



The empathising-systemising (E-S) theory

Can psychology solve the puzzle of autism? Why are some people talented at figuring out how things work but challenged by the apparently simple skills of chatting and socialising? **Simon Baron-Cohen** examines these questions.

Classic autism and Asperger's syndrome share *three* core diagnostic features:

- (a) difficulties in social development
- (b) difficulties in the development of communication
- (c) unusually strong, narrow interests and repetitive behaviour

Since communication is always social, it might be more fruitful to think of autism and Asperger's syndrome as sharing features in *two* broad areas: social communication and narrow interests/repetitive actions. As for distinguishing features, a diagnosis of Asperger's syndrome requires that the child spoke on time and has average IQ or above.

The mind-blindness theory

According to this theory, children with autism spectrum conditions are delayed in developing a **theory of mind** (ToM) — the ability to put oneself into someone else's shoes, to imagine their thoughts and feelings. When we try to read someone's mind, we not only make sense of another person's behaviour — why did their head swivel on their neck? Why did their eyes move to the left? — but also we imagine a whole set of mental states (they have seen something of interest, they know something or want something) and we can predict what they might do next.

The mind-blindness theory proposes that children with autism and Asperger's syndrome suffer from a delayed development in their ToM, leaving them with degrees of *mind blindness*. As a consequence, they find other people's

behaviour confusing and unpredictable, even frightening. Evidence for this comes from difficulties they show at each point in the development of their capacity to read someone's mind.

- A typical 14 month-old shows **joint attention** (such as pointing or following another person's gaze), during which they not only look at the other person's face and eyes, but also pay attention to what that person is interested in. Children with autism and Asperger's syndrome show reduced frequency of joint attention in toddler-hood.

- The typical 24 month-old engages in **pretend play**, using their mind-reading skills to understand that in the other person's mind, they are just pretending. Children with autism and Asperger's syndrome show less pretend play, or their pretence is limited to more rule-based formats.

- The typical 3 year-old child can pass the **seeing leads to knowing** test — understanding that merely touching a box is not enough to know what is inside. Children with autism and Asperger's syndrome are delayed in doing this.

- The typical 4 year-old child passes the **false belief** test, recognising when someone else has a mistaken belief about the world. Most children with autism and Asperger's syndrome are delayed in passing this test (Baron-Cohen, Leslie and Frith 1985).

- Deception is easily understood by the typical 4 year-old child. Children with autism and Asperger's syndrome tend to assume that everyone is telling the

truth, and may be shocked by the idea that other people do not always say what they mean.

- The typical 9 year-old can figure out what might hurt another's feelings and what might therefore be better left unspoken. Children with Asperger's syndrome are delayed by around 3 years in this skill, despite their normal IQ.

- The typical 9 year-old can interpret another person's expressions from their eyes in order to figure out what they might be thinking or feeling (see Figure 1). Children with Asperger's syndrome tend to find such tests far more difficult, and the same is true when the adult test of reading someone's mind in their eyes is used (see Figure 2). Adults with autism and Asperger's syndrome score below average on this test of advanced mind reading (Baron-Cohen et al. 2001).

Strengths of the mind-blindness theory are that:

- it can make sense of the social and communication difficulties in autism and Asperger's syndrome

- it is universal, in that it applies to all individuals on the autistic spectrum

Shortcomings of the mind-blindness theory are that:

- it cannot account for the non-social features

- while *mind reading* is one component of empathy, true empathy also requires an emotional response to another person's state of mind. Many people on the autistic spectrum also report that they are puzzled by how to *respond* to another person's emotions (Grandin 1996).



Seven year-old autistic boy, with a gift for spelling out words, in a class for the learning handicapped

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Two key ways of revising this theory have been to explain the non-social areas of strength by reference to a second factor and to broaden the concept of ToM to include an emotional reactivity dimension. Both of these revisions were behind the development of the next theory.

The empathising-systemising theory

The empathising-systemising theory (E-S) is a newer theory that explains the social and communication difficulties in autism and Asperger's syndrome by reference to delays and deficits in *empathy*. At the same time, it explains the areas of strength by referring to intact or even superior skill in *systemising* (Baron-Cohen 2002).

ToM is just the cognitive component of empathy. The second component of empathy is the response element — having an appropriate emotional reaction to another person's thoughts and feelings. This is referred to as **affective empathy**. On the empathy quotient (EQ), a questionnaire filled out either by an adult about themselves or by a parent about their child, both cognitive and affective empathy are assessed. On this scale, people with autism spectrum conditions score lower than comparison groups.



Figure 1 The child version of the 'reading the mind in the eyes' test

- | | |
|-----------------|----------|
| 1 feeling sorry | 2 bored |
| 3 interested | 4 joking |



Figure 2 The adult version of the 'reading the mind in the eyes' test

- | | |
|--------------|--------------|
| 1 sarcastic | 2 stern |
| 3 suspicious | 4 dispirited |



Kevin Curtis/SPL



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Boy exhibiting repetitive behaviour typical of autism as he continuously bangs his hand on a tray

According to the empathising-systemising (E-S) theory, autism and Asperger's syndrome are best explained not just with reference to empathy (below average), but also with reference to a second psychological factor (systemising), which is either average or above average. Therefore, it is the discrepancy between E and S that determines if you are likely to develop an autism spectrum condition.

To understand this theory, we need to turn to this second factor, the concept of *systemising*. Systemising is the drive to analyse or construct systems. These might be any kind of system. What defines a

system is that it follows *rules*, and when we systemise, we are trying to identify the rules that govern the system, in order to predict how that system will behave. These are some of the major kinds of system:

- *collectible* systems (distinguishing between types of stones or wood)
- *mechanical* systems (a video-recorder or a window lock)
- *numerical* systems (a train timetable or a calendar)
- *abstract* systems (the syntax of a language or musical notation)
- *natural* systems (the weather patterns or tidal wave patterns)
- *social* systems (a management hierarchy or a dance routine with a dance partner)
- *motor* systems (throwing a Frisbee or bouncing on a trampoline)

In all these cases, you systemise by noting regularities (or structures) and rules. The rules tend to be derived by noting if A and B are *associated* in a systematic way. The evidence for intact or even unusually strong systemising in autism and Asperger's syndrome is that, in one study, such children performed above the level that one would expect on a physics test. Children as young as 8–11 years old who had Asperger's syndrome scored higher than a comparison group who were older (typical teenagers).

The strength of the E-S theory

The strength of the E-S theory is that it is a **two-factor theory** that can explain the cluster of both the social and non-social features in autism spectrum conditions. Below average empathy is a simple way of explaining the social communication difficulties, while average or even above average systemising is a way of explaining the narrow interests, repetitive behaviour and resistance to change/need for sameness. This is because when you systemise, it is easier to keep everything constant and only vary one thing at a time. In this way, you can see cause and effect, thus rendering the world predictable.

When this theory first came out, one criticism of it was that it might only apply to the high-functioning individuals with autism or Asperger's syndrome. While their obsessions (with computers or maths, for example) could be seen in terms of strong systemising, it was questioned whether this would apply to the low-functioning individuals. However, when we think of a child with autism, many of the classic behaviours can be seen as a reflection of their strong systemising. Some examples are listed in the 'Student activities' on page 6.

The E-S theory is about a different cognitive style. It posits excellent attention to detail (in perception and memory), since when you systemise, you have to pay

attention to the tiny details. This is because each tiny detail in a system might have a functional role. Excellent attention to detail in autism has been repeatedly demonstrated.

Therefore, when the low-functioning person with classic autism has shaken a piece of string thousands of times close to his eyes, the E-S theory sees the behaviour as a sign that the individual understands the physics of that string movement. He may be able to make it move in exactly the same way every time. When he makes a long, rapid sequence of sounds, he may know exactly that acoustic pattern and get some pleasure from the confirmation that the sequence is the same every time.

Much as a mathematician might feel an ultimate sense of pleasure that the 'golden ratio' ($a + b/a = a/b$) always comes out as 1.61803399, so the child (even with low-functioning autism) who produces the same outcome every time with their repetitive behaviour appears to derive some emotional pleasure from the predictability of the world. Autism was originally described as involving 'resistance to change' and 'need for sameness', and here we see that important clinical observation may be the hallmark of strong systemising.

Conclusion

In summary, the E-S theory has the power to explain not just the social communication deficits in autism spectrum conditions, but also the uneven cognitive profile, repetitive behaviour, islets of ability, savant skills and unusually narrow interests that are part of the atypical neurology of this subgroup in the population. The E-S theory has implications for intervention, as is being tried by 'systemising empathy', presenting emotions in an autism-friendly format.

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See www.thetransporters.com, a website that helps children with autism recognise emotions.

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