

The Plight of the Sense-Making Ape

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Summary

This is a selective review of the published literature on object-choice tasks, where participants use directional cues to find hidden objects. This literature comprises the efforts of researchers to make sense of the sense-making capacities of our nearest living relatives. This chapter is written to highlight some nonsensical conclusions that frequently emerge from this research. The data suggest that, when apes are given approximately the same sense-making opportunities as we provide for our children, they will easily make sense of our social signals. The ubiquity of nonsensical contemporary scientific claims to the effect that humans are essentially – or inherently – more capable than other great apes in the understanding of simple directional cues is, itself, a testament to the power of pre-conceived ideas on human perception.

4.1 Introduction

Is the development of a theory of evolution by natural selection a human capacity? Contemporary psychological methods would argue “no”, because it is far from typical. Developing a theory of evolution by natural selection is an exceedingly rare behavior. In the mid-19th century, the population of the world was approximately 1.3 billion people. Two of these people, Charles Darwin and Alfred Russell Wallace (Darwin and Wallace, 1858), independently developed theories of evolution by natural selection. The proportion of the human population displaying the behavior of creating theories of evolution by natural selection was roughly 1 in 650 million.¹ This is, thus, a vanishingly rare human behavior. Contemporary psychology, with its reliance on hypothetico-deductive use of inferential statistics, must conclude that these kinds of brilliant scientific insights are utterly deviant. Psychology has become blind to the rare, incapable of appreciating brilliance, enslaved by the cold conceptual blinders of the mode, the median, and the mean (Sidman, 1960). Its methodological obsession with the typical has left psychology frequently incapable of

¹ Inclusion of several scholars’ anticipations of Darwin’s synthesis (e.g., Matthew, 1831; Wells, 1818) does not substantially alter the conclusion that the development of a theory of evolution is an extremely rare human behavior.

detecting, let alone explaining, the atypical. In no sub-discipline is this more evident than in comparative psychology, where, as we shall see, extraordinary animal feats are often dismissed as anecdotes or artifacts, and high performances are either rejected or subsumed into “group means” in which the manifest sophistication of the few is buried in the feebler response patterns of the many. I will argue, here, that the chief methodological failing that accounts for this submersion of evidence for social understanding in animals is the reckless grouping of animals who have had incommensurate life history experiences (see, e.g., Hopkins et al., 2013; Leavens and Bard, 2011; Lyn et al., 2010; Russell et al., 2011). While this sampling error is not characteristic of the entire field of comparative psychology, a surprisingly large proportion of recent investigations into the sociocognitive abilities of our nearest living relatives, the great apes, display a puzzling and unwarranted insensitivity to the fact that our animal and human subjects bring task-relevant experiences of varying degrees to our experimental challenges.²

Although we can all benefit from the singular insights of the rare genius – in science, technology, and artistic expression – we cannot all generate these insights. Given the same background literature and similar intensive exposure to the minutiae of the natural world, both Darwin and Wallace perceived the decimating effects of the struggle for existence and their implications for both diversity of natural forms and their contextual *savoir-faire*. They are considered geniuses for their insight, but they were also studying similar ecological and biological phenomena, with similar intellectual foundations – both, for example, acknowledged the influence of Malthus’s (1798) treatise on human populations on their thinking. Darwin and Wallace, thus, made manifest certain ideological syntheses that were immanent in the intellectual and natural worlds of their time.

In this chapter, I will introduce a handful of high-performing apes. I will use each example to argue that close consideration of these individuals’ cognitive competencies will illuminate two issues with which both philosophers of mind and cognitive scientists are intimately concerned. First, I will argue that the contemporary psychological analytical obsession with the “typical” is too intellectually impoverished to discern substantive influences on cognitive performance. The problem emerges because these studies are plagued by the usually implicit, but completely false, assumption that genotypically representative animals

² I thank Louise Barrett for bringing to my attention that there are many examples in comparative psychology of researchers avoiding the kinds of errors I discuss in this chapter.

are phenotypically (or psychologically) representative of their species.³ Second, I will argue that these examples poignantly underscore the urgent need for a phase shift in our scientific and philosophical axioms about the mental lives not only of animals, but of ourselves; specifically, a wide range of cognitive phenomena might be more profitably studied as dances at the interface of body and environment than as the output of neural software programs, written by natural selection into our genomes.

Apes' abilities to follow pointing or other directional cues are exhibitions of their skill in interpreting culturally conventional behaviors; pointing is, itself, an anatomically variable behavior, both within and between cultures, and intrinsically meaningless (e.g., Tomasello et al., 2007). For example, lip-pointing is the canonical form of pointing in many non-Western populations (e.g., Enfield, 2001; Wilkins, 2003). Thus, the ability to interpret pointing or any other deictic signal depends on processes external to the signal itself. One of the most vigorous debates in the contemporary cognitive sciences is over the question of whether these processes entail (a) the codification of intent into a signal which is transmitted and then the original intent recovered through an act of inference or simulation (the Information-Theoretic view – see, e.g., Tomasello et al., 2007) or (b) the direct perception of communicative intent in organisms whose perceptions have been shaped through experience to perceive the relevant patterns as meaningful (e.g., Leudar and Costall, 2004).

4.2 Chantek and Puti: case studies in sharp contrast

Consider Chantek, an orangutan, currently living in Zoo Atlanta in Atlanta, Georgia, USA. Born in captivity in 1977, at Yerkes Primate Center in Atlanta, Georgia, USA, Chantek was taken into a language-training program at the age of nine months, at the University of Tennessee at Chattanooga (Miles, 1990). As Miles put it, “Chantek was not just trained to use signs; he was immersed in a human cultural environment and learned the rules for behavior and interaction, a process anthropologists call *enculturation*” (1990, p. 513). During this project, Chantek acquired approximately 140 signs, using them in context-appropriate ways. Like many other apes, including many captive apes who have not been enculturated, he displayed recognition of himself in a mirror, attempted occasionally to deceive his

³ Again, thanks to Louise Barrett for her suggestion to more finely discriminate between population-level and sample-specific analyses; the thrust of this chapter is to argue against the reckless generalization to populations of unrepresentative or illegitimately aggregated samples.

caregivers, and manifested the ability to take somebody else's point of view, sometimes moving somebody's head so that they could see the signs he was making. At nine years of age, he was returned to the Yerkes Primate Center; subsequently, in 1997, he was given to Zoo Atlanta, where he remains.

Thus, Chantek gained a close understanding of human interactional dynamics for over eight years before being re-institutionalized at the Yerkes Primate Center in the mid-1980s. In the early 1990s, an enterprising young graduate student from Emory University, Josep Call, noticed that Chantek frequently pointed to items in the environment, usually in apparent requests for their delivery (Call and Tomasello, 1994). Although pointing had been reported in enculturated great apes for decades – dating from Witmer's (1909) report of pointing by a performing chimpanzee named Peter – according to the predominant theories in the developmental psycholinguistics of the late 1980s and 1990s (Leavens, 2013) pointing was a human species-specific gesture, an adaptive signal “designed” by natural selection for the creation of joint visual attention to a common, shared locus or entity (e.g., Baron-Cohen, 1989; Butterworth and Grover, 1988; Petitto, 1988). Call was interested in gestural communication, particularly in great apes, and he immediately recognized the scientific relevance of Chantek's pointing. In collaboration with his doctoral supervisor, Michael Tomasello, he set out to study Chantek's pointing behavior, along with the pointing of another orangutan, a female named Puti.

In contrast with Chantek's upbringing, Puti was both born and raised in the institutional setting of the Yerkes Primate Center. Like many captive apes, Puti was born to a mother who lacked adequate mothering skills, so she was raised in a standard biomedical nursery environment for her first two years, before being transferred to a small group of orangutans. Standard nursery rearing procedures were developed from the knowledge gained from raising monkeys and apes in social isolation (e.g., Harlow et al., 1965). Isolation-reared animals were profoundly affected, growing into adults who could not form stable social relationships with conspecifics. A significant goal of this research program was to find effective methods to ameliorate the global social deficiencies in animals raised apart from their mothers. That later work identified the presence of conspecific peers as a significant buffer against some of the more extreme emotional trauma induced by social isolation (e.g., Suomi et al., 1976). Thus, a standard nursery rearing protocol for great apes (at least through the end of the 20th century) involves regular feeding, diaper-changing, and some incidental, husbandry-related interaction, but – crucially – infants are expected

to satisfy their emotional needs from their interactions with same-aged peers; human caregivers are typically not trained to provide emotional comfort, intellectual stimulation, or even the fostering of species-typical communicative signals. Astonishingly, some contemporary researchers refer to apes raised in these stark, socially impoverished circumstances as “human-reared” (e.g., Warneken et al., 2006; for discussion: Bard and Leavens, 2014; Leavens and Bard, 2011; Leavens et al., 2008; Lyn, 2010), thus failing to discriminate between animals like Chantek, who was steeped in human cultural practices for almost the entirety of his juvenile life, and animals like Puti, who was left to fend for herself, who did not experience the daily love, laughter, and play from a primary caregiver of any species who spontaneously cherished her for much of her infant life, and was then cast out of the nursery into the general, institutionalized ape population.

Call and Tomasello (1994) tested both Chantek and Puti on their production and comprehension of pointing gestures. Both Chantek and Puti were already pointing at the start of the study, but Puti had only recently been trained to point to a container of juice, in a separate study; Chantek tended to point with his index finger, whereas Puti pointed primarily with all fingers extended. Call and Tomasello (1994) set up three containers in a row outside the subjects' cages, each surrounded by a wire mesh enclosure with a hinged lid, which was, in turn, locked with a padlock. To access food that had been placed in the container, a rake-like tool was used to pull the container to the side of the wire cage, so that the experimenter could reach through the wire mesh and retrieve the food. When required to point only to the baited container (Non-tool Condition) or to point only to a tool required to access a baited container (Tool Condition), both Chantek and Puti pointed accurately to these single targets.

However, in a more difficult test, the Hidden Tool condition, a striking performance difference emerged between the two apes. In this Hidden Tool condition, a confederate baited one of the three containers, pushed the container out of reach to the center of the wire cage, then hid the rake-like tool behind one of three cloths hanging on the wall opposite the subjects' cages, before leaving the area. The orangutans' task, then, was to indicate to a second experimenter, with pointing gestures, (a) the location of the hidden tool and (b) the location of the baited container. In the first 22 trials in this condition, Chantek correctly indicated both the tool location and the location of the hidden food significantly above chance, although his performance in the latter half of the experiment was substantially better than in the first half

(he pointed correctly to both the food and the tool in nine out of ten of the last ten trials). Puti, on the other hand, failed to indicate the location of the tool in all 22 trials. After some initial pointing, by the second half of testing she had ceased responding altogether. Puti was placed under remedial training and eventually began to point to both the tool location and the location of the food. Interestingly, she adopted a temporary tactic of climbing up the walls of her cage and gazing pointedly at the location of the hidden tool on the opposite wall, but this behavior was ignored by the experimenter (i.e., not rewarded), because the task, as apparently conceived by the experimenters, was to point manually.

In a subsequent test of the orangutans' comprehension of pointing, the same containers and cages were used. An experimenter took all three containers behind an occluding screen and baited one of them, then put all three containers back into the three wire cages, placing the containers so that no tool was required to access them. Before leaving the room, she pointed with her index finger to the baited container. After her departure, a second experimenter entered the area and used the orangutans' pointing to find the location of the baited container, delivering the food to the orangutans when the apes pointed to the correct container (this is an adaptation of an earlier study of chimpanzees by Woodruff and Premack, 1979). Again, Chantek outperformed Puti, performing significantly above chance in pointing to the baited container, demonstrating that he comprehended the pointing of the first experimenter. Puti, on the other hand, performed almost exactly at chance levels (32% correct, when chance performance was 33% correct, or one out of three).

In a third and final experiment, Call and Tomasello (1994) tested the effects of audience characteristics on the production of pointing by Chantek and Puti. They filled two translucent containers with different amounts of juice, and presented them in view, but out of reach, of the orangutans, about 60 cm apart. After the presentation, the experimenter adopted one of four attentional states for about 30 seconds: (a) he left the room (Out), (b) he went to a corner of the room and turned his back to the subjects (Away), (c) he continued to sit facing the subjects but closed his eyes (Eyes Closed), and (d) he continued to sit facing the subjects with his eyes open (Eyes Open). The researchers recorded how many pointing gestures the two orangutans produced during these 30-second epochs. Both Chantek and Puti clearly discriminated in their pointing behavior between the first two conditions (Out and Away) and the second two (Eyes Open and Eyes Closed) by pointing significantly less often in the Out and Away conditions,

compared with the Eyes Open and Eyes Closed conditions. However, Chantek also pointed significantly less when the experimenter had his eyes closed than when his eyes were open (thus demonstrating his discrimination between these states of the eyes), whereas Puti did not discriminate between these two conditions in her pointing behavior. Thus, once again, Chantek displayed a superior understanding of these human attentional cues. In summary, the orangutan who had had over eight years of close contact with human cultural practices (Chantek) was more sensitive to human non-verbal cues than was the orangutan who had been institutionalized from birth (Puti). Call and Tomasello (1994) sensibly concluded that

When this result is taken in conjunction with other recent findings of differences among apes with different types of experience with humans, the methodological lesson is clear: It is not wise at this point to make generalizations about the cognitive capacities or incapacities of apes without some explicit accounting of their previous experience, especially with humans. (Call and Tomasello, 1994, p. 316)

Thus, Call and Tomasello (1994) emphasized the seemingly obvious point that apes who have more experience with humans will be better capable of reading humans' non-verbal cues, or body language, than apes who have languished in austere institutional settings. The differences between Chantek and Puti in their sociocognitive skill sets were fairly large, and Chantek's superiority in these kinds of challenges would seem to implicate his enriched upbringing, relative to Puti's neglected, institutional rearing history. Unfortunately, what seems obvious from this pair of case studies evidently becomes murky through the analytical glass of inferential statistics.

4.3 The ignoble mean

Only three years after this study of pointing production and comprehension by Call and Tomasello (1994), they conducted a cross-species comparison between nine great apes (six chimpanzees and three orangutans, including Chantek) and 48 human children (Tomasello et al., 1997). In this study, the researchers sought to determine whether there was any evidence for a species-specific human specialization in the ability to perceive the communicative intentions of others. The basic approach exemplifies what is known as the "object-choice task": behind an occluder, one experimenter, the Hider, placed a desirable reward into one of three different containers, arrayed between the Hider and the subjects. After one of the

containers had been baited, the curtain shielding this baiting process was withdrawn. Behind the Hider was the Communicator, who had observed which container had been baited, and then, after the curtain was opened, indicated to the subjects which of the three containers had been baited in one of three different ways: (a) she pointed to the baited container, (b) she placed a wooden marker on the baited container, or (c) she held up an exact duplicate of the baited container. For present purposes, we shall focus on the pointing cue condition (see Figure 4.1 for a schematic of the object-choice task with three containers and a pointing cue).

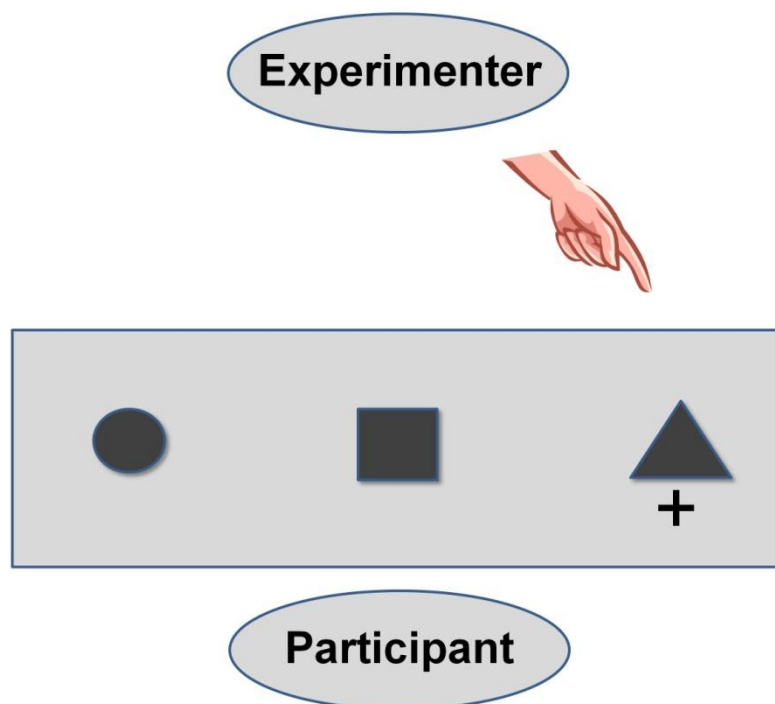


Figure 4.1 Schematic of a three-choice object choice task, similar to those used in Call and Tomasello (1994), Tomasello et al. (1997), and many others. The triangular container has been baited by an experimenter, behind an occluding screen, and the participant is presented with a cue, in this case a pointing gesture. The plus sign indicates that selecting this container will result in delivery of the reward hidden there

For a three-location choice, we expect one out of three correct choices by random chance alone (33% correct). Each child was given six trials in each condition, so, to be significantly above chance, they had to get at least five trials correct out of every six in each condition. Only 17 of 24 two-and-a-half-year-olds (71%) and 17 of 24 three-year-olds (71%) displayed comprehension of pointing in this study. Thus, on

this evidence, fully two-and-a-half to three years of immersion in a human cultural environment is insufficient to elicit pointing comprehension in almost 30% of humans.

In comparison, the great apes were given 18 trials in each condition, and, to achieve above-chance performance, they needed to select the correct container on at least 11 of the 18 trials. Only one of the nine animals passed the test (11% of the sample). Would the reader care to guess which ape it was who passed the test? Yes, it was Chantek, who had already demonstrated his comprehension of human pointing in the controlled scientific conditions of Call and Tomasello (1994). Tomasello and his colleagues noted that the children performed better than the apes in using novel signs to indicate the bait location (markers, replicas), and concluded, reasonably enough, that the children were superior to the apes in generalizing the task to use novel kinds of cues. Astonishingly, however, they concluded that the superior human performance was attributable to the different evolutionary histories of the participants, both human and ape. In other words, their argument boiled down to a claim that the humans performed better in generalizing because of cognitive capacities that are unique to human beings. Despite paying considerable attention to some of the procedural differences applied to the humans and the apes, the authors failed to make even a single mention of the possibility that raising apes in cages in a biomedical research institution might have deleterious effects on their abilities to read human cues, especially when they are compared with humans who have not been so isolated from human cultural milieux. This oversight constitutes both (a) a tacit commitment to the idea that pre-experimental experiences are irrelevant to the skill of following human pointing gestures and (b) a repudiation of the conclusions of Call and Tomasello (1994). This interpretative stance is, therefore, anti-ontogenetic. However, I digress, slightly.

One of the research questions considered in this study (Tomasello et al., 1997) was the question of whether humans might have a superior understanding of the pointing gesture compared with the apes. Tomasello et al. reported that the apes did not perform above chance in following the pointing gestures, even when the high-performing Chantek was included in the group-level analysis (“including Chantek still yields nonsignificant results”, p. 1076). Thus, in addition to the failure of the apes to generalize to novel cues, Tomasello and colleagues argued that apes were relatively poor at comprehending pointing, as a group. In other words, the claim is that, *on average*, apes are worse than humans at comprehending these cues.

My colleagues and I have pointed out, repeatedly (e.g., Hopkins et al., 2013; Leavens et al., 2010; Leavens et al., 2008; Lyn et al., 2010; Racine et al., 2008), that it is not legitimate to compare institution-raised apes with human children sampled from urban or suburban Western, postindustrial environments. Of the nine apes in that study, only Chantek and Erika (a chimpanzee) had experienced the kind of close, daily interactions with human caregivers that characterize the kind of enculturation described by Miles (1990; see Itakura et al., 1999, for information on Erika's rearing history). The other seven apes in this study had been isolated from the patterns of engagement typical of human family environments for the entireties of their lives, and were therefore not a legitimate comparison group to the human children. (In other words, if these institutionalized apes perform differently, as a group, from non-institutionalized human children, it is always going to be ambiguous whether the difference is due to the groups' separate evolutionary histories or to their radically different levels of pre-experimental enculturation; see, e.g., Leavens et al., 2008; Racine et al., 2008.)

When the data are analyzed correctly, comparing only those participants who had been enculturated, then 17 of 24 two-and-a-half-year-old humans (71%) and 17 of 24 three-year-old humans (71%) passed the pointing comprehension test (by selecting the baited container at levels significantly greater than expected by chance), whereas one of two enculturated apes (50%) passed this test. By Fisher's exact test, there is no significant difference in performance between either the younger or the older human children and these two apes ($p = .53$ in both comparisons), although the small sample of two apes argues for caution in interpreting this finding. The essential point here is that, as soon as we make the slightest attempt to match our participants on the life history variable of human cultural experience, the alleged "species difference" between them in the comprehension of pointing disappears. This pattern is lost when we illegitimately lump enculturated animals with institutionalized animals and then take a group average as representative of a given species' capabilities (see Hopkins et al., 2013, for related discussion of the facile comparison of pet dogs with institutionalized apes).

This essential point (that, when apes are given the same kinds of opportunities as human children to learn about human non-verbal cues, then they tend to comprehend human cues as well as human children do) is underscored by a slightly later study of chimpanzees conducted by Itakura and his colleagues (1999). This study comprised two experiments, the second of which I wish to discuss in some detail. These

researchers had the very clever idea that, if they paired human gaze cues towards a baited container (one of two possible hiding places) with chimpanzee-species-specific food barks (also known as “rough grunts”; see, e.g., Schel et al., 2013a, 2013b), then this Food Bark experimental condition might facilitate the chimpanzees’ comprehension of human gaze cues, relative to the gaze cue without accompanying sounds (Gaze 1 and Gaze 2) or with concomitant nonsense words (Word). The chimpanzees were administered 24 trials in each of four conditions: (a) Gaze 1, (b) Word, (c) Food Bark, and (d) Gaze 2. The researchers found only equivocal evidence for their hypothesis: numerically, the highest average performance by the chimpanzees was in the Food Bark condition, and overall performance in the Food Bark condition was also significantly better than in the pooled gaze conditions (Gaze 1 and Gaze 2), but there was no statistically significant difference between the Word and Food Bark conditions, leading the authors to conclude that chimpanzees may not perceive food calls as referential signals (see, e.g., Slocombe and Zuberbühler, 2005, for more recent data and arguments to the contrary).

The authors also concluded that chimpanzees were relatively poor, as a group, at comprehending human non-verbal cues, unless they had been enculturated. Itakura and his colleagues (1999) noted that the two enculturated chimpanzees performed quite well: Erika, introduced above and who performed significantly above chance in three out of the four experimental conditions, and Peony, who selected the baited container in all 96 of 96 consecutive trials (100% correct in all four conditions). They hypothesized that rearing with humans may cause apes “to develop more human-like social-cognitive skills” (p. 455), here echoing the speculations of Call and Tomasello (1996). The idea that being raised by humans induces human-like social-cognitive skill in great apes warrants more space than I have to devote to the matter in this chapter. The key to understanding where I disagree with Call and Tomasello (1996) is their belief that the ability to follow pointing and gaze cues requires sophisticated inferential reasoning processes not usually found in non-humans, whereas my colleagues and I have long argued that there is no evidence that any inferential processes are involved in these skills, either in humans or in apes, or, indeed, in other animals (e.g., Leavens, 2012a, 2012b; Leavens et al., 2004; Lyn et al., 2010). In any event, in the sentence immediately after Itakura and colleagues speculated about the influence of humans on the mental development of great apes, they return to the mainstream dogma, concluding that their study constituted continuing evidence for “chimpanzees’ difficulties in using the simple gaze direction cue” (p. 455), as if

either (a) Erika and Peony were not “real” chimpanzees or (b) they were unrepresentative of chimpanzees. The present chapter is my attempt to make it clearer that Erika’s and Peony’s superior performance in interpreting human gaze cues is completely representative of chimpanzees who have been given the same opportunities to engage with humans that we give to our human children.⁴

I think that it ought to be patently obvious that it is illegitimate to simply lump enculturated organisms with institutionalized animals to support statements about species’ capacities. To support this claim, I asked a simple question: is there any evidence from Itakura et al. (1999) to support the contention that the enculturated and institutionalized chimpanzees in this study were sampled from the same population? Like Itakura et al. (1999), I lumped the data on the two identical gaze conditions, and found that the enculturated chimpanzees performed significantly better than the institutionalized chimpanzees on each of the three types of measures (Gaze: $t(10) = 3.60, p = .005$; Word: $t(10) = 3.65, p = .004$; Food Bark: $t(10) = 4.48, p = .001$). These data are depicted in Figure 4.2. From the standpoint of the ability to read human non-verbal cues, these data demonstrate that enculturated chimpanzees are superior to institutionalized chimpanzees; that is, the apes in Itakura et al. (1999) were not sampled from the same population, but represent two different populations, with different response characteristics to this kind of psychological challenge (just as we saw for Chantek in the preceding sections). Therefore, it is not methodologically proper to combine the data from Erika and Peony with the data from the non-enculturated, institutionalized chimpanzees.

The point of this exercise is to raise the question: have Erika and Peony stopped being chimpanzees? Of course not: genetically, anatomically, and psychologically, they are chimpanzees; they epitomize the very simple and obvious observation that how organisms act in adulthood is, in part, a function of their early rearing experiences, which is something we have known for thousands of years (e.g., the biblical injunction to discipline one’s children: “[h]e that spareth his rod hateth his son: but he that

⁴ Louise Barrett noted that some researchers view enculturation of animals as constituting a kind of contamination of their species’ “true” capabilities and, hence, they believe that the performance of institutionalized animals that have been, to some degree, isolated from human cultural practices is more “representative” of a species’ abilities. I acknowledge that this is an opinion extant in the literature, but have argued elsewhere (e.g., Leavens et al., 2008) that this position requires the premise that human normative profiles for cognitive performance are uninfluenced by human exposure to human cultural practices. Because this is so obviously untrue (e.g., Henrich et al., 2010; Nelson et al., 2007), I will not devote further space to the idea here.

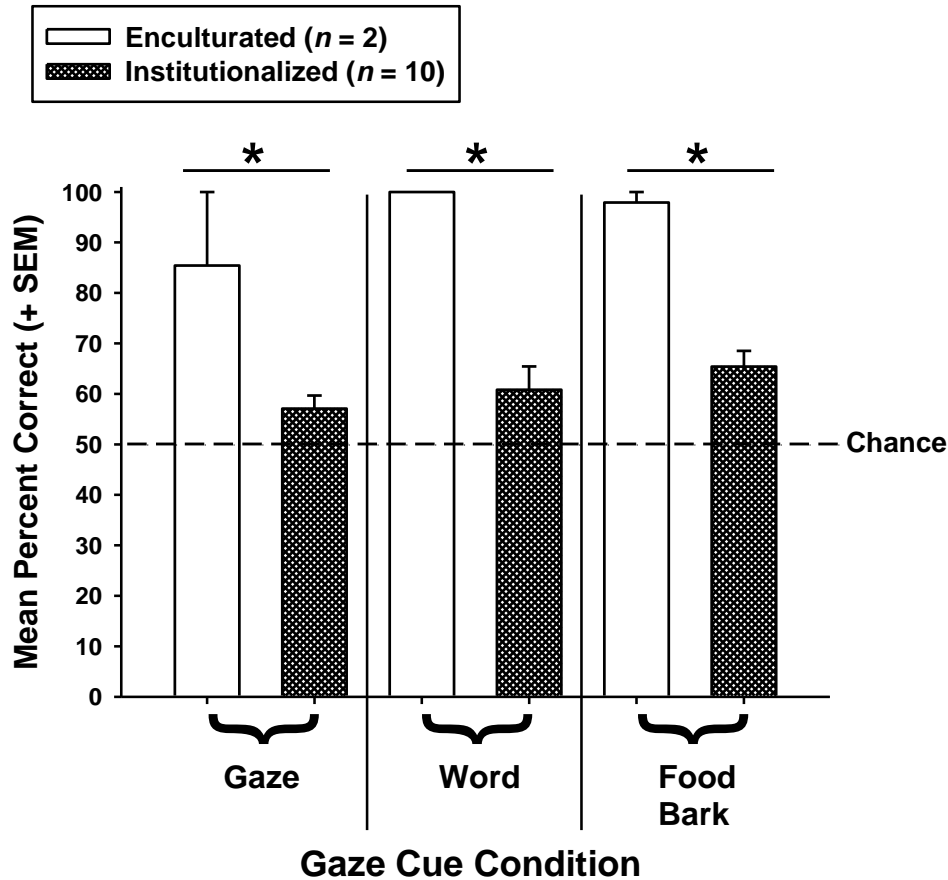


Figure 4.2 Enculturated chimpanzees systematically outperformed institutionalized chimpanzees in using human cues to find food. Data re-analyzed from Itakura et al. (1999), their table 2. Initial and final Gaze cue conditions have been combined for analysis in this figure, as they were combined for analysis in the original study

loveth him chasteneth him betimes”, Proverbs 13: 24). Thus, these “superstar” apes, Chantek, Peony, and Erika, far from being geniuses among apes, are actually representative of apes whose developmental trajectories have been grounded in complex human cultural environments. This point is underscored still further if we look at the performances of larger samples of enculturated apes.

4.4 Systematic influences of human enculturation on great apes

There are very few groups of enculturated apes; historically, most enculturated apes were raised individually, apart from other apes (e.g., Furness, 1916; Gardner and Gardner, 1969; Hayes and Hayes,

1954; Kellogg and Kellogg, 1933; Ladygina-Kohts, 1935/2002; Miles, 1990; Patterson, 1978; Witmer, 1909), and so systematic comparisons between groups of enculturated apes and non-enculturated apes have been impossible until relatively recently. The Premacks designed a comparison between language-trained chimpanzees and a non-language-trained control group (e.g., Premack and Premack, 1983). The Gardners also raised a group of chimpanzees in a human cultural environment (e.g., Gardner et al., 1989). Another group of enculturated apes, enlisted for language studies by Rumbaugh and Savage-Rumbaugh, includes a number of chimpanzees at the Language Research Center in Atlanta, Georgia; this group includes a number of stars of the ape language studies: Lana, Sherman, Austin, Panzee, and a number of other chimpanzees (e.g., Rumbaugh, 1977; Rumbaugh et al., 2008; Savage-Rumbaugh, 1986). Rumbaugh and Savage-Rumbaugh are responsible for the creation of another group of enculturated apes: the enculturated bonobos (formerly known as “pygmy chimpanzees”) at The Great Ape Trust (now the Ape Cognition and Conservation Initiative) in Des Moines, Iowa, including Kanzi, Panbanisha, and others (e.g., Savage-Rumbaugh et al., 1998).⁵

One of the most obvious effects of enculturation on great apes is that, as far as I know, all home-raised or language-trained apes use pointing gestures in their daily lives. Pointing is extremely rare in wild apes (e.g., Hobaiter et al., 2014; Leavens et al., 2010; Veà and Sabater-Pi, 1998), whereas about half of institutionalized apes point (Leavens and Bard, 2011); yet, pointing is ubiquitous among home-raised or language-trained apes (e.g., Leavens and Bard, 2011; Leavens et al., 2010). On the face of it, given the high frequency of productive pointing in captive populations of great apes, it is therefore puzzling that so many researchers report that great apes have difficulty in comprehending pointing gestures and other non-verbal deictic cues, such as gaze direction, in object-choice task experimental contexts (e.g., Herrmann et al., 2007; Kirchofer et al., 2012; Povinelli et al., 1997; Tomasello et al., 1997). Of course, the reason for this puzzle is that it is much easier to gain access to institutionalized apes, who generally perform at mediocre levels in these kinds of tasks, than it is to gain access to enculturated great apes; enculturated apes have no difficulty in comprehending pointing and other non-verbal deictic cues.

⁵ Thanks to an anonymous reviewer for pointing out that ape rearing histories are far more varied than the institutional vs. enculturated comparison highlighted here (see, e.g., Leavens and Bard, 2011; Leavens et al., 2009; Racine et al., 2008). Thanks also to Rose-Anne I. Roy-Chowdhury for noting that the animals I am characterizing here as “enculturated” have not been, in fact, enculturated in the same way that we have been enculturated.

To illustrate this, Lyn et al. (2010) compared great apes on the comprehension of pointing in an object-choice task. They had access to six institutionalized chimpanzees at the Yerkes Primate Center, seven enculturated bonobos at the Great Ape Trust, and four enculturated chimpanzees at the Language Research Center. Figure 4.3 summarizes their findings: only 20% of institutionalized chimpanzees passed the object-choice task, but 71% of enculturated bonobos and fully 100% of the enculturated chimpanzees passed the battery of tests (Lyn et al., 2010).

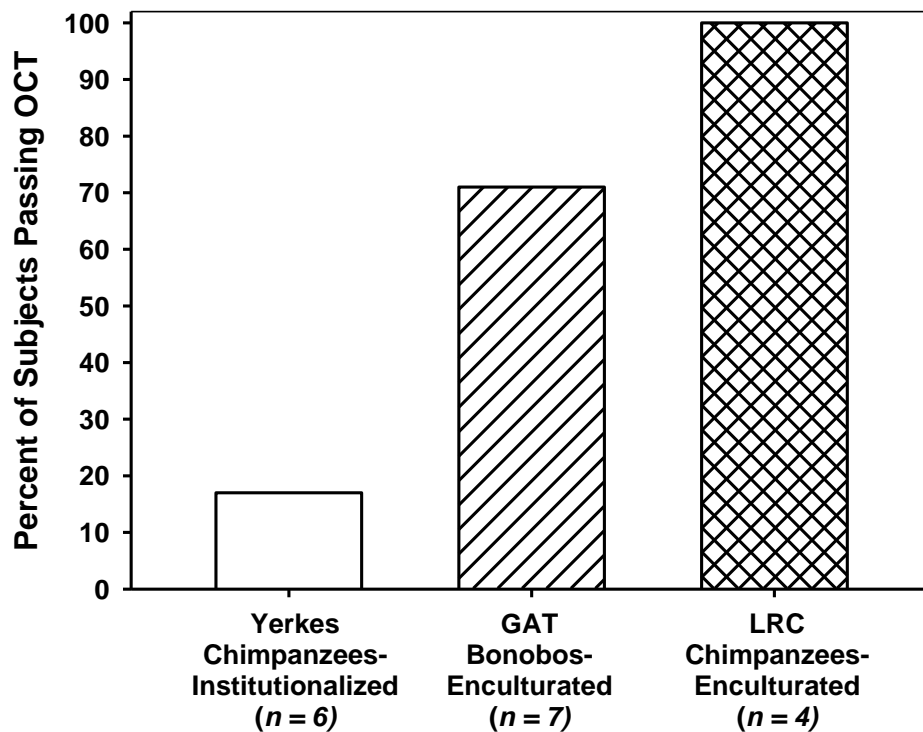


Figure 4.3 Enculturated chimpanzees and bonobos systematically outperformed institutionalized chimpanzees in using human cues to find food. Data from Lyn et al. (2010), their figure 2. GAT = Great Ape Trust in Des Moines, Iowa. LRC = Language Research Center, Atlanta, Georgia. OCT = object-choice task

For comparison, recall that 71% of the two-and-a-half- to three-year-old children passed a three-location object-choice task in Tomasello et al. (1997), and, in a two-location object task, between 83% and 100% of the three-year-old children in Povinelli et al. (1997) passed the task at levels significantly above chance.

Thus, when humans and great apes are approximately matched for early rearing experiences of enculturation, the much ballyhooed (and completely mythical) "species differences" in comprehension of non-verbal cues disappears: both human children and enculturated apes perform similarly in similar tests of their sociocognitive skills, at least as measured in object-choice tasks (see, e.g., Leavens and Bard, 2011; Leavens et al., 2008; Lyn, 2010, for reviews).

4.5 Conclusions

There are at least two substantive conclusions from the analyses presented here. First, when apes have been matched, even only approximately, with human children for pre-experimental experience with human sociocultural practices, then they perform similarly to human children (Leavens et al., 2008). The currently popular idea that humans have some cognitive specialization for understanding social, non-verbal, referential cues (such as pointing and gaze direction) is a myth (Leavens, 2012a, 2012b). Apes can and do make sense of human non-verbal communication when they have sufficient exposure to these kinds of social signals.

Second, a shockingly high proportion of contemporary studies on comparative social cognition contain reports of performance data from groups of apes that have been illegitimately averaged together. As the present analyses make abundantly clear, enculturated apes are not sampled from the same psychological population as institutionalized apes (Figures 4.2 and 4.3). Therefore, any averaged data calculated from the dubious practice of combining participants from these distinctly different populations are inherently meaningless – the means have no meaningful interpretation.

These considerations are summarized in Figure 4.4. In this figure, two hypothetical learning curves are represented: a learning curve associated with enculturation (dotted line) and a learning curve associated with isolation from human cultural practices (dashed line). The solid line in this figure represents the “mystical mean”: a mythical, fallacious performance curve that is lower than the enculturation curve by virtue of wrongly calculating an average performance on a heterogeneous collection of enculturated and institutionalized organisms.

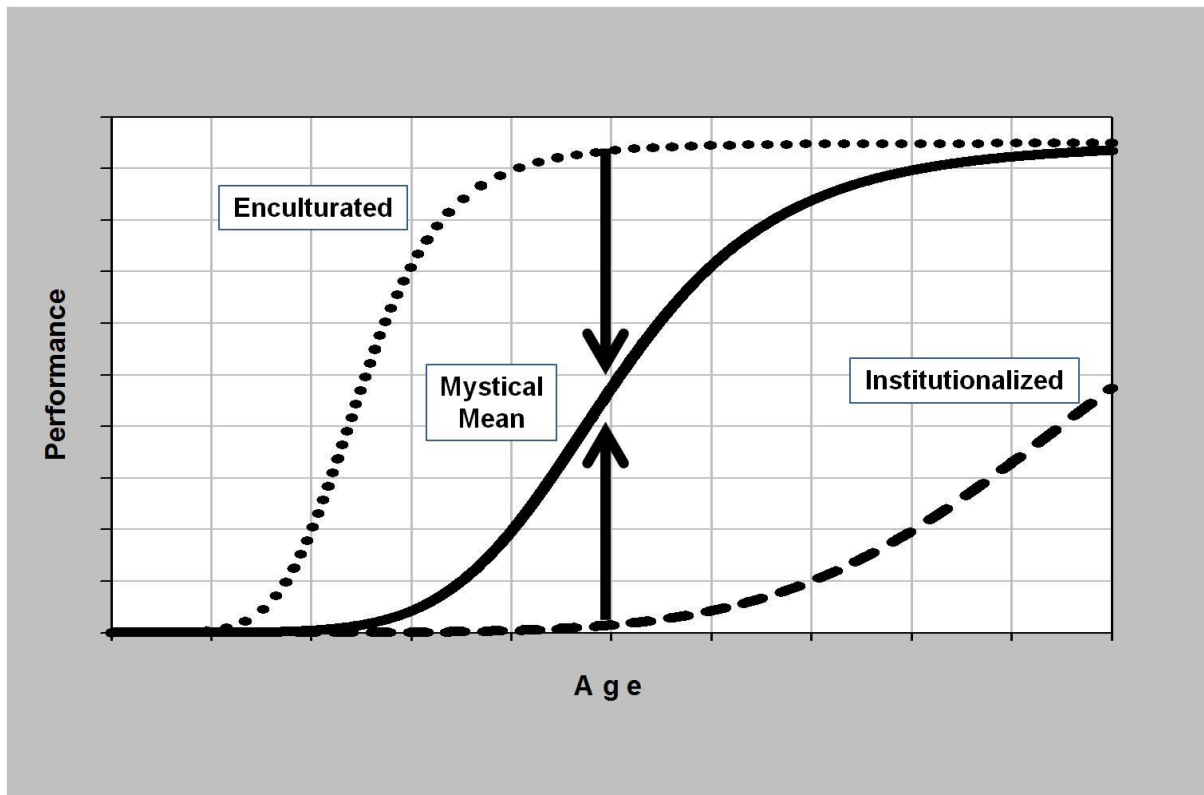


Figure 4.4 The mystical mean: two levels of exposure to human sociocultural conventions. The dotted line, left, depicts a hypothetical learning curve for organisms, like human children and enculturated apes, who are intensively exposed to human cultural communicative practices. The dashed line, right, represents the hypothetical learning curve for organisms raised in complete or partial isolation from human sociocultural conventions, like most institutionalized apes, for example. The solid line represents the “mystical mean” – a nonsensical summary statistic representing the performance of a heterogeneous group of enculturated and institutionalized organisms

The present analysis of selected papers in the contemporary literature on apes’ abilities to make sense of their social environments joins a growing chorus of objections to the widespread practice of comparing human-enculturated organisms of one species with non-enculturated organisms of a different species, finding differences in their abilities to understand human signaling conventions, then concluding that the difference must, therefore, be attributable to the different evolutionarily adaptive histories of the two groups, with no proper consideration of the immense and systematic differences in their rearing histories and lived experiences (e.g., Bard and Leavens, 2009, 2014; Bard et al., 2014; Boesch, 2007, 2010, 2012; Bulloch et al., 2008; Furlong et al., 2008; Gardner, 2008; Hopkins et al., 2013; Leavens et al., 2008; Leavens et al., 2009; Lyn et al., 2010, 2014; Racine et al., 2008; Rumbaugh et al., 2008; Udell et al., 2008,

2010). Boesch (2012), for example, offers a particularly sustained critique of ape–human comparisons performed under the auspices of the Cartesian worldview, in which cognition in both humans and animals is wrongly seen to be largely immune to developmental influences. Bard and her colleagues (e.g., Bard et al., 2014; Bard and Levens, 2009; van IJzendoorn et al., 2009) have documented early and sustained differential influences on social, emotional, and cognitive development in chimpanzees exposed to qualitatively different caregiving regimens. Lyn and her colleagues (e.g., Lyn et al., 2010, 2014) have documented substantial differences in social cognition between enculturated and institutionalized apes. Boysen and her colleagues (Bulloch et al., 2008; Furlong et al., 2008) have demonstrated the superiority of enculturated chimpanzees on tests of both physical and social cognition, compared with norms derived from institutionalized chimpanzees. Thus, after a generation of scientific study in which the specific learning histories of both human and non-human organisms were utterly ignored in a collective, spasmodic rejection of all things behaviorist (e.g., Levens, 2013), we are beginning, again, to view animals as individuals with individual learning histories that have significant bearing on their performances in experimental challenges of their social understanding.

Of particular relevance to the present volume, the empirical patterns we have discussed in this chapter require us, in the mainstream cognitive science perspective, to accept that extensive exposure to human cultural conventions inculcates species-atypical cognitive capacities not otherwise found in these animals. Enactive approaches to cognition require only that we view sense-making as a developmental process, dependent upon sufficient pre-experimental exposure to the relevant dynamic contingency configurations to recognize intentional deictic signals when they occur. This latter is, thus, a more parsimonious approach to the phenomena of point- or gaze-following than the idea that animals (or young children) are performing completely invisible, scientifically unverifiable feats of representation and inference. Of course, there is substantial theoretical ferment over basic questions of where might be the loci for the perception of agency and what might be the constituents of intersubjective engagement, but, by bringing life experiences back into the explanatory framework, we gain a significant arsenal of objective tools to discern where, in the organism/environment interface, the cognitive work is being done. As Froese (2012) noted, enactive approaches can at least ask the questions that “orthodox cognitive science ... has so far failed to even ask” (p. 213).

In conclusion, it does not, as it happens, take a rare genius to understand a pointing gesture, or a meaningful glance. The fault in the reasoning of contemporary cognitivist approaches lies in their commitment to the idea that our social perceptions are insufficient to foster understanding of social cues (Froese and Leavens, 2014). We simply cannot, as a science, continue to completely neglect the pre-experimental histories of the organisms we study, be they human or otherwise. It is not the case that human beings are a species of geniuses with unprecedented capacities for the discernment of meaning in simple, deictic cues. A generation of scientists obsessed with the idea that uniquely human cognitive skills emerge early in our species' ontogeny have claimed for our infants almost godlike powers of discernment before they speak. So apparently seductive is this idea – that human babies are born with essential capacities for the representation of invisible minds – that a generation of scientists have loaded the dice against the hypothesis that babies might learn (much like any other great ape) through experience how to interpret the communicative conventions of their own cultures (exception: Moore and Corkum, 1994). There is a striking parallel between the state of the contemporary literature on comparative social cognition and the unconsciously racist, scientific determination of European superiority in intellectual function that dominated the first half of the 20th century; this turned out to be due, in large part, to an unsupportable commitment to the false idea of essential kinds of humanity (e.g., Gould, 1981). The ubiquity of this kind of confirmation bias of innate human superiority in the use of social signals is manifest. As Kottler (1974, quoted in Jablonka and Lamb, 2013, p. 567) put it, in a different context: “Preconception led to confirmation; confirmation strengthened the underlying preconception; the strengthened preconception increased the likelihood of further confirmation which was, indeed, forthcoming”.

So, consider Chantek (or Erika, or Peony, or Kanzi, or Sherman, etc.), an ape of uncommon experiences and skills, who has been judged not on the strength of his performances, but on the presence and color of his fur. For all the reports of his ability to comprehend human social cues, it seems to me that humans have repeatedly failed to comprehend the significance of his performance for understanding the development of their own social acumen. Chantek, Peony, Sherman, Panzee, Kanzi, and the other cross-fostered apes have revealed a psychic unity between humans and their nearest living relatives. Apes and humans are plastic in their accommodations to the specific configurations of their social environments, making sense of social signals in similar ways when they have similar levels of exposure to these signals

and the repeated contexts of their uses. For nearly 20 years, scientists have dismissed the social skills of Chantek and other enculturated apes as aberrations; but to be aberrant is not necessarily to be wrong or uninformative, as Darwin and Wallace have amply demonstrated (1858).

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