Henrik Høgh-Olesen
Department of Psychology, University of Aarhus, Denmark

Gaze following and shared attention: Limitations for the story telling primate and relevant experimental conditions for its relatives

(Commentary to Jill Byrnit: Primate theory of mind: A state-of-the-art review)

First of all, I want to compliment the author for a well-written and thorough review, which is the reason why I do not have any serious objections. Instead I would like to draw attention to some paradoxes in the Theory of Mind (ToM) research and suggest two opposite ways – an empirical and a theoretical – to overcome this state of the art. But first…

Paradox No one

The anecdotal evidence for the ToM and deception among our nearest primate relatives is overwhelming (Whiten & Byrne 1988; Byrne & Whiten 1988; De Waal 2000). And, as everybody who has tried it will know, it is almost impossible to spend observational time with any group of primates, without reclining on ToM-explanations and complex Machiavellian schemes in order to describe what goes on. But, as Byrnit's comprehensive review shows, as soon as these alleged behaviours and abilities are brought into the laboratory and subdued to standard experimental procedures, the evidence becomes less evident so to speak.

As suggested by several people, this of course may have something to do with the experimental procedures, but also it may have something to with one (or both) of the primate species involved in these observations. Not least, the story telling primate usually known as Homo sapiens sapiens, so let's start here.

Geometry and gods

By nature man is an interpretive and story telling creature. Inevitably, he projects sense and meaning into the meaningless and causality and purpose into accidental occurrences, and there is not much that he can do about it.

This hermeneutic propensity is best shown in Heider & Simmel's (1944) classic cartoon experiment and in Mischotte's (1963) studies of causality perception.

In these experiments the arbitrary movements of a number of simple geometrical figures are shown to the test persons who are asked to describe what they see. Even though it is possible to report in an objective laboratory language describing the random starts, e.g.: "When Rectangle A moves from the right to the left, Circle B makes a similar movement", the test persons do not choose this possibility. Instead they spontaneously produce meaningful stories where characteristics such as gender, mind, and motives are attributed to the figures. And then the above series of events becomes for instance the story about how the male rectangle desires and follows the female circle that flies from the advances. In short, each presented report is a small story with a plot where the arbitrary and meaningless movements are classified and made meaningful on the basis of categories from the human world.

Likewise, the anthropological literature is full of examples of how every natural phenomenon (a rock, the sea, the wind in the trees) can become animated and endowed with agency, intentions, and a humanlike mind (Boyer 2002). Barrett (in Boyer, 2002) studied the god-concept of Christian westerners by having them picture a range of situations where they would pray to god for their rescue, such as on a shipwreck. He also made them choose between various rescue scenarios that would all be trivial to an omnipotent god. God could keep the ship floating despite its damages. He could make the passengers of the shipwreck survive the ice-cold water, or he could give a captain on a nearby boat the idea that something is wrong, so that he changes course and thereby rescues the passengers.

Most people choose the last possibility. God may be omnipotent, but intuitively it appears most plausible and easy to influence somebody's mind than to change the laws of nature. At the same time this shows that we represent God as a "person-like agent" who interacts with us. And this aspect of the god-concept is more salient than the aspect of omnipotence. Besides, this characteristic appears in all places where people have gods. Everywhere – despite their special qualities – gods and spirits are represented as person-like agents who we can interact with, in fact: "The only feature of humans that is always projected onto supernatural beings is the mind" (Boyer 2002, p. 163). In short, we simply have an anthropocentric and animistic bias that inevitably makes everything appear and behave as if endowed with something like a human mind. And, if everything from geometrical figures to natural phenomena and gods are perceived as

mindful, intentional beings such as ourselves, so why not our primate relatives, with whom we share so many morphological and social psychological characteristics, and particularly when studied by means of uncontrolled, naturalistic field observations!

One way to escape from this anthropocentric and interpretive trap could be to go back to more simple experimental procedures directed at some of the necessary but basic precursors to the ToM, such as "shared attention" and "eye direction detection" (Baron-Cohen 1991, 1995; Tomasello, 1999).

Gaze following and shared attention

Basically, shared attention refers to the relational act of two or more individuals who attend to the same external stimulus or event by following one of the individuals' indicative gestures or lines of gaze, and while doing so they are aware that the attention is shared.

There is strong evidence that non-human primates (Tomasello, Call, & Hare 1998) and other animals, such as goats (Capra hircus), dolphins (Tursiops truncatus), dogs (Canis familiaris), South-African fur seals (Arctocephalus pusillus), and ravens (Corvus corax), are able to follow gaze (Kaminski, Ridel, Call, & Tomasello 2005; Tschudin, Call, Dunbar, Harris, & van der Elst 2001; Scheumann & Call 2004; Hare, Call & Tomasello 1998; Bugnyar, Stöwe, & Heinrich 2004).

Once again, a recent experiment by Bräuer, Call, & Tomasello (2005) convincingly confirms that all great apes (Pongo pygmaeus, Gorilla gorilla, Pan troglodytes, Pan paniscus) follow gaze to distant locations and around corners. Individuals from all four species clearly followed a human's gaze direction and practiced double-looks (i.e. looked back at the human's face and then followed the gaze again) when nothing special was found the first time. Likewise, when a barrier was added individuals from all four species clearly put themselves in places from which they could see what the experimenter was looking at behind the barrier. And these results suggest that great apes not just practice a simple orienting response, but actually attempt to take the visual perspective of the other. In other words, studies like this suggest that apes acknowledge what others can and cannot see. And even if this may not be a fully-fledged ToM, it is definitely close enough to be of interest. But here another paradox pops up.

Paradox No two

Why is it that apes and sometimes also monkeys (Tomasello, Call, & Hare 1998; Vick & Anderson 2000, 2003; Vick, Bovet, & Anderson 2001) more consistently succeed in gaze-following experiments than in object choice tasks which, among other things, involve the ability to take cues from gaze and stare?

Could it be that gaze following (just as the competition paradigm) is a more ecologically relevant activity to participate in than the object choice experiments? Let's take a closer look at this possibility.

To follow the gaze of someone – primarily a conspecific – is an adaptive behaviour that may provide an animal with central evolutionary information about the surroundings and the locations of things such as food, predators, sex, and group mates etc. In other words, when somebody stares in an intense and concentrated way, we can expect something of importance in the line of the above-mentioned categories to be present in the environment. In this way, the intense stare or gaze of a conspecific may function as a "key stimulus" (in man as well as in non-human primates) that activates the more or less fixed action-pattern (FAP) of looking in the same direction.

An FAP is not just a general orienting reflex. Anything (e.g. the coincidental change of light or other environmental stimuli) may elicit such a reflex. An FAP, on the other hand, is a specified behavioural pattern activated by a specified social releaser – in this case the intense gaze of a conspecific – with the programmed and specified expectation that something of existential importance is present in the environment.

In the gaze-following experiment the paradox of confusion is: That nothing important is found where the gaze ends. Therefore the animals take double-looks and stay vigilant – something may still be out there.

In the object choice experiment on the other hand, the animals' expectations to find something of importance are positively frustrated. Here the paradox or confusion is that all the indicative gestures (stare and gaze included) are directed towards something apparently unimportant, namely a stationary, opaque box! Not food, not sex, not dangerous etc. and this fact may have a lot of confounding implications from sheer confusion to loss of vigilance and interest. Close head and stare cues directed at the box may be even more confusing, as there is obviously nothing of existential importance to be seen (and if something of importance is actually there, why do you not grab it?). So, all in all it may very well be that gaze-following is a more ecologically relevant activity to participate in, than the object choice experiment, and that could be one reason why performances are better in this line up than in the other!

Back to the armchair

But not only our experimental procedures need to be improved. The whole field would most likely benefit from a brush-up of our theoretical and evolutionary understandings of why a ToM-function developed in the first place in our own species. To which central life themes and basic evolutionary challenges has a ToM-function been adaptive and functional, and what are the selective forces that made it appear? And last but not least, do these forces form a crucial part of the lives of higher apes or not?

If this is so, it may give us circumstantial or suggestive evidence for a possible ToM-function and perhaps guide our experimental endeavours towards more fertile and species relevant areas.

I admit that these are difficult and speculative questions. Anyway, I would like to invite Byrnit and others to

take a seat in the theoretical armchair, once again, and reflect on some of the ultimate causes behind the ToM.

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