Quality matters! Differences between expressive and receptive non-verbal communication skills in adolescents with ASD

Ruth B. Grossman [a,b,*], Helen Tager-Flusberg [c]

[a] Emerson College, Department of Communication Sciences and Disorders, 120 Boylston Street, Boston, MA 02116, United States
[b] University of Massachusetts Medical School Shriver Center, 200 Trapelo Road, Waltham, MA 02452, United States
[c] Boston University, Department of Psychology, 64 Cummington Street, Boston, MA 02215, United States

ABSTRACT

We analyzed several studies of non-verbal communication (prosody and facial expressions) completed in our lab and conducted a secondary analysis to compare performance on receptive vs. expressive tasks by adolescents with ASD and their typically developing peers. Results show a significant between-group difference for the aggregate score of expressive tasks, but not for the aggregate score of receptive tasks. There was also a significant within-group difference among individuals with ASD for expressive vs. receptive performance. Our data indicate that adolescents with ASD can achieve receptive accuracy in non-verbal communication, but show significant qualitative deficits in expressive skills across a range of tasks, which may have a significant negative impact on their success as social communicators.

© 2012 Elsevier Ltd. All rights reserved.

One of the hallmark characteristics of individuals with autism spectrum disorders (ASD) is their difficulty understanding and producing non-verbal aspects of social communication, such as prosody and facial expressions (Kanner, 1943). More recent studies, however, have shown that the abilities of individuals with ASD in non-verbal communication are significantly more nuanced. Several studies of prosody have documented deficits in lexical stress, or affective and grammatical marking in expressive and receptive modalities (Diehl, Watson, Bennetto, McDonough, & Gunlogson, 2009; Paul, Augustyn, Klin, & Volkmar, 2005; Peppé, McCann, Gibbon, O'Hare, & Rutherford, 2007; Shriberg et al., 2001), while others have shown preserved abilities to process emotional prosody or produce lexical stress (Boucher, Lewis, & Collis, 2000; Grossman, Bemis, Plesa Skwerer, & Tager-Flusberg, 2010). Similarly, some studies of facial expressions have documented deficits in the ability to decode emotions from faces (Adolphs, Sears, & Piven, 2001; Boucher et al., 2000; Celani, Battacchi, & Arcidiacono, 1999), particularly if the facial expressions are more complex (Golan, Baron-Cohen, & Golan, 2008). Other studies, however, have revealed facial emotion recognition skills equal to those of their typically developing (TD) peers (Gepner, Deruelle, & Grynfeltt, 2001; Grossman, Klin, Carter, & Volkmar, 2000; Rosset et al., 2008). In addition to studies showing quantifiable differences in non-verbal communication, individuals with ASD have also been shown to exhibit facial and vocal expressions that are perceived as qualitatively "odd" (Grossman et al., 2008; Macdonald et al., 1989; Yirmiya, Kasari, Sigman, & Mundy, 1989).

Most studies of nonverbal communication in ASD focus on only one or a few specific aspects of facial expressions or prosody in a single modality. Even when performance is elicited across receptive and expressive modalities, the results can only inform our understanding of the individual skill tested, such as lexical prosody, or communicative facial expressions. In order to understand whether performances of individuals with ASD on these individual tasks are related to an underlying deficit in non-verbal communication, we must look at their performance across a range of expressive and receptive tasks.

* Corresponding author at: 120 Boylston Street, Boston, MA 02116, United States. Tel.: +1 617 824 3505.
E-mail address: ruth_grossman@emerson.edu (R.B. Grossman).

The purpose of this investigation was to conduct a cross-study analysis of several studies of non-verbal communication conducted in our lab. We wanted to determine the pattern of competence for receptive vs. expressive skills in a range of prosody, facial expression, and auditory-visual (AV) integration tasks for a small group of adolescents with high-functioning autism who had participated in several of our studies over the course of three years. Based on existing documentation of the "odd" nature of facial and vocal expressions in this population, our hypothesis was that the cross-study analysis would reveal general deficits for a group of individuals with high-functioning ASD compared to a group of their TD peers in the expressive, but not the receptive modality of non-verbal language.

1. Method

1.1. Participants

We selected data from participants who shared the same inclusion and exclusion criteria and had successfully completed at least three out of six studies of non-verbal communication conducted over the course of three years. These criteria were used to obtain data from as many participants as possible who had participated in a large number of the studies involved. This method allowed us to analyze data for several individuals across a range of studies, rather than attempting to interpret data of participants who had participated in only one or two of the studies included. Two groups were included in this analysis: children and adolescents with ASD (N = 7 or 11, depending on task) and typically developing TD controls (N = 5 or 6 depending on task) ranging from 9 to 18 years old. Inclusion criteria for participant with ASD were meeting criteria for ASD or autism on the ADOS, confirmed by clinical impression and inclusion for TD participants was determined by a lack of developmental delays or differences in social or communication ability based on standardized testing. Exclusion criteria for both groups were: frank neurological diseases (other than ASD), cerebral palsy, genetic disorders, significant dysmorphology without diagnosis, mental retardation, or mild to moderate hearing loss in at least one ear. Participants were originally recruited through local schools, advertisements placed in local magazines, newspapers, the Internet, advocacy groups for families of children with autism, and word of mouth.

Standardized testing. The Kaufman Brief Intelligence Test, Second Edition (K-BIT 2; Kaufman & Kaufman, 2004) was used to assess IQ, receptive vocabulary ability was measured by the Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997), and reading ability by the Woodcock–Johnson III Diagnostic Reading Battery (WJ III DRB, Woodcock, Mather, & Schrank, 2004). All participants had IQ and receptive vocabulary scores within the normal range (Table 1). Using a multivariate ANOVA with group as the independent variable we verified that the ASD and TD groups did not differ significantly in age (F (1,16) = .17, p = .68), verbal IQ (F (1,16) = .72, p = .41), nonverbal IQ (F (1,16) = .21, p = .65), receptive vocabulary (F (1,16) = .16, p = .7), and reading skills (F (1,13) = 1.23, p = .29). A chi-squared analysis showed that the groups did not differ in the distribution of gender (χ^2 (1, N = 17) = 2, p = .52).

Diagnosis of ASD. Participants in the ASD group met DSM-IV criteria for autistic disorder, based on expert clinical impression and confirmed by the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994) and the Autism Diagnostic Observation Schedule (ADOS) Module 3 (Lord, Rutter, DiLavore, & Risi, 1999), which were administered by trained examiners. Participants with known genetic disorders were excluded. Based on their ADOS scores, nine participants met criteria for autism and two met criteria for ASD.

1.2. Measures included

The data shown here represent a synthesis of nine measures taken from six studies conducted at our lab. We selected the measures that represented the central data focus of each study. The methods and results for each measure and study are described here and summarized in Table 2.

1. *Production of emotional facial and vocal expressions.* We analyzed emotional communicative facial and vocal (prosody) expressions of adolescents with ASD elicited during a story-retelling task of four brief stories. Each story contained at least one sentence with happy, fearful, angry, and positive surprise emotion. Fifteen adolescents with ASD and 12 TD controls

Table 1
Descriptive characteristics of participant groups.

	ASD (N = 11) M(SD)	TD (N = 6) M(SD)
Age	13:7 (2:11) Range: 9:5–18:10	14:2 (2:5) Range: 9:5–15:8
Sex	8 male, 3 female	6 male, 0 female
Verbal IQ	104.18 (19.57)	112.33 (17.5)
Nonverbal IQ	113.73 (10.11)	116.17 (11.3)
PPVT-III	108.03 (31.56)	113.33 (9.5)
WJ III DRB	104 (11.59)	112.33 (16.66)