “sad” (See figure 1) .

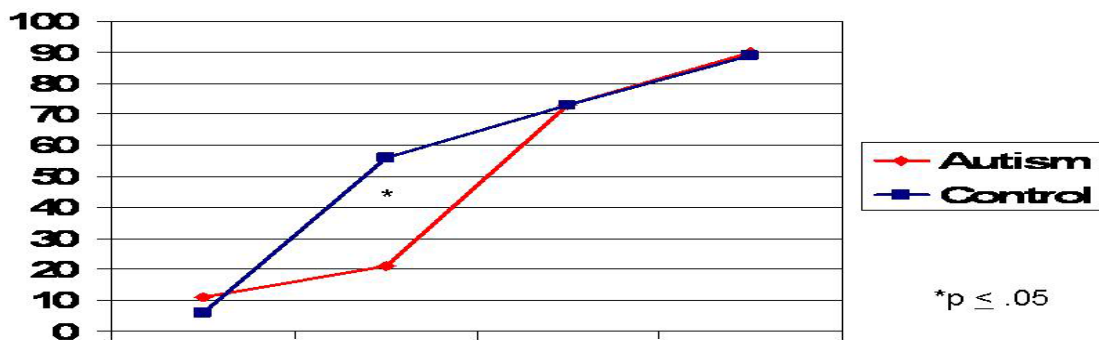




Figure 1. Differences in ability to recognize facial expression of the emotion “sad” between participants with autism and controls.

2- H2: There will be differences in ability to recognize facial expression of the emotion “angry” between participants with autism and controls.

Control participants were significantly better than participants with autism at recognizing featural cues of “angry” (See figure 2)

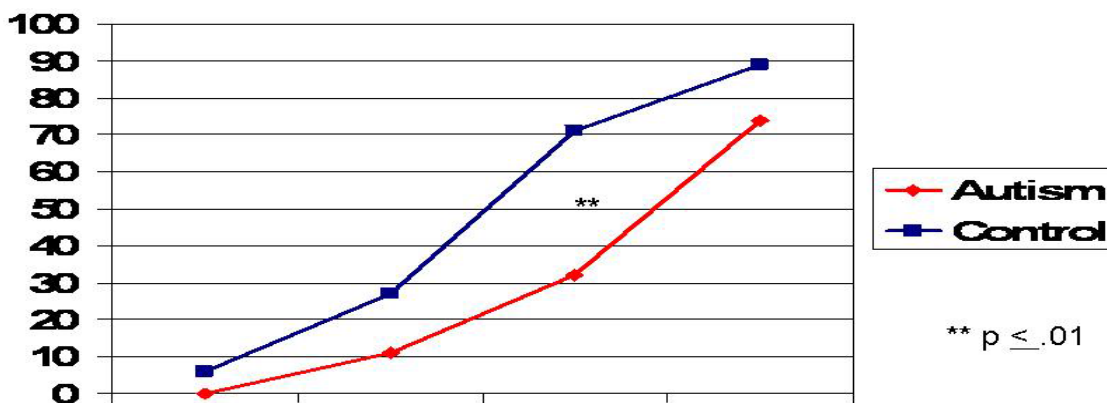


Figure 2. Differences in ability to recognize facial expression of the emotion “angry” between participants with autism and controls.

3- H3: There will be differences in ability to recognize facial expression of the emotion “afraid” between participants with autism and controls.

Control participants were significantly better than participants with autism at recognizing featural cues of “fear” (See figure 3)

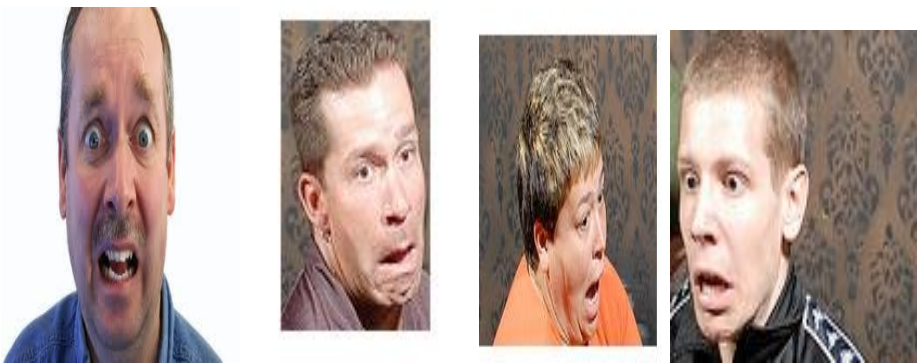
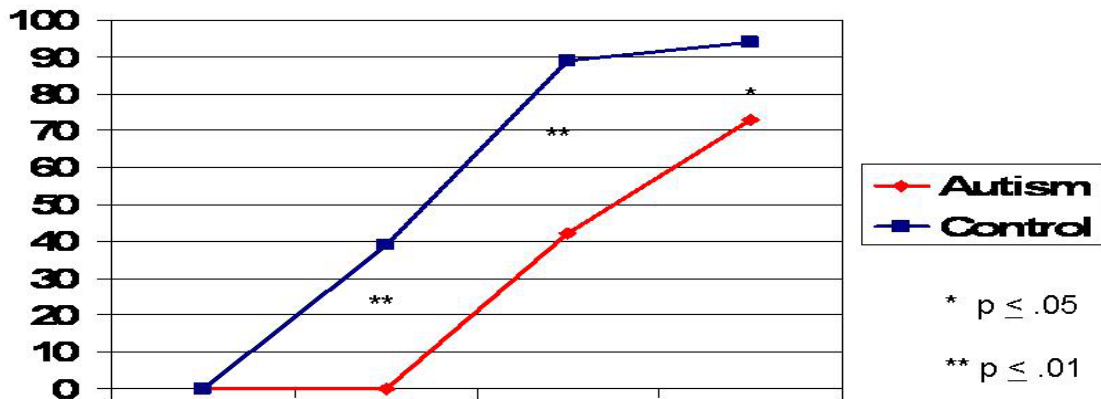


Figure 3. Differences in ability to recognize facial expression of the emotion “afraid” between participants with autism and controls.

4- H4 : There will be differences in ability to recognize facial expression of the emotion “happy” between participants with autism and controls.
 All of the control participants and participants with autism correctly identified the face stimuli at this level.

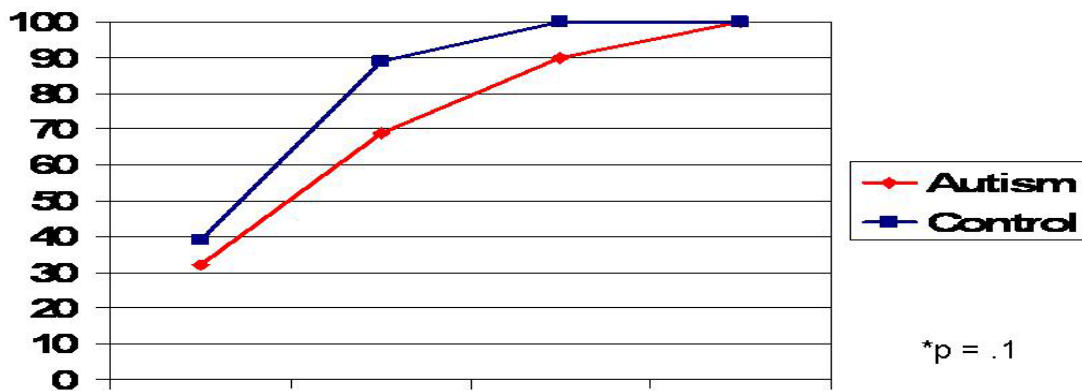




Figure 4. Differences in ability to recognize facial expression of the emotion “happy” between participants with autism and controls.

Discussion

This study examined facial affect recognition abilities in children with autism compared to their typically developed peers. Typically-developing children were able to correctly identify “sad”, “anger”, and “fear” stimuli earlier than children with autism. For “happy” stimuli, participants with autism were able to identify each expression as accurately as the control children for all emotions except for “fear.”

Differences in performance between groups of participants may have occurred due to a configural processing deficit thought to be present in autism. But later on, performance became statistically equivalent in three out of four emotions (“happy”, “sad”, and “angry”), and this demonstrated ability of participants with autism to identify exaggerated expression as well as control children may have occurred because when exaggeration occurs, it becomes easier to focus on individual facial features to extract emotion information. More subtle expressions, on the other hand, require attention to, and integration of, smaller cues. For one emotion, “happy”, no significant differences were found between groups, and both groups were at ceiling (100% accuracy).

This result may have occurred because “happy” is easier to identify using only one feature, the mouth, as compared with the other three emotions in this experiment, which require integration of information from both the mouth and the eyes.

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