Title: Re-conceiving nonhuman animal knowledge through contemporary primate cognitive studies.

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Abstract

In this paper I examine two claims that support the thesis that chimpanzees are substantive epistemic subjects. First, I defend the claim that chimpanzees are evidence gatherers (broadly construed to include the capacity to gather and use evidence). In the course of showing that this claim is probably true I will also show that, in being evidence gatherers, chimpanzees engage in a recognizable epistemic activity. Second, I defend the claim that chimpanzees achieve a degree of epistemic success while engaging in epistemic activity.

Typically humans qualify as substantive epistemic subjects. Again, typically, knowledge plays an integral role in intentional human behaviour. As a consequence of defending the claims that chimpanzees are evidence gatherers and achieve a degree of epistemic success while engaging in such epistemic activities, I will also have shown how knowledge plays an integral role in intentional chimpanzee behaviour.

The importance of these arguments does not wholly reside in the significance of knowledge explaining some chimpanzee behaviour. Treatments of animal knowledge in the literature tend to go in one of two directions: either the treatment embraces reliabilism and so construes animal knowledge as reliably produced true beliefs (or, if not beliefs, the relevant analogue for non-linguistic animals), or it embraces an anthropocentric stance that treats animals as knowers only when they find themselves behaving in circumstances that, were it true of humans, would imply the presence of causally efficacious knowledge. What I offer here is another way of understanding non-linguistic animals, in this case chimpanzees, as knowers.

Introduction

A substantive epistemic subject has the capacity to engage in activities of an epistemic nature governed by rules or standards (henceforth referred to as epistemic activities) adopted, or learnt, by the individual in question and held in common with her social group, or so I will hold. This account implicates, among other things, a capacity to gather (and use) evidence and the ability to achieve a degree of epistemic success. In this paper I defend two claims that support the thesis that chimpanzees are substantive epistemic subjects.[1] First, I defend the claim that chimpanzees are evidence gatherers (broadly construed to include the capacity to gather and use evidence). In the course of showing that this claim is probably true I will also show that, in being evidence gatherers, chimpanzees engage in a recognizable epistemic activity. Second, I defend the claim that chimpanzees achieve a degree of epistemic success while engaging in epistemic activity.

At face value the implications following from my contentions that chimpanzees are evidence gatherers and enjoy a degree of epistemic success are modest—just as human knowledge plays an integral role in intentional human behaviour, so chimpanzee knowledge also plays an integral role in intentional chimpanzee behaviour. However, this way of seeing chimpanzees reveals a path for re-examining animal knowledge. Treatments of animal knowledge in the philosophical literature tend to go in one of two directions: either the treatment embraces reliabilism and so construes animal knowledge as reliably produced true beliefs (or, if not beliefs, the relevant analogue for non-linguistic animals) (see Goldman 1976; Kornblith 1999; Sosa 1991; Steup 2003), or it embraces an anthropocentric stance that treats animals as knowers only when they find themselves behaving in circumstances that, were it true of humans, would imply the presence of causally efficacious knowledge (see Davidson 1982; Russell 1948/56).[2] It should be noted that neither of these accounts imply that the relevant nonhuman animals are substantive epistemic subjects as it is characterized here. It is difficult to determine the view of knowledge informing its ascription to nonhuman animals in comparative psychology, ethology, and primatology. Kornblith has suggested that a reliabilist account of knowledge will capture the sense of knowledge assumed in these animal sciences (Kornblith 2002: 53-62). I suspect, however, that a more active cognitive account of nonhuman knowledge, one that presents many nonhuman animals as knowers on their own terms, as it were, better accords with what many comparative psychologists, ethologists, and primatologists are ascribing to their nonhuman subjects.[3] What I offer here is a way of understanding non-linguistic animals, in this case chimpanzees, as knowers in this more active sense.

Terms of the discussion

Before proceeding further I should clarify what I mean by evidence gathering and epistemic activity. For the purposes of my discussion, to be an evidence gatherer (and user) is to engage in, or be capable of engaging in, the collection (and use) of information about one's physical, social or phenomenological environment in ways that tend to produce representational states in one's noetic structure (or, though perhaps only for linguistic animals, one's belief system) that can then be used to assess the epistemic value (e.g. the truth or probable truth) of beliefs (or their analogues in non- or pre-linguistic animals) that are already in one's noetic structure, or are at least being considered for inclusion (though not necessarily consciously considered). Minimally then, *evidence* is information *both* relevant to assessing the epistemic value (e.g. the truth, probable truth, or falsity) of beliefs (or their analogues in non- or pre-linguistic animals) already, or potentially, in an individual's noetic structure *and* available to be so used by an evidence gatherer. My account of evidence is broad enough to include experience(s) and does not require meta-cognitive capacities (i.e., using new information to order, revise or reject beliefs one already holds need not involve meta-cognition). Even internalist epistemologists, who tend to be the most conservative of contemporary epistemologists, are not in total agreement about whether evidence use *requires* meta-cognition, and so my treatment here is neutral on that score.[4]

Epistemic activity, on my account, is any cognitive activity (e.g., evidence gathering) that results in beliefs (or their analogues for non- or pre-linguistic animals) that, due to this activity, have varying degrees of positive epistemic status. *Minimally*, this involves the processing of information, ranking the resulting beliefs (or their relevant analogues for non- or pre-linguistic animals) using values of an epistemic nature relative to the individual's continuing environmental feedback, and manipulating these resulting beliefs (or their relevant analogues for non- or pre-linguistic animals) in ways that affect the individual's future behaviour. On my account, epistemic activity neither requires meta-cognitive capacity nor does it implicate phenomenally conscious states though it does implicate a to-be-specified degree of sensitivity and responsiveness to environmental feedback.[5]

On chimpanzee hunters (of knowledge) and (evidence) gatherers

The claim that chimpanzees engage, with *some* degree of sensitivity and responsiveness, in activities which can be appropriately described as gathering evidence has a degree of *prima facie* plausibility, and for the following reasons. First, chimpanzees begin life lacking many of those skills that will, as they mature, be needed to find nourishment, protect themselves from the aggressive behaviour of conspecifics, find mates, and so on.[6] Young chimpanzees will acquire some of these skills while observing the behaviour of older conspecifics, including their mothers (Gómez 2004: 18-19, Hauser 2000: 35, 135-36; Russon 1997: 175, 184-85). To accomplish this in the context of tool use, these young apes attend to the activities of others around them, and not only respond to the relevant stimuli, which itself will probably reflect innate dispositions to find certain stimuli attractive, but combine certain objects in ways that resemble what they have just observed (Hauser 2000: 135; Parker 1996: 351, 352-55; Matsuzawa 1996: 201-03; Matsuzawa and Yamakoshi 1996: 215, 217, 226-29). Think here of very young chimpanzees who will re-insert a discarded probe into a termite nest after the mother has finished feeding at that particular site.[7] To acquire some of these skills in the context of social interactions, these young apes learn, among other things, which behaviours precede, or tend to precede, aggressive activity and which do not, which chimpanzees are more dominant than others, which male chimpanzee is the most dominant, and which individuals are a part of the 'range community' and which are not (de Waal 1987: 421-29; de Waal and Aureli 1996: 86-87, 88-89; Fruth et al 1999: 66-67, 69; McGrew 2004: 131, 157-59; Nishida and Hiraiwa-Hasegawa 1987: 167-70, 171-72, 174-76).[8] These features of their social environment are not fixed, and so a degree of sensitivity and responsiveness to, say, changes in the social hierarchy are required if they are to successfully navigate this environment.

Second, chimpanzees, as well as bonobos, have demonstrated a remarkable ability to acquire proto-linguistic, or *perhaps* weak linguistic, skills within artificial settings

(Fouts and Fouts 1999: 252-55; Gómez 2004: 277-91; Greenfield and Savage-Rumbaugh 1990/94: 541-43, 545-71, 572-74). Think here of Loulis' ability to sign to other chimpanzees or human attendants (Fouts and Fouts 1999: 253-54, 255) or Ai's ability to reliably respond to various lexigrams or Japanese *kanji* (Matsuzawa 2002: 191-95). When these skills have not be moulded, the relevant individuals seem to have acquired the skills through observation and *perhaps* imitation (Savage-Rumbaugh and Lewin 1994: 135-42; Matsuzawa 2002: 192, 194).

Taken together, these facts about chimpanzees suggest that they are evidence gatherers. A closer examination of these facts about chimpanzees, then, is warranted. Several points bear mention before delving deeper, however. (i) A sensitivity and responsiveness to environmental feedback is an important part of efficient learning (Saidel 1998: 1, 2, 3-5, 7-8). (ii) The learning that is of interest to me here need not involve imitation or what psychologists call 'insight' (Byrne 1995: 45-48). Even instrumental learning can be epistemically significant, though perhaps only if the relevant organism remains sensitive or responsive to their environment after having learned certain behaviour (Byrne 1995: 56-62). (iii) When information from environmental feedback positively or negatively affects the status of information *already* stored in an animal's central nervous system (i.e., the information states already possessed by the relevant animal), this *newly acquired* information arguably qualifies as evidence (or plays an evidentiary role). This may seem to be too loose a sense of evidence, or by implication evidence gathering, but we need to pause and reflect on what qualifies as the possession of evidence, or evidence gathering capacity, among *human* conspecifics, who, when developed enough, are quintessential evidence gatherers and users. Think here of the evidence gathering capacity of young human children. As human children experiment with objects or the relations of objects in their environments (e.g. striking two toys together or fitting them into various boxes/containers or dropping them in water), they are in effect gathering information about these objects or their relations with other objects and the regularities associated with these objects' relationships (Crain 1992: 173-74, 322-23; Tomasello and Call 1997: 59, 68-71, 97). This information serves as grounds for future responses to, or inferences about, similar objects or relations in their environment, even affecting what future *information* is taken to be relevant in responding, or making inferences useful, to a task at hand (Langer 1996: 263-65, 266-67; Santrock 2001: 238, 257-58, 259-60). The activities I have just described are widely regarded as evidence gathering, and taken as an indication of an evidence gathering capacity in the individual engaged in them.

Let us now return to some of the facts about chimpanzees I listed earlier. Consider a common tool-using activity among wild chimpanzees—termite fishing. Several points are noteworthy. (1) Chimpanzees who forage for termites in termite nests typically do not do so year round, their foraging behaviour is correlated with the seasonal activities of termites (see, for example, Goodall 1988/97: 74-75). Here we see a *hint* of selective behaviour, though it is not sufficient to suggest that this behaviour is not driven by environmental contingencies. (2) That this foraging behaviour is not simply an expression of a set behavioural pattern or a predisposed response to a particular stimulus is strongly suggested by the facts that (i) not all chimpanzees – even from the same sub-species in similar ecological conditions – will hunt termites and (ii) not all chimpanzees – even from the same sub-species in similar ecological conditions – hunt the *same species* of termite (Matsuzawa and Yamakoshi 1996: 219; McGrew 1994/96: 30-31; McGrew 2004: 113; Sanz et al 2004: 567-68). (3) Importantly, before beginning to forage at a nest, a chimpanzee will first *investigate* the level of its activity. She does this by disturbing the nest structure and *observing* the reaction of the resident termites. Enough activity will incline her to dip a grass blade or thin twig – denuded of protruding leaves – into the nest (Sanz et al 2004: 574). (4) What community this chimpanzee belongs to is a relatively reliable indicator of what material substrate she will use for termite fishing (McGrew 2004: 111-13) and how she removes the termites from the probe is a weak indicator of how conspecifics around her have done this in the past (McGrew 1994/96: 31-32). (5) The chimpanzee infant typically spends a significant part of the waking day clinging to the body of her mother. Often attentive to what is happening around her, the infant seems to at least sometimes watch the mother foraging for termites, including her preparation of the probe and how she removes the termites upon extracting the probe from the nest. As the infant matures, becoming physically mobile and moving about in the vicinity of the mother, she will probably pick up a discarded probe and, with enough time taken in the past to exploring such an object's features, begin to insert it into holes left by the mother's foraging (Lonsdorf 2006: 36-37, 42-43).[9]

As the infant learns termite fishing technique, either by watching conspecifics or exploring the nest with a discarded probe, she processes a good deal of information about her own body, the termite nest structure, termites, probes, how to extract a probe without losing a lot of termites and how to extract the termites without getting bitten. This information processing, it is reasonable to suppose, yields, among other things, a to-be-specified number of information, affective and conative states that will have an affect on the future behaviour of this maturing ape. It is also reasonable to suppose that, as the infant matures, new information obtained in play or 'practice' will inform the direction the infant takes in manipulating objects in her environment, even inclining her to adopt new ways of accomplishing old tasks (e.g. new ways of holding twigs, better ways to prepare the probe for insertion into a termite nest, how to insert the probe into a nest and so on). Here evidence gathering and use, as I characterized it above, seems to be at work early on in a chimpanzee's life.

Consider further some chimpanzee stone tool use. In certain parts of West Africa, some of the members of *Pan troglodytes verus* will forage for nuts using hammers and anvils to break open the casing of oil palm, coula or panda nuts (Matsuzawa 1994/96: 353; McGrew 2004: 118-20). Anvils will be any hard surface (e.g. rock, tree root or tree trunk) that can both hold the nut and provide resistance to the force of the hammer used by the chimpanzee. Hammers are typically rocks used to strike, and break open, the nut casing (Matsuzawa 1994/96: 356-60; McGrew 1994/96: 35; McGrew 2004: 118). To explain this behaviour we need to posit causally efficacious information, affective and conative states—no other explanations seem adequate to the task. Young chimpanzees learn to successfully use stone tools between the ages of three and five, but it takes "almost ten years to acquire the refined level of skill shown by adults" (Matsuzawa 1994/96: 367). Clearly, this is a case of learned behaviour, rather than the result of a fixed action pattern or even the combination of fixed actions as a conditioned response to the right physical stimulus (what some might call 'innate behaviour'). Not all chimpanzees use stone (or wood) tools in this way, only the subspecies *Pan troglodytes verus* (in West Africa) (McGrew 1994/96: 33), and not all members of the subspecies *Pan troglodytes* *verus* engage in nut cracking behaviour (McGrew 1994/96: 30). This behaviour is not ecologically determined. The rocks (or wood) and nuts are available in habitats frequented by a least one of the other subspecies of chimpanzee (e.g. *Pan troglodytes troglodytes*), but only *Pan troglodytes verus* exhibit nut-cracking abilities (McGrew 1994/96: 35). It *seems* to be a pattern of behaviour that chimpanzees can learn to apply through the example of others. A female chimpanzee ('named' Yo), in a community of chimpanzees who did not break open coula nuts,[10] immediately did so when a study area watched by a group of primatologists was seeded with coula and oil-palm nuts (Matsuzawa 1994/96: 364). The other adults of this community, who witnessed Yo crack open the coula nuts and eat the kernels, showed little interest in doing the same (Matsuzawa 1994/96: 364; Matsuzawa 1996: 202). Some of the younger chimpanzees, however, gathered around to watch Yo break the coula nuts' casing and consume the kernels. In the days that followed, two of these juveniles copied Yo's behaviour, obtaining and eventually consuming the nut's kernel (Matsuzawa 1994/96: 364-65, 367; Matsuzawa 1996: 202). Note that the adults in the group did not begin to mimic the female in question (Matsuzawa 1994/96: 364, 367; Matsuzawa 1996: 203). So, whatever the source of this behaviour, it does not arise as a result of mere stimulus enhancement.

Also take note that Yo did not learn this behaviour in the group of which she was now a member, nor was she disposed to break open any nut or nut-like object encountered in a feeding area. A year after the aforementioned experiment was conducted, an area frequented by this group of chimpanzees was seeded with wooden balls that resembled coula nuts in both shape and size. Yo, though not the aforementioned curious juveniles, ignored these wooden balls (Matsuzawa 1996: 202). It would appear, then, that this chimpanzee possessed information about particular nuts that were not normally in her environment and, when the opportunity arose, used this information to obtain some food. Just in these two incidents alone we have the presence of causally efficacious information, affective and conative states that contribute to Yo's foraging and which are selectively used to accomplish this.

Once more, evidence gathering is evident in this type of behaviour. In Yo's case, she is sensitive to certain features of various small nut-like objects in her surrounding environment. Before using a stone to break a small nut-like object, that object must relevantly resemble nuts she has broken open in the past. Arguably, Yo is using already stored information (i.e. memories of some past experience) and comparing it to information recently received from her senses and then using a positive correlation as evidence that an edible object is in her field of vision. None of this need happen at the level of awareness nor need it be realized as a syllogism to qualify as evidence gathering or use. It is this kind of evidence gathering and use that is surely the more prevalent form at work in human daily affairs.

As I have just stated, it takes young chimpanzees seven years or more to acquire the nut-cracking skill of experienced adults (Matsuzawa 1994/96: 367). Matsuzawa has noted that there are at least three developmental stages in a young chimpanzee's ability to forage for nuts using stone tools. He writes,

> First is the action manipulating a single object, such as a nut or a stone ….Second is the action of relating two objects; a nut and a stone, or a stone and another stone. Third is coordinating the multiple actions of manipulated objects (Matsuzawa 1996: 201).

As the young chimpanzee matures, she can be observed first playing with individual nuts or stones, or taking a kernel for consumption from off her mother's anvil after her mother broke open a nut's casing. After a time, she begins rolling a nut off her mother's anvil or pushing one stone against another. She might even try hitting the nut with her hand while the nut is either on the ground or is sitting on a stone, clearly emulating the behaviour of older chimpanzees around her. She might, instead, strike a nut against a root, trunk or stone. After a time, she will begin to strike the nut with a stone, and learn to place the nut onto a stone or other hard substrate before she strikes it (Matsuzawa 1994/96: 356-59). Again, all of this behaviour requires a to-be-specified amount of information processing, including the integration of new information over time about individual objects, relations between objects, and her own body relevant to developing the skills required for breaking open nut casings. This all seems to relevantly resemble what I described earlier when talking about the evidence gathering activities of young humans. Young chimpanzees appear to be evidence gatherers and users. Coupled with the reasonable suspicion that these young apes also possess a to-be-specified number of information states which inform, in conjunction with various affective or conative states, their interactions with nuts, stones or other material substrates, we can reasonably hold that these young chimpanzees already resemble epistemic subjects.

I mentioned earlier that chimpanzees must learn various social skills if they are to successfully navigate their social environments. Within the context of their social interactions there are suggestions of evidence gathering and use. One common 'practice' among chimpanzees who have been victims of recent aggression is the insertion of a finger of the victim, typically the subordinate, into the mouth of the one who behaved aggressively, typically the more dominant chimpanzee (de Waal 1990/96: 80). This is a risky behaviour. Chimpanzees have been known to bite off digits, or worse, in moments of aggression (de Waal 1990/96: 60, 80). How is the behaviour to be construed? It seems to play an evidentiary role in revealing the present disposition of the relevant conspecific. A positive response to the finger insertion leads to a relaxing of the victim, with grooming often ensuing (de Waal 1990/96: 40-41, 43, 80). Arguably, the positive response is taken as evidence that the aggressor is not going to behave aggressively for the time being, or something to that affect.

A second area rich in suggestive examples of evidence gathering in a social context concerns the acquisition and use of information about chimpanzee social hierarchy. As I mentioned earlier, the social hierarchy within chimpanzee groups is flexible—something that is not uncommon among primates (including, of course, humans) (de Waal 1994/96: 248; McGrew 2004: 157-59). Among the males, one chimpanzee enjoys alpha status, typically giving him, among other things, first access to common food, a good deal of uninterrupted access to sexually receptive females, and a certain 'license' to express himself aggressively to conspecifics within the group (i.e. aggressive behaviour will not typically result in *retaliation* from others within the group) (McGrew 2004: 157). This status is not achieved or maintained on brute strength alone, so that it is not always the strongest or biggest chimpanzee male that 'ascends' to alpha status. It is not uncommon to find (more longer term) alliances or (shorter term) coalitions[11] that maintain a male's dominance over the group (de Waal 1990/96: 49, 50-51; McGrew 2004: 157-59). Evidence of a male's dominance resides, at least in part, in the periodic repetition of submissive behaviour of others within the group. A male who approaches a more dominant male will typically exhibit submissive behaviour. This seems to consist of rather stereotyped behaviour, including a relatively low approach to the more dominant male and the vocalization of certain sounds christened "submissive grunts" (de Waal 1990/96: 44-45, 52-53). Such behaviour reveals the relative status of two interacting chimpanzees, and other chimpanzees observing this behaviour seem attuned to its significance. Changes in the social hierarchy (e.g. the fall in status of one male and the rise of another) can be evidenced by the change in the frequency of submissive behaviour between previously dominant and subordinate chimpanzees and the rise of behaviour among conspecifics that is uncharacteristic of the past hierarchy—e.g. approaching sexually receptive females despite the agitation, or aggressive responses, of the 'current' alpha male, or more straight forward aggressive behaviour directed towards the 'current' alpha male (see de Waal 1990/96: 50, 52, 57-61, 63-69). Young and old alike, in order to avoid becoming victims of aggression, must learn the social significance of such behavioural changes or expressions of submission.

It is reasonable to suppose that a chimpanzee who observes such behavioural changes, or expressions of submission, is storing information about the social hierarchy of the group that can be used in future behaviour. This stored information will consist of a to-be-specified number of information states which, in conjunction with various affective or conative states, can incline an individual to behave submissively or aggressively when approaching a particular conspecific in possession of some food or pursuing a sexually receptive female. The pay off will be the avoidance of personal injury – or the continuation of a relatively peaceful day – or the continued possession of, or access to, various resources.

What is more, the relevant information states concerning the dominance ranking within the relevant group will have to change over time, and sometimes very quickly, to keep up with the changes in social hierarchy. A chimpanzee that is too inattentive may find themselves on the 'wrong side' of a fight over, say, a common food source. Past experience being the victim of aggressive behaviour by an 'up and coming' male no doubt 'teaches' chimpanzees to stay attuned to such changing interactions within the group. Once again, there is good reason to think that chimpanzees are evidence gatherers and users and with a not insignificant degree of sensitivity or responsiveness to changing circumstances in their environment.

The other examples with which I began this section can all receive the kind of analysis I just gave, but I do not think that this is necessary to defend the claim that chimpanzees are evidence gatherers and users. What I have just provided is sufficient to defend this claim.

Knowing success

Arguably, the most fertile ground for finding clear and strong evidence of epistemic success is skilled behaviour. It is reasonable to think that skilled behaviour consists of (i) *coordinated* (ii) *goal-directed* behaviour that an organism has (iii) *learned* during its ontogeny, that (iv) requires a *non-haphazard application of past experience* in (v) successfully *achieving a desired end*, and (vi) involves *ends that are themselves selected by the organism*[12] in question (vii) based upon its past experience and preferences.[13] This analysis of skilled behaviour distinguishes it from the mere expression of genetically determined predispositions of the kind encountered in the behaviour of digger wasps (Gould and Gould 1994/99: 39-43) or sphex wasps (Dennett 1984: 11) *without excluding* associative or instrumental learning as a component of skilled behaviour—learning that we even see in some of the skilled behaviour of humans (Crain 1992: 165).

For the sake of brevity I will focus on the example of chimpanzee *stone tool* use discussed in the previous section (though what I have already discussed in that section implies both skilled behaviour and epistemic success). Several features of this activity are noteworthy. (1) Chimpanzee nut-cracking behaviour is learned (Matsuzawa 1994/96: 356-59). (2) It requires the presence of causally efficacious information states about the relevant species of nut, the utility of the relevant tools for the task at hand, and the desirability of a certain end (e.g. the acquisition of the relevant nut kernel) in the relevant individual's noetic structure (see Matsuzawa 1996: 202-03). (3) These information states enjoy a certain prominence in the individual's noetic structure in the relevant foraging context (after all, they, rather than competing information states about other sources of nourishment and the means to procure them, inform the behaviour of the foraging chimpanzee in a 'nut-cracking context'). (4) These information states enjoy their aforementioned prominence in the relevant chimpanzee's noetic structure in the face of ongoing feedback from that chimpanzee's physical environment.

The behaviour of Yo and some of the juvniles in her group, mentioned in the previous section, seem to clinch the matter. Remember, of the adults in her group, only Yo immediately placed a seeded coula nut on an anvil, broke open its shell, retrieved the kernel and consumed it. Two juveniles watched her behaviour, and in the days that followed were observed successfully retrieving a coula nut kernel from each of the nuts they cracked, though they initially spat them out after only briefly tasting them (Matsuzawa 1996: 202).

What does this set of observations show? First, Yo seems to have possessed information states with content identifying coula nuts as a food source that contains an edible core. This is suggested not just by her apparently lone appreciation of seeded coula nuts as something that both could be broken open and contained an edible kernel, but her eagerness to eat the nut kernels, something the younger chimpanzees were not initially willing to do (presumably because of the difference in taste from the oil-palm nuts) (Matsuzawa 1996: 202). Second, knowledge – or something akin to it – can be '*transmitted*' from one generation to the next.[14] This is not only relevant to the chimpanzee culture debate (see de Waal 2001: 227-29; Gómez 2004: 249-65; McGrew 2001: 248 for examples), but is relevant to analytic epistemologists interested in the history or scope of social knowledge (see Longino (2002); Schmitt (1994)). Third, it suggests that at least some chimpanzees are sensitive to the information possessed by others. Here, then, we seem to see acquired information effecting the behaviour of chimpanzees, and within a context of action requiring skilled behaviour.

Did Yo also engage in epistemic – and not 'merely' evaluative – activity using epistemic standards she had adopted? As I stated in (4) above, these information states enjoy prominence in the relevant chimpanzee's noetic structure in the face of ongoing feedback from that chimpanzee's physical environment. Each time Yo engages in nut-cracking behaviour she receives further reinforcement from her success. In other words, the relevant, causally efficacious information states receive ongoing positive feedback when Yo succeeds in obtaining an edible kernel from breaking open the relevant nut. Presumably, this means that Yo is more inclined to use these information states in relevantly similar circumstances in the future. These facts about Yo's nut-cracking behaviour, and the continuing prominence of certain information states conducive to this behaviour, speaks to the accuracy of the relevant information states. As accuracy is a straightforwardly epistemic value, there is an epistemic value at work in the cognitive activity required for Yo to break open nut casings.

We can see evidence of a contrary instance of information states that lack this degree of accuracy in the behaviour of the juveniles who had copied Yo in breaking the coula nut casings. As I briefly mentioned in the previous section, a year after the aforementioned experiment was conducted, an area frequented by this group of chimpanzees was seeded with wooden balls that resembled coula nuts in both shape and size. Yo, though not the aforementioned curious juveniles, ignored these wooden balls (Matsuzawa 1996: 202). Matsuzawa writes,

> The youngsters … seemed ready to crack any objects resembling edible nuts even if the objects were unfamiliar. Their attempts to crack open wooden balls may reveal an abiding tendency to try to crack open unfamiliar nut-like objects which was facilitated by their observing Yo's cracking new nuts in the last year (Matsuzawa 1996: 202).

Interestingly, these juveniles appeared to possess causally efficacious information states that, unlike Yo's, lacked a certain accuracy. Perhaps better yet, these youngsters possessed rules of action that allowed information states with a degree of inaccuracy to enjoy a prominence in their respective noetic structures while engaging in nut-cracking-behaviour. Presumably, this was registered by the juveniles upon receiving negative feedback from their attempts to break open the wooden balls.

Important to my point here is that accuracy of the relevant, causally efficacious information states is important to the success of these chimpanzees, and that at least some of these animals favour accurate information states over time and, in so doing, in effect track their truth or falsity. At any rate, accuracy is a value clearly at work in this kind of behaviour, at least some of the time, and since it is clearly an epistemic value evinces (i) the existence of chimpanzee epistemic activities and (ii) information states that meet the epistemic standards (at least concerning accuracy) adopted by these chimpanzees themselves. Consequently, this example of chimpanzee skilled behaviour supports the claim that chimpanzees can, and sometimes do, achieve a degree of epistemic success while engaging in epistemic activity.

In this section I have provided an example of skilled chimpanzee behaviour that suggests or implies that these animals engage in epistemic activities, and that these activities track the accuracy of the relevant information states that inform the subsequent skilled behaviour. If this is right, I have shown not only that chimpanzees are evidence gatherers, but that they can achieve a degree of epistemic success while engaging in epistemic activity.

On why this matters

The importance of these observations partially resides in their implications for both future work in chimpanzee cognitive studies and naturalized epistemology. There is enough data on chimpanzee cognition and behaviour for naturalized epistemologists to now begin to contribute analyses of knowledge, as it is understood philosophically, with the express intention of developing an account of knowledge, and epistemic activity, of use to primatologists that reflects the active cognitive activities of such nonhuman primates as chimpanzees. This offers primatologists a way of moving beyond metaphor or perhaps even analogy, and ascribing knowledge to chimpanzees in the relevantly similar sense in which we ascribe knowledge to ourselves. By recognizing chimpanzees as epistemic subjects, and recognizing in at least some of their behaviour epistemic activities, we deepen the picture of what it means for animals to be actively cognitively engaged with their physical or social environments. This also deepens our shared understanding of epistemic subjectivity and offers a way of exploring its evolutionary history.

In contrast to either reliabilism or the anthropocentric stance mentioned earlier, what I offer here is another way of understanding chimpanzees as knowers. Arguably, these animals engage in epistemic activities: that is, goal-directed activities governed by rules evincing values (and goals) of an epistemic nature. These activities, and the relevant values, ought to figure in future naturalistic analyses of knowledge or, perhaps, other forms of positive epistemic status. Up until now, and with few exceptions, the epistemic activities and values informing the development and defence of theories of positive epistemic status, or epistemic subjectivity, have been human (in particular, the activities and values of mature, properly functioning, adult humans).This has tended to yield analyses of positive epistemic status or epistemic subjectivity that require sophisticated cognitive capacities (see Bonjour 2002; Rescher 2001; Steup 2003). Reliabilist epistemologies are an exception here, though they still tend to prioritize human epistemic activities and values when developing or defending their analyses (see Goldman 1976; Goldman 1988; Kornblith 1999). Indeed, reliability of beliefs, or belief forming mechanisms or processes, is a recognizable epistemic value to human epistemic subjects. Arguably, this explains the persuasiveness of reliablist epistemologies. Even here, then, the values informing naturalized theories of positive epistemic status bear the mark of their human origins. Contemporary work in chimpanzee cognitive studies offers naturalized epistemologists a chance to correct this bias.

Conclusions

I have provided examples of chimpanzee evidence gathering and, what might be described as, epistemic success. This strongly implies that chimpanzees engage in epistemic activities, identifying them as epistemic subjects markedly similar to ourselves. If chimpanzees are properly regarded as epistemic subjects, this has some significant consequences for both contemporary research in chimpanzee cognitive studies and naturalized epistemology. Naturalized epistemologists now have the data needed to begin to develop analyses of positive epistemic status, and even epistemic subjectivity, that are sensitive to the epistemic activities of, and implicit epistemic values held by, chimpanzees. This will be of use in tracking bona fide examples of chimpanzee epistemic activity in free-living or captive chimpanzee populations, and understanding how knowledge, understood philosophically, affects the behaviour of some animals other than humans. This also deepens our shared understanding of epistemic subjectivity and offers a way of exploring its evolutionary history. It may also enable naturalized epistemologists to effectively move beyond anthropocentric epistemic frameworks, properly putting the nature back into naturalized epistemology.

Notes

[1] In arguing that chimpanzees are good candidates for substantive epistemic subjects I have been influenced by a distinction, found in the literature on animal cognition, between active and passive knowing or active and passive cognition (see Gould and Gould 1994/99: 8, 87, 114, 120, 126). Gould and Gould describe this distinction as follows,

> Cognition can be innate – passive knowledge encoded in an animal's genes and used as instructions for wiring a nervous system to generate particular inborn abilities and specializations. Active cognition – the ongoing process of gathering, analyzing, and using knowledge – can incorporate several stages of mental processing beginning with sensation, which is the detection of stimuli by a sensory receptor organ and the subsequent processing of that sensory information by the brain. … It is the processing and analysis of sensory information that engenders knowledge, which can then be stored, recalled, and used in decision-making (Gould and Gould 1994/99: 8).

To be a substantive epistemic subject on my account is to qualify as an active knower on Gould's and Gould's account.

[2] I understand Bertrand Russell to be offering a realist analogical approach in *Human Knowledge: Its Scope and Limits*. His discussion of knowledge possessed by a dog on pages 182 and 446-447 resembles what I am describing here. Russell's discussion of animal belief on pages 109 and 110 are also relevant here. In contrast, Donald

Davidson allows that we ascribe knowledge to other animals analogically without granting the realist position. Davidson writes,

> [a]gainst the dependence of thought on language is the plain observation that we succeed in explaining and sometimes predicting, the behavior of languageless animals by attributing beliefs and desires and intentions to them. This method works for dogs and frogs much as it does for people. And, it may be added, we have no general and practical alternative framework for explaining animal behavior (Davidson 1982: 323).

He goes on,

> But there would be a clear sense in which it would be wrong to conclude that dumb … animals have propositional attitudes. To see this it is only necessary to reflect that someone might easily have no better or alternative way of explaining the movements of a heat-seeking missile than to suppose the missile wanted to destroy an airplane and believed it could by moving in the way it was observed to move. This uninformed observer might be justified in attributing a desire and beliefs to the missile; but he would be wrong (Davidson 1982: 323).

This, I think, nicely illustrates the application of a non-realist analogical approach.

[3] Kornblith uses some of Carolyn Ristau's work on the piping plover to try and show the applicability of his account (Kornblith 2002: 53-55). Unfortunately, it is clear from Ristau's own comments on the significance of the cognitive vocabulary she uses when explaining and describing the behaviour of her nonhuman animal subjects that she

thinks that her subjects possess knowledge, and that it is reasonable to think this because they seem to be cognitively engaged with their environment (i.e. that, as believers, they are sufficiently sensitive and responsive to their environment to be, in some important sense, epistemic subjects) (see Ristau 1991a: 93, 124; Ristau 1991b: 309-10).

[4] This sense of evidence and evidence gathering reflects how Bonjour and Steup, to name just two examples, seem to understand them (see Bonjour 2002: 39-43 and Steup 2003: 313-14). Steup is clear, however, that evidence gathering and use involves meta-cognition, at least if it is to be epistemically significant (Steup 2003: 314). Bonjour is, I think, in general agreement here, though he is less explicit about it (see Bonjour 2002: 41, 224-26). Bonjour's own admission, however, that (i) it is reasonable to suppose that many humans, including children, possess knowledge or justified beliefs and (ii) this is acquired without engaging in meta-cognition (Bonjour 2002: 225, 226) appears to imply that Bonjour is at least willing to concede that evidence gathering and use does not *require* meta-cognition—a concession Steup seems unwilling to make (Steup 2003: 314). Nicholas Rescher is an internalist epistemologist whose understanding of evidence gathering clearly *requires* meta-cognition (see Rescher 2001: 14-16, 19-20). Audi is a dissenting voice here, in that, though an internalist epistemologist, he does not think it is plausible to hold that meta-cognition is necessary for evidence gathering or use. Interestingly, Audi's rejection of what he calls second-order internalism – nicely exemplified by the likes of Steup or Rescher – is at least partially based upon the plausibility of talking of the justified beliefs of young humans who have as yet to develop extensive conceptual frameworks (see Audi 1989: 309, 311).

[5] In the philosophical literature, the sensitivity and resposiveness of animals to environmental feedback figures in contexts related to this one. See Allen (1999) and Kornblith (2004).

[6] This is generally true of nonhuman primates (Strier 2000: 255-56, 263, 266-71)

[7] There are videos associated with Sanz et al (2004) that can be viewed when accessing it through *The American Naturalist* online. Video 1, titled "Chimpanzees Approaching Nest", appears to show a young chimpanzee copying the behaviour of his mother as she forages for termites.

[8] A very general description of the kinds of social knowledge developed by individual nonhuman primates can be found in Ray (1999) or Chapter 7 of Tomasello and Call (1997).

[9] Again see the videos associated with Sanz et al (2004) which can be viewed when accessing it through *The American Naturalist* online.

[10] Members of the community in Bossou of which she was a part did crack open nuts, but only oil-palm nuts (Matsuzawa 1994/96: 364).

[11] Coalitions are described as "two or more individuals joining forces against one or more conspecific rivals" (Nishida and Hosaka 1996: 114). Alliances are coalitions that survive for a lengthy period of time within a given community (though the amount of time required for a coalition to qualify as an alliance is, as far as I know, unspecified) (Nishida and Hosaka 1996: 114). Coalitions seem to be contrasted with alliances both because of their brevity of existence and opportunistic character (Nishida and Hosaka 1996: 114).

[12] Once again, these do not have to be consciously chosen nor do the ends need to be non-species specific or in some important sense idiosyncratic. That is to say, even ends that arise out of what an animal is predisposed to find salient will qualify as ends selected by this animal in the relevant way.

[13] Arguably something like this notion of skilled behaviour underlies James and Carol Gould's discussions of learning and insight (see Gould and Gould 1999: 65-67, 68-87, 100-13).

[14] Note that I need no other learning mechanisms at work here than stimulus enhancement and instrumental learning. Even if these, and not more social learning, mechanisms best explain how the juveniles began to acquire the skills associated with cracking open coula nuts, they still acquired knowledge (or something akin to it) of the edibility of coula nuts similar to the knowledge (or something akin to it) possessed by Yo and only learned of this property of coula nuts from observing Yo's foraging behaviour.

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