REPORT

Foundations for self and other: a study in autism

R. Peter Hobson and Jessica A. Meyer

Developmental Psychopathology Research Unit, Tavistock Clinic, London and Institute of Child Health, University College London, UK

Abstract

There is controversy over the basis for young children's experience of themselves and other people as separate yet related individuals, each with a mental perspective on the world – and over the nature of corresponding deficits in autism. Here we tested a form of self–other connectedness (identification) in children with and without autism, who were group-matched according to CA (approximately 6 to 16 years) and verbal MA (approximately 2½ to 14 years), and therefore IQ. We gave two forms of a novel 'sticker test' in which children needed to communicate to another person where on her body she should place her sticker-badge. Across the trials of Study 1, all of the non-autistic children pointed to their own bodies at least once, but over half the children with autism failed to point to themselves at all, even though they communicated successfully in other ways. In Study 2, where a screen was introduced to hide the tester's body, group differences in the children's communicative self-orientated gestures were most marked after the tester had 'modelled' a point-to-herself gesture in communicating to the child. Our interpretation is that autism involves a relative failure to adopt the bodily-anchored psychological and communicative stance of another person. We suggest that this process of identification is essential to self–other relations and grounds young children's developing understanding of minds.

Introduction

One of the most challenging tasks for developmental psychology is to characterize the developmental underpinnings of a person's understanding of self vis-à-vis other people. The present study attempts to examine a critical component of self–other connectedness and differentiation by studying children with autism.

The story of the development of self–other relations begins in the earliest months of life, when infants apprehend and copy certain of the facial and manual actions of other people (Field, Woodson, Greenberg & Cohen, 1982; Meltzoff & Moore, 1977), register if someone fails to maintain responsiveness towards them in face-to-face interactions (Cohn & Tronick, 1983; Murray & Trevarthen, 1985; Nadel, Carchon, Kervella, Marcelli & Réserbat-Plantey, 1999), and adjust to the interactive style of their caregiver (Bigelow, 1998). Then towards the end of the first year, infants relate to others' actions and attitudes with reference to a shared world, for example by showing things to others and making requests, imitating others' actions on objects, and engaging in social referencing (Bretherton, 1992; Butterworth, 1991; Meltzoff, Moore & Keith, 1994; Sorce, Emde, Campos & Klinnert, 1985; Rochat, 2001; Tomasello & Farrar, 1986; von Hofsten & Siddiqui, 1993; Walden & Ogan, 1988). A further stage that occurs between the middle and the end of the second year is when children show conceptual understanding of self and other, for example in adjusting their actions to the needs and feelings of others, referring to themselves as ‘I’ and addressing others as ‘you’, and talking about their own and others’ mental states (Bretherton & Beeghly, 1982). This latter accomplishment has been considered to reflect a child's growing 'theory of mind', but it also reveals the child's increasingly sophisticated concept of 'selves', that is, individual persons who have distinctive psychological relations with the social and physical world.

There is much to discover about the psychological mechanisms by which self- and other-awareness are derived. In particular, how are we to characterize the processes (beginning very early in life, but continuing to operate across the lifespan) that establish both psychological connectedness and differentiation between 'self' and 'other'? Although there is lively theoretical debate over the topic (e.g. Gopnik, Capps & Meltzoff, 2000; Hobson, 1990, 1991; Meltzoff & Brooks, 2001; Rochat, 2001; Stern, 1985; Tomasello, 1998) and relevant research has taken place on infant imitation (Meltzoff & Moore, 1995), understanding of self and other as intentional...
agents (Tomasello, 1999), and the early understanding and use of personal pronouns and mental state concepts (Austing & Jenkins, 1999; Imbens-Bailey & Pan, 1998), new avenues of empirical research may be needed to specify the nature of these processes.

One potentially powerful investigative approach is that of developmental psychopathology. This has the aim of elucidating both typical and atypical development by studying the one in conjunction with the other. There are reasons to believe that the study of autism might be especially revealing in the present context. First, there is clinical evidence that many children with autism have relative lack of self-consciousness, sometimes obliviousness towards others, and difficulties with aspects of social understanding such as those expressed in pragmatic language and the use of ‘I’ and ‘you’ (Bosch, 1970; Kanner, 1943; Scheerer, Rothmann & Goldstein, 1945). Second, there is experimental evidence for abnormalities in these children’s face-to-face communication with other people on both verbal and non-verbal levels, their engagement with others’ attitudes and actions towards a shared world, their use of personal pronouns, and their understanding of mental states in themselves and others (Baron-Cohen, Leslie & Frith, 1985; Fay, 1979; Hobson & Lee, 1998; Kasari, Sigman, Mundy & Yirmiya, 1990; Landry & Loveland, 1988; Lee, Hobson & Chiat, 1994; Mundy, Sigman, Ungerer & Sherman, 1986; Sigman, Kasari, Kwon & Yirmiya, 1992; Tager-Flusberg, 1992). Even able individuals with autism who display relatively sophisticated ‘theory of mind’ concepts show a range of abnormalities that pertain to self–other relations, for example when they show limitations in ascribing social meanings to geometric shapes that move and act like humans (Klin, Jones, Schultz & Volkmar, 2003), in mentally representing themselves in relation to others (Lee & Hobson, 1998), and in shifting among the roles of characters in stories (Garcia-Pérez, Hobson & Lee, 2005). There is also evidence that, although they will remove rouge from their faces when they perceive themselves in a mirror (Dawson & McKissick, 1984; Neuman & Hill, 1978; Spiker & Ricks, 1984), they rarely show signs of coyness, nor do they experience embarrassment or pride with the same ‘personal/social’ qualities that characterize such experience in individuals without autism (Capps, Yirmiya & Sigman, 1992; Kasari, Chamberlain & Bauninger, 2001; Kasari, Sigman, Baumgartner & Stipek, 1993).

A third line of evidence is that individuals with autism have impairments in imitating other people, perhaps especially in copying meaningless, non-goal-directed actions and facial expressions (DeMyer, Alpern, Barton, DeMyer, Churchill, Hingtgen, Bryson, Pontius & Kimberlin, 1972; Rogers, Hepburn, Stackhouse & Wehner, 2003). Research in this domain may bring fresh insight into the varieties and mechanisms of self–other relatedness. A study of our own demonstrated how children with autism have specific difficulties in copying another person’s expressive ‘style’ of executing actions (Hobson & Lee, 1999), and yielded an especially interesting serendipitous finding. In one condition, where the investigator strummed a stick along a serrated pipe-rack, it so happened that he positioned the pipe-rack against his own shoulder. Participants were then given the pipe rack and stick and were asked to ‘Use this’. Almost all participants used the stick to strum along the pipe-rack. Yet whereas almost all of the non-autistic children placed the pipe-rack against their own shoulder, imitating the investigator’s actions in relation to his body, the majority of children with autism executed the action without mirroring the investigator’s self-orientation. When we followed up these results with an experimental study of imitating self–other orientation as a feature of four different actions on objects (Meyer & Hobson, 2004), again there was evidence of abnormality among the children with autism.

These findings are in keeping with our hypothesis that children with autism are impaired in a biologically grounded mechanism that establishes a specifically human form of social connectedness: the propensity to ‘identify with’ another person, that is, to relate to the actions and attitudes of someone else from the other’s perspective or stance in such a way that the child assumes or assimilates the other’s orientation towards the world, including towards the self (Hobson, 1993; Hobson & Lee, 1999). It led us to investigate whether children with autism would show abnormality in self–other connectedness in a new imitative context that involves natural person-to-person communication. To study this, we devised the Sticker Test and predicted that children with autism would show a lesser propensity to point to a location on their own bodies when communicating to another person where on her own body she should put a sticker-badge. We anticipated this would be the case even after the other person had subsequently ‘modelled’ such self–other referential pointing when communicating to the children.

Method

Preliminary study with typically developing nursery-school children

To provide a background to the study, we tested whether typically developing young children spontaneously point to themselves when communicating to someone else
where on her body she should place a sticker badge. Postgraduate speech and language students working in nurseries, who were blind to the purpose of the study, tested typically developing children individually. There were 27 children (10 boys and 17 girls) with a mean age of 3 years, 8 months ($M = 3;8$, range 2;3 to 4;7). The student began by offering the child a set of stickers and asked him or her to select one of these (and if necessary, instructed the child to put it on). Next the student asked the child for a sticker and, seated beyond the child’s reach, held up the sticker and said: “This sticker is for me to wear. Where shall I put it?” The results were that three of the children did not communicate a location to the tester, four gave a verbal response, 11 pointed to a location on the tester’s body, and nine (four boys and five girls) pointed to a place on their own bodies to convey the position on the tester’s body. This latter response of pointing-to-self occurred in exactly one-third of the 2-year-olds (one out of three), one-third of the 3-year-olds (five out of 15) and one-third of the 4-year-olds (three out of nine). This indicated that, although a variety of communicative strategies were employed, pointing-to-self was one mode of communication available even to the youngest typically developing children we tested.

### Study 1: The sticker test

**Participants**

Participants were 17 children (16 boys and one girl) with the diagnosis of autism, and 17 non-autistic children (12 boys and 5 girls) with learning difficulties or developmental delays (LD), group-matched for chronological and verbal mental age (see Table 1). Prior to constituting these groups, a further three children with autism were excluded because they failed to communicate to the tester by whatever means, when prompted to do so. All participants with autism displayed characteristic impairments in social interaction and communication, together with repetitive or stereotyped interests and activities. The diagnosis of autism was confirmed in each case by ratings on the Childhood Autism Rating Scales (CARS; Schopler, Reichler & Renner, 1986), where a score of 30 or above is taken to indicate autism: the scores ranged from 31.0 to 45.5 ($M = 36.6$, $SD = 4.8$). In addition, we conducted a systematic review of DSM-IV criteria (American Psychiatric Association, 1994) in interviews with teachers.

Verbal ability was assessed with the British Picture Vocabulary Scales (BPVS; Dunn, Dunn & Whetton, 1982), a receptive vocabulary test which reflects a relative ‘trough’ in the profile of abilities of persons with autism (Jarrold, Boucher & Russell, 1997; Lockyer & Rutter, 1970). The groups were closely similar in estimated verbal ability (for the children with autism, verbal IQ $M = 52.5$, $SD = 21.9$, range = 21–107; for the learning-disabled group, verbal IQ $M = 52.4$, $SD = 23.0$, range = 23–100).

**Procedure**

The *Sticker Test* was designed to see if a child would point or otherwise gesture toward a position on his or her own body, in order to indicate where the female investigator (henceforth called the ‘tester’) should place a sticker on her own body. There were three conditions in fixed order, and participants came ‘fresh’ to the first condition without previous communication from the tester about what to do with the stickers.

To begin with, the tester and child were seated on the floor facing one another, two metres apart at each end of a testing mat. The tester gave the children a sheet of stickers and asked them to choose one and put it on. With the exception of two LD children who declined to wear stickers on the first condition, every child did so. Next, the examiner said she would also like to wear a sticker, and asked the child to choose one and give it to her. Every child did so. The tester held up her sticker in front of herself and said: ‘This one is mine. Where shall I put it?’ If the child hesitated, the tester repeated the question with a vague gesture of moving the sticker around in front of her body. The child’s communicative response (pointing to self, pointing to/touching the tester, or a verbal direction) was recorded.

Approximately 15 minutes later, after playing an unrelated game, the tester produced a further two stickers, gave one to the child, and stated: ‘Put it here’, pointing to the outer side of her own (the tester’s) left shoulder. Although this was done naturally, it provided a potential model of how to communicate where the sticker should go on the other, by pointing to the self. The tester then held up the remaining sticker, and said: ‘This one is mine. Where shall I put it?’ Again the child’s communicative response was recorded.

On another day, the second condition was repeated, only this time the participant and tester were standing...
just out of reach from one another. Our purpose in introducing a time gap in the testing was to limit carry-over effects and avoid the impression that participants’ previous responses were either correct or incorrect. The aim of the modified procedure was to increase the likelihood that the child would simply step across to the tester and point to her body to show where the sticker should go. Once again, therefore, the tester gave a sticker to the child, and pointing to a new position on her body (again her left shoulder, but now to the front), said: ‘Put it here’. Thus, for a second time in this study, the tester provided a communicative model for pointing to the self with reference to the other. Finally, the tester held up her sticker and said: ‘This one is mine. Where shall I put it?’ The child’s communicative response was recorded as before.

**Results**

We analysed the data using non-parametric statistics and (notwithstanding our directional predictions) with two-tailed tests of significance. The principal measure was the number of times a participant pointed to him- or herself when making reference to the tester’s body. There were three opportunities for this to happen, and therefore ‘point-to-self’ scores ranged from 0 to 3. There was a highly significant group difference in these scores ($U = 44.0, p < .001$). As Figure 1 illustrates, all of the LD children pointed to themselves to indicate where the sticker should go on at least one occasion, but fewer than half the children with autism did so; and whereas 12 of the 17 LD children pointed to their own bodies more than once, this was the case for only three of the 17 children with autism (Fisher’s exact test, $p = .005$).

This pattern of results held for each of the three conditions considered in turn. In the first condition, 13 out of 17 LD children but only three out of 17 children with autism pointed to themselves (Fisher’s exact test, $p = .002$); and in the second condition, where just before the child’s response the tester had pointed to herself to communicate through self-reference, 14 of the 17 LD children compared with only six of the 17 children with autism subsequently pointed to themselves with reference to the tester’s body (Fisher’s exact test, $p = .013$).

As expected, when the participant and tester were standing across from one another, there was a lesser tendency for children in both groups to point to their own bodies: in this case, only seven of the LD children and three of the children with autism pointed to themselves (Fisher’s exact test, ns).

The question arises: When the children were not pointing to themselves, how were they showing the tester where to put her sticker? Almost always, they pointed to or touched the tester: this occurred in all instances except in the case of five children (two with LD and three with autism) who on one or more occasions, simply said where she should place her sticker, without using a gesture.

The next question is whether the children understood what the tester meant to convey when she pointed to her own body to indicate where the child should place the sticker on his or her own body. Mostly they did: over the two times this instruction was given (in the second and third conditions), 18 of the children (nine with LD and nine with autism) placed the sticker correctly, either on the side or front of their shoulder, on both occasions. Of the remaining children, most attempted to place the sticker on the tester on one of the two conditions. The exceptions were one child with LD who simply declined to wear a sticker on the second condition, and two children (one with LD and one with autism) who, in the second condition, placed the stickers on some different place on their bodies (the abdomen and an arm, respectively). Only one child – a boy with autism – tried to place the sticker on the tester both times. In terms of the accuracy of the shoulder placements, there was again no group difference in that every single child who positioned the sticker on his or her shoulder did so on a location that corresponded with what they had been shown on the body of the tester. Therefore the children with and without autism were similar in being able to recognize the correspondence between a body-as-observed and their own body-as-experienced, when the tester was communicating in this way.

![Figure 1](image-url)
When we examined whether point-to-self scores were related to chronological or verbal mental age, we found that this was not the case, either for children with autism (VMA: \( \rho = .05; \) CA: \( \rho = -.05 \)) or those with LD (VMA: \( \rho = -.11; \) CA: \( \rho = .02 \)). We also explored whether there might be differences in CA, VMA, and IQ, between the nine children with autism who never used a point-to-self, and the eight who did so at least once: it turned out that in these respects, the two subgroups were similar (e.g. in CA, the subgroups were \( M = 12.4 \) and 12.6, respectively, and in verbal IQ, the subgroups were \( M = 49, \) SD = 19, and \( M = 56, \) SD = 25, respectively). Finally, a rater who was blind to diagnostic group and study details reviewed video clips of all the children’s points-to-self across the conditions, and detected no group differences in the communicative quality or morphology of their points.

Discussion of Study 1

The principal result from Study 1 is simple and striking: children with autism rarely used reference to their own body when trying to convey something to their communicative partner about her body. Over half the children with autism, but not a single child in the control group, never pointed to themselves. Instead the children with autism tended to point to the tester. Their behaviour was little influenced by the tester’s point-to-self communication, in that the group difference was evident in the second condition when the children’s communication followed the tester pointing to herself to refer to the participant’s body. In the latter instance, there were only three of the 17 non-autistic children who did not make a self-referential gesture, yet 11 of the 17 children with autism still did not do so. The third condition illustrated how even among non-autistic participants, point-to-self was but one of several communicative strategies available, so that when the tester was within easy reach, just over half the group made direct reference to the location on her body where the sticker should be placed, in the same way a large majority of children with autism were prone to do. It is important to stress that on all three conditions, every child successfully communicated to the tester where to place her sticker. The children differed only in how this message was conveyed.

There were three respects in which the interpretation of the results was less than clear, however. First, the aim of the study was to test whether children with autism are atypical in the propensity to identify with someone else. If this is invoked to explain the group difference in communicating to the tester, then how are we to explain the group similarity when the children responded to the tester’s point to her own shoulder by placing their sticker on their own shoulder? A large majority of both groups of children were accurate in interpreting the tester’s gesture to her body as indicating a position for the sticker on their own body, and on the face of it, this seems to entail mapping from an allocentric to an egocentric orientation.

Second, there appears to be an alternative plausible explanation for the result that children with autism point directly to another person’s body to indicate where her sticker should be placed, one that does not invoke any consideration of deficits in self–other awareness. Perhaps they are drawn to point to what is immediately perceptually available – the other person’s body – or are unable to disengage from the ‘concrete’ reality of where the sticker should be located in physical space.

Third, there remains unclarity about a possible group difference in the potential for identifying with the self-orientated communication of the tester. We had introduced the ‘modelling’ condition in order to prompt participants to employ self-pointing, if this was in their repertoire. The result was, as anticipated, an undiminished group difference, adding weight to the suggestion that it was not in the repertoire of most of the children with autism. However, the potential impact of such modelling was still open to question – a question of considerable interest, given that shifts towards a tester’s mode of communication might be another index of identification with the person. To recapitulate, children without autism showed near-ceiling effects for own-body-reference prior to the tester communicating with a point to her own body. Therefore it was no wonder that approximately the same number of participants in this group used such gestures to communicate after the modelling. Among the group with autism, the tester’s demonstration appeared to prompt a small number of additional participants (three children) to make own-body-reference. Therefore this specific element within the sticker task – the influence of the tester’s mode of communication – invited further investigation.

Study 2: Screen version of the sticker test

The following study was designed and conducted after the first experiment had been completed and analysed (and after we had been challenged by the penetrating criticisms of a perspicacious anonymous reviewer). Our predictions were as follows: (i) Children in both groups, when given a sticker by an adult – even without any further direction or instruction about what to do with it – would show a natural propensity to place the sticker on their own bodies. The basis for our prediction was that the tendency to respond in this way could be attributed to processes other than identification with the other person.
in the testing situation; (ii) Children with autism would still differ from those without autism in self-body-reference, even when the tester’s body was not visible to participants. This would mean that one could not explain group differences in terms of children being drawn to point to the visible body of the tester; (iii) Children without autism, but not children with autism, would be influenced by the tester’s self-orientated communication (in part through identification). Therefore, we expected that among participants who did not use a point-to-self initially, only those in the comparison group would be influenced by the tester’s point-to-self and shift into a point-to-self style of communication.

**Method**

**Participants**

Participants were 20 children (18 boys and two girls) with a diagnosis of autism, and 20 non-autistic children (17 boys and three girls) with learning difficulties or developmental delays (LD), group-matched for chronological and verbal mental age (see Table 2). Half of the sample (nine with autism and 11 with LD) had participated in the original study, conducted over a year previously. Prior to constituting these groups, one young child with autism was excluded because he appeared not to understand the task. Scores on the CARS (Schopler et al., 1986) ranged from 26.5 to 54.5 (Mean = 36.9, SD = 6.6). The single child with a CARS score under 30 was a passive, verbally able female who had a developmental history of autism and currently satisfied criteria for the condition when assessed with the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, Dilavore & Rissi, 1999). Systematic DSM-IV-based interviews with teachers confirmed that all participants with autism displayed the characteristic impairments in social interaction and communication, together with repetitive or stereotyped interests and activities. The groups were closely similar in estimated verbal ability (for the children with autism, BPVS verbal IQ Mean = 59.3, SD = 25.6, range = 34–124; for the LD group, BPVS verbal IQ Mean = 59.9, SD = 20.9, range = 23–100).

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
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<td>11.8</td>
<td>2.6</td>
<td>6.0–14.8</td>
<td>6.7</td>
<td>2.3</td>
<td>3.0–12.5</td>
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<tr>
<td>Control</td>
<td>20</td>
<td>11.9</td>
<td>2.9</td>
<td>6.6–15.7</td>
<td>7.1</td>
<td>2.11</td>
<td>2.8–13.7</td>
</tr>
</tbody>
</table>

*Note: Ages presented in ‘years;months’.*

**Procedure**

After setting the scene by completing a construction activity with the child, the tester handed the child a sticker, said simply: ‘Here is a sticker’, and averted her gaze while the child decided what to do.

Once the child had either placed the sticker somewhere, or had explicitly declined to accept a sticker, the tester said that she would like to wear a sticker. She selected a sticker, held it up, and said ‘I will wear this sticker’. Without further explanation, she moved a rectangular white screen in front of herself so that only her eyes, nose, and the sticker on the tip of her finger were visible. Then she asked the child: ‘Where shall I put my sticker?’ If the child was perplexed, the tester gave the prompt: ‘You tell me where to wear my sticker’. Then the screen was set aside.

A construction game followed, to provide a separation between the first and final conditions. Then the tester handed the child a sticker, and told him or her where to place it by a point-to-self gesture: she pointed to her own elbow (positioned within the child’s reach) and said: ‘Put it here’, as she steadfastly avoided looking at either her own or the participant’s elbow. For the minority of children (seven with autism and four with LD) who initially placed the sticker on the tester’s elbow, she returned the sticker to the child, and gave a further instruction to accompany another point-to-self: ‘Here, on your own elbow’ to assist the child in understanding that the gesture was made in reference to their own bodies. The rationale of this procedure was to ensure that all children received a ‘model’ of pointing-to-self as communication for location-on-other. The tester then repeated the ‘screen test’, exactly as described above.

**Results**

The first result was that, without instruction or indication of what to do with their sticker, 18 out of 20 children in each group spontaneously placed it on their own bodies. The remaining two children in each group declined to take a sticker because, as they explained, they did not want to wear one.

The second result concerned children’s mode of communication to the tester behind the screen. Ten out of 20 children without autism pointed to a location on their own bodies when communicating, eight pointed ‘through’ the screen, and two gave only a verbal instruction. Among the children with autism, five pointed to a location on their own bodies, 11 pointed ‘through’ the screen, and three gave only a verbal instruction. The remaining child with autism insisted on coming around the board to point to the actual place on the tester’s body. There was not a significant group difference here.
As already indicated, when the tester communicated where the child should place the sticker by indicating her own elbow, the majority of each group (13 with autism, 16 with LD) spontaneously placed the sticker on their own elbow. This happened, even though the tester’s elbow was easily accessible. The remainder did so after the ensuing prompt. In the screen condition that followed, 15 out of 20 LD children but only four out of 20 children with autism pointed to themselves to indicate where the tester should put her sticker (Fisher’s Exact Test, \( p = .001 \)). Two of the LD children pointed ‘through’ the board, and the remaining three gave only a verbal instruction. By contrast, 11 of the children with autism pointed ‘through’ the board, two gave only verbal instructions, and three came around the board to point to the tester’s body.

The pattern of individuals’ responses was as follows: All of the children without autism who pointed to themselves in the first of the screen tests also did so in the second, and now five additional children shifted to responding in this way. Among the five children with autism who initially pointed to themselves in the first test, three did so in the second, and a further one now used this mode of communication for the first time. Although the six children with autism who ever pointed to themselves tended to be within the upper range of CA (\( M = 13;0, \) range = 10;8–14;8), they were unexceptional in MA (\( M = 5;9, \) range = 4;7–7;7) and tended to be within the lower range of IQ (\( M = 45, \) range 35–58).

Discussion of Study 2

The first result of Study 2 revealed how nearly all participants spontaneously placed a sticker on to their own bodies, without any instruction. Clearly, they already considered that when given a sticker, this was the thing to do. Although we do not know how they came to behave in this way, it is clear that in the context of the sticker test, there was no need for them to identify with the tester in order to do so.

The second result was that a minority of the children with autism pointed to their own bodies when indicating where on her body the tester should place a sticker, even when a screen hid the tester’s body. Therefore it was not the case that in Study 1, the immediately perceptible location of a site on the tester’s body had somehow interfered with pointing-to-self, for example by drawing the children into ‘literal’ points. A similar pattern of responding occurred when such visible cues (the actual location on the tester’s body) were absent. The complication here was that the interpolation of the screen introduced a potentially distracting or disconcerting element into the task, so that some participants may have thought that they were supposed to point ‘through’ the screen. This might explain why a relatively small proportion of children without autism (exactly half the group, compared with three-quarters of the group in Study 1) pointed to their own bodies, so that now there was only a non-significant trend towards the expected group difference.

The third result was that after the tester had modelled point-to-self in communicating about the participant’s body, two-thirds of the children without autism now pointed to their own bodies in communicating to the tester about her body, even when her own body was occluded by the screen. In marked contrast, there were only four children with autism who responded in this way (of whom three had done so prior to the modelling), and there was now a highly significant group difference in the point-to-self form of communication. If this result were considered in isolation, one might consider whether it reflected domain-general rigidity or perseveration in the children with autism, but of course this would beg the important question of whether such rigidity arises from communicative inflexibility of the kind highlighted by the present study.

General discussion

In a preliminary, informal study with young typically developing children, mostly 3- and 4-year-olds but also three 2-year-olds, one-third of the sample used points-to-self to indicate where someone else should place a sticker on her (i.e. the someone else’s) body. This established that such a communicative approach is within the repertoire of at least some very young children. There were perfectly acceptable alternative ways for the children to communicate, and given that no attempt was made to elicit any particular form of response, it is highly likely that a substantially greater proportion of the children might point-to-self in other circumstances. In any event, the early onset of this kind of behaviour suggests that it does not depend upon later-appearing abilities such as those required for more sophisticated forms of ‘theory of mind’ (e.g. false belief) understanding, or those that entail later-developing higher levels of executive control.

In the original form of ‘sticker test’ that we designed for Study 1, results revealed a marked contrast between the communicative strategy employed by children with autism and that used by matched LD children. Whereas the majority of LD children gestured towards their own bodies when communicating with a tester about her body, few children with autism did so. Additional conditions in Study 1 and Study 2 yielded evidence that
neither a 'prompt' in the form of the tester's use of point-to-self in communicating with the participant, nor a manoeuvre that removed the tester's body from sight, had more than a minor effect on the performance of the children with autism. By and large, the proportion of these children making points-to-self remained consistently low across conditions. By contrast, there were several aspects of task administration that altered the prevalence of points-to-self by the non-autistic LD children. When the tester and participant stood close by one another, or when the tester moved a screen between herself and the participant just before the child was supposed to indicate where she should place her sticker, a substantial proportion of the LD children pointed towards the tester or gave a verbal response only. On the other hand, in the initial tests of Study 1, or after the tester communicated with a point-to-self prompt in the 'screen' condition in Study 2, a substantial majority of the LD children made points-to-self.

There was one additional finding that was consistent across the two studies: the groups were closely similar in responding to the tester when she indicated by pointing to herself where the participant should put his/her sticker on his/her own body. The interpretation of this finding is informed by the further result that even when no instruction was given, and participants were merely given a sticker at the commencement of Study 2, nearly all of them spontaneously positioned it on their own bodies. Therefore in the context of the present exchanges, it probably does not require further explanation why they should respond to the tester's point-to-self by positioning the sticker on themselves. For nearly all children, this was the 'natural' thing to do, whatever the developmental underpinnings of the response (and by chance, we did once witness a teacher instructing a class what to do with stickers!). What does still need comment, though, is why they should also adjust the positioning of the sticker in accordance with the place demonstrated by the tester. Here there was nothing to distinguish the near-perfect performance of both groups – although one should also note that it is not a demanding feat to position a sticker accurately on the front of one's chest, on the front or side of one's shoulder, or on one's elbow, and it might have been possible to elicit less accurate placement with other positions. What these results seem to suggest is that all participants have access to 'cross-person representation' (Gopnik et al., 2000). Awareness of a related kind seems to be implicated when one locates a mark on one's body through seeing a mirror-reflection, something that even young children with autism are able to do (Neuman & Hill, 1978; Spiker & Ricks, 1984).

The present study was designed specifically to test body-self-orientation in the context of interpersonal communication – here, points-to-self that made reference to someone else's body. One analysis of the communication would stress a participant's need to understand that another person would understand that through pointing-to-self, the child's own body came to stand for the other person's body. If one adopts this position, the critical theoretical issues are at what level such 'understanding' occurs, and the processes through which it arises.

Our own view is that in the typical case, very young children identify with the actions and attitudes of other people through a mechanism that is biologically prepared and pre-reflective in nature (Hobson, 1990, 1993, 2002; Hobson & Lee, 1999; Meyer & Hobson, 2004). They find in and through the other person patterns of action and feeling in which they can participate, and which they can incorporate into their own productive repertoire. Identification is not reducible to perceiving self-other correspondences, because it entails an individual being moved to the stance of the other, in the sense of assimilating that which is perceived and 'making it one's own'. This mechanism is manifest across the lifespan in specific forms of imitation and empathy, and is operative when individuals think of the other person and spontaneously relate this thought to experiences of their own bodily-anchored stance.

We interpret the results from children with autism according to the hypothesis that the mechanism of identification is weak in this condition. These children tended to communicate by pointing to the tester rather than to themselves; and as a group, their behaviour was little influenced by the tester's point-to-self communication. The group differences might be explained by the participants' (relative) failure to identify with the other either as a bodily-anchored locus of subjective orientation or as a self-referential communicator, along with an inability to recognize that the other person would identify with themselves. Such a view is consistent with the possibility discussed by Peeters, Grobben, Hendrickx, Van den Eede and Verlinden (2003) that at times, children with autism may communicate in accordance with a third-person stance, rather than a first- vis-à-vis second-person perspective. The study of Peeters et al. (2003) did not elicit clear evidence of such responding, and the authors suggested that children with autism may draw upon non-social sources of self-other categorization. This view is compatible with results from the present study, where the children's propensity to indicate the 'exact' location of a sticker placement rather than the location relative to self appears to reflect a form of 'I–Thou' abnormality that may be undisclosed in other contexts (Hobson, 1993).

Our theoretical approach is in keeping with Mead's (1934) view of the interpersonal development of mind,
according to which symbolic thinking emerges through the ability to communicate using gestures that anticipate the reaction of the listener and entail one taking the role or perspective of the other, including the attitude of the other toward the self. As Gerhard Bosch (1970) emphasized, children with autism have a ‘delay in the constituting of the other person as someone in whose place I can put myself . . . and in the constituting of a common sphere of existence, in which things do not simply refer to me but also to others’ (p. 89). What the present account highlights is how identification may be pivotal for this process; and what our study illustrates is how children who do not have autism can assume the role of someone else and anticipate that the other will adopt their self-orientated actions as these apply to the other’s self. At the same time, the study points to a striking abnormality in autism, one that may prove to be ‘basic’ to their social-communicative impairments and a source of wide-ranging cognitive inflexibility.

One is led to consider whether the current formulation of the nature of and basis for impairments in ‘theory of mind’ in autism really captures the essence of the children’s social deficit (Hobson, 1991). True, children with autism have limited concepts of mind, so that (for example) they often fail to grasp what it means for one person to entertain a false belief (Baron-Cohen, 1989; Tager-Flusberg, 1992). Yet an essential component of mental states is that they are attributable to someone who has a mind that is both similar to and distinguished from one’s own. The children’s cognitive deficits in ‘theory of mind’, as well as a range of their associated restrictions in creative symbolic thinking, might occur as the developmental outcome of abnormalities in relating to persons as ‘selves’ with whom one can identify in feeling and action (Hobson, 1993, 2002). If children with autism are impaired in this respect, then they may lack a vital source of knowledge about the nature of mental states as potentially shared between, but also distinctive to, individual people.

Acknowledgements

This research was supported by the Economic and Social Research Council (award reference R000239355) and the Baily Thomas Charitable Foundation. We are indebted to the staff, students and parents at Edith Borthwick School, Helen Allison School, Springhallow School and Swiss Cottage School. Our sincere thanks go to Dr Tony Lee for establishing foundations for the study, Dr Shula Chiat and her students on the MSc course in Speech and Language Sciences at UCL for testing the typically developing children, and Amy Young (aged 4) for teaching us the task.

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Received: 29 October 2003
Accepted: 7 February 2005