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Can the chimpanzee mind be upgraded?

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

For centuries humans have been looking for the key element that transformed non-human into human minds. Divine intervention, language, and more recently enculturation have been some of the candidates proposed for enacting such a change.

Ten years ago I could have subscribed one of the thesis of this paper: "Enculturated great apes might transform the typically astute primate behavior-reading into a more advanced understanding of mind, and thereby bridge the gap between human and non-human primate theory of mind" p. 37. This is a fascinating possibility, and one that I happen not to subscribe anymore, at least not in its extreme form. The reader may wonder about what has changed in the last decade. The answer is simple: data. Enough data has accumulated over the past ten years that made us revise our original position (see Tomasello & Call, 2004). In particular, there is today enough evidence that non-enculturated apes, not just enculturated ones, possess some aspects of theory of mind. In particular, chimpanzees (and possibly certain other animals) are sensitive to the attentional and intentional states of others. Thus, enculturation does not appear to be a necessary condition to develop some components of theory of mind. Thus, enculturation may not transform behavior-reading chimpanzees into mind-reading ones because chimpanzees are already sensitive to some of the psychological states of others in the first place (see Tomasello et al., 2003 and Povinelli & Vonk, 2003 for opposing views).

Enculturation is not the first attempt to upgrade the chimpanzee mind. There have been other attempts based on providing chimpanzees with symbolic systems such as language or Arabic numerals. Initially, it seemed that the intervention of such devices allowed individuals to move beyond the capabilities of the species. Only chimpanzees with language training were able to solve analogies (Premack, 1983) and chimpanzees with numerical training were able to use numerals to solve reverse contingency problems that had stubbornly resisted initial attempts using the actual food quantities (Boysen & Berntson, 1995; Boysen et al., 1996). However, later it was shown that chimpanzees were able to solve analogies (Thompson et al., 1997) or the reverse contingency task (Vlamings et al., 2006) without the intervention of symbolic systems. It is still possible that using symbolic devices may help subjects express their abilities, but whether they are instrumental in creating those abilities is a question that remains unresolved.

Questioning the importance of enculturation as a mind upgrading device has the advantage that it solves one of the puzzles that the author raised in her paper. Where do the skills

observed in enculturated apes come from? Are they created from nowhere just by the enculturation process? The answer, at least the answer I would give today, is that those abilities are already there in non-enculturated individuals. It is still possible that enculturation may enhance those abilities. In fact, the data available suggesting that enculturated individuals perform better than non-enculturated in several domains of social cognition most notably imitation has increased since we published our first paper on this topic (Call & Tomasello, 1996). However, caution is needed when evaluating the differences between enculturated and non-enculturated apes because such differences could result from other processes besides a mind upgrade.

One possibility is that enculturated apes may have become better behavior-readers, not better mind-readers as the author suggested, than their non-enculturated counterparts. Thus, the enhanced ability in the object choice paradigm observed in enculturated apes may be a consequence of paying closer attention to humans rather than superior joint attention and theory of mind abilities. The idea that enculturated animals may be better behavior-readers than non-enculturated animals is reinforced if one considers that enculturation reduces fear to humans and makes them more likely to pay attention to them – a process also observed in dogs compared to wolves as well as in other domesticated species such as goats or silver foxes. These species, like enculturated apes, also do well in object choice tasks compared to their wild counterparts (Hare et al., 2005; Kaminski et al., 2005). In fact, their performance of some of these species is comparable to that of enculturated apes, and better than that displayed by non-enculturated apes (e.g., Hare et al., 2002). Such interspecific similarities beg the question of whether animals such as dogs, like enculturated apes, should be considered mind-readers. A problem with this conclusion is that object choice does not necessarily provide evidence of theory of mind because solving this task does not require joint attention; visual co-orientation is sufficient.

Another possibility that could explain the differences between enculturated and non-enculturated apes is that the former are more amenable to the type of testing used in the laboratory than the latter – the object choice paradigm being a prime example of laboratory test. Therefore, the putatively more advanced skills of enculturated animals may result from our inability to use appropriate paradigms to test non-enculturated subjects. The impact that social competition tasks have had in the last six years nicely illustrates this point (e.g., Bräuer et al., in press; Hare et al., 2000, 2001; Santos & Flombaum, 2005). Before those studies were conducted, most

experimental studies on visual perspective taking or investigating the distinction between seeing and knowing had met with very limited success (e.g., Povinelli & Eddy, 1996; Povinelli et al., 1990, 1994; Call & Tomasello, 1999). However, these studies used a cooperative paradigm in which an ignorant or a knowledgeable human informed the ape about the location of food. However, chimpanzees do not inform each other about the location of monopolizable food sources. Instead, they compete for them. Therefore, we and others started asking questions about perspective taking using a competitive paradigm. The results were clear. Chimpanzees know what others can and cannot see. Something that several researchers, us included, had not been able to show using cooperative paradigms. Incidentally, there is also now some information that apes also deploy similar perspective-taking capabilities when begging food from others (e.g., Kaminski et al., 2004).

There are two other issues I would like to mention before finishing. First, the previous discussion on the effects of enculturation should not be taken to mean that chimpanzee minds are impervious to change. Perhaps enculturation has deep repercussions on chimpanzees' cognitive processes but we still have to find solid evidence to confirm this idea. In other words, although there seem to be differences among apes with different rearing histories, the basis for those differences remains unclear. Second, theory of mind as the author puts it, is not "a cognitive entity that is either present or absent", it probably entails "different levels of abstraction and may take different avenues in different primate species". Even some innate mechanisms postulated for humans such as the Eye Direction Detector or the Intentionality Detector (Baron-Cohen, 1995) are very likely shared with non-human primates. Thus, we agree that theory of mind is better understood as a mosaic of components, not as a single entity. Recognizing this fact is extremely important to enable the field to move forward. This is why I was so surprised to read that the author treated theory of mind in such a monolithic way in her final discussion, conceding theory of mind abilities to enculturated apes but not a hint of them to non-enculturated ones

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