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Theory of Mind in Chimpanzees: A Rationalist Approach

Benjamin Grant Purzycki

Abstract: The question of whether or not chimpanzees possess the ability to mentally represent others' mental states has been a popular question since Premack and Woodruff (1978) originally asked the question. It is well established that humans have a theory of mind (ToM), but extending this psychological faculty to our evolutionary cousins has created a massive amount of literature and research attempting to resolve this issue. Such a resolution is arguably not possible given the nature of the debate. An Either/Or approach to chimpanzee theory of mind both ignores the essential components of ToM as well as foreclosing on the possibility that there is variability of the informational encapsulation at the modular level between closely related species.

The Modular Mind and Naturalism

In order to discuss ToM, it is imperative to summarize the body of scientific advancements, particularly in the realm of cognitive science, to understand the theoretical backdrop behind the current debate. The most influential production concerning the Modular or Computational Theory of Mind comes from Jerry Fodor's classic *The Modular Mind* (Fodor 1983).¹ Firstly, the distinction between mind and brain is important to make. While the brain, a biological structure, is responsible for the bulk of what constitutes an organism's behavior, the mind can be divided *conceptually* into various functions or faculties. Fodor thus defines "faculty psychology" as the "view that many fundamentally different kinds of psychological mechanisms must be postulated in order to explain the facts of mental life" (Fodor 1983: 1). In other words, there are a number of innate, cognitive mental mechanisms that are responsible for particular functions, or "domain-specific".

Domain-specificity is defined by Hirschfeld and Gelman as "the idea that all concepts are not equal, and that the structure of knowledge is different in important ways across distinct content

areas...[i.e.] cognitive abilities [that] are specialized to handle specific types of information” (Hirschfeld & Gelman 1994: 3). Put differently, there are a number of different ways of organizing what is perceived, and various mental structures are responsible for organizing different bodies of information; e.g. language, a template-system of intuitive ontology, naive physics, etc. (Boyer 2001; Boyer & Barrett Forthcoming; Chomsky 2000; Vosniadou 1994 respectively). This essay focuses specifically on mental functions; not the brain as a biological structure.

As for the study of mind, whether human or chimpanzee, Chomsky notes that “a ‘naturalistic approach’ to the mind investigates mental aspects of the world as we do any others, seeking to construct intelligible explanatory theories, with the hope of eventual integration with the ‘core’ natural sciences” (Chomsky 2000). What Chomsky and others hope for is an understanding of the domain-specific mechanisms of the mind, how they operate, and what they do with specific representational information. Summing up the naturalistic program, Sperber notes that “Representations, whether mental or public, are themselves objects in the world” (2000: 3). Such an approach is attempted here, though the difficulties in such an investigation concerning chimpanzee cognition should be abundantly clear and equally problematic.

The most conservative of definitions, according to Jerry Fodor, claims that there are four distinct characteristics of modularity: encapsulation, inaccessibility, domain specificity, and innateness (Fodor 1998: 127-128). Encapsulation, or “informational encapsulation” is the idea that modules have hardwired information within them, which informs perception and that “Information flow between modules—and between modules and whatever unmodularized systems the mind may contain—is constrained by mental architecture” (127). Optical illusions (Fig. 1) provide such an example: regardless of what we actually *know* about the illusion—it remains illusory.

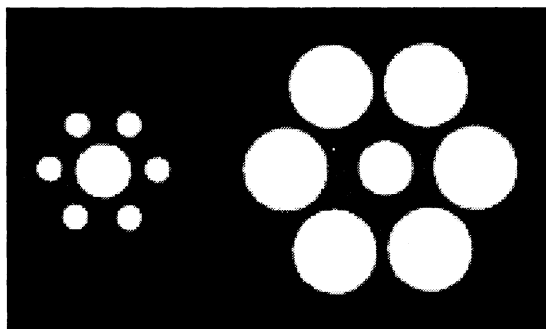


Fig. 1

The above illustration is deceptive: the center circles are the same size, yet the center circle on the left *looks* considerably larger than the center circle on the right. Even though we *know* they are the same size, the illusion is maintained because our cognitive architecture *demands it*. “Inaccessibility” refers to the idea that while incoming information cannot alter the state of or the information contained within the target module (encapsulation) itself, the target module cannot inform outside information—in other words, “it is supposed not to be available for the subject’s voluntary report” (Ibid). This, however, does not exclude the researcher from identifying a modular faculty.

The question, then, becomes what precisely should be considered modular, based on the above-listed qualifications. Many have argued that the ToM is a modular characteristic of both our own species and chimpanzees. Before returning to this debate, it is necessary to examine whether chimpanzees employ a general learning mechanism or indeed have “domain-specific” mental organs that organize perception and thought. If we can safely assume our own minds are organized in such a specific way—are researchers susceptible to applying an invalid degree of anthropomorphism to chimpanzees when considering *their* minds?

Tooby and Cosmides (1992) aptly articulate the main theoretical difference between behaviorist and nativist approaches to the mind. They distinguish between what they call the Standard Social Science Model (SSSM) and the Integrated Causal Model (ICM). The SSSM is “The consensus view of the nature of social and cultural phenomena that has served for a century as the intellectual framework for the organization of psychology and the social sciences and the intellectual justification for their claims of autonomy from the rest of science” (Cosmides & Tooby 1992: 23). Because of this century-long stagnation of development, “the central concept in psychology [has been] learning”, rather than innateness (29). In other words, most behavior is learned, rather than an expression of genetically endowed faculties. And such learning, according to the SSSM, must be “equipotential, content-free, content-independent, general-purpose, domain-general...these mechanisms [of learning] must be constructed in such a way that they can absorb any kind of cultural message or environmental input equally well” (29). The ICM, on the other hand, attempts to locate specific qualities of the mind, their function(s), and under what conditions are they optimal. While Cosmides and Tooby argue that such domain-specific mechanisms have been specifically *selected for* evolutionarily, this debate lies outside the scope of this paper (for further information on Evolutionary Psychology, see Buss 2004; Barrett *et al.* 2002).

Concerning the *growth* of innate faculties, our own species illustrates an interesting trend during development. Gopnik and Wellman note that there are three main stages of a child's cognitive development with regards to the ToM. At 2 years, a child is equipped with "psychological knowledge [that] seems to be structured largely in terms of two types of internal states, desires, on the one hand, and perceptions, on the other" (Gopnik & Wellman 1994: 265). In other words, a landmark achievement in childhood development in an understanding of others' mental states such as *needs*—the understanding that "what is in the mind can change what is in the world"—and the understanding that "what is in the mind depends on what is in the world" (265).

By 3 years of age, an elaboration of mental activities and states occurs. Such concepts of "think, know, remember, make-believe, dream" are understood as mental activities, while a 5-year-old has a fully "representational model of mind". By this time, mental states including "beliefs [and false-beliefs], pretences, and images" are but a few of the psychological understandings of normally developed children. Baron-Cohen's (1997) groundbreaking essay on "mind-blindness" of autistic children who have an impaired or lack a ToM illustrates that understanding mental states is quite a task for individuals afflicted with such disorders. It should be kept in mind, then, that if chimpanzees lack a ToM, they would behave in a similar manner to autistic individuals, which, as discussed below, is clearly not the case.

Premack and Woodruff (1978) were the first to ask whether chimpanzees have a ToM. Premack and Woodruff understand the ToM as an "individual [that] imputes mental states to himself and to others" (515). They argue that "assigning mental states to another individual is not a sophisticated or advanced act, but a primitive one" (525). The question of whether or not the chimpanzee (or human, for that matter) is *correct* in his/her inference of attributing a mental state to another is irrelevant (but interesting)—the question is whether such inferences *occur*. Premack and Woodruff note that

Only on two occasions are the inferences [of mental states] not found: when there is not enough understanding of the scene to permit the inference, as in the young, confused child, or when the inference indeed occurs, but is quite deliberately suppressed, as by a sophisticated adult who, having been taught the differences between data and inference,

elects on this occasion to give what he calls an objective ‘description’ (525).

Byrne and Whiten elaborate: “If an individual is able to respond differentially, according to the beliefs and desires of another individual (rather than according to the other’s overt behaviour), then it possesses a theory of mind” (Byrne & Whiten 1997: 8). In sum, then, a behavior exhibiting a reaction based on an understanding of another’s beliefs and desires would be the shadow cast from the substance of a theory of mind module or mechanism (ToMM).

On the other hand, one must be wary when regarding certain behaviors as indicators of a ToM. Take, for example, a squirrel that takes flight each time a human approaches. While it may be argued that the squirrel has a ToM because it has an understanding of the human’s mental state (e.g. “wanting to eat it”), such a conclusion ignores the possibility that the squirrel is reacting to *the human* and *not* its mental states. Comparing the cognitive capacity of a squirrel with that of a chimpanzee is inherently absurd—primarily because of the fact that chimpanzees’ do indeed display a certain degree of protean behavior. Geoffrey Miller argues that this proteanism—the capacity for unpredictable behavior—is an evolutionarily sound feature of the animal kingdom (Miller 1997). More specifically, individual chimpanzees require a degree of unpredictability in order to fool others, *ergo* maximizing fitness.

While some have argued that “reading minds” is an innate faculty of our species and—by extension—chimpanzees, others argue that such a trait is wholly learned. For instance, Perner, Ruffman, and Leekam (Perner *et al.* 1994) argue that “sibling interaction provides a rich ‘data base’ for building a theory of mind” because “children from larger families [are] better able than children from smaller families to predict” a false-belief in a character of a story narrated to them. The main problem with Perner *et al.*’s thesis is the fact that they confuse *mastery* of mind reading with the ability to read minds. In other words, if a child is not employing or “exercising” this faculty, they will not be as adept at identifying false-beliefs, intentions, etc. to a given agent. It should be argued, however, that having more siblings better *prepares* the ToM faculty, rather than actually “bestowing” it upon an individual. While Perner *et al.* contend that their findings create a “serious problem for nativist proposals and various developmental explanations relying on internal maturation”, they deem Fodor’s “earlier, less radical claims” compatible with their own data (1994). Unfortunately, Perner *et al.* remain unclear regarding the distinction between *learned vs. developed* (what is already there) when they claim that “the finding that

siblings help develop a theory of mind is compatible with the sociocognitive tradition [which emphasizes] intellectual progress as a function of social interaction among peers and view intellectual growth as a process of internalizing the knowledge already incorporated in the social interaction” (1994).

In sum, Perner *et al.*'s data do not create problems for “nativist proposals,” if anything they support them, as “poverty of the stimulus” arguments contend. Scholl and Leslie (1999) note that “whenever modularity exists, it is always a matter of degree.”² Put differently, Chomsky argues that “a central part of what we call ‘learning’ is actually better understood as the *growth* of cognitive structures [which are innately endowed] along an internally directed course under the triggering and partially shaping effect of the environment” (Chomsky, 1980: 33. Emphasis added.). If this truly is the case, one may feasibly pose the question to Perner *et al.*: where did only-children “learn” a theory of mind? If the answer is from the parents, that would certainly not disqualify a single child from “learning” a theory of mind, but rather reducing the amount of stimulation. But “poverty of the stimulus” arguments contend that the *stimulus itself is impoverished* (in this case, behavior)—a great deal of our thinking is the result of inference-making rather than a recording of all behaviors and outcomes. What we see is extremely limited—what we intuit is just as, if not more, important than the behaviors that stimulate mental activity (Fodor 1985).

Primate/Machiavellian Intelligence

One scheme of what constitutes a ToM comes from Simon Baron-Cohen, who notes that while it “is clear that many monkey species and the apes show social intelligence in that they form alliances, keep track of social status, and behave tactically in grooming those allies they depend on...it is not necessarily evidence of the possession of a theory of mind” (1999: 14). Baron-Cohen argues that there are eight requirements that must be met in order to grant one a ToM, namely: a) intentionally communicating with others; b) repairing failed communication with others; c) teaching others; d) intentionally persuading others; e) intentionally deceiving others; f) building shared plans and goals; g) intentionally sharing a focus or topic of intention; and h) pretending (Baron-Cohen 1999). Baron-Cohen unnecessarily separates “persuasion” and “deception”; deception is simply a specific form of persuasion. In other words, if an individual deceives, he or she persuades—deception is successful persuasion of something false. Such qualifications are discussed below, resulting in the identification

of what may be the *only* lacking qualification—building shared plans and goals. However, all of the above requirements spring from the core qualities of a ToM: understanding *beliefs*, *desires*, and *intentions* in others.

At this point, it should be clear that the notion of “general intelligence” is not applicable to our own species, as domain-specificity proves. However, the question arises as to whether our evolutionary cousins *Pan troglodytes* operate under such modes of “general intelligence” or not. If “general intelligence” were applicable, we would find individual chimpanzees in a single social group behaving in the same manner, as they would be exposed to the same stimuli. Put differently, general intelligence in this case forecloses on the possibility of within-group variability. This, however, turns out not to be the case (see Goodall 1990). In addition, Tomasello and Boesch (1998) argue that, indeed, chimpanzees are “cultural” beings. If “culture” is “a set of processes” rather than “monolithic”, chimpanzees exhibit a number of varying behaviors that qualify as cultural insofar that they are both specific to a certain group and learned behaviors (591). In addition, relationships between individual chimpanzees based on rank are clearly different across individuals.

Tomasello and Boesch note that we can “posit that the naturally occurring behaviors of a primate group may be assumed to be cultural...when (1) two groups of the same species differ in a behavior... (2) there are no obvious differences in the environments of the two groups...and (3) there are no genetic differences between individuals that acquire the behavior and those that do not” (1998: 592-593). Such qualifying factors imply that learning is taking place on an individual level, rather than a predisposition for certain behaviors among all individuals. Tomasello and Boesch note that “ecological differences in the environment inhabited by different chimpanzee populations may in some cases be a direct explanation for the variations we observe between them” (593). While chimpanzees of Mount Nimba in West Africa, Gombe, and Taï crack nuts against tree trunks, the chimpanzees of Bossou do not because the fruit *Strychnos* that contains the nuts do not grow in the area that the Bossou inhabit (594). On the other hand, using a stick for extracting bone marrow from red colobus monkeys has only been observed among the Taï, even though all species hunt the red colobus (594).

In sum, it is doubtful that while chimpanzees are endowed with an obviously less specialized mind as humans have, their minds are not organized in a different manner in terms of domain-specificity. While different groups of chimpanzees exhibit different behaviors, this does not foreclose on the possibility that chimpanzees are born with

minds as a *tabula rasa*. Further proof of this lies in chimpanzees' *application* of their ability to deceive others in a number of ways.

Machiavellianism has been defined as "a strategy of social conduct that involves manipulating others for personal gain, often against the other's self-interest" (Wilson *et al.* 1996, quoted in Byrne & Whiten 1998: 12). If a chimpanzee fools another in order to, for example, acquire resources (sexual or nutritional), the "fooling" alone does not necessarily suggest a ToM immediately. On the other hand, such acts of deception which rely on "whether an individual can discriminate another's *false belief* would be the most convincing way to demonstrate a true reading of 'mind'" (Whiten 1998: 144). Has this been demonstrated?

Franz de Waal recounts how a chimpanzee Yeroen mildly hurt his hand in a fight with another chimp named Nikkie. One observer noticed that Yeroen only limped when Nikkie was around. De Waal confirmed this when he noticed that once Yeroen was out of Nikkie's field of vision, he would walk normally (de Waal 2000: 35). Not only does this imply that chimpanzees are aware that "seeing is knowing" (see below), but also that an individual chimp *wanted another to believe he was hurt*. This behavior lasted a week, during which "Yeroen kept an eye on Nikkie to see whether he was being watched" (Ibid). This example fulfills not only the "pretending" qualification of possessing a ToM, but the "persuasion" and "deception" components as well. The next grouping of criterion falls under the general heading of "social" or "shared intentions."

At this point, Tomasello *et al.* (2004) argue that "the crucial difference between human cognition and that of other species", namely, "the ability to participate with others in collaborative activities with shared goals and intentions: shared intentionality" (1). What immediately comes to mind is the question of chimpanzee collaborative hunting, which Tomasello *et al.* consider: "The most complex cooperative activity of chimpanzees is group hunting, in which two or more males seem to play different roles in corralling a monkey" (18). Tomasello *et al.* render such cooperation as having no difference from hunting carried out by other social mammals (e.g. lions and wolves), which operates on impulse and opportunistic frenzies. In addition, Tomasello *et al.* find it "almost unimaginable that two chimpanzees might spontaneously do something as simple as carry something together or help one another make a tool" (19). In the case discussed below, it is clear that chimpanzees—if given the chance—will behave in a manner that benefits the agent solely, rather than any cooperative behavior that would indicate a shared intention (see Kennedy, this volume).

However, Tomasello *et al.* overlook the fact that chimpanzees will act cooperatively by forging coalitions to overthrow an alpha male, let alone work together to maintain the power of an alpha (see de Waal 2000: 139-149; Goodall 1990: 98-111). It should be noted that coalitions are created at fantastically frequent rates, (ca. 1,000-1,500 per year in captivity), but the overthrowing of an alpha does not (de Waal 2000: 31). If this irrefutable fact of coalition building to overthrow an alpha were a result from “observation” (that is, assuming chimpanzees are true behaviorists), it would be quite a feat to explain coalition forging and alpha-overthrowing in such terms. Individuals participating would collectively have to understand that their goal is, indeed, to get rid of an existing alpha. If chimpanzees were incapable of doing so, all those involved in the overthrow of an alpha would have to have already *observed* not only the removal of an alpha, but also a collaborative effort to do so. Moreover, they would have to be able to understand the outcome as a result from the collaborative effort if they are to repeat the process. Individuals who build coalitions are obviously goal-oriented and require assistance from others to achieve this goal. This suggests, indeed, that chimpanzees have a ToM.

However, mundane, everyday behaviors are far better indicators for shared intentionality. De Waal, for instance, observes that individual chimpanzees will hold branches for others to climb into trees guarded by electrical fence. The branches are placed in a manner that requires one individual to reinforce the instability of the formation while another climbs the branches in order to gather otherwise unobtainable leaves (2000: 198-199). Even an adult helping an infant out of a tree indicates that there is some degree of sharing by way of understanding another’s predicament (30). Moreover, the fact that after engaging in conflict, chimpanzees will avoid each other until one of the combatants expresses a behavior indicative of a truce (e.g. extending a hand). Such a “collaborative” avoidance not only indicates mutual animosity, but also suggests that each individual involved in a conflict “keep in mind” that alleviating the tension has yet to occur.

Turning to a related question: *is seeing believing or indicative of understanding another’s mental states?* More specifically, *does joint attention imply shared intention?* Flombaum and Santos (2005) recently published findings that suggest rhesus monkeys are equipped with the understanding that a researcher’s inability to see a hidden grape provides an opportunity to steal it. Povinelli and Eddy (1996a) conducted a study to determine whether chimpanzees followed a human’s gaze. In one case, the human looked at a specific location with only his eyes, while in another case the human looked with both eyes and head. They found that “subjects looked where the human was

looking equally often whether or not the head was moved, demonstrating the efficacy of eye direction alone” (Tomasello & Call 1997: 317). In another experiment (Povinelli & Eddy 1996b), researchers stared directly at a Plexiglas wall. The assumption was that the chimps would bypass the wall, rather than inspect it, if the line of gaze were of particular significance in the chimps’ minds. However, chimps consistently looked at both sides of the partition—with particular emphasis on the side available to the researcher’s view—rather than exhibiting a primary concern with the wall at the end of the room. In sum, chimpanzees determined that the Plexiglas wall was of the *researcher’s* interest, rather than blindly following his line of vision.

De Waal also reports an occasion when researchers hid a number of fruits in an enclosed area. Chimpanzees in an area close saw the researchers enter the area—with a box full of fruit—then leave the area with an empty box. When the chimps were allowed into the area, they searched “madly” without finding any of the fruit:

A number of apes passed the place where the grapefruits were hidden without noticing anything—at least that is what we thought. Dandy [the name of one chimp] too had passed over the hiding place where the grapefruits were hidden without stopping or slowing down at all and without showing any undue interest. That afternoon, however, when all the apes were lying dozing in the sun, Dandy stood up and made a bee-line for the spot. Without hesitation he dug up the grapefruits and devoured them at his leisure. If Dandy had not kept the location of the place a secret, he would probably have lost the grapefruits to the others (1990: 62).

Even if this were *not* the first time Dandy behaved with such cunning, he still would require an understanding that if he suppressed acknowledgement of the fruit, others would not enjoy the bounty. Not only was Dandy planning, but also intentionally, and probably *consciously*, deceiving others in order to better himself.

Elsewhere, Byrne and Whiten (Byrne & Whiten, 1992) review the complexity of tactical deception, which they define “*functionally*, as ‘acts from the normal repertoire of the agent, deployed such that another individual is likely to misinterpret what the acts signify, to the advantage of the agent’”. Obviously, “Acts of deception involve *other primates*: as objects to be manipulated, as social tools to manipulate others, or even sometimes as the resource to be gained”. On the other hand, it also implies that the deceivers/deceived must be able to both retaliate *and* remember (1992).

According to Byrne and Whiten, “the two *Pan* species and the *Papio* baboons are significantly over-represented in records of deception. By contrast, *no clear case of deception has yet been reported for strepsirhine primates or tarsiers*” (1992). The data collected by Byrne and Whiten were exclusively anecdotal, which opens the procedural doors to many problems. Povinelli and Vonk argue that the

real problem with the anecdotes is *not* that it is unparsimonious to account for chimpanzee deception by appealing to associative learning models...[but] that each anecdote presupposes a behavioral abstraction on the basis of which a mental state is inferred, without specifying what unique causal work the second-order mental state performs (2003: 159).

In other words, anecdotal “evidence” for chimpanzees’ mental representations inherently relies on the assumption that representations of behaviors already occur—something which has yet to be proven, according to Povinelli and Vonk. So, for instance, if one were to observe a chimpanzee deceiving another into thinking he does not have food, the observer is already attributing an understanding of mental states to the chimpanzee without *testing*. The problems with experimental procedures that attempt to definitively reveal that chimps have an understanding of others’ mental states are equally problematic.

By now, it should be clear that there is no question that chimpanzees’ have representational or intentional minds. For instance, Goodall notes that in the wild, “often an individual prepares a tool for use on a termite mound that is several hundred yards away and absolutely out of sight”, implying that not only do chimpanzees’ have the capacity to retain a complex amalgam of representations (termite hill; need to use tool to collect termites; how to construct tool; how to use tool; location of termite hill; “my” location in response to termite hill), but also the ability to *plan* based on said representations (1990: 22). If chimpanzees were observed to construct such a tool *for* another chimpanzee, this would add more evidence of a ToM, but would still fall under scrutiny that such a behavior was learned. Either way, it would suggest that “shared intentions” were evident.

Discussion

The arguments made by a number of skeptics regarding the chimpanzee’s ability to mentally represent others’ mental states boil down to a few fundamental, yet ultimately unanswerable (arguably)

questions. Firstly, until chimpanzees can fully articulate what they understand in a comprehensively intelligible way, humans may never have definitive proof that chimps have a ToM. Taken to the extreme, Robert M. Gordon argues that “one familiar with the recent literature ought to conclude that there is still no convincing evidence of theory of mind in *human* primates” (Gordon 1998: 120). If the ToM is defined as “the anticipation, explanation, and social coordination of behavior”, Gordon reasons, we certainly cannot attribute a ToM to our own species because “a very important part of our social behavior—our emotional responses to ephemeral shifts in another’s vocal and facial expression—seems chiefly to rely on fast processing that does not await causal analysis” (121).

Put differently, individuals react to such subtle behaviors (which they may not even be *conscious* of) that an understanding of another’s mental states is not necessary. Gordon fails to understand precisely what *he* is doing: namely, by assuming that supporters of ToM do not *understand* or have not read (a mental activity) the “recent literature,” he is surely granting them a mental state, however impoverished Gordon thinks they may be. In sum, attributing mental states to an individual that is not present may very well be the best proof of a ToM in our species. Such philosophical hair-splitting revolves around—yet argues against Cartesian understandings of the mind and its operations (Descartes 1998: 35-39). Mental activities such as thought prove existence—yet thinking about external stimulation is actually meditating on the *representation* of the said stimulation (127). Descartes notes that making “the inference ‘I am walking, therefore I exist’” is not a plausible conclusion “except in so far as the awareness of walking is a thought” (Ibid). The question of modularity in this case, however, is less clear.

Descartes interestingly observed that

if I look out of the window and see men crossing the square, as I just happen to have done, I normally say that I see the men themselves...Yet do I see any more than hats and coats which could conceal automatons? I *judge* that they are men. And so something which I thought I was seeing with my eyes is in fact grasped solely by the faculty of judgment which is in my mind (Descartes 1998: 85).

In sum, we do not look at others without granting them *agency*. In terms of modularity, this ability fits under Fodor’s original qualifications. While Descartes was incorrect insofar as he understood an agent as an intellectual exercise, rather than an innate faculty, he certainly described ToM aptly. Gopnik creates a first-person narrative

describing the world according to an autistic. People sitting around the individual are described as “bags of skin [that] are draped over chairs, and stuffed into pieces of cloth, they shift and protrude in unexpected ways” (1993; quoted in Baron-Cohen 1997: 4-5). Are we to believe, then, that chimpanzees *truly* look at the world—especially their fellow chimps—in this manner?

We grant agency without necessarily being *aware* of it. In other words, we do not look at others and acknowledge the fact that we are seeing more than “hats and coats which could conceal automatons”. The information that is encapsulated is the attribution of *agency*, and arguably with experience, this attribution is elaborated and specified: in the case of our own species, attributing mental states as “dreaming” and “making-believe” are not innate, but elaborations or outgrowths of attributing agency. In the case of chimpanzees, ToM is less specific or sophisticated—rather than completely absent. The question, then, turns itself inward: are we simply anthropomorphizing chimpanzees because of our own innate faculties?

Anthropomorphizing has been included in Brown’s human universals, a characteristic that is demonstrated around the world by all peoples (Brown 1991: 139). While Brown notes that this trait is generally found in religious contexts, anthropomorphizing occurs in other contexts as well. One common view of anthropomorphism is the notion that our species animates certain entities (e.g. God, ghosts, chimpanzees, etc.) in order to understand them better and to mitigate fears surrounding them. Pascal Boyer argues that firstly, “gods and spirits are not represented as having *human* features in general but as having *minds*, which is much more specific” and secondly, “the concept of a mind is not exclusively human,” meaning we attribute *agency* to all entities rendered *intentional* (Boyer 2001: 144). In other words, we intuitively (i.e. naturally) attribute *a will* and *desires* to animate entities—this is the crux of anthropomorphism (Ibid). Are primate psychologists guilty of inappropriately attributing “a mind” to chimpanzees in this case?

Povinelli and Vonk (2003) tend to think so by suggesting that the chimpanzee mind seems so much like our own because “the human mind may have evolved a unique mental system that cannot help distorting the chimpanzee’s mind, obligatorily recreating it in its own image” (2003: 157). Like religious ideas, we may be projecting our own qualities on chimpanzees by granting them a ToM by our intuitive inference making. But if in fact chimpanzees *do* have such an understanding of others’ mental states, and we agree that they do, we would still be anthropomorphizing—we would simply be *accurate* in

our inference-making. This attribution of *other* minds, on the other hand, creates a problem for such hair-splitters such as Gordon.

Gordon's question also relates to what Chomsky and others call "Descartes' problem", namely "the emphasis on the creative aspect of language use and on the fundamental distinction between human language and the purely functional and stimulus-bound animal communication systems, rather than the Cartesian attempts to account for human abilities" (Chomsky 2002: 55). While Chomsky is specifically discussing the "creative aspect of human language", the same argument may be applied, as Gordon has, with respect to chimpanzee ToM. Firstly, if all of these "subtleties" that Gordon refers to are actually the sum-total of the stimuli, and behaviors that are a response to the processing of that sum-total, this still does not deny the possibility of a ToMM because such a module *requires* stimulation for engagement (just like the optical illusion example provided above). Secondly, such arguments foreclose on the possibility of a "creative aspect" of chimpanzee behavior. The point is, Gordon is taking a purely behaviorist approach to the ToM—mostly a *mental* activity.

In addition, what Gordon does not acknowledge, but alludes to (perhaps not consciously) is what Chomsky calls "Plato's problem": "How is it possible that we have the knowledge that we do have? What is the knowledge that we do have and on what basis could we possibly have acquired it?" (Chomsky 2004: 207; 1980: 180). A behaviorist such as Gordon assumes such knowledge is learned and behaviors are reacted to based on either previous experience or processing a number of subtle gestures that "do not await causal analysis". If such a suite of subtleties do not "await causal analysis", then such subtleties are arguably *purely instinctual*, rather than a *choice* on the part of an agent. This fits nicely with Fodor's definition of modularity, but denies the ability of researchers to explain such behaviors. In sum, then, *ToM cannot be ultimately "proven" behaviorally or "behavioralistically"*.

For instance, Povinelli and Vonk (2003) note that "those who believe that deceptive chimpanzees possess a theory of mind must postulate two things: first, that they possess behavioral abstractions, and second, that they possess representations of mental states" (158). They argue that for the entire body of data produced by chimpanzee observation to be of any explanatory value, only "*behavioral abstractions* will suffice". (2003: 159) Similar observations made by Scott (2001) divide the approaches into those who attribute ToM to chimpanzees and those who simply learn "from past experiences", in other words a representational memory of behavior, rather than a representational understanding of *others' representations*.

Many have called such representations “metarepresentations” (see Sperber 2000). Andrew Whiten (2000) discerns between two types of metarepresentations. Sense (1) is “A mental representation of a mental representation.” An example of this is (in the mind of you, the reader) “John believes in ghosts”. You understand that John’s belief in ghosts is a mental activity—so John’s representation is now yours, so to speak. Sense (2) is “A mental representation of a mental representation *as a representation* (2000: 140). So, your understanding that John’s belief in ghosts is a representation *is a representation*. Does this occur in chimpanzees?

The Premacks (1983: 57-67; 2003: 145-157) conducted a study in which the chimpanzees were shown videotaped images of actors attempting to solve a number of problems. In the first test, an actor attempted to reach inaccessible bananas (hanging overhead, lay outside a cage, blocked by a large box). In another number of tests, actors were confronted with “malfunctioning equipment: a disconnected hose, a phonograph whose cord was unplugged, a gas heater that was unlit”, etc (2003: 146). After viewing the videos, Sarah (the Premacks’ test subject) was given an envelope with photos of the solution *and* solutions to other problems. Initially, Sarah chose the correct solution to 18 out of 20 problems. The Premack’s note that her mistakes were likely due to “her ignorance of the difference between chimpanzee and human strength” (she “assumed” that a human could push a brick-filled box aside, rather than empty it) and “an unclear photo” (146). Children, on the other hand, who were presented with this task failed 50 percent of the time. Even after altering the study to accommodate children’s “suburban lifestyles” (e.g. cookies out of reach on top of a refrigerator), they continued to fail at the same rate.

The Premacks argue that the difference lies between the ability of chimps to identify, i.e. *mentally represent*, a “problem” rather than a simple sequence of events on a video. The chimps had to attribute a *goal* on the part of the actors presented in the film, whereas three-and-a-half year old children failed at a larger rate due to their failure to attribute a goal to the actors. It would be highly informative to give the same tests to older children, as their ToM is mostly fully functional (see above). Can one still maintain the stance that Sarah may have “learned” this ability—especially after being confronted with a novel test? Sarah represented not only the problem identified by the actors and the problem itself (Sense 1), but recognized it *as a problem* (Sense 2).

The following provides the logic employed by Either/Or approaches to understanding ToM in a behavioral context. Considering

much of the debates revolve around “learned” behaviors versus “innate ideas”, the equations are divided as such:

Behaviorist

- a) Initial behavior + Representation of behavior & outcome (successful)→Repeated behavior
- b) Initial behavior + Representation of situation→ Repeated behavior

Nativist (Either/Or)

- c) ToMM→ Representation engaging module→ Initial Behavior→ a) and/or b)
- d) ToMM→ Representation engaging module→ Behavior X→ New (similar) situation→ ToM module→ Representation engaging module→ Behavior Y
- e) ToMM→ Representation engaging module→ Behavior X→ New (different) situation→ ToMM→ Representation engaging module→ Behavior Y
- f) ToMM→ Representation engaging module→ Behavior X→ New (similar) situation→ ToMM→ Representation engaging module→ Behavior X
- g) ToMM→ Representation engaging module→ Behavior X→ New (different) situation→ ToMM→ Representation engaging module→ Behavior X

All “learned theories” of mind assume that the *behavior*, rather than the intentions or mental states of another individual are represented in the mind. While a) grants the subject *agency*, or a choice, b) would rely on the notion that the repeated behavior is more instinctual or automatic, rather than premeditated. However, the logic of “innateness” arguments do not necessarily foreclose on the possibility of premeditation although most who argue for modularity of the ToM support the notion of premeditated deceptive behaviors.

Both d) and e) rely on the assumption that “Descartes’ problem” (in the Chomskyan sense) is answered—new behaviors will apply to either new situations that are similar enough to previous experience (thus maintaining one step ahead of the deceived, for

example) (d) or a completely novel experience (e). The logic employed in f) and g) do not demand that a subject displays a new behavior each time a novel situation occurs, but f) relies on either the new situation involving a different individual and the same interpretation of the situation. If, however, the individual who is deceived, for example, is the same individual in the previous experience—the deceived is either not equipped with the ability to “figure things out” (i.e. too dumb to learn) or simply that the deceiver’s behavior is relatively new.

Looking at a) and b), the question begs: when did behavior originate? At some point, the behavior must have been an act of creativity (overcoming an obstacle) and either must be learned and remembered continuously throughout generations (thus lowering the amount of creativity in chimpanzees) or spontaneously occurs throughout chimpanzee populations more often, rather than a behavior lineage of some sort (thus heightening the creative abilities in chimps). The former relies on the assumption that chimpanzees have less of a capacity for creative tactical deception or protean behavior. What *must* be understood, however, is the fact that if this were the case, a chimpanzee would require the ability to understand the difference between a deceptive tactic and a behavior that accidentally may have been deceptive.³

If Chimp X learned a deceptive tactic from Chimp Y, not only the behavior and the outcome have been committed to memory (representations), but the *motive* or *appropriateness* of behavior must be understood as well. This indicates that chimpanzees do indeed possess an understanding of others’ mental states based on the requirement of understanding the concomitant basic *point* of a deceptive behavior. In sum, chimpanzees would have to be able to understand the rationale of a deceptive tactic as well as the *ability not to be fooled* in order to learn from another chimpanzee.

In a naturalistic setting, there is no *a priori* reason to foreclose on the possibility that even scientists cannot be fooled by such a potentially subtle behavior. The fact that such surprising finds have been so recent in the realm of primatology only reinforces this. If we are susceptible to projecting our own anthropomorphizing minds onto others, we certainly may not account for certain subtleties. Some data collection methods simply are not capable of keeping such a close watch on a number of individuals (Altmann 1970). Problematically, however, experimental settings are susceptible—and frequently under scrutiny from—to the skeptical argument that the chimpanzees were taught a focal behavior.

However, should we think of the ToM in an Either/Or manner? If we discount the prescribed “collaborative intentionality”,

chimpanzees, it would seem, have the capacity to read other's minds—but with a limited number of abstraction-level mental state categories. The category which they fail to fulfill is likely concomitant to more complexly social animals—i.e. humans. If ToM is modular, “collaborative intentionality” should not necessarily be a condition—such an extra or more complex system of social cognition is likely equipped with another cognitive mechanism at work—rather than more encapsulated information. In other words, chimp ToM is likely only equipped with the mental abstractions of “seeing” and “desiring”, with an emphasis on how to properly exploit *others* in order to benefit one's self (egocentric) whereas human ToM *can be employed* to accommodate collaborative intentionality—arguably made possible only by another psychological mechanism.

Returning to Baron-Cohen's explication of “mind-blindness”, we find what he calls the “Autism Spectrum” (2003). At the extreme end of this spectrum, we find low-functioning autists who are unable to perform false-belief ToM related tasks that individuals with Down's syndrome can perform (1997: 71). Baron-Cohen briefly discusses the difference between high-functioning autists and those who have Asperger's syndrome (AS) who have difficulty in picking up on social cues: “Compared with someone of the same age and IQ level without autism, all people with autism or AS are seen as socially odd, odd in their communication, and unusually obsessional, to varying degrees” (2003: 136). If there is, then, an Autism Spectrum, is there not conversely and ToM spectrum?

What a “degree” model would throw into question is how developed *our own* ToM truly is in terms of informational encapsulation. Intuitively, it is probably not so much the case that “dreaming” is an innate concept, but such innate mental abstractions such as “knowing” or “believing” are likely evolutionarily sound mechanisms to have. It is also more likely that such initial characteristics of human ToM are not much different from a chimp's— we simply obtain more stimulus, both quantitative and qualitative, which would expand our understandings of others' mental states. In sum, then, a ToM spectrum should stimulate the question that there may be some variability in the information encapsulated within our modules. In addition, it opens yet another question: is there variability in translation from essential information to behavior? Put differently, if our ToMM contains the same essential elements that a chimp's does, why is there a cognitive limitation on how it is used? Is it simply a matter of language?

Conclusion

It seems that the debates need not be black or white in the case of ToM. Specifically, why should we confine ToM as an “Either/Or” debate rather than a matter of “degree”? From an evolutionary standpoint, it is possible that at the level of mental abstractions, chimpanzees simply did not require an elaboration of the basic aspects of ToM found in 2-year-old (desires and perceptions) and 3-year-old (remember) humans. Along the same lines, the chimpanzees’ understanding of others’ mental states may simply be regarded as less developed or more restricted than humans’. However, until we have a better understanding of how our *own* minds work, the debate will likely not see a conclusion any time soon, and nor should it. Bridging the chasm between our distant cousins and ourselves will be no simple task, but nevertheless a worthy one.

Footnotes

¹ While the term “module” and its applicability continues to rouse much debate (one such example is found in Fodor 2000; Pinker Forthcoming; Sperber 2002), it should be clear that employing this terminology is unavoidable given the nature of the debate discussed below. In addition, see the difference between “diachronic” and “synchronic” modularity as discussed in Scholl and Leslie (1999).

² Here, Scholl and Leslie are suggesting longitudinal variability. Below, I question cross-species variability of the same or similar mechanism(s) at a fully-functional degree.

³ In an engaging article, Kristin Andrews (2005) argues that the experiments that researchers employ—particularly Povinelli and Vonk—actually operate with the tacit assumption that a *human* child’s mind is not equipped with a ToM. Povinelli and Vonk operate similarly to the above-mentioned logic.

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