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Chapter 11

Autism and 'theory of mind'

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Most people carry in their heads what psychologists call a 'theory of mind'. Such a theory allows us to infer mental states (beliefs, desires, intentions, imagination, emotions, etc.) in other people. We seem to do this an enormous amount, as a natural way of thinking about why people do what they do.

For example, you might wonder why some friends have not phoned you for a while. You may speculate that maybe you have *offended* them in some way, or at least that they *think* you have. Or maybe they are *trying* to avoid you because they *feel* that the friendship is suffocating. Or maybe they just *want* more space. So you phone them up and they say that everything is fine. You then start wondering whether, when they say that, do they actually *mean* it? Perhaps they are *intending* to keep things polite but really *wish* the friendship was over?

In the above paragraph you can see that there are lots of words referring to what goes on in one's own and other people's minds. Psychologists call this using a 'theory' of mind (Astington 1994) simply because there is often little if any evidence for what the other person is actually thinking or feeling, so people speculate (theorize) in just this way. But this theorizing about what might be in someone's mind is a crucial way to help us make sense of behaviour, and predict what that person might do next. In brief, a theory of mind is the ability to be able to reflect on the contents of one's own and other's minds.

Autism

In this chapter I shall be describing some of the evidence for the argument that the condition of autism involves difficulties in working out what is

going on in someone else's mind. But first, a word about autism (Baron-Cohen and Bolton 1993). Autism is considered to be the most severe of the childhood psychiatric conditions. It is diagnosed on the basis of abnormal development of social behaviour, communication and imagination, often in the presence of marked obsessional, repetitive or ritualistic behaviour. Such children find it difficult to be part of a social group and dominate their families by insisting on their own preoccupations and bizarre routines.

Some children with autism suffer from moderate or severe degrees of mental learning difficulties, suggesting that they have autism plus more diffuse problems. The proportion of children with autism who also have learning difficulties is reported to be 65–75 per cent, with a corresponding 25–35 per cent having intelligence (an IQ) in the average or above average range.

Just as autism can co-occur with learning difficulties, so it can co-occur with mutism. However, those children with autism who do have speech are inevitably delayed in starting to speak, and when they do communicate, they do this in a very one sided way, rather than using reciprocal dialogue. ~~They tend to talk at you, rather than to you or with you. They may frequently also misunderstand a speaker's intended meaning and provide insufficient information for their listener to understand what they mean. These~~ communication abnormalities are thought to reflect their failure to take into account what their listener might be thinking or interested in. Instead, language is used almost exclusively in literal and factual ways, to answer questions, to collect information or to obtain things.

Finally, children with autism have unusual perception, frequently noticing small details that others miss (such as the serial numbers on the back of street lamp-posts) or recalling information with considerable precision (such as the exact time and date they last visited a theatre, three years earlier) or paying attention to textures that others may not notice (such as the feel of a wall) or becoming upset by sounds in their environment (such as the shrill tone of a telephone).

Autism and 'theory of mind'

This chapter opened with a description of how, in the normal case, we interpret each other's actions and speech in terms of what people have in their minds. We called this using a 'theory of mind' and it is the main way in which we make sense of other people. However, not everyone seems to be able to do this quite so easily or in the same way. Abnormality in understanding other people's minds – in developing a normal theory of mind – is not the only psychological feature of autism, but it seems to be a core and possibly a universal abnormality among such individuals (Baron-Cohen *et al.* 1993b). Some people with autism lack almost all signs of a theory of mind. One might think of such extreme cases as a form of 'mindblindness' (Baron-Cohen 1995). More commonly, people with autism have some of the basics of a theory of mind, but have some difficulties in using it at a level that one would expect, given their intelligence in other areas. If you like, their social intelligence is lagging behind their non-social intelligence. In their case, one

might say they have degrees of mindblindness, ranging from severe through to moderate, or even just very mild.

This chapter describes some of the manifestations of this and emphasizes how developmentally appropriate tests are needed in order to reveal it. Note that the terms 'theory of mind' and 'mindreading' can to some extent be used synonymously. The chapter is also intended to serve as an illustration of theory building in psychology, since the idea that autism might involve problems in theory of mind is a useful way of making sense of some key symptoms of the condition: their social and communication problems and, to some extent, their limited imagination. (Note, however, that this theory has little or no relevance to other symptoms in autism, such as their unusual perception.) Nonetheless the theory has helped applied psychologists working with these children to understand more about the condition and hopefully, in the long term, to find better ways of treating it.

The mental-physical distinction

~~Perhaps the best place to start in illustrating the normal theory of mind, and how this develops abnormally in autism, is with the mental-physical distinction, since many consider that this distinction is a fundamental cornerstone of the theory of mind. The test for this is a good way to convey what it is. The test involves a child listening to stories in which one character is having a mental experience (e.g. thinking about a dog) while a second character is having a physical experience (e.g. holding a dog). The experimenter then asks the child to judge which of the two characters can perform different actions (e.g. which character can stroke the dog?). Normal 3-4-year-old children can easily make these judgements (e.g. they can judge that it is only the character holding the dog that can stroke it), thereby demonstrating their grasp of the distinction between mental and physical things. Children with severe autism have difficulty making such judgements despite having a mental age of at least a 4-year-old level (Baron-Cohen 1989a).~~

Understanding the functions of the brain

Normally developing 3-4-year-olds also already know that the brain has a set of mental functions, such as dreaming, wanting, thinking, keeping secrets, etc. Some also know it has physical functions (such as making you move, or helping you to stay alive, etc.). In contrast, children with autism (but who have a mental age above a 4-year-old level) appear to know about the physical functions, but most fail to mention any mental function of the brain (Baron-Cohen 1989a).

The appearance-reality distinction

Children from about the age of 4 years are normally able to distinguish between appearance and reality, that is, talk about objects that might have

misleading identities. For example, they may say, when presented with a candle fashioned in the shape of an apple, that it looks like an apple but is really a candle. Children with autism, presented with the same sort of test, may not talk about objects in the same way, instead saying the object really is an apple, or really is a candle, but not capture the object's dual identity in their spontaneous descriptions (Baron-Cohen 1989a). Given that this requires being able to simultaneously keep track of how an object appears (to your mind) versus what it actually is, this is an additional clue that in autism there is a difficulty in the development of a theory of mind. Alternative interpretations of this difficulty are certainly possible however, since this task relies on quite complex language skills.

First-order false belief tests

First-order false belief tests measure a child's understanding of the fact that different people can have different thoughts about the same situation. They are called first-order tests because they involve inferring only one person's mental state. (See pp. 189–90 for discussion of second-order tests.) Normally developing 4-year-olds can keep track of how different people might think different things about the world (Wimmer and Perner 1983). For example, when interpreting well known stories such as *Little Red Riding Hood* or *Snow White*, even 4-year-olds will say things like: 'Little Red Riding Hood *thinks* that it's her grandmother in the bed, but really it's the wicked wolf!' or 'Snow White thinks the old woman is giving her a nice juicy apple. She doesn't *know* that it's really her wicked stepmother all dressed up, and that the apple is poisoned!' A large number of studies have repeatedly demonstrated that children with autism have difficulties in shifting their perspective to judge what someone else might think, instead of simply reporting what they themselves know (Baron-Cohen *et al.* 1985).

'Seeing leads to knowing'

Yet another cornerstone of the normal child's theory of mind is an understanding of where knowledge comes from, so that the child can work out who knows what, and more importantly, who does not know what. This is a key development simply because it underpins appropriate communication (telling people what they do not know – informing others – rather than telling them what they already know). It also underpins an understanding of deception, since before considering changing someone's beliefs about what is true, you first have to work out what they know or do not know. Deception obviously fails if you cannot keep track of what the other person might know or not know. (We return to discuss deception on pp. 187–8.)

Normally developing 3-year-olds can understand the 'seeing leads to knowing' principle in that, when given a story about two characters, one of whom looks into a box and the other of whom touches a box, they can work out that it is only the one who looked who knows what is in the box. In contrast, children with autism perform virtually at chance on this test, and are as much likely to pick one character as the other when asked 'Which

The question: which one knows what is in the box?

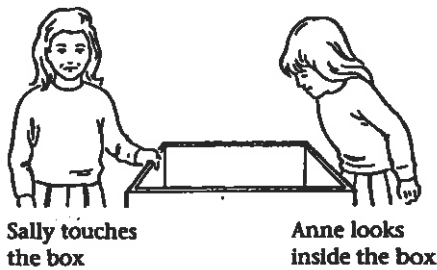


Figure 11.1 A schematic illustration of the seeing-leads-to-knowing test

one knows what is in the box?' (Baron-Cohen and Goodhart 1994). (See Figure 11.1 for a schematic illustration of the experiment.)

Recognizing mental state words

It turns out that by 4 years old, normally developing children can also pick out words from a word list that refer to what goes on in the mind or what the mind can do. These words include 'think', 'know', 'dream', 'pretend', 'hope', 'wish' and 'imagine'. These are easily distinguished from other kinds of (non-mental) verbs like 'jump', 'eat' or 'move', or other kinds of (non-mental) nouns, like 'door', 'school' or 'computer'. Children with autism have much more difficulty in making this judgement (Baron-Cohen *et al.* 1994). This is really a test of their mental vocabulary, but it may well be an indicator that conceptual development in this domain is also less well developed than would be expected for the child's general mental age.

Mental state words in spontaneous speech

The previous finding dovetails with reports that children with autism produce fewer mental state words in their spontaneous descriptions of picture stories involving action and deception, compared to their normal counterparts (Baron-Cohen *et al.* 1986; Tager-Flusberg 1992). Of course, just because they do not use these words so readily, this may not necessarily reflect a lack of competence. It may be simply a lack of interest. But when taken together with other experimental evidence summarized in this chapter, the likelihood is that this reflects delays or difficulties in comprehension of mental state concepts or, at the very least, reduced attention to such phenomena.

Spontaneous pretend play

Many studies since the mid-1970s have reported a lower frequency of pretend play in the spontaneous play of children with autism (Wing *et al.* 1977;



Figure 11.2 The test of 'Which one is thinking?'

Baron-Cohen 1987). This can be interpreted in various ways. For example, it might reflect a failure to reflect on one's own imagination – a mindreading difficulty. Or it might reflect a failure to switch attention flexibly from 'reality mode' to 'pretend mode', as a result of some aspect of what is called executive function (Jarrod *et al.* 1994). Or it could mean both.

Understanding causes of emotion

Emotions can be caused by physical events (e.g. falling over causes you to cry, or being given a present makes you feel happy). But emotions can also be caused by mental states such as desires and beliefs. For example, you can be happy because you get what you *want*, or because you *think* you are getting what you want. Normally developing 4–6-year-olds understand both types of emotional causes. In contrast, studies show that children with autism at this mental age have difficulty with the more complex mental states as causes of emotion (Baron-Cohen 1991; Baron-Cohen *et al.* 1993a).

Inferring from gaze direction

Why do we spend so much time looking at people's eyes? In the 1980s, it was not clear what the information around someone's eyes conveyed to another person. We now know that even young normal children (age 4 years) can work out from gaze direction when someone is thinking about something (e.g. a gaze directed upwards and away, at nothing in particular, strongly signifies the person is thinking: see Figure 11.2). Gaze direction also allows young normal children of the same age to work out which of several objects a person wants (see Figure 11.3). Children with autism in contrast are relatively blind to such information from gaze direction, even though they can answer the explicit question, 'What is Charlie looking at?' Mentalistic interpretation of the eyes of another person does not seem to come naturally to them (Baron-Cohen and Cross 1992; Baron-Cohen *et al.* 1995).

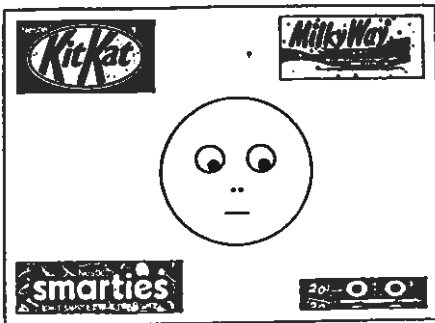


Figure 11.3 The test of 'Which one does Charlie want?'

Monitoring one's own intentions

We have covered a number of tests of understanding other people's thoughts, but another important class of mental states is intentions. Working out why people behave as they do is all about keeping track of people's intentions, since tracking actions alone gives you a description of what people do, but not why they do it. In a novel test of this, 4-year-old normal children were asked to shoot a toy gun at one of six targets, stating their intended target. Then, unbeknownst to the children, the outcome was manipulated by the experimenter such that sometimes the children hit their chosen target, and sometimes they did not. Normally developing 4-year-olds could correctly answer the question, 'Which one did you mean to hit?', even when they did not get what they intended, but children with autism more usually referred to the one that they actually hit (Phillips *et al.* 1998).

Deception

Deception is relevant to understanding other people's minds simply because it involves trying to make someone else *believe* that something is true when in fact it is false. In other words, it is all about trying to change someone else's mind. By the age of 4 years the normally developing child is showing both an interest in deception, and beginning to be more adept at it. Leaving moral aspects aside, such signs of deception can be taken as a yardstick that the child is understanding other minds. Of course, the child's early attempts at deception may be clumsy and ineffective, such as the young child claiming that he did not take the chocolate cookie, while the telltale evidence is all over his face, or the young child in a game of hide and seek, calling out from her hiding place behind the curtains to 'come and find me!' In these instances, the child is arguably trying to deceive, but is not keeping track of the clues that would lead the other person to know the truth.

Children with autism have been shown to have difficulties both in production of deception, and in understanding when someone else is deceiving them. An example of one test is the 'penny hiding game' (Baron-Cohen 1992), where the aim of the game is not to reveal in which hand you have

hidden a penny. Young children with autism, despite having a mental age above that of a 4-year-old, often make errors in this game, which suggests that they do not understand how to deceive very well. Examples of their errors include hiding the penny in one hand, but leaving the other hand open; or between trials, transferring the penny from one closed fist to the other; or putting the penny out of sight, and then telling the other person 'it's in here!', and so on.

Understanding metaphor, sarcasm and irony

Happé (1994) has tested if children with autism understand figurative speech through story comprehension. Figurative speech also requires an understanding of the speaker's intentions, in order to move beyond the literal level of simply mapping words on to their referents. Examples of figurative language include sarcasm ('How clean your room looks today!', uttered by an exasperated parent to a child) and metaphor ('You've got a sharp tongue!'). Results suggest that this more advanced mindreading test (pitched at the level of a normal 8-year-old) reveals more subtle mindreading difficulties in higher functioning individuals with autism spectrum conditions. A similar finding using a simpler test comes from a study of normal preschoolers based on testing to see if they can understand someone's intention to joke. Children as young as 3 years old heard utterances like 'This is a shoe', spoken by the experimenter while pointing at a cup, and were asked why the experimenter said that. Whereas normal children referred in their explanations to 'joking' and 'pretending', children with autism tended to refer to the speaker having got it wrong ('It's not a shoe, it's a cup') (Baron-Cohen 1997).

Pragmatics

Understanding figurative speech and humour is a subset of pragmatics, or the use of language appropriate to the social context (Baron-Cohen 1988). Pragmatics includes at least the following:

- tailoring your speech to a particular listener
- adapting the content of your speech to what your listener already knows or needs to know
- respecting conversational principles such as being truthful, relevant, concise, and polite
- turn taking appropriately so that there is space for both participants in the dialogue
- being sensitive to the other person's contribution to the conversation
- recognizing what is the wrong or right thing to say in a particular context
- staying on topic
- appropriately helping your listener to follow when a topic change is occurring.

Almost every aspect of pragmatics involves sensitivity to speaker and listener mental states and hence mindreading, although it is important to note that pragmatics also involves using context. This means that a difficulty

in pragmatics could occur for at least two different reasons: some degree of mindblindness, or some degree of what Frith (1989) calls 'weak central coherence' (use of context). Two experimental studies of pragmatics in children with autism have included a test of whether the principles of conversational relevance can be recognized, and a test of recognizing when someone said the wrong thing (*faux pas*). Both studies suggest that children with autism have difficulties in this area (Surian *et al.* 1996; Baron-Cohen *et al.* in press):

Imagination

We discussed the relevance of pretend play earlier, but this is only one possible way that imagination can be expressed. More broadly, imagination is relevant to theory of mind since it involves building an unreal world that exists purely in your own mind, and being able to reflect on this virtual world. In one study Scott and Baron-Cohen (1996) investigated the ability of children with autism to draw pictures of unreal or impossible objects (such as two-headed people) and found that children with autism were either more reluctant or less able to produce such drawings than normal children.

These results may be due to the so-called 'executive function' (the need to suppress routine approaches to drawing, and override these with novel approaches). However, there is experimental evidence for persisting imagination impairments in both children with autism and Asperger Syndrome on a range of tasks not restricted to drawing (such as story telling, and standard creativity measures). (Asperger Syndrome is a milder form of autism, without the delay in cognitive development, but with the abnormalities of social interaction and repetitive or stereotyped activities.) This evidence is clearly in line with the clinical descriptions of impaired imagination in people with an autism spectrum condition, and as specified in most diagnostic classification systems.

Correlation with real life social skills

One might raise here the concern that theory of mind tasks simply measure aspects of social understanding under laboratory conditions and, as such, have no relevance to social impairment in the real world. For this reason, Frith and her colleagues have examined the correlation of theory of mind skills in children with autism in relation to real world behaviour. Using a questionnaire with teachers, asking about real life skills such as keeping secrets, comforting others and understanding others' intentions, they report that the laboratory tests are indeed significantly correlated with these relevant behaviours, thus providing some measure of validity of the tests (Frith, Happé and Siddons 1994).

Second-order false belief tests

The universality of theory of mind difficulties in autism has been questioned simply because a proportion of children with autism pass first-order tests.

First-order tests, including most of those reviewed above, involve simply inferring one person's mental state. Happé (1996) points out that this could still mean that these abnormalities are universal, since there are no reported cases of autistic children who pass first-order theory of mind tests at the right mental age. Thus, a high functioning individual with an autism spectrum condition (e.g. with Asperger Syndrome) who has normal intelligence, should be able to pass such tests at 3–4 years of age. Typically, however, they are older than this when they pass such tests. Equally, Happé (1996) finds that on average a mental age of 9 years is needed for children with autism to pass such tests, and that the youngest mental age of an individual with autism passing such tests is 5 and a half years.

As one might expect, as a result of a delay in acquiring first-order theory of mind competence, these individuals often fail second-order false belief tests (Baron-Cohen 1989b). Second-order tests involve considering embedded mental states (e.g. one person's thoughts about another person's thoughts). Whereas first-order tests correspond to a normal 4-year-old mental age level, second-order tests correspond to a 6-year-old mental age level. This may be another way of revealing if there is a specific developmental delay in theory of mind at a point later in development. Some individuals with ~~autism or Asperger Syndrome who are high functioning (in terms of IQ and language level)~~, and who are usually adults, may pass even second-order false belief tests. Those who can pass such second-order tests however may have difficulties in more advanced theory of mind tests such as inferring complex mental states such as bluff and double bluff in story characters – an 8 year mental age level test (Happé 1994) – or in decoding complex mental states from an expression in the eye-region of the face (Baron-Cohen *et al.* 1997).

Applications of the theory to the classroom

It is one thing to build theories about a condition like autism, but as Marx said, the point is not just to describe the world: the point is to change it. Do such theories have any practical application to the world of these children, such that we could improve their situation? Here I shall briefly mention a practical application of the theory of mind approach to autism.

There have been attempts to try to teach children with autism to mindread. This is the most logical practical application. If the tests described above highlight specific difficulties in what these children understand, then focused teaching methods might make a difference. A particular example of this involved the teacher (a psychologist) explaining to children with autism that thoughts are like photos inside people's heads (Swettenham *et al.* 1996). This gives children with autism a concrete analogy to help them grasp what thoughts are. Since children with autism have no difficulty understanding what cameras and photos are, you can go quite a long way using this analogy.

Specifically, you tell the child that the mind is like a camera, and the camera lens is like the eye. The teacher then explains that just as when you point a camera at something and click the button, this produces a picture of

that thing inside the camera, so when a person faces something and looks at it (blinks an eye), this produces a picture of that thing inside the person's head.

The teacher then illustrates this using a polaroid camera, since the child can then practise using this to see the instant picture being produced. The next step of the teaching involved telling the child that sometimes pictures are out of date, because things change in the world without changing in the picture. (For example, you might move house but the picture of your house is still of your old one.) In the same way, people might have out of date pictures in their minds (beliefs which are no longer true) because they were not present when things changed. Teaching them this step allows children with autism to work out why someone might act in the way that they do, on the basis of an outdated picture in their minds. The last step involves teaching the child that if people are looking for something, they will go to find it in the place shown in the picture in their head.

With this somewhat elaborate teaching method, psychologists have shown that children with autism can learn to work out where someone will look if something is moved when the person was not present – they can work out that that person will go to where he or she *thinks* the object is, rather than to where it *actually* is. That is, autistic children can be taught to pass first-order false belief tests. This is just the beginning of helping children with autism to get an idea of how to mindread.

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Difficulties in mindreading in autism spectrum conditions appear early on (from at least the end of the first year of life, if you include joint attention abnormalities, such as not following what others are interested in). They also appear to be universal (if you test for these either at the right point in development or, in the case of high-functioning older individuals, by using sensitive, age-appropriate tests).

Some clues relating to the brain basis of theory of mind difficulties in autism are being gathered from both functional neuro-imaging (Baron-Cohen and Ring 1994; Happé *et al.* 1996), and studies of acquired brain damage (Stone *et al.* 1998a; 1998b). It is hoped that future research in this area will refine both the techniques for studying this skill, and make further headway in understanding the underlying mechanisms essential for mind-reading. Finally, most importantly, much of the basic research in this field may have clinical applications in the areas of both intervention/teaching, or diagnosis (Baron-Cohen *et al.* 1996). This is an area which needs systematic exploration.

Acknowledgements

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Discussion questions

- 1 How do we know that other people have minds?
- 2 Can you try to imagine what the world would be like if you did not realize that other people had minds?
- 3 Why is it so important to our survival to be social?

Further reading

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