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On Intersubjective Engagement in Autism: A Controlled Study of Nonverbal Aspects of Conversation

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Abstract Does autism involve a deficit in intersubjective engagement with other persons? We studied nonverbal communication in children and adolescents with and without autism ($n = 12$ per group), group-matched for chronological age and verbal mental age, during 3 min of a videotaped interview. In keeping with previous studies, there were only subtle but potentially revealing group differences on behavioral ratings. Participants with autism made fewer head-shakes/nods (but not smiles) when the interviewer was talking, and the interviewer made fewer head-shakes/nods when participants were talking. Yet there were marked group differences on reliable 'subjective' ratings of (a) affective engagement and (b) the smoothness of reciprocal interaction. We interpret the findings in terms of a group difference in *identification* between conversational partners.

Keywords Autism · Intersubjectivity · Identification · Communication · Conversation

Introduction

In his original description of the syndrome of early childhood autism, Kanner (1943) proposed that the children had 'disturbances of affective contact' with other people. Yet until recently, theories concerning the pathogenesis of autism have tended to focus upon cognitive aspects of the disorder (for recent restatements and overviews, see Bailey, Phillips, & Rutter, 1996; Hill & Frith, 2003). Against this tide of opinion, Hobson (1989, 1993) has long championed an elaboration of Kanner's view that a profound disruption of patterned intersubjective engagement between the child and others is basic to autism, and a substantial number of researchers have highlighted aspects of the clinical picture that are affective/relational in nature (e.g., Loveland & Landry, 1986; Rogers & Pennington, 1991; Klin, Volkmar, & Sparrow, 1992; Mundy, 1995, 2003; Sigman & Capps, 1997; Dawson, Meltzoff, Osterling, Rinaldi, & Brown, 1998; Charman, 2003). These perspectives do not gainsay the characteristic quality of cognitive impairments in autism. Yet in its more radical form (e.g., Hobson, 2002), the intersubjective perspective ascribes the source of many of the children's abnormalities in interpersonal understanding ('theory of mind') and symbolic functioning to their lesser propensity to perceive, respond to and engage with the bodily-expressed attitudes of other people. As one critical aspect of the disorder in interpersonal relations, Hobson (1993, 2002), Hobson and Lee (1999), Hobson and Meyer (2005), and Meyer and Hobson (2004) have stressed the significance of the children's lesser propensity to *identify with* the actions and attitudes of others, that is, to register and assimilate the bodily-anchored psychological stance of another person so that this becomes a potential stance for themselves.

The present study is an attempt to explore this hypothesis as it applies to face-to-face conversations

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between adolescents with autism and an interested adult. Our aim was to see whether, despite earlier studies suggesting only minor abnormalities in nonverbal communication between individuals with autism and a conversational partner, there might be previously undisclosed evidence of severe disruption in intersubjective connectedness between the two parties.

Already there are several strands of evidence that point to the plausibility of this suggestion. First, clinicians have written of the unique 'feel' to one's own experience of relating to a person with autism, even to the extent of feeling treated as if one were a piece of furniture (e.g., Kanner, 1943; Bosch, 1970; Klein, 1975; Alvarez, 1992). Although such evidence is sometimes discounted, it remains the case that the appropriate measure for assessing *inter*subjectivity is one person's experience in relation to another—and often it *does* feel that something essential is missing in one's engagement with a person with autism. Hobson and Lee (1998) conducted a study of nonverbal communication in situations of greeting and departure toward an adult, and supplemented behavioral measures with reliable 'subjective ratings' of interpersonal engagement. The results were that children and adolescents with autism were not only less likely than matched control participants to offer spontaneous verbal and nonverbal gestures, to establish eye contact, and to smile or to wave goodbye, but also they were significantly less likely than those without autism to receive subjective ratings of being 'strongly engaged' with the adult. These findings indicate that in certain circumstances, at least, limited interpersonal engagement is apparent among children with autism in both behavioral *and* 'subjective' assessments.

If one considers this aspect of autism in developmental perspective, there is evidence from videotape studies (e.g., Adrien et al., 1992; Eriksson & de Chateau, 1992; Osterling & Dawson, 1994; Baranek, 1999) and direct observations of infants (Charman et al., 1997), as well as from retrospective parental reports (e.g., Wing, 1969; Hoshino et al., 1982; Dahlgren & Gillberg, 1989; Stone & Hogan, 1993; Vostanis et al., 1998; Wimpory, Hobson, Williams, & Nash, 2000), that even very young children with autism have characteristic impairments in nonverbal communication of a kind that might reflect and/or lead to disruption in intersubjective engagement. For example, Wimpory et al. (2000) devised a semi-structured interview which was administered to mothers of matched 2–3-year-old children with and without autism. There were significant group differences in what the mothers reported to have occurred during the first 2 years of the children's lives, both in person-to-person interactions (such as the frequency or intensity of eye contact, greetings, and turn-taking) and person–person-world interactions (such as referential looking and pointing to share).

Studies of toddlers and older children with autism have also reported specific impairments in nonverbal communication. These have included abnormalities in coordinating expressions of affect and/or eye contact with other people, for example in contexts involving joint action and attention (Curcio, 1978; Kasari, Sigman, Mundy, & Yirmiya, 1990; Phillips, Baron-Cohen, & Rutter, 1992), face-to-face interaction (Snow, Hertzig, & Shapiro, 1987; Dawson, Hill, Spencer, Galpert, & Watson, 1990), requests (Phillips, Gomez, Baron-Cohen, Laa, & Riviere, 1995), empathy and social referencing (Sigman, Kasari, Kwon, & Yirmiya, 1992), and self-consciousness (Neuman & Hill, 1978; Dawson & McKissick, 1984). Stone, Hoffman, Lewis, and Ousley (1994) reported that preschoolers with autism showed deficits not only in imitation and social play, but also in responsiveness to others and expressions of interest in things through eye contact or pointing. Studies by Lord (1984; Lord & Magill-Evans, 1995) have highlighted the paucity of initiations and coordinated expressions in the peer interactions of children with autism.

Each of the above studies highlights one or another aspect of nonverbal communication that may play a role in establishing and maintaining subjective engagement between persons. A further aspect of intersubjectivity at the focus of the present study—the propensity to identify with someone else—has been the explicit topic of only three published studies to date. Hobson and Lee (1999) reported striking differences between matched adolescents with and without autism in the propensity to imitate the style with which actions were carried out. This appeared to reflect a failure to 'link in with' aspects of the expressive behavior of someone else. Moreover, participants *without* autism tended to imitate how the demonstrator used an object held against his shoulder by holding the same object against *their* shoulder, whereas those with autism tended to position the object in front of themselves on the table. In further studies of this latter phenomenon, Meyer and Hobson (2004) and Hobson and Meyer (2005) report further evidence that children with autism have a reduced propensity to imitate the self/other-orientation of another person's actions. These results suggest that individuals with autism might lack a propensity to adopt the self-anchored stance-in-acting of someone else, that is, they may be less inclined to identify with someone else and assume the other person's style of action and self-orientation as their own.

There remains the challenge to discover whether, in more natural interpersonal exchanges, individuals with autism have impaired abilities not only to sustain the kinds of co-ordinated nonverbal communication needed to achieve mutual intersubjective relations, but also to identify with other persons. From a complementary perspective, the study of such interpersonal transactions should pinpoint which features of nonverbal communication are most critical for the establishment of intersubjective engagement.

It was with these questions in mind, that the present study was designed to examine a particular aspect of social interaction: nonverbal communication in the context of one-to-one interpersonal conversation. This is an especially challenging topic for investigation, given that results from two previous controlled studies of conversations seemed to suggest that *little* distinguishes adolescents with and without autism or Asperger's syndrome in nonverbal aspects of communicative exchanges. In one of these studies, Capps, Kehres, and Sigman (1998) examined both the conversational and nonverbal communicative characteristics of language-matched groups of 15 children with autism and 15 children with developmental delays. In the course of a 6-min conversation in which they were asked about schools, friends, and vacations, participants with autism more often failed to respond to questions or comments, and they tended to make verbal contributions that were bizarre or idiosyncratic. On the other hand, they did not differ from comparison children in nodding and shaking their heads to respond to yes–no questions, and contrary to expectations, they smiled and displayed appropriate affect as frequently as comparison children. The children with autism were as likely as those without autism to use gesture, although the authors noted that this was often to enact an activity being described, and other gestures were not examined in detail. There was one further, seemingly marginal result: participants with autism were less likely to nod while listening to their partners talk (and see van Engeland, Bodnar, & Bolhuis, 1985, for complementary evidence of a lack of shakes and nods of the head when children with autism interact with someone else). The authors remarked on how the relative dearth of group differences might have reflected a lack of subtlety in their methodological approach, but concluded that 'children with autism demonstrated limited involvement in the co-construction of a shared conversational trajectory through nonverbal as well as verbal channels' (Capps et al., 1998, p 337). Yet on the face of it, one might surmise that there was little in this study to suggest basic impairments in intersubjective engagement between the participants and the interviewer. Perhaps with this in mind, the authors closed their discussion with the suggestion that 'the social deficits in autism, then, are perhaps best understood in terms of a profound difficulty in acquiring and making use of conventional knowledge' (p 340).

The results from a second study by Tantam, Holmes, and Cordess (1993) are more complex to interpret. Here participants were individuals with Asperger's syndrome and two control groups comprising participants with schizoid personality disorder and individuals without psychopathology. The principal finding was that compared with the nonpsychopathological group, and near-significantly compared with schizoid individuals, those with Asperger's syndrome tended to look less at the other person when the interviewer was vocalizing but not when the interviewer was listening. The authors interpreted this finding in terms of these participants' reduced gaze when the other person was talking and producing 'social cues including speech' (p 111). Once again, however, despite a tendency for individuals with Asperger's syndrome to show less co-ordination between vocalizations and head movements, there were no other significant group differences beyond a greater number of self-stimulatory gestures. It was also the case that in one condition, the interviewer showed less frequent but longer gazes when talking to individuals with Asperger's syndrome. Overall, the authors considered that 'the differences between autistic and control subjects in the frequency of nonverbal expression during social interaction are much less than would be expected' (p 129).

The challenge is how to reconcile such findings with clinical and research literature that points to potentially severe and developmentally significant impairments in intersubjective engagement in autism. Do such impairments not exist, at least in adolescents with autism? Or are we failing to capture the sources and expression of such disorder with methodological tools that focus on frequencies and surface features of behavior—and in addition, perhaps, failing to grasp the significance of those group differences already detected?

Our aim in the present study was to test whether we could replicate previous findings, and to set the results in the context of additional measures of intersubjective engagement. Despite the behavioral evidence outlined, we consider that clinical experience of individuals with autism justifies the hypothesis that in comparison with individuals without autism, they are less *engaged with* other people emotionally and psychologically. Therefore, we predicted that group differences would be apparent when ratings of videotaped interactions were made of two *relational* characteristics: participants' degree of affective engagement with the interviewer, and the 'flow' of the dyadic exchange.

Beyond this, on the basis of an hypothesis that individuals with autism are seldom 'moved' to adopt the bodily expressed psychological orientation of others (Hobson, 1993)—a phenomenon we consider to reflect a limited propensity to align one's own subjective stance with that of someone else through the process of identification—we anticipated a further set of group differences: partly in keeping with the findings of Capps et al. (1998) and Tantam et al. (1993), we expected that participants with autism would show fewer episodes of nods and shakes of their heads and a smaller proportion of time looking to the interviewer's face, and anticipated that these group differences might be more marked at those times when the interviewer was talking *vis-a-vis* periods when they (the participants) were talking. The point here is that according to our hypothesis, there should be a specific difficulty when individuals with autism need to accommodate to and connect with *someone else's* stance-in-talking, rather than simply failing to show nonverbal communicative expressions. We also anticipated that participants with autism would show fewer smiles.

Finally, we considered the interviewer's side of the equation. According to our hypothesis, individuals with autism often fail to identify with others, but in addition, they are abnormally difficult to *identify with.* As one manifestation of such a difficulty in 'linking in' with the bodily expressed states of mind and communicative efforts of persons with autism, we predicted that the interviewer would show fewer headshakes and nods specifically when participants with autism were talking.

Method

Participants

The group with autism comprised 12 adolescents (eight males and four females) who satisfied standard diagnostic criteria for autism (DSM-IV: American Psychiatric Association, 1994). We confirmed the diagnosis by systematic interviews with teachers using a checklist of DSM clinical features, and confirmed the diagnosis by rating classroom behavior on the Childhood Autism Rating Scale (CARS: Schopler, Reichler, & Renner, 1986, with a conventional cut-off score of 30 for a diagnosis of autism), where scores were between 30 and 35.5. These participants were matched for chronological age and verbal mental age according to performance on the British Picture Vocabulary Scale (BPVS: Dunn, Dunn, & Whetton, 1982) with 12 adolescents (nine males, three females) who had mental retardation but not autism nor any other diagnosed medical condition. As an additional measure of language ability, we had available estimates of Mean Length of Utterance calculated on the basis of the first 50 utterances of the interview, where again the groups were similar. Participant characteristics are shown in Table 1.

Procedure

For the present study, we examined excerpts of videotapes of semi-structured interviews that had been recorded in order to study the self-concepts of adolescents with autism (Lee & Hobson, 1998, based on Damon & Hart, 1988). At the time the interviews were conducted, we did not anticipate that the videotapes would be reviewed for the present purposes. Participants were asked questions about themselves, and the interviewer (AL), a psychologist who had come to know the participants through his visits to their schools over a period of years, expressed his understanding and offered prompts to encourage participants to elaborate on their responses. The interview took the form of a conversation, albeit with some question-and-answer exchanges. Although the interviews lasted between 35 and 60 min, for the detailed labor-intensive ratings we pre-defined a selected 3 min of the videotapes for each participant. In order to make the excerpts comparable across participants, we took these from an early part of the interview. Once a participant had been set at ease with some introductory exchanges, we selected the part of the interview that began with the opening 'self-understanding' question: '*What kind of person are you? How would you describe yourself?'*. The videotape ratings were terminated exactly 3 min after this point.

Table 1 Participant characteristics

	Chronological age			Verbal mental age (BPVS)			Mean length of utterance (MLU)		
	Mean (years;months)	SD (months)	Range (months)	Mean (years;months)	SD (months)	Range (years;months)	Mean	SD	Range
Autism (n = 12)	15;06	42	9–19	6;06	19	4;04–9;09	5.31	1.52	3.3–8.1
Without autism (n = 12)	14;04	22	11–17	6;07	18	4;00–9;03	6.1	1.31	4.6–9.0

Measures

Behavioral measures

Our first approach was to employ behavioral measures that had been used in previous studies: durations of looks, numbers of head-shakes/nod episodes, and smiles. The primary rater who assessed the excerpts was blind to the diagnostic group of participants, and we decided in advance to employ her ratings (providing these proved reliable) for the subsequent analyses. To estimate reliabilities, an independent rater who was blind to diagnostic group and the hypotheses and predictions of the study evaluated the first minute of the videotaped interactions for ten participants (videotapes of five participants with autism and five control participants were intermixed for these purposes).

(a) *Looks* were coded by summing second-by-second ratings of looks to the partner, to create a durational variable. For the participants' looks, the intraclass coefficient (ICC; Shrout & Fleiss, 1979) for total duration of looks was 0.85 when the participants were talking, and 0.97 when the interviewer was talking. The ICC for the interviewer's looks was 0.96 when the participants were talking, and 0.97 when the interviewer was talking.

(b) *Head-shakes/nods* were coded by counting the numbers of episodes of these head movements, defined as the period from the beginning to the end of a shake or nod (or quick succession of such head gestures). In keeping with previous studies, we excluded in advance those episodes where the participants moved their heads to answer 'yes' or 'no' in agreement or disagreement. For ratings of the numbers of participants' shakes and nods in each of the two 'floor holding' aspects of the conversation, estimates of inter-rater reliabilities were ICC = 0.94 when the participants were talking, and 0.92 when the interviewer was talking; for the interviewer's head-shakes/nods, the values were 0.67 when the participants were talking, and 0.63 when the interviewer was talking.

(c) *Smiles* were simply counted. The ICC for the participants' smiles was 0.76 when they were talking, and 0.93 when the interviewer was talking; for the interviewer, the values were 0.93 when participants were talking, and 0.82 when the interviewer was talking. As an informal rating (without estimate of inter-rater reliability), each smile was classified according to whether or not it occurred immediately following a smile of the conversational partner, where such 'responsive' smiles were defined as commencing after the onset of the partner's smile but no later than one second after its ending.

Therefore the majority of estimates of inter-rater reliability exceeded the ICC value of 0.75, which is considered 'excellent' according to the criteria of Cicchetti and Sparrow (1981), and the only exception (concerning the interviewer's head shakes and nods) was 'good'.

Intersubjective measures

Here our aim was to employ the sensibilities of human raters to make 'intersubjective' ratings of affective engagement and the flow of the interview, each of which was rated separately. The rationale for this approach is that human beings are the *only* appropriate 'measuring instrument' for evaluating these aspects of interpersonal relatedness, and that providing independent raters could agree in their judgments, then ratings of this kind complement counts of the behavioral components of communication. Because of the novelty of this approach, it was especially important to have very sound estimates of inter-rater reliability, and therefore two raters blind to diagnosis each rated the 3 min excerpt as a whole for all participants except for a single individual whose tape was mislaid prior to the second set of ratings.

(a) *Affective engagement* was defined as the degree of emotional connectedness between the participant and the experimenter, and was rated using a one-to-five point scale: a score of 1 was given for 'no emotional connection', and a score of 5 was given when there was judged to be a 'strong emotional connection' between the participant and the interviewer. The Kappa estimate of inter-rater reliability was 0.59, on the border between 'moderate' and 'substantial' agreement between the investigator and the rater (Landis & Koch, 1977). On inspection of the ratings, it was noted that 19 of 23 (83%) of the ratings were within one point of each other, and that only in the case of one shy and inhibited child (whom the raters judged at opposite ends of the scale, and also judged very differently for the flow of the interview) was there a discrepancy of more than two points: apart from this individual, the Kappa estimate of reliability was 0.73.

(b) *Flow of the interview* was rated according to whether the exchanges between the participant and the interviewer were smooth, on a one-to-five point scale: a score of 1 was given when there was a minimal degree of mutual exchange, a score of 3 when there were 'fits and starts' to the interaction (requiring effort on the part of the interviewer to keep things going), and a score of 5 was given when the interview proceeded at a relaxed and steady pace, with the work fairly evenly balanced between the interviewer and the participant. The Kappa coefficient estimate of inter-rater reliability was 0.55 (moderate), and again if the single case of the shy child with uniquely discrepant ratings were excluded from consideration, the estimate would be 0.65.

Although we made directional predictions, we analyze the results according to two-tailed tests of significance. Given that the observations were not independent—for example, measures of head shakes/nods and smiles probably contributed to ratings of affective engagement and the flow of the interview—and also that we decided in advance to focus upon a restricted range of behavioral indices, we do not attempt to adjust the *p*-values reported. However, a conservative approach toward the multiple comparisons might be to consider $p < 0.01$ as the criterion for significance of any particular result, considered in isolation.

Results

Preliminary results on 'floor holding'

A preliminary matter was to establish 'floor-holding' by either the participant or the interviewer, that is, to determine those periods during which either the participant or the interviewer was talking (and excluding periods of silence). The time periods during which the participants with and without autism (respectively) 'held the floor' and talked were as follows: when participants were talking, autism $M = 59$ s (SD = 10.7 s), without autism $M = 91$ s (SD = 30.4 s); when the interviewer was talking, autism $M = 97$ s (SD = 11.2 s), without autism $M = 76$ s (SD = 25 s). Unsurprisingly, therefore, in comparison with control participants, those with autism tended to speak less, and to be spoken to more, during the 3-min interview excerpt. Therefore in what follows, we analyze the prevalence of items of behavior in terms of the rate per minute of floor-holding, and thus with specific reference to whether the participant or the interviewer was talking.

Looks

The results on participants' looks are important not only as a possible indication of group differences, but also as a background for interpreting other aspects of behavior (and in particular, head-shakes/nods and smiles) that occur most often during looking. As it turned out (and as represented in Fig. 1), there was not a significant group difference in the percentage of time that participants looked to the interviewer, either when the participant or the interviewer was talking (i.e., holding the floor). In each case, participants of both groups looked to the interviewer for ~30–40% of the time.

Head-shakes/nods (excluding 'yes' and 'no' responses)

Inspection of the results showed that there was one participant with autism who was a clear outlier, in that she seemed to nod almost constantly over the interview. She made 24 head-nods and shakes over the 3 min, and (for example) her rate of head gestures when listening to the interviewer was over seven times that of the next most head-nodding/shaking person with autism. Therefore, this participant was not included in this section of the analysis.

We adopted two approaches to analyzing the results on participants' head-shakes/nods. Given that there was a relatively restricted range of data, and a substantial number of zero scores, we conducted nonparametric analyses of the results. When participants were talking, the two groups were *not* significantly different with regard to the rates per minute of

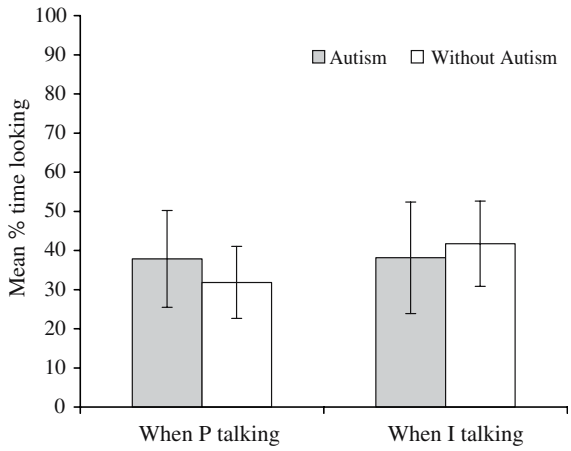

Fig. 1 Percentage of time that participants (*P*) looked at the interviewer (*I*) according to who was speaking

head-shaking or nodding (Mann–Whitney, $U = 47$, two-tailed, ns). To bring out the profile of results, we also counted the number of individuals who nodded *at all* when they were speaking. There were 5 of 11 participants with autism, and 10 of 12 participants without autism, who nodded at all when the participants were talking (Fisher's exact test, two-tailed, $p = .09$). Although fewer than half the participants with autism, but the majority of participants without autism, nodded when they were talking, it should be recalled that the former group spoke for a mean of ~60 s, compared with the 90 s for the control group. According to each approach, therefore, there was not a significant group difference, although there was a trend for participants with autism to nod less.

When the interviewer was talking, on the other hand, participants with autism showed a significantly lower prevalence rate of shakes and nods of the head (Mann–Whitney, $U = 25.5$, two-tailed, $p < 0.01$). The group contrast in the profile of results is apparent in our second approach to data analysis: only 2 of 11 participants with autism, but 9 of 12 participants without autism, nodded *at all* during this time (Fisher's exact test, two-tailed, $p = 0.001$). This result is all the more striking, given that the duration of the interviewer's floor-holding was substantially greater in the case of interviews with participants with autism (mean ~100 s), than in those with participants who did not have autism (mean ~75 s).

Smiles

Contrary to expectation, the two groups were very similar regarding the overall numbers of smiles shown (for children with autism, mean number of smiles = 4.5, SD = 5.0; for control participants, $M = 5.2$, SD = 3.9), and for each group, there was little to indicate that smiling differed according to whether the participant or interviewer was talking. Nine participants in each group smiled at least once when they were talking, and seven participants with autism and nine control participants smiled at least once when the interviewer was speaking. There were five participants with autism and two control participants for whom at least one smile followed the onset of a smile by the interviewer.

Interviewer

Interviewer's looks

First, we adopted the approach used by Tantam and collaborators, and considered amounts of looking without reference to who was speaking. Overall, the time the interviewer looked toward the participants with autism was $M = 159$ s (SD = 8.9 s), and toward control participants was $M = 167$ s (SD = 12.6 s), a nonsignificant difference.

Second, we analyzed the interviewer's looks according to who was speaking, as a percentage of the time occupied by that speaker. When the interviewer was the one speaking, he looked for significantly less time to participants with autism than to those without autism (for those with autism, $M = 84.2\%$, SD = 6.2%; control $M = 90.7\%$, SD = 9.6%, Mann–Whitney, $U = 35$, two-tailed, $p < 0.05$). For those periods when a participant was talking, on the other hand, the interviewer looked to participants of each group for more than 95% of the time (in the case of those with autism, $M = 95.7\%$, SD = 4.5%; control $M = 96.1\%$, SD = 5.0%).

Interviewer's head-shakes/nods

Here our *a priori* prediction had been that specifically when the participants with autism were talking, and there was a need for the interviewer to 'link in with' the mental state and communicative stance of the participant, the interviewer would show fewer head-shakes/nods. Once again here, prior to analysis it was decided to exclude the interview involving the participant with autism who shook and nodded her head almost constantly and far more frequently than any other participants of either group.

It should be recalled that when participants were talking, the groups were not significantly different in their own head-shakes/nods, and the interviewer looked equally consistently (over 95% of the time) toward the participants in each group. Despite this, when participants were talking the interviewer showed a significantly lower prevalence of head-shakes/nods (in terms of rate per minute of participant floor-holding) toward individuals with autism (for those with autism: $M = 1.7$ per minute, SD = 2.4, range 0–6.3 per minute; for those without autism, $M = 3.3$ per minute, SD = 1.6, range 1.0–5.7: Mann–Whitney, $U = 31$, two-tailed, $p < 0.05$). Here, the profile of the data is revealing: the interviewer showed *no* head-shake nor nod to 7 of 11 participants with autism when they (the participants) were talking, but this total absence of head-shakes and nods was *never* seen in relation to participants without autism (Fisher's exact test, two-tailed, $p = 0.001$). The four participants with autism to whom the interviewer showed head-shakes/nods were the only four adolescents within this group who, while

they were talking, showed head-shakes/nods themselves at a rate of over two such gestures per minute (there being only one other participant with autism who showed any head-shakes/nods, and in this case it was a single instance). Although these latter results need to be considered in relation to the somewhat diminished time during which participants with autism held the floor, they reveal a substantial group difference.

In the situation where the interviewer was talking, on the other hand, there was not a significant group difference in the rates of his head-shakes/nods (Mann–Whitney $U = 41$, ns). Here the interviewer shook or nodded his head toward all the participants in each group. The rates of head-shakes/nods per minute of interviewer floor-holding were as follows: for group with autism, $M = 6.4$ (range 2.1–11.3, SD = 2.5), and for the control group, $M = 9.0$ (range 5.1–18.0, SD = 4.1), so again the trend was toward fewer head-shakes/nods toward participants with autism.

Interviewer's smiles

The pattern of the interviewer's smiles was very similar in both groups, and he made a total of 52 and 44 smiles to the participants with and without autism, respectively. The interviewer smiled at least once to the majority of the participants in each group, both when the participants were talking (toward nine autistic and eight control participants) and when the interviewer was talking (toward 11 autistic and ten control participants). We noted that in the case of eight participants with autism and nine control participants, at least one of the interviewer's smiles was in response to the participant's smile, and such 'responsive' interviewer smiles amounted to between one-third and one-half of his smiles for each group.

Intersubjective measures

Affective engagement

These judgments relate to emotional connectedness *between* the participants and interviewer. The results appear in Fig. 2. As predicted, there was significantly less affective engagement between the interviewer and those participants who had autism (Mann–Whitney, $U = 26$, $p < 0.01$, two-tailed). Eleven of 12 control participants were rated to have at least a moderate affective connection with the interviewer, but this was the case for only 5 of 12 individuals with autism (Fisher's exact test, $p = 0.03$, two-tailed). In the case of only one participant with autism, was the rating of a strong emotional connection with the interviewer. The five participants with autism for whom there were relatively high ratings for affective engagement tended to be older ($M = 17;6$ years, SD = 1;2, range = 16;2–18;9), but with lower verbal IQ ($M = 38.8$, SD = 13.2, range = 27–61), and they were typical for the group in verbal MA.

Flow of the interview

As anticipated, the exchanges between the participant and interviewer were judged to be less smooth and flowing among the participants with autism (Mann–Whitney, $U = 12$, $p < 0.0001$, two-tailed). The results are presented in Fig. 3, where it may be observed that 10 of 12 control participants but only 1 of 12 participants with autism had exchanges with the interviewer that were 'very smooth' (Fisher's exact test, $p = 0.0001$, two-tailed). The six participants with autism in the top two categories for 'flow', three of whom were also among the five in the top two ratings for affective engagement, were very typical for the group as a whole with respect to CA, VMA, and VIQ.

An additional perspective

We approached this study with a particular perspective on the nature and patterning of interpersonal transactions. We consider interpersonal engagement as shaped by the process of identification to be a dyadic state (or series of events) of the 'system' of self-in-relation-to-other. According to this approach, it is appropriate to interpret the behavior of *each* of the participants in conversation as reflecting qualities of

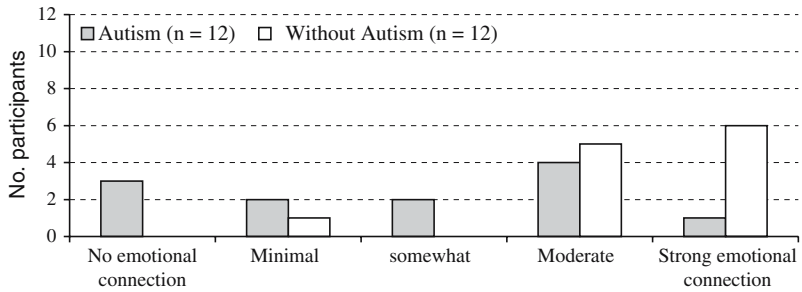

Fig. 2 Affective engagement

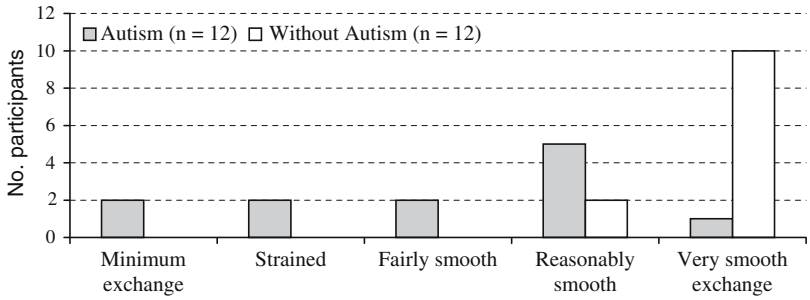

Fig. 3 Flow of the interview

such engagement. An alternative view is that one should partition out the respective contributions of the interviewer and the person interviewed, and in order to do so, one ought to control or statistically adjust for the behavior of the interviewer. For example, it might be that the interviewer had systematic biases in his own behavior that were not elicited by participants' current modes of relating, and if so, these might have affected participants' behavior.

We adopted one exploratory approach to assessing how the results might appear if one adopted such a perspective (although already we have seen how the experimenter looked and smiled for equal amounts of time to each group of participants). We considered that, in terms of the nonverbal behavioral measures of this study, a reasonable index of experimenter bias would need to be as independent as possible from participants' current behavior (even if, as we believe, this was never truly the case). Therefore, we inspected the rates per minute of the interviewer's shakes/nods when he (the interviewer) was speaking, and (blind to the participants' behavior while listening) we eliminated outlying data so that two subgroups were constituted thus: 11 participants with autism and ten without autism, in relation to whom the interviewer made $M = 6.9$ (SD = 2.1) and $M = 7.6$ (SD = 2.6) head-shakes/nods per minute. In this way, we controlled for this aspect of interviewer behavior in these parts of the interview. When we examined this subgroup of participants' head-shakes/nods when the interviewer was speaking, there were 8 of 11 children with autism but only 3 of 10 participants without autism who had *no* head-shakes/nods.

Clearly this illustration does not preclude the likelihood that there were *mutual* and complex transactional effects between the two participants in dialog, especially at the level of fine interpersonal timing of exchanges. Indeed, we suppose this is what was happening. Rather, it provides supplementary evidence that the interviewer's behavior (if considered in isolation) was not a primary source of group differences.

Discussion

Perhaps the most striking feature of the results is the discrepancy between the very marked group differences that appear on 'subjective' (but objectively reliable) judgments of affective engagement and interactive flow between the conversational partners, and what seem to be either absent, or subtle but modest, group differences on behavioral measures of amounts of looking, smiling, and head-nods/shakes. The participants with autism were rated as low in affective engagement and even more markedly discrepant from the control group in the smoothness of their exchanges, yet at first blush they appeared more similar than different in the behavioral components of nonverbal communication. How can one account for this apparently discordant set of findings—and in what respects might the explanation further our understanding of autism?

It is worthwhile to begin by noting that there are strong grounds for accepting the validity of each set of findings. From a clinical perspective, Kanner (1943) described autism as a disorder of affective contact, and other writers have elaborated upon aspects of this abnormality in how it feels to relate to individuals with autism (Bosch, 1970; Hobson, 2002). Yet to our knowledge, there is only one controlled study by Hobson and Lee (1999) that has employed measures specifically focused on limitations in *intersubjective* co-ordination between participants with autism and other people. There is a simple reason for this: researchers have shied away from applying the appropriate instrument to render measures of one person's psychological involvement with another. The only way to assess interpersonal relatedness is through inviting human beings to use their own human sensitivity to give 'subjective' ratings of the quality of person-with-person engagement. If there is agreement in the judgments of independent raters, then the measures are more than 'subjective' in the sense of idiosyncratic. It becomes unsurprising but far from trivial that individuals with autism are rated as being less affectively engaged than those without autism.

Much more surprising is what emerges from ratings of aspects of behavior that one might imagine to be critical for, and/or sensitive indices of, intersubjective engagement. Why are there not striking group differences in amounts of looking, smiling, and gesturing in conversation? Yet once again, the present results are not unexpected when one considers previous related investigations. The results from studies by Capps et al. (1998) and Tantam et al. (1993) correspond very closely with those reported here concerning the relative *lack* (or perhaps better, the relative subtlety) of group differences when elements of nonverbal communication are studied in isolation, and in each case the investigators expressed perplexity that their findings were not more impressive. Therefore, it seems to be the case that such behavioral ratings fail to capture what is critical for assessing interpersonal engagement, or at least those aspects of such engagement that are specifically impaired in individuals with autism.

Yet there is another way to view this consistent pattern of results. However minor in scale are the group contrasts on behavioral measures, they may nevertheless betray qualities of interpersonal communication that are essential to what is both experienced and rated to be abnormal in the case of autism. It is just that we have not yet grasped their significance and meaning.

Consider how remarkable the consistencies appear to be. Capps et al. (1998) reported that children with autism were able to use head nods and shakes to respond to yes–no questions, so they did not suffer a 'head-nodding/shaking' deficit—and yet they were less likely to nod while listening to their partners talk. Tantam et al. (1993) reported that individuals with Asperger's syndrome looked less at the other person when the other person was talking. We did not replicate this latter finding, but in keeping with both previous sets of results, we too found that abnormalities in children with autism were more marked when the conversational partner was talking. Exactly as in the study by Capps et al. (1998), we found that head-shakes/nods were often absent when the partner was talking, and in the present case we ascertained that in this respect the group difference was *not* significant when the participants were talking, *nor* was it a response to the partner altering his amount of looking or head-nodding when speaking. It is also of note that similar findings have emerged when conversations have concerned different topics. Although this makes it is unlikely that the present results were unduly shaped by the focus upon the participants' self-characteristics, it remains to examine whether the results are replicated in more natural conversations, and how they might be amplified or otherwise altered when the conversations occur between peers.

What might this set of results signify? In our view, it probably signifies that children with autism are limited in the degree to which they identify with another person in conversation. We suggest that in the case of people who do *not* have autism, one individual nods in accordance with what he/she is saying when he/she is talking, and nods 'in accordance with him/herself in identification with the other person' when the other person is talking. In other words, it is because of the kind of engagement people have with the stance (and corresponding ideas) expressed by the other person's speech and expressive behavior—an engagement that leads one to adopt the other person's cognitive-affective orientation in the act of comprehending the other—that the natural, unselfconscious kind of nodding-in-communicating follows. Individuals with autism are specifically impaired in this kind of intersubjective linkage and attunement. Such an account does not conflict with the proposal by Capps et al. (1998), that persons with autism have a 'profound difficulty in acquiring and making use of conventional knowledge' (p 340), nor with the suggestion by Tantam et al. (1993) that persons with autism have impairment in an inborn tendency to orientate to human faces and vocalizations, but it does set such considerations in a new framework. Although our hypothesis may seem more speculative than these competing explanations, it accords with other recent evidence that children with autism are limited in the degree to which they identify with the actions of others in imitative contexts (Hobson & Lee, 1999; Meyer & Hobson, 2004; Hobson & Meyer, 2005).

The proposed account is in keeping with two further aspects of the present study. First, there were the marked group differences in affective engagement and flow of interpersonal exchanges. These results suggest that there is something more than 'conventional knowledge' at stake, and support clinical judgments that the something has to do with intersubjective linkage. Second, the hypothesis generated a prediction that would not have been predicted by alternative hypotheses. If children with autism have a lowered propensity to identify with and feel moved by another person, then the other person might have a reciprocal difficulty in identifying with individuals who have autism. Therefore, we predicted that the interviewer would *also* show less head-shaking/nodding specifically when the participant was talking, owing to the interviewer's difficulty in identifying with the stance of the participant. This prediction was borne out. Here it is notable that the interviewer did *not* look significantly

less to the participants with autism when they were talking, nor was he lacking in smiles. Therefore, the result was not simply a reflection of his looking less to the participants, or showing less feeling. Its source was deeper.

There remain grounds for holding back from the conclusion that the source was a lesser propensity to identify with others. First, we had also made two incorrect predictions. The first of these was that participants with autism would look less to the conversational partner when the latter was talking. Although it proved to be a strength of the study that the two groups were *not* significantly different in this respect, in that it allowed us to determine the specificity of the head-shaking/nodding contrast, we had anticipated that the failure to identify would also be reflected in less looking toward the other person. Second, we predicted that participants would smile less to the conversational partner. As it turned out, the two groups were very similar in the number of smiles shown, and even similar in the proportions of smiles that followed closely after the onset of smiling by the interviewer. A majority of participants in each group smiled at the interviewer during the interaction.

How are we to interpret these findings? Our suggestion is that there are differences in the *qualities* of the looks and smiles that are easily overlooked—and that should have influenced our original predictions. Indeed, we have reported evidence that under certain circumstances, children with autism have specific abnormalities in 'sharing looks' when imitating another person's actions (Meyer & Hobson, 2006). It would be in keeping with the subjective ratings of engagement in the present study, that participants with autism gave looks that differed in the quality of interpersonal contact. However, we were not able to judge from the videotapes whether or not this was so for particular looks. Here it is relevant to note how previous studies have highlighted atypical forms of emotional expressiveness and/or a relative lack of co-ordinated modes of expression among children with autism (e.g., Macdonald et al., 1989; Yirmiya, Kasari, Sigman, & Mundy, 1989; Dawson et al., 1990). Therefore, it is open to question whether the looks and smiles recorded in the present study served as indices of the kinds of interpersonal engagement that implicate one person identifying with someone else.

Finally, it is appropriate to draw attention to the clinical implications of the study. First, the results point to the likelihood that people who live with and relate to individuals with autism are liable to be affected in their own ability not only to engage with these individuals on an experiential (intersubjective) level, but also to behave 'naturally' toward them in moment-to-moment interactions. Although it might be argued that this is an inevitable adjustment to individuals with autism that may be adaptive in relation to their difficulties in nonverbal communication, there are obvious dangers that one might compound these individuals' handicaps to truly interpersonal exchange. Second, and as a corollary, one challenge facing therapeutic interventions is how to foster the levels of communicative connectedness and exchange that are essential to intersubjective relatedness and what Kanner (1943) called 'affective contact' between one individual and another.

Whatever the resolution of these issues and challenges, the present study has demonstrated that it is possible to make reliable ratings of affective engagement and the flow of interchange *between* individuals, and that when one does so, participants with autism differ markedly from matched children without autism. Such observations need to be encompassed by any adequate theory of what makes autism 'autism'. Second, the study has revealed that although more focused behavioral ratings may fail to capture the degree and quality of contrasts in intersubjective engagement between individuals with and without autism, such measures illuminate the patterning of such engagement. If the essence of intersubjectivity is connectedness between one person and another, including the 'feel' that this entails, then the challenge we face is to characterize the forms of interpersonal transaction that give such force to human engagement. The study of individuals with autism is helping us to meet this challenge. And the study of intersubjective processes promises to elucidate the nature of autism.

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