anthro notes

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SPEAKING OF APES: LANGUAGE EXPERIMENTS AND COMMUNICATION AMONG OUR CLOSEST RELATIVES

What would other animals tell us about themselves if only they could speak? What could a close relative such as the chimpanzee tell us about ourselves and our history? Like Dr. Doolittle, researchers have long dreamed of communicating with other species. Over the past years, numerous experiments have shown that a capacity for symbolic language is not necessarily the sole preserve of Homo sapiens, and that it may indeed be possible to have meaningful communication across species boundaries.

It has become increasingly clear to anthropologists in the past decade, that although there are dramatic differences between the overall behavior and lifeways of humans and the great apes, many of the characteristics once thought to be unique to humankind are being discovered, albeit in a very limited form, in the behavioral repertoires of the chimpanzee, gorilla, and orangutan.

For instance, it used to be thought that only humans used tools. Then Jane Goodall at the Gombe Stream Reserve in Tanzania electrified the world with the news that chimpanzees also used rudimentary tools in the wild, to fish for termites and to sponge up water. Others have observed chimpanzees elsewhere using rocks as hammers and anvils to crack open palm nuts. Some anthropologists countered that only man actually made tools, but, once again, chimpanzees were found to prepare their termiting sticks with considerable care

and foresight. One captive orangutan was even taught to chip stone tools. Clearly, no other animal species depends on tools for survival to the extent that the human species does (and has done probably for millions of years), but it is nonetheless true that at least our closest relatives are capable of tool-using and tool-making behavior that foreshadows that of human beings.

In the same way, it now appears that the ability to think about and refer to things in the abstract, or by means of symbols, may be due in part to a common substrate of intelligence that we share with the chimpanzee, gorilla, and orangutan. Although it is not yet clear whether any of the great apes make use of this capacity in the wild, recent experiments in laboratories and primate colonies have shown that all apes are able to learn symbolic systems of communication modeled after human language. Further, apes can communicate with humans and other apes about objects, persons, places, and activities using these "artificial" languages. For those who believed that language and the ability to communicate about something other than one's immediate emotions were the sole province of human beings, these experiments have provided a fascinating glimpse into the minds of apes and perhaps have given us clues about the communicative potentials of our last common ancestor.

The first attempts in the 1940's to teach chimpanzees how to speak mimicked the way human infants learn language. Baby chimpanzees were raised in human homes, by human caretakers, and were treated as if they were human. One such chimpanzee, Viki, was eventually able to use pictures to ask for objects or activities. On tests of conceptual discrimination she was as accurate as similarly aged human children. But Viki was never able to pronounce more than three words, even after years of training and constant exposure to human speech. As her surrogate mother summed up the experiment in the 1951 book The Ape in Our House, "We said that if an ape had proper upbringing, it might learn to speak spontaneously. But we were wrong. You can dress an ape in the finest of finery, buy it a tricycle, and kiss it to death--but it will not learn to talk."

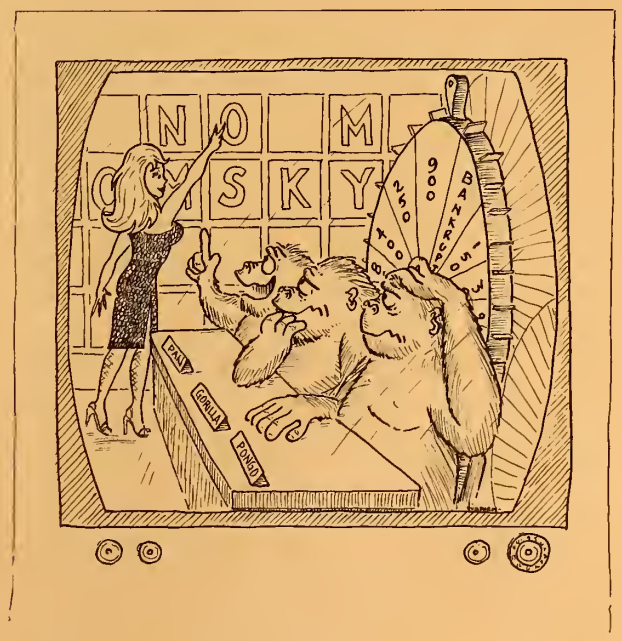
Viki's inability to master spoken language was not a training problem, we know now. It has since been demonstrated that in addition to some differences in their vocal tracts, apes simply lack the special brain connections which make human speech possible. In the 1960's, psychologists began to realize that language had to be distinguished from speech when thinking about primate communication abilities. Because human language is expressed through speech, we tend to equate one with the other, but any formal communication system is a language.

If chimps cannot speak, perhaps they can use a different form of language. As a result of more field work among chimpanzees in their natural habitat, some observers noticed that chimpanzees use hand signals in their natural communications with each other. Suggesting that chimpanzees might be more successful at learning methods of communication that used the chimpanzee's native gestural abilities, the Gardners, working at the University of Nevada in the 1960's, taught their chimp infant, Washoe, to make hand signals in ASL (American Sign Language). The success the Gardners were able to achieve excited anthropologists, psychologists, and linguists everywhere. During her four years of training, Washoe learned 150 signs, signed them in combinations (though never in such a constant order as to resemble a real sense of syntax), and learned some signs that were never taught to her, apparently by imitation and observation alone (such as "smoke"). She also invented some signs on her own and adapted others.

Washoe's success with sign language was not unique. Over the course of the last 15 years, similar experiments have been conducted with other common chimpanzees and with the bonobo (or pygmy chimpanzee), the gorilla, and the orangutan as well. Most of the experiments have focused on sign language, but such studies are difficult to control scientifically, and utterances must be filmed to be preserved. Hoping to avoid these methodological problems, some experimenters devised artificial languages, based on plastic tokens or keyboard symbols, in order to better control and record the animals' actual utterances. Sarah, a common chimpanzee, was taught by David and Ann Premack to manipulate plastic discs of various shapes and colors to name and ask for objects and to make simple sentences. Another chimpanzee, Lana, at the Yerkes Primate Center, was taught "Yerkish," an artificial language using "lexigrams" (or graphic symbols) on a keyboard connected to a computer. This system had the advantage of eliminating the human trainer, and with it, the possibility that humans were unconsciously cuing the animals to make appropriate responses, a criticism which continues to cloud some of the sign language studies' results.

The artificial language systems have also had their own share of critics. With such narrow training, some say, the animals have little opportunity to use language in the important ways in which humans use it, namely to construct a world, to obtain desirables, and to regulate the behavior of others. "Language" it may be, but it is divorced from the open social context that makes language a meaningful phenomenon instead of a trivial game.

Although the sign language experiments are difficult to conduct, maintain, and to verify by objective means, they still provide us with the most compelling evidence of the apes' symbolic capacity for language. Because of these studies' relative openness, they also document the trained animals' ability to use symbolic communication in innovative and productive ways, such as to convey spontaneous or novel thoughts and desires. Koko, a lowland gorilla who was raised from infancy and taught ASL by Dr. Francine Patterson, now has a sign vocabulary of some 500 words and recognizes 500 more. This is the largest vocabulary of any of the signing apes. Most importantly, Koko uses her abilities to joke with, lie to, and insult her human and animal companions, as well as to perform the more mundane vocabulary exercises and comprehension tests, which are administered to obtain objective information about her language skills. Koko has used sign language to protest



to trainers about boring vocabulary drills, to ask for a kitten as a pet (which she got), and to insult her young male gorilla companion Michael ("Michael stupid toilet devil").

To be sure, not all authorities have been willing to accept that the behavior being taught and used is truly "language." Before these studies were first undertaken, it was assumed by many prominent linguists that human language was so distinct and qualitatively different from all other forms of communication that it could not be explained as an evolutionary development from any more primitive communication system. But the language studies showed that ape language did share some of the important components of human communication. Apes could use a symbolic system of arbitrary referents, could generalize (that is, transfer meaning from one context to another appropriate one, as in the use of the word "coke" to mean all sweet dark drinks), and could use signs or symbols to create new words or combinations of words spontaneously in response to unfamiliar objects. As a result, some linguists began to draw ever stricter definitions of what constitutes "real" language and claimed the apes were merely "aping" their trainers and not producing intentional, patterned, or grammatical language at all. One experimenter, Herbert Terrace, who had worked with the chimpanzee Nim, concluded that his experiments showed only that Nim was mimicking his trainers and at best could use signs as simple demands.

Workers who had experience with raising infant apes countered that Nim, in particular, had an unstable environment with so many changes in personnel that his language training may have been compromised. Problems with objectively verifying tests of any ape's language comprehension and usage also occur when the animals are bored, or when the tester is a stranger to the animal. Motivation and emotional state contribute to ape testing performance just as they do to that of human children.

Fortunately, the researchers at The Yerkes Center have found ways around these various methodological impasses. The latest results of the work of Sue Savage-Rumbaugh and her colleagues are the most impressive yet. Dr. Savage-Rumbaugh worked for many years training two common chimpanzees, Sherman and Austin, to use Yerkish. Their training was considered successful, but nonetheless the two common chimpanzees required intensive conditioning to first acquire symbols and then to progress from a simple stage of symbol association to the more abstract representational use of symbols. In sum, although common chimpanzees clearly can deal with symbolic usage on a conceptual level, they still do not learn language in the same way, at the same pace, or with anywhere near the same facility as do human children, even with the kind of intensive conditioning that children never undergo.

More recently, the Yerkes group has worked with the bonobo, or pygmy chimpanzee, a little-known ape that until recently was considered to be merely a smaller version of the common chimp. Startling behavioral differences between the two closely-related species have been found, both in field studies and in laboratory colonies, and the bonobo's language abilities are remarkably advanced in comparision to those of the common chimpanzee. Kanzi, a young male being raised by his mother, showed spontaneous use of the Yerkish keyboard and recognition of symbols, without any training or conditioning behavior. His sole experience with language came by observing his mother, who was actively trained during his infancy. When it became clear that Kanzi was able to

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learn the Yerkish lexigrams independently, the research project was altered so that Kanzi would never be trained in the same manner as previous study subjects. Instead, he was given full access to the keyboard, both inside the laboratory and outside as he roamed the 55 acre enclosure. Kanzi requests all food, activities, and personal contact with his human and ape companions by means of the keyboard. Because of this research design, the criticism of past studies, that the apparent linguistic behavior is only a conditioned response, has been avoided.

Kanzi's language use differs from that of Austin's and Sherman's. Unlike them, Kanzi will name objects he does not want immediately, so his responses are not reward-dependent. He frequently uses gestures and vocalizations in conjunction with lexigrams, and his gestures are more controlled and precise. Most fascinating is the fact that Kanzi understands spoken English. Although it seemed that Austin and Sherman did also, it was not until their English comprehension was tested (in the absence of the usual contextual and gestural cues) that their performance on identification tests dropped to slightly better than chance. Using lexigrams improved their scores once more to almost 100%. Kanzi's performace shows no drop with the switch to English, and in fact he seems to use the spoken English as an additional cue to the meaning of lexigrams. More recent studies of Kanzi's younger sister Mulika indicate that Kanzi's abilities are not unique, leading Savage-Rumbaugh to conclude that the bonobo has some innate language abilities not shared with the common chimp, abilities that seem more like those of humans.

What do these results tell us about how animals communicate naturally among themselves? Very little is known about how wild chimpanzees communicate with each other, or about the complexity of their messages. These studies would seem to indicate that chimpanzees very likely use several types of cues simultaneously, such as vocalizations, gestures, and eye contact. No study in the wild has yet documented the range of chimpanzee's natural communications, but that may simply be a question of the human observers knowing what to look for.

Some surprising results have been obtained from studies of monkey calls. Recording both vocalizations and behavior of wild vervet monkeys, Robert Seyfarth and Dorothy Cheney have shown that these monkeys have different alarm calls for each of their four major predators and different vocalizations for different types of social interactions. The calls seem to be a simple kind of representational signaling. Interestingly, while some of these calls are acoustically distinguishable to the human ear, others are not. If wild monkeys are capable of such unsuspected behavior, it seems likely that apes may also be able to communicate some types of information to each other, some of which we may not be able to hear.

Do these experiments provide any clues about how language might have begun in the human past? From these studies, and from observations of human infants, it seems clear that the ability to conceptualize and to hear complex vocalized messages can exist before the ability to produce actual speech is present. The ape experiments also show that once started, language use and learning can continue, even without further human training. For instance, Washoe, now living in a colony with other signing apes, has learned a few signals from her companions. They have also invented or modified signs on their own. Washoe has even taught signs to her adopted son Loulis, who continues to pick up additional vocabulary by imitating the other apes. Roger Fouts, the

researcher in charge of the colony, reports that Jane Goodall has remarked upon the low levels of aggression among the signing chimps, compared to chimps in other situations. This is an especially telling observation, since one of the theories about why language evolved in humans suggests that language became necessary to regulate social behavior. Whatever its origin, language, even among apes, may be an important diffuser of the tensions of group living. These experiments make it seem likely that the ability to symbolize might well have been present in the last ancestor we share with all the living great apes (that is, by about 11 to 12 million years ago). It is now possible to see human language not as a trait without a past, unique to human beings, but rather as one extreme development of primitive communicative abilities and potentials shared with our nearest relatives, the great apes.

For further reading:

Linden, Eugene. Apes, Men and Language. Penguin, 1976. (A survey of the sign language studies with apes.)

Patterson, F. G. The Education of Koko. Holt, Rinehart, and Winston, 1981. (Describes the training of Koko the gorilla and the controversies about language experiments.)

Savage-Rumbaugh, E. Sue. Ape Language: From Conditional Response to Symbol. Columbia University Press, 1986. (A somewhat technical but complete account of the work of the Yerkes Primate Center.)

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