Reading minds

How the study of autism can reveal evolved mechanisms in the mind.

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Human beings pass effortlessly through the social world – empathising, loving, joking, arguing, cheating – taking their ability to do so for granted. These social capacities are crucial to our success in life. But what do we know about humans' capacity to understand what is going on in other peoples minds? For a Darwinian, a structure in the mind is likely to have a function which has been adaptive at some point. In this article, I show how recent work on the psychology of autism gives us insights into the evolution of such mental mechanisms.

A world of one

Autism starts early in childhood, affects mental development and is diagnosed on the basis of what is sometimes called the 'triad' of symptoms: abnormal social development, abnormal development of communication and impoverished development of imagination.[1] The last of these, limited imagination, also often goes hand in hand with extreme repetitive behaviour, or what Leo Kanner (the discoverer of autism) called 'an insistence on sameness'.[2] Such children not only fail to connect socially with others – hence the name autism, from the Greek word for self – but also find change in their environment very upsetting and seek to maintain a strict order in their lives, immersing themselves in material such as lists of objects, timetables or calendars, or performing rituals and routines.

In some respects, the parents of these children suffer more, for while their child may simply act as if they are oblivious of others, its parents work tirelessly to socialise it, seeking recognition that personal relationships mean something and that the child values the relationship with their parent in particular. Unlike the normal child, who wears their heart on their sleeve, revealing in a thousand ways to their parent that their relationship matters, the autistic child may act as if they are indifferent to people.

Parents of such children know they matter more than strangers, in that children with autism do form 'attachments' to familiar adults. But the normal exchange in the relationship just isn't there. These children will approach the parent when they need something but will otherwise appear self-sufficient in their activities involving the non-human world. Whereas the normal child takes pleasure in an exchange of smiles, of humour, a shared game or activity, or a conversation, the child with autism shows no interest in such social chit-chat.

Different rates of interest

We know from studies of normal development that during the pre-school years, children show specific social behaviours. They smile in response to eye contact at two months old and stay close to their parents at months nine to twelve. Reports of children with autism also suggest such behaviours may be present, though the accounts are usually retrospective. So it is unlikely that an absence of the social smile in infancy or of attachment at a year old, can be involved in the cause of autism.

Behaviour of normal children absent in autistic children

Age	*Behaviour*
2 months	• smiles in response to eye contact
9-12 months	• stays close to their parents
14 months	• actively monitors where someone else is looking
	• points at different objects in the environment
	• brings objects to parent or carer
	• monitors senses of seriousness/playfulness
	• engages in pretend play

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2. Kanner L, Autistic disturbance of affective contact in *Nervous child* 1943; vol 2, pp 217-50.

The normal child, however, does much more than this. At fourteen months old, he or she actively monitors where someone else is looking by turning to look in the same direction. This is called joint attention.[3] Normal children also turn to look at what someone else is pointing at, this time refocusing their attention on what the other person finds interesting. And at fourteen months, they point at different objects in the environment and check whether their parent or carer has turned to look too, they monitor whether another person is being serious or playful, threatening or affectionately teasing, and they engage in pretend play with others. Finally, at this age the normal child brings things over to their parent or carer, simply to show them. All these behaviours serve to bring the child and adult into a shared focus in space – 'a meeting of minds'[4] – but these kinds of behaviour are largely missing in children with autism.

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Pointing and pretending

Here we see a catalogue of things that the normal child is doing at fourteen months which the child with autism is failing to do by eighteen months – or indeed, for many years to come. What all these behaviours have in common is that they are about taking account of what is going on in another person's mind, and what their intentions are. It is as if, by the tender age of fourteen months, children recognise there are two realities: the physical world and the world as someone might be construing it. In short, the normal child has begun to mindread, while the child with autism is mindblind.[5]

Mindreading and mindblindness beyond infancy

If the normal child can be considered a mindreader, while the child with autism suffers in some respect from degrees of mindblindness, then we should expect to see this difference expressed in other areas of behaviour at later ages. This is exactly what we do find. By thirty months, the normal child is talking. Early speech is full of reference to the physical world (cups, cars, shoes, animals) as well as to the social world (mummy, daddy, eye movements, actions), but it is also full of words that refer to what is in people's minds (thoughts, desires, pretence, goals). Many studies of early normal speech have documented this remarkable precocity in young children's acquisition of 'mental state terms'.[6] By three years old, normal children say things like, 'Mummy thinks I'm sleeping, but I'm just pretending!' Children with autism, when they do start to speak, and many are delayed in this, seem to talk about just one level of existence: the physical. They use few, if any, words that refer to the contents of people's minds.[7] By four years old, normal children are even more sophisticated. They not only monitor what another person might think, but attempt to mislead people by planting false beliefs into their minds. They begin to deceive. This might be playful, as in hide-and-seek, or opportunistic. While we might frown on the morality of such behaviour, it is further evidence of the very human ability to mindread. Again, children with autism, by this age, have real difficulties in understanding deception, and rarely, if ever, lie themselves.[8]

Autism's window on the mind

In observing such abilities and disabilities, we see the outline of a natural structure or mechanism in the mind – a mechanism for mindreading, brought into sharp relief by its absence (in degrees) in children with autism. We know now that autism is a genetic condition,[9] so mindreading might be genetically coded. We know that normal infants are not explicitly taught to mindread, but just do it. Currently, new neuroimaging techniques are being used to hunt down where in the brain this mechanism is located (probably in the prefrontal cortex), but the clear evidence of its origin and development in the normal infant and pre-schooler, and its impairment in infants and pre-school children with autism, shows it must be there.

It is not hard to imagine an evolutionary explanation for mindreading. Just try to imagine how much social life one would be capable of without such an ability. Our social lives would either be highly constrained, displaying rigid patterns like ants or bees, or they would be limited to physical interactions, like many species of monkey or ape. Important social interactions such as teaching, persuading, empathising, communicating flexibly and deceiving, would be impossible, since all these require the consideration of another person's mind. In the context of human survival, if you want a picture of how well one might cope without an ability to mindread when all around you there are people who can, you need look no further than the child with autism. They can survive physically, but are largely socially cut off.

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The agility of maladapted mind games

Great caution must be exercised in thinking about psychiatric conditions within an evolutionary framework, since it is imperative that this approach is clearly distinguished from the morally offensive pseudo-evolutionary ideas that were taken up by the nazis. But with this important caveat in mind, there may be many ways in which the evolutionary framework can provide a valuable lens through which to understand psychiatric conditions. One other is the group of anxiety disorders such as phobias and obsessive-compulsive disorder. It is not hard to imagine that the normal fear reaction evolved because it increased our chances of survival. It is only a short step from this to consider how the neural mechanisms controlling 'normal' fear can sometimes malfunction to produce 'abnormal' fear. The challenge for research in psychiatry now is to identify which psychiatric conditions are illuminated by being viewed within the spotlight of evolutionary biology ⊙

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