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Do sex differences in empathy account for sex differences in language acquisition?

by Simon Baron-Cohen

In this paper I want to go beyond 'theory of mind' (ToM) to talk about the broader capacity for empathy. I then review the evidence for sex differences in empathy (females developing faster, and showing a stronger drive in this, than males). Finally, I raise the possibility that since language acquisition requires not just decoding heard words in a look-up table but identifying the speaker's intended meanings (i.e., the speaker's mental states), a female advantage in empathy could have driven the female advantage in rate of language acquisition.

The term 'empathizing' encompasses the following earlier terms: 'theory of mind', 'mind-reading', and taking the 'intentional stance' (Dennett, 1987). Empathizing involves two major elements: (a) the ability to attribute mental states to oneself and others, as a natural way to understand agents (Baron-Cohen, 1994a; Leslie, 1995; Premack, 1990); (b) having an emotional reaction that is appropriate to the other person's mental state. In this sense, it includes what is normally meant by the term 'theory of mind' (the attributional component) but it goes beyond this, to also include having some affective reaction (such as sympathy).

The first of these, the mental state attribution component, has been widely discussed in terms of being an evolved ability, given that in the universe can be broadly divided into two kinds of entities: those that possess intentionality and those that do not (Brentano, 1970). The mental state attribution component is effectively judging if this is the sort of entity that might possess intentionality. Intentionality is defined as the capacity of something to refer or point to things other than itself. A rock cannot point to anything. It just is. In contrast, a mouse can 'look' at a piece of cheese, it can 'want' the piece of cheese, and it can 'think' that this is a piece of cheese, etc. Essentially, agents have intentionality, whereas non-agents do not.

This means that when we observe agents and non-agents move, we construe their motion as having different causes (Csibra, Gergely, Biro, Koos, & Brockbanck, 1999; Gelman & Hirschfield, 1994). Agents can move by self-propulsion, which we naturally interpret as driven by their goals and desires, whilst non-agents can reliably be expected not to move unless acted upon by another object (e.g., following a collision). Note that mental state attribution is quite broad, since it includes not just attribution of beliefs, desires, intentions, thoughts and knowledge, but also perceptual or attentional states, and all of the emotions (Baron-Cohen, Wheelwright, Hill, & Golan, submitted; Griffin & Baron-Cohen, 2002).

The second of these, the affective reaction component, is closer to what we ordinarily refer to with the English word 'empathy'. Thus, we not only attribute a mental state to the agent in front of us (e.g., the man 'thinks' the cake is made of soft, creamy chocolate'), but we also anticipate his or her emotional state (the man will be disappointed when he bites into it and discovers it is hard and stale), and we react to his or her emotional state with an appropriate emotion ourselves (we feel sorry for him). Empathizing thus essentially allows us to make sense of the behaviour of another agent we are observing, predict what they might do next, and how they might feel. And it allows us to feel connected to another agent's experience, and respond appropriately to them.

The normal development of empathizing

Empathizing develops from human infancy (Johnson, 2000). In the infancy period, it includes:

- being able to judge if something is an agent or not (Premack, 1990);
- being able to judge if another agent is looking at you or not (Baron-Cohen, 1994b);
- being able to judge if an agent is expressing a basic emotion (Ekman, 1992), and if so, what type;
- engaging in shared attention, for example by following gaze or pointing gestures (Mundy & Crowson, 1997; Scaife & Bruner, 1975; Tomasello, 1988);
- showing concern or basic empathy at another's distress, or responding appropriately to another's basic emotional state (Yirmiya, Sigman, Kasari, & Mundy, 1992);
- being able to judge an agent's goal or basic intention (Premack, 1990).

Empathizing can be identified and studied from at least 12 months of age (Baron-Cohen, 1994a; Premack, 1990). Thus, infants show dishabituation to actions of 'agents' who appear to violate goal-directedness (Gergely, Nadasdy, Gergely, & Biro, 1995; Rochat, Morgan, & Carpenter, 1997). They also expect agents to 'emote' (express emotion), and expect this to be consistent across modalities (between face and voice) (Walker, 1982). They are also highly sensitive to where another person is looking, and by 14 months will strive to establish joint attention (Butterworth, 1991; Hood, Willen, & Driver, 1997; Scaife & Bruner, 1975). By 14 months they also start to produce and understand pretence (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Leslie, 1987). By 18 months they begin to show concern at the distress of others (Yirmiya et al., 1992). By 2 years old they begin to use mental state words in their speech (Wellman & Bartsch, 1988).

Empathizing of course develops beyond early childhood, and continues to develop throughout the lifespan. These later developments include:

- attribution of the range of mental states to oneself and others, including pretence, deception, belief (Leslie & Keeble, 1987);
- recognizing and responding appropriately to complex emotions, not just basic ones (Harris, Johnson, Hutton, Andrews, & Cooke, 1989);
- linking mental states to action, including language, and therefore understanding and producing pragmatically appropriate language (Tager-Flusberg, 1993);
- making sense of others' behaviour, and predicting it, and even manipulating it (Whiten, 1991);
- judging what is appropriate in different social contexts, based on what others will think of our own behaviour;
- communicating an empathic understanding of another mind.

Thus, by 3 years old, children can understand relationships between mental states such as seeing leads to knowing (Pratt & Bryant, 1990). By 4 years old they can understand that people can hold false beliefs (Wimmer & Perner, 1983). By 5-6 years old they can understand that people can hold beliefs about beliefs (Perner & Wimmer, 1985). By 7 years old they begin to understand what not to say, to avoid offending others (Baron-Cohen, O'Riordan, Jones, Stone, & Plaisted, 1999). With age, mental state attribution becomes increasingly more complex (Baron-Cohen, Joliffe, Mortimore, & Robertson, 1997; Happe, 1993). The little cross-cultural evidence that exists suggests a similar picture in very different cultures (Avis & Harris, 1991).

These developmental data have been interpreted in terms of an innate module being part of the infant cognitive architecture. This has been dubbed a theory of mind mechanism (ToMM) (Leslie, 1995). But as we have suggested, empathizing also encompasses the skills that are needed for normal reciprocal social relationships (including intimate ones) and in sensitive communication. Empathizing is a narrowly defined domain, namely, understanding and responding to people's minds.

The female brain: empathizing

What is the evidence for female superiority in empathizing? In the studies summarised here, sex differences of a small but statistically significant magnitude have been found.

1. *Sharing and turn-taking*. On average, girls show more concern for fairness, whilst boys share less. In one study, boys showed fifty times more competition, whilst girls showed twenty times more turn-taking (Charlesworth & Dzur, 1987).
2. *Rough and tumble play or 'rough housing' (wrestling, mock fighting, etc)*. Boys show more of this than girls do. Although there's a playful component, it can hurt or be intrusive, so it needs lower empathizing to carry it out (Maccoby, 1999).
3. *Responding empathically to the distress of other people*. Girls from 1 yr old show greater concern through more sad looks, sympathetic vocalizations and comforting. More women than men also report frequently sharing the emotional distress of their friends. Women also show more comforting, even of strangers, than men do (Hoffman, 1977).
4. *Using a 'theory of mind'*. By 3 years old, little girls are already ahead of boys in their ability to infer what people might be thinking or intending (Happe, 1995). This sex difference appears in some but not all studies (Charman, Ruffman, & Clements, 2002).
5. *Sensitivity to facial expressions*. Women are better at decoding non-verbal communication, picking up subtle nuances from tone of voice or facial expression, or judging a person's character (Hall, 1978).
6. *Questionnaires measuring empathy*. Many of these find that women score higher than men (Davis, 1994).
7. *Values in relationships*. More women value the development of altruistic, reciprocal relationships, which by definition require empathizing. In contrast, more men value power, politics, and competition (Ahlgren & Johnson, 1979). Girls are more likely to endorse co-operative items on a questionnaire and to rate the establishment of intimacy as more important than the establishment of dominance. Boys are more likely than girls to endorse competitive items and to rate social status as more important than intimacy (Knight, Fabes, & Higgins, 1989).
8. Disorders of empathy (such as psychopathic personality disorder, or conduct disorder) are far more common among males (Blair, 1995; Dodge, 1980).
9. Aggression, even in normal quantities, can only occur with reduced empathizing. Here again, there is a clear sex difference. Males tend to show far more 'direct' aggression (pushing, hitting, punching, etc.,) whilst females tend to show more 'indirect' (or 'relational', covert) aggression (gossip, exclusion, bitchy remarks, etc.,). Direct aggression may require an even lower level of empathy than indirect aggression. Indirect aggression needs better mindreading skills than does direct aggression, because its impact is strategic (Crick & Grotpeter, 1995).
10. *Murder is the ultimate example of a lack of empathy*. Daly and Wilson (Daly & Wilson, 1988) analysed homicide records dating back over 700 years, from a range of different societies. They found that 'male-on-male' homicide was 30-40 times more frequent than 'female-on-female' homicide.
11. *Establishing a 'dominance hierarchy'*. Males are quicker to establish these. This in part may reflect their lower empathizing skills, because often a hierarchy is established by one person pushing others around, to become the leader (Strayer, 1980).
12. *Language style*. Girls' speech is more co-operative, reciprocal, and collaborative. In concrete terms, this is also reflected in girls being able to keep a conversational exchange with a partner going for longer. When girls disagree, they are more likely to express their different opinion sensitively, in the form of a question, rather than an assertion. Boys' talk is more 'single-voiced discourse' (the speaker presents their own perspective alone). The female speech style is more 'double voiced discourse' (girls spend more time negotiating with the other person, trying to take the other person's wishes into account) (Smith, 1985).
13. *Talk about emotions*. Women's conversation involves much more talk about feelings, whilst men's conversation with each other tends to be more object- or activity-focused (Tannen, 1991).

14. *Parenting style.* Fathers are less likely than mothers to hold their infant in a face-to-face position. Mothers are more likely to follow through the child's choice of topic in play, whilst fathers are more likely to impose their own topic. And mothers fine-tune their speech more often to match what the child can understand (Power, 1985).
15. *Face preference and eye contact.* From birth, females look longer at faces, and particularly at people's eyes, and males are more likely to look at inanimate objects (Connellan, Baron-Cohen, Wheelwright, Ba'tki, & Ahluwalia, 2001).

These sex differences in social interest appear very early: Little girls also show more eye contact that boys do by 1 yr of age (Lutchmaya & Baron-Cohen, 2002). Some argue that even by this age, socialization might have caused these sex differences. Although there is evidence for differential socialization contributing to sex differences, this is unlikely to be a sufficient explanation. This is because among one day old babies, girls look longer at faces than boys do (Connellan et al., 2001). This raises the possibility that, whilst culture and socialisation may partly determine sex differences in the mind, biology may also partly determine this. There is ample evidence for both cultural and biological influence (Eagly, 1987; Gouchie & Kimura, 1991). For example, the amount of eye contact a child makes at 1 yr old is inversely related to their level of prenatal testosterone (Lutchmaya, Baron-Cohen, & Raggatt, 2002; Lutchmaya, Baron-Cohen, & Raggett, 2002). The evidence for the biological basis of sex differences in the mind is reviewed elsewhere (Baron-Cohen, 2003).

Sex differences in language ability and language acquisition

Females have also been shown to have better language ability than males (Lutchmaya et al, 2002). We know from experimental studies that good empathizing promotes language development (Baron-Cohen, Baldwin, & Crowson, 1997) – for example, looking up at the speaker's face to take note of gaze direction allows normal toddlers of even 18 months old a quicker route into mapping novel words onto their correct referent. Treating language a string of lexical entries each of which has a one-to-one mapping with a referent is not the most effective route into language, since it raises the insoluble problem of reference: that any sound could refer to any object or state of affairs in the environment, or any aspect of an object, or even any object or state of affairs in the past or future or in a fictional world. Using empathy helps narrow down the search space for reference.

The proof of this idea that good empathy causes faster language acquisition would be if it is shown that female toddlers engage in more joint attention than male toddlers, when hearing novel utterances. This is highly testable. Naturally, this is not to suggest that the direction of causality does not also go in the opposite direction, since a good facility for language would also provide access to another's mental states (people can tell you what's on their mind). The net result would be an upward spiral in development, with empathy promoting language and vice versa. Arguably this ontogenetic pattern might resemble what also occurred in the evolution of these crucial human abilities.

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