

Probing Monkeys' Minds

How Monkeys See The World by Dorothy Cheney and Robert Seyfarth (1990) is the result of many years of close observational research on vervet monkeys in Africa. Vervets are members of the Family Cercopithecidae who are monkeys who live in Africa and Asia. They are more closely related to apes and hominoids than are New World Monkeys, as their line and the hominoids diverged after the New World Monkey ancestors had migrated to South America. These are small (under 8 kilos) monkeys who live in multi-male, multi-female social groups and compared to many forms, forage and travel on the ground more frequently. This means that they are in more danger of predation from terrestrial predators such as jackals, hyenas, lions, leopards and wild dogs, as well as eagles and other raptors. They must also cope with snakes, such as pythons, and other tree-climbing predators. Their large social group is an adaptation because there are many eyes to see and ears to hear potential danger. They also have pouches in their cheeks in which to store and carry food they may find on the ground to the safety of the trees. This is a feature of all Cercopithecid type monkeys such as baboons and macaques. Vervets are highly adaptable and live in a wide range of habitats from South Africa to Northern Kenya, and across the continent. Thus, they can be studied under a wide range of conditions and have taught us a great deal about how 'monkeys see the world'.

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This book is a fascinating compendium of information about vervet monkey (*Cercopithecus aethiops*) communicative and cognitive abilities; a comparison of vervets with other primates such as chimpanzees and with other social animals from bees to zebras. Its utility derives from the many observations and experiments which are recounted in detail and then analyzed to shed light on the question of how vervet minds work. This format allows readers to decide for themselves how they would interpret the outcome of particular episodes, in the light of their own thoughts and experience. Very few long-term research projects on monkeys have been published and this work gives the reader an opportunity to compare what have been claimed for the much publicized chimpanzee, with what can be gained by years of painstaking observation for a less popular but equally social primate species.

Over the 11- year period when Dorothy Cheney and Robert Seyfarth were studying vervet monkeys in Kenya, the question was raised of how similar was the observers' view to the monkeys view of what was happening. Is seeing understanding? Can we interpret what goes on before our eyes in ways that make sense not only to us, but to the organisms we are observing? To a large extent this depends on what perceptual abilities we share with that organism. Do we share sensory channels and acuity, responsiveness, social facility, communicative ability, learning potential, and intentionality? The question becomes "How do we know what levels of these capacities are available to organisms other than humans?" "How do monkeys perceive the world?" or as in the authors' question, "What is it like to be a monkey?"

This is a very difficult question to answer, but various aspects have been addressed in previous studies with some level of success. For example, the sensory and physiological world of monkeys has been investigated using experimental procedures to assess levels of hearing, degrees of visual acuity, motor system responses, attention span, physical

strength, and motivational aspects of hunger, pain and social/ sexual drives. All of these tell us something about a primate's perceptual world, but only hint at how they perceive the world.

A major aspect of learning available for study is the acquisition of species-specific communication systems. By studying both how the system is learned and how it operates we grasp some principles of categorization, generalization, and what the system allows them to communicate. A more involved, specific and experimentally controlled technique for learning about learning and communication systems is the effort to teach apes to use a human designed system as a language. But an understanding of primate perception and intelligence is limited by the constraints of experimental systems. The piecemeal knowledge that we acquire from studying perceptual systems, response systems, learning systems and communication systems can be synthesized into a whole much more adequately when supplemented by observations of animals living in natural social systems in the environment they have adapted to over the millennia. That is the focus of how Cheney and Seyfarth approach the problem of what it is like to be a monkey.

This investigation is divided into discussions of social skills, vocal systems, deception, intentionality, attribution and intelligence. The basic theoretical foundation of the study is acceptance of the evolutionary perspective. In what ways does primate intelligence and perception improve their level of adaptation? This rather general question can be investigated by examining some very practical functional problems that face social monkeys such as vervets in their everyday life. Do they recognize kin, control the behaviour of others, transmit information about concrete aspects of their world, or communicate so as to modify the mental states of others? Some of these questions can be answered using a combination of observation, laboratory experiments and field experiments. Others are very difficult.

The authors approach has been to "borrow methods from the empiricists, but place them tentatively within the framework of a more mentalist approach." (9) However, the observations of functioning systems such as communication remain operational since the meaning is inferred from responses. Conclusions based on these responses allow them to document how the systems work, and thus why the animals need to know certain types of information. For example, unless primates understand the principles of transitive inference (if A is bigger than B, and B than C, then A is bigger than C) they are going to have to engage in many painful dyadic encounters before they can accurately assess their own place in the social system. "If A ranks higher than B who ranks higher than me, I should not aggravate A." This principle seems very adaptive in the social sphere and the question arises as to whether it can be translated into the physical world in terms of path lengths to the water hole, or respective sizes of food patches, both of which would also be quite adaptive.

Cheney and Seyfarth begin by describing vervet social relations from both an outward and inward focus. Since vervets are observed and described as acting in ways which challenge the status quo, their motivations are assessed as, 1) discontent with their current status and 2) utilizing strategies to improve their position. Choice of grooming and alliance partners, assessing individual situations and taking advantage of opportunities to aid higher ranking animals are all strategies available to an individual to improve either her rank, her access to resources, or both. The systems are complex and subtle allowing small accretions of influence until a propitious situation arises when an animal can make a bid to improve her position. Statements like these can be supported by long term observations of what choices an animal makes, and by observing changes in how another animal responds to her. Once the general system is understood by the observers, specific predictions about

who is likely to groom whom most often can be made and empirically investigated. In many cases predictions about the attractiveness of kin, of high ranking females, and resource access were supported. In cases where there was some ambiguity, Cheney and Seyfarth suggested that females with potential for higher rank were groomed more than expected. This potential was often manifested in high birth and survival rates of daughters who would support their mother and each other in agonistic encounters and thus eventually raise the ranking of the whole matriline. The ability to use observations to form predictive hypotheses which can be tested moves the information from a descriptive to an explanatory level. In order to achieve successful explanation, the question of motivation must be addressed. Cheney and Seyfarth tend to agree with Hamilton's (1964) kin selection hypothesis, which provides both proximate (help your close kin first) and ultimate (leave more of your genes in the next generation) levels of motivation. They validate these motivations by constructing computer models of interactions based on these motivational principles and testing them against what they observe.

Chapter 3 is a discussion of social knowledge. An initial distinction is made between the concepts of knowing how and knowing that (e.g. Ryle 1949). Knowing how is a fairly clear phenomenon; a specific procedural task based on stimulus recognition which can be observed. Knowing that "implies an ability to make statements and causal inferences about the world." (59) In other words can the monkey's knowledge transcend the framework in which it was learned and thus allow the animal to assess, for example, relations between other animals such as 'kin' 'friends' or 'enemies', based on particular experiences and observations of others. Investigations of whether this level of knowledge is available were conducted using observations and field experiments. There is some evidence that monkeys can assess the status and kin relationships of others; not just that they are kin, but properties of kin relationships that spread across families, such as the ability to distinguish pairs of adult sisters from mother-adult daughter pairs. Field playback experiments were undertaken to assess whether animals from one group could recognize members of another group by vocalization alone, which they proved able to do. Additional expedients suggested that vocalization of particular individuals from other groups provoked different responses depending on the relative rank of the sender. Within-group field group experiments revealed that unrelated females who had recently groomed were much more likely to aid one another than if they had not recently been groomed, but if they were kin, they did not require a grooming encounter in order for aiding behaviour to occur. In other words kin relationships are a very important aspect of vervet social life, but astute political alliance behaviour could function to develop kin-like support relationships.

The animals themselves are not fooled into confusing friendships with kin relationships. Kin recognition occurs both within a matriline and for other matrilines. Female vervets recognize the screams of their own out-of-sight offspring, and can also correctly attribute the screams of out of-sight juveniles to the right mother. The nature of the screams (at least in a rhesus study done in Cayo Santiago) can tell the mother the social identity of the juveniles' antagonist, and she responds differentially depending on the antagonist's rank and kin relationship. Reconciliation behaviour also occurs rather differently, with non-kin antagonists reconciling more frequently with their previous opponent's relations, while kin who fight tend to reconcile directly with each other. The results of this series of field experiments and observations support the idea that animals recognize individuals in their own and adjacent groups, can classify their own group members by kinship lines and respond both supportively and in reconciliations differently with their own kin and with non-kin. They seem to recognize that long term close associations exist for other animals and that these relationships will influence responses to any episode in which they are involved. This ability to generalize the nature of relationships for other animals suggests

some level of concept formation in terms of social behaviour. This chapter is left with the questions of whether the animals are aware of their abilities to categorize, and whether these can be transferred to non-social stimuli.

Chapter 4 discusses vocal communication and reviews the studies of the 1960's and 1970's which tended to conclude that primate vocalization were non-voluntary, emotion-based and non-denotative of external objects. In other words they were categorized as 'indexical' referring only to the animal itself. More recent work tends to supersede these earlier conclusions since expedients now suggest that primates have voluntary control over sending or suppressing vocalizations, require learning and experience to perfect them, and in some cases use them in referential fashion. Cheney and Seyfarth go beyond describing vervet vocalizations, using them as "a tool for understanding how animals *think*." (102) Playback experiments of alarm calls and social indicators substantiated and expanded Struhsaker's (1967) early work on referential alarm systems. The 'snake', 'eagle' and 'leopard' alarm calls were further investigated to test whether context, alarm level or acoustic features were salient factors in eliciting differential response. Viewing length and amplitude of alarms and presence or absence of the relevant predator did not change how the animal responded. However, in a few cases when eagles were attacking animals on the ground in the open, a leopard alarm was given which elicited running for the trees, instead of looking up, which under the circumstances was probably a safer response. The authors attribute this difference to a greater level of emotional stress raised by a leopard alarm, but consider that the calls have referential information. I agree that the information may be there, but it also seems probable that the call which has been classed as 'leopard' referring to the stimulus, may in fact be more adequately interpreted as 'run for the trees.' In order to study whether these calls are indeed directives rather than referents, the few occasions in which the appropriate response to a particular predator was different from the one generally used would be the test cases. If the leopard was between the vervets and the only trees, would they give a 'leopard' call and attempt to run past it to the trees, or would they give an 'eagle' call and scatter in the grass? This topic is addressed again in chapters on deception and meaning of calls.

Attribution of referentiality in alarm calls is supposed by additional investigation of intragroup social communications. Even experienced human observers hear "no immediately obvious audible differences among grunts" (115) either between individuals, or in the four major contexts in which they are used. Yet a grunt tape-recorded in an interaction with a dominant, elicits different behaviour when played back than does a grunt recorded when another group approaches. This is in contrast to previous viewpoints (e.g. Smith 1977) that animals use generalized vocalizations to arouse the interest or attention of others and that the context provides the meaning. The grunt playback studies support an alternative view that slight differences in pitch, pulse, length and amplitude do serve to distinguish referents between sounds which are very similar; and that these differences are consistent across individuals. Another informative aspect of this experiment occurred while investigating the changes in call type when three juvenile vervets moved into a group. Initially when they saw the new group leader male they had changed to 'grunt to a dominant'. Over exactly this same time the females residing in the troop changed their response to the newcomers from 'grunt to another troop' to either 'grunt to a dominant' or 'grunt to a subordinate' as was appropriate.

In addition to these indications of referentiality, study of compound calls investigates the possibility of syntax. For animals, this term has been redefined as "any system of rules that will allow us to predict sequences of signals" (Snowden 1982:231). Whether these combinations represent phonological syntax or lexical syntax is a major issue. Wedge-capped capuchins use certain calls which can be given singly or in combinations of up to

four in predictable sequences in particular contexts. The authors suggest that this can be interpreted on the level of phonological syntax, since the compound calls are used in situations which are intermediate between situations where the component calls were used singly. The determination of lexical syntax is much more ambiguous because of difficulty in establishing specific meaning for segments of calls which can be rearranged. The order of call notes is very important in gibbon songs. Gibbons respond strongly to playbacks in which the notes have been rearranged, which suggests that order is an important variable for them, but it is not clear if specific notes add specific information. It is quite probable that acoustic features permit individual recognition, but it is not clear if this occurs through 'paravocal' features or signature notes.

These features derived from field playback experiments and acoustic analysis reveal a much more complex system of primate vocal communication than was evident even a decade ago. Referential usage in alarm as well as other social situations, large size of repertoire which is not clearly audible to human observers, breakdown of graded systems into acoustically distinct calls, development of neural specificity, and the presence of call combinations all contribute to the complexity. Observation of vervet infants learning to use the referential alarm calls and grunts suggests that they have to refine their initial categories to coincide more closely with adult ones. They begin this process at a very early age and by twelve weeks have modified some features of their grunts to the adult form, while other aspects take between two and three years to master. As in human infants, comprehension of alarm calls precedes the ability to produce the correct call in context. However by two to three years of age, vervets have acquired the complex of social and environmental knowledge and the motor skills required to produce and respond to the vocal repertoire. Because much of this vocalization is influenced by rank relations, age and group membership, study of the system reveals glimpses of how vervets perceive and categorize the world.

The next major question addressed by Cheney and Seyfarth in Chapter 5 is what the vervets 'intend' to signal with their vocalizations. Do they just broadcast the message no matter who hears it, or do they tailor it to a particular audience? Do they adjust the signal if it does not produce response? There is some evidence that primates do take message receipt into consideration, but what does that tell us about their intentions? In an effort to comprehend whether vervets understand the referential relations between their calls and features of the external world, a number of field experiments were devised. They are based on Dennett's (1987) scheme for assessing levels of intentionality in animal vocalizations. These levels are categorized as zero-order systems, with no beliefs and desires- first-order systems, with beliefs and desires, and, second-, third-, or higher-order intentional systems, which imply desires or beliefs about beliefs, and beliefs about beliefs about beliefs, etc. For vervets the difference would be: zero-order "leopard alarm bark" = I'm afraid; first-order "leopard alarm bark" = "I believe there is a leopard nearby"; second order "leopard alarm bark" = "I want others to believe there is a leopard nearby"; and so on (143).

Almost everyone would agree on the ability of primates to function at zero-level intentionality. The question of how to test for the first-and second-order is reflected in what these levels suggest about a vervet's mental state. First order intentionality suggests that the sender recognizes the effect of his signal on another's behaviour. It is only at second-level intentionality that the signaller's intention to modify the audience's mental state as well as behaviour is addressed .

The intentionality of signalling was first tested by arranging situations in which adults alarm called to offspring or non-kin. The rate of calling was higher when kin were

threatened, but it was absent when the animal was alone and dealing with a predator. Several experiments of this type support the argument that the production of calls is voluntary, and can be suppressed. The nature and rate of calling depend on the audience. This allows researchers to claim at least a first-order intentionality for vervets, and other primates such as chimpanzees.

The next set of experiments allowed the authors to test whether two acoustically different signals ('wrr' and 'chutter') used in similar contexts were classified by acoustic similarity, or similar meaning. If the calls were classified on the basis of meaning then habituation to one call, played back in a non-relevant context, should produce habituation to the other call, from the same female. In fact this did happen: habituation to one animal's taped unreliable 'wrr' meant that her 'chutter' was also ignored. However, the same animal's vocalization from another context was still responded to initially. Also, even if the group were habituated to one individual's 'wrr', they still responded strongly to another individual's use of the call. The responding animals are basically making same difference judgements, and revealing that they classify calls on the basis of meaning rather than acoustic similarity.

In addition to generalizing the meanings of acoustically different alarm calls sent by conspecifics, vervets also showed some ability to respond appropriately to the avian and terrestrial predator calls given by starlings. Because starlings respond to many terrestrial predators not relevant to vervets' starling terrestrial predator alarms did not elicit appropriate responses in vervets as frequently as did avian predator alarms. The assessment of meaning was made not only from appropriate response, but also from the transferability of habituation between vervet and starling avian alarms (which had a high rate of transfer) and terrestrial predator alarms which had a more ambiguous result. Thus it seems evident that vervets perceive starling alarms as having broader (less relevant) attribution for terrestrial predators, and more focused and relevant attribution for avian predators. This ability to generalize relevance across species and to transfer habituation to calls strongly supports the suggestion of signal categorization by meaning.

Still, the exact nature of the meaning being attributed to particular calls is rather imprecise. Calls can be classed by context, but clearly there is some difference between them or it is unlikely that two calls would have evolved. Another approach to the process of assigning meaning to vocalizations is to compare the process to the development of meaningful word use from babbling children. Children begin by vocalizing from internal motivations, but quickly pick up social facilitation and turn taking. They begin to accompany accompany sounds with gestures used to direct attention. Later sounds become more precisely articulated and show reference to external cues, such as 'kitty'. But words are not yet used in the context, social situation, or level of generalization, which characterize adult speech, and it is difficult to know what they actually mean to a child. There are several theoretical positions which attempt to account for the criteria used by children to classify objects. Also, it seems that children at early stages have more comprehension of the system than production ability, and this may also be true for vervets. Most importantly, study of child word use suggests that a stage exists in which sounds are used "as if they are denoting particular features of the environment or 'commenting' on the situation in which they find themselves" (173), without researchers really being able to demonstrate the precise meaning of the terms used. The same is true for vervets.

Chapter 6 summarizes what can be construed about vervet mental life from the preceding observations and experiments on social life and vocal systems. It is still not clear how much information is structured or coded. We have no information indicating that monkeys

recognize or label the criteria they use to classify objects or relations, or the correlation of calls and objects. In fact the lack of vocalizations that seem to operate as classifiers across a large range of referents suggests that they may not be aware of the relations between them (labels for superordinate classes). On the other hand, it is possible that future investigations may uncover such classifiers.

The next major question, addressed in Chapters 7, 8, and 9, is consideration of whether monkeys move past trying to influence another individual's behaviour, to trying to influence what others think. Chapter 7 deals with the phenomenon of deception. Various levels of deception have been described from animals, birds and insects. They range from false flash patterns in lightning-bugs to attract non-conspecific males who provide a meal for the falsely signalling female, to well documented abilities to misdirect attention in chimpanzees (Lloyd 1986). One of the major, and most frequently documented, means of deception is withholding information, which can be intentional or unintentional (de Waal 1982).

However the signalling of false information is a more complex and explicit action. False reconciliation, where friendly approach gestures are followed by the attack, occurs in both apes and monkeys. Also recruitment of allies often involves situations in which an animal indicates that it has been attacked by another when it has not, with the results that other individuals approach and chase the presumed attacker. I have seen this occur with a 6-month-old macaque who shrieked repeatedly in the presence of a high ranking adult female until the leader male came around the corner and attacked her. This represents the use of a social tool and may be much more common, Cheney and Seyfarth suggest, than observers think. However such episodes are also easy to overinterpret. The methodological problem of ascertaining what animals intend to communicate based solely on observations of how others react, is open to noise, channel interference, and lack of reception as well as misinterpretation or deception by either the sender or the receiver. The degree to which the deception is perceived as a quality of an individual rather than a situation is judged by determining whether appropriate responses to a discovered deceiver occur in other contexts. If an individual's signals which have been discovered to be deception are later ignored, it can be suggested that their intent is being suspected by others, and that s(he) is being attributed with the intent to deceive. This definitely moves into second-order intentionality. In the experiment where inappropriate taped play-backs of 'wrrs' and 'chutters' were used, the vervet did not generalize from habituation to inappropriate group approach signals to alarm calls and this would indicate that they had not transferred the attribution of unreliability to a different setting. Therefore the question of second-order intentionality based on observations of deception is still open. However it is clear that a wide range of insects, amphibians, birds and mammals do utilize deceptive silences and signals, which indicates that such behaviour has major adaptive value.

Although the material on deception indicates that primates clearly recognize the effects of their own actions on the behaviours of others, it is not clear whether they are attempting to influence another's beliefs. However, since behaviour is based on knowledge, in a deceptive episode it is knowledge manipulation which is occurring whether the sender recognizes this or not. The discussion of attribution in Chapter 8 deals with trying to distinguish between actions resulting from knowing the state of another's mind, and actions resulting from knowing how another will behave. This distinction is investigated by examining a number of factors. These include teaching by mothers, imitation, deception, informing, social relationships, compassion and self-awareness. In cases of deliberate teaching, an individual must attribute a state of ignorance to the other.

In most cases mothers only restrain or punish behaviour, and do not set out to actively

influence it positively. The only case of positive action by the mother that I can think of occurs in chimpanzees, where a mother has been observed to reposition a nut that the youngster is trying to crack with a stone, to a more advantageous position on the anvil. Monkey mother teaching may be adequately explained as promoting her own comfort rather than being directed towards remedying the ignorance or changing the mental state of her offspring. There may be some difference between monkeys and apes in this regard. In a number of cases chimpanzees seem to attribute intentionality to others, as when they cooperate to drag and hold tree branches as ladders, or as in Kohler's observations of attack by dominants when subordinate chimps knock down piles of boxes they have built to reach bananas, as they see the dominants approach to supplant them. These episodes are capable of being explained in other ways than attributing intention, but they also support this interpretation. Cheney and Seyfarth also suggest that imitation of tool use by chimpanzees can be interpreted as evidence of understanding what the other animal is trying to do -- in other words imputing purpose to the other actor. This is particularly evident in the chimps' ability to change roles in a co-operative food extraction experiment. Monkeys can learn to co-operate but do not seem to be able to spontaneously change roles. Although some of the experiments would allow the conclusion of attributing mind or intention to others in monkeys, none of the results seem to demand that level of explanation. The authors' studies of imitation, social attribution, compassion, lack of teaching and lack of awareness all revealed varying aspects of learning abilities, but do not seem to support a theory of mind. The question of imitation, deceit, teaching and self-awareness for chimpanzees however is still open to investigation.

After considering many aspects of interaction in an effort to discover the mental capacities of monkeys, the authors turn to the possibility that a major area of difference may be due to the social or nonsocial nature of a problem. Monkeys can learn to classify objects, but they rarely do so naturally. On the other hand free ranging animals apparently distinguish between kin and non-kin, and can classify other types of social relations. This theory of the social adaptiveness of mental skills as the source of their evolution was developed by Jolly (1966) and provides a rationale for the apparent difference in abilities between vervets and chimpanzees. The evidence presented supports the viewpoint that vervets exhibit 'domain specific intelligence', in other words, that they understand social relationships and can solve social problems without being able to transfer these abilities to a non-social sphere. This suggests that monkeys have specific areas of ability and are not able to transfer concepts, such as ranking or classifying from the social to the physical context. The argument is made that deriving information from indirect cues, rather than from specific objects, requires an understanding of causality which has not been clearly established in monkeys. Chimpanzees, however do appear to exhibit some understanding of causality as demonstrated by modification of tools. In fact, this ability to comprehend ideas from both the social and physical worlds may be a major advantage in the evolutionary development of chimpanzee mental ability. The capacity to transfer concepts from the situation in which they were learned, to new situations may be argued as the foundation for transferring ideas about your own beliefs or motives to ideas about the beliefs and motives of others.

However, monkeys do not seem to have reached this stage. They clearly perceive and categorize social relationships, but they may not be aware of their ability to do so. They can predict the behaviour of others and manipulate it by deception, but it is not clear that they understand why this works. Their vocalizations are representative to some extent, and their production and comprehension are influenced by mental states of both the sender and the receiver. They also can assess the validity of vocal communications and choose whether and how to respond. In these senses the authors claim a 'semantic' for many vocalizations, even though the sounds are not given with a view to modifying mental

states of others. The book concludes that monkeys do not seem to recognize how much they know, or to transfer their knowledge to alternate situations. More developed cognitive abilities are suggested for chimpanzees, but must be more clearly and unequivocally demonstrated before they can be claimed as fact.

This book is a complex source of information about communication, mental ability and intentionality. The communicative abilities of vervets are much more complex and referential than had previously been recognized. If many of the calls in the original repertoire identified by Struhsaker (1967) can be subdivided as having different contexts or referents, and if they are classed by meaning rather than acoustic properties, then our understanding of how primate vocal systems work is profoundly altered. The capacities of vervets to label, to classify, to learn and to manipulate aspects of their communicative system suggest some well developed mental abilities. But close observation of when, where, and how these behaviours occur leave the interpretation of why they happen open to some doubt. It is not clear that vervets can attribute causality to mental states, or even recognize mental states in other animals. In fact, they seem unable to derive information from secondary cues, such as the sight of a python track in the sand, even though the approach of a high ranking female's infant can make them nervous, as if they expect the mother to be nearby. This difference between physical and social referents for comprehension is puzzling, unless we accept the suggestion that social facility is an extremely important adaptation. Even so, monkeys do not seem to be able to move past first-order intentionality to the point of attributing beliefs and mental states to others, although they seem to have access to their own. This is a major difference between the mind systems of vervets and adult humans, but children require time to develop this ability. The comparisons of vervet abilities with those of developing children are useful in two areas. First, it becomes clear that we can recognize the function of some early activities without being able to accurately assess motivation, and this gives us a technique to use when studying pre-verbal and non-verbal forms. Secondly, the onto-genetic phase of non-self consciousness may be a model to investigate the evolutionary stage which looks similar in some primates. The fact that chimpanzees appear to have abilities to recognize intention and self-knowledge between those of monkeys and young children is a very strong evolutionary argument for assessing their intellectual capacities.

Reading this book provides a great deal of information to consider, explore and question. At how many levels can particular behaviours be interpreted? Why does there seem to be such a difference between monkeys and apes? The real value of this research is the synthesis of a large amount of information into an argument to attribute a particular level of mental and perceptual ability to vervets. It would be very useful to see additional equally detailed works on macaque and baboon vocalizations and social skills. Also comparative material on New World monkeys would allow these conclusions to more adequately reflect the true state of the primate form we call monkeys. In my opinion the light that has been shed on the level of intentionality and motivation in vervets is a valuable beginning to our comprehension of what it is really like to be a monkey.

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Anne Zeller is an Associate Professor in the Department of Anthropology at the University of Waterloo (Canada). She has recently been conducting fieldwork in Indonesia (Kalimantan) on the adult-infant social relations in *Macaca fascicularis* (crab-eating macaque). She is the author of a study of visual and vocal communication in *Macaca sylvanus* in *Primates: recherches actuelles*. J.J. Roeder and J.R. Anderson (eds.) Paris: Masson (1990). Among her other publications are: "Comparison of component patterns in threatening and friendly gestures in *Macaca sylvanus* of Gibraltar" in *Current perspectives in Primate Social Dynamics*. D.M. Taub and F.A. King (eds.) New York: Van Nostrand Reinhold Press, 1986. (487504). "Primate Facial Gestures: A Study of Communication" *International Journal of Human Communication* (1980) 13.4:565-606.

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