

Current Comments®

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When the Apes Speak, Linguists Listen. Part 2. What the Critics Say

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Last week, we discussed the projects designed to teach apes a means of communication comparable to human language.¹ These projects, which began about 20 years ago, were designed to test the linguistic potential of our closest relatives in the animal world—the great apes, including the chimpanzee, gorilla, and orangutan. In the earliest project, researchers taught a chimpanzee to use American Sign Language (ASL), a gestural form of communication used by deaf people in North America. In later projects, chimpanzees were taught artificial languages using plastic symbols or a computer keyboard. Each research group published data describing the remarkable similarities between the linguistic skill of their chimpanzee and early language development in human children. However, shortly after this research appeared, questions arose concerning the methodology and interpretation of these studies. Let's now review the controversy surrounding the claims that apes are able to use a rudimentary form of human language. And is the comparison between ape and child language a valid one?

What the Critics Say

Criticism of the ape language studies encompasses interpretive as well as methodologic issues. Many critics feel that the ape language researchers have not provided sufficient evidence to show that the apes comprehend the nature

and function of the symbols they use. Rather, the critics suggest that the animals are imitating the trainers or that they are conditioned to respond in the appropriate manner. Critics also suggest that the apes trained to use artificial languages rely on rote memorization rather than knowledge of syntactic rules in formulating word sequences. In the case of ASL-trained apes, some critics say researchers may be interpreting too much from the animals' responses, identifying as ASL signs movements that are not well-formed ASL words. Others suggest the animals may receive inadvertent cuing from their trainers.

In addition to all the controversy surrounding the methods and interpretations of these studies, one of the major problems in this field is the lack of a standard definition for human language. If we can't describe language by a well-defined set of criteria, it is difficult to decide whether another species is using it. Until recently, we assumed that humans were the only species to use language, and, therefore, we had no need to define it precisely. In fact, Margaret Atherton and Robert Schwartz, Department of Philosophy, University of Wisconsin-Milwaukee, noted that language is closely tied to our concept and definition of human intelligence and that as long as language is uniquely human we can believe human mentality is unique and special.² However, anthropologists Horst D. Steklis, Rutgers University, New Brunswick, New Jersey, and Michael J.

Raleigh, Brentwood Veterans Administration and Neuropsychiatric Institute, University of California, Los Angeles, note that both behavioral and neurological research support the idea of shared cognitive features between great apes and humans.³ Therefore, it should not be surprising that the great apes possess at least rudimentary language abilities. The definition of language and the uniqueness of human mental abilities became an important issue with the first words of Washoe, an ASL-trained chimpanzee. However, the claims that ape language researchers make for their animals are questioned not only by linguists, but by the ape language researchers themselves.

Is It Language?

The major question raised by the ape language studies is whether the newly found communicative abilities of these apes can be considered language. Noted linguist Noam Chomsky, Massachusetts Institute of Technology, Cambridge, suggested that human language is acquired effortlessly and without training.⁴ However, Catherine E. Snow, Institute for General Linguistics, University of Amsterdam, the Netherlands, noted that language acquisition is the result of interaction between the mother and child beginning in early infancy and involves teaching on the mother's part.⁵ Mothers speaking to their children limit the semantic content, but not the grammar, to what the child can understand and reproduce. The ape language experiments also require extensive training of the research subjects.

Ape language researchers seem to be the most severe critics of each other's work. Since three different language systems have been used to train the apes, the various researchers disagree as to whether the others are indeed teaching and testing their animals in the best way. For example, psychologists R. Allen Gardner and Beatrix T. Gardner, Uni-

versity of Nevada, Reno, suggest that in the artificial language experiments conducted by psychologist David Premack at the University of Pennsylvania and by Duane M. Rumbaugh working at the Yerkes Regional Primate Research Center at Emory University and Georgia State University, Atlanta, the chimpanzees could perform the tasks required of them on the basis of learning sets and rote memory.⁶ In return, Rumbaugh and Sue Savage-Rumbaugh, Yerkes Regional Primate Research Center and Georgia State University, state that the Gardners' Washoe project failed to demonstrate that ASL signs, when used by a chimpanzee, are functionally equivalent to the words used by humans. They also suggest that a series of ASL signs formed by a chimpanzee is nothing more than the animal producing a group of "appropriate" responses, or signs, and not rudimentary sentences as the Gardners and Francine G. Patterson, who worked with the ASL-trained gorilla Koko, have suggested.⁷

Moreover, psychologist Herb S. Terrace and colleagues, Columbia University, New York, concluded from their ape language study, which was designed to replicate the Gardners' work, that the chimpanzee can learn that particular symbols are appropriate to particular situations.⁸ The function of the ASL symbols used by Terrace's chimpanzee, Nim, was not so much to identify things or convey information but to satisfy the trainer's requirement that the chimpanzee use the proper symbol to obtain a reward.⁸

Spontaneity

One quality that is generally agreed to be characteristic of human language is spontaneity. Terrace and colleagues reported that Nim's language performance was almost entirely prompted by the trainers or imitative of their signs.⁸ Imitative signs are those that are repeated immediately after the trainer makes the

sign. Prompted signs, on the other hand, use only part of the sign made by the trainer. By observing films of Washoe and Koko signing, Terrace and colleagues reached a similar conclusion regarding the lack of spontaneous signing. However, in a recent book, linguist Philip Lieberman, Brown University, Providence, Rhode Island, points out that Terrace used very stringent criteria.⁹ Terrace considered signing spontaneous only if it was not preceded by a teacher's signing.⁸ Lieberman noted that these criteria are much more stringent than those used by child language researchers in analyzing spontaneous utterances. He points out that, according to the criteria used by Terrace, children between the ages of one and two years almost never produce spontaneous utterances.⁹

Patterson, then of Stanford University, California, disputes Terrace's assertions about the spontaneity of Koko's utterances. She claims that 41 percent of Koko's signs are spontaneous and 11 percent imitative,¹⁰ in contrast to the 28 percent spontaneous utterance figure Terrace and colleagues calculated for Koko.¹¹ Patterson, as well as the Gardners, notes that films of ape-trainer interactions made under classroom drill conditions are not representative of the everyday discourse that is necessary for comparison with child language.

Psychologist Richard J. Sanders, University of North Carolina, Wilmington, a former graduate student in Terrace's laboratory, suggested that the method of testing influences the degree of imitation by the ape.¹² In fact, in a study of language acquisition in the ASL-trained orangutan Chantek, anthropologist H. Lyn Miles, Department of Sociology and Anthropology, University of Tennessee, Chattanooga, used Terrace's criteria for analyzing the spontaneity of utterances. However, the recording was done in a relaxed environment where the animal was allowed to move freely and was not pressured to sign. Under these condi-

tions, Miles found that 37 percent of Chantek's utterances were spontaneous.¹³ Her reanalysis of videotapes of Nim's signs found that 8 percent were spontaneous. As Sanders suggested, the pattern of the ape's signing is sensitive to the setting, goals, and behavior of the trainer. Spontaneity and imitation are related to the environment as well as to the animal.¹²

Rumbaugh and T.V. Gill, then his graduate student, noted that their chimpanzee, Lana, seemed to lack motivation to use language, requesting the names of things only when they were food items. "She never 'discussed' spontaneously the attributes of things in her world."¹⁴ According to Savage-Rumbaugh and colleagues, both Washoe and Lana used their language skills to "control and regulate the behavior of their human experimenters."¹⁵ Mark S. Seidenberg, Center for the Study of Reading, University of Illinois at Urbana-Champaign, and Laura A. Petitto, Department of Human Relations, Harvard University Graduate School of Education, Cambridge, also suggest that the apes have not learned the meanings or grammatical functions of signs; rather they have learned that signing behavior is very important to the researchers and can be used to obtain food. Seidenberg and Petitto compare this behavior with that of a child who learns an obscene word. The child knows that repeating this word will produce a certain response in the adult. In essence the child understands the consequence of saying the word but not the meaning of the word.¹⁶

Another indication that the apes do not understand the symbolic significance of their communication is that they do not appear to engage in conversational turn-taking. Language users take turns, functioning both as producers and recipients of communications. Terrace concluded from his studies of Nim that his signing bore only a superficial resemblance to a child's conversations with its parents. While the child

frequently initiates conversation, only 12 percent of Nim's utterances were spontaneous.¹⁷ Thomas E. Van Cantfort and James B. Rimpau, Department of Psychology, University of Nevada, Reno, suggested that Terrace and colleagues misread the overlapping between the first sign of the chimpanzee's reply and the last sign of the trainer as an interruption.¹⁸ In ASL an overlap in signing between two fluent signers is common. In fact, Miles found an equal number of interruptions between the caretaker and Chantek.¹³

Carolyn A. Ristau, Department of Animal Behavior, The Rockefeller University, New York, and Donald Robbins, Division of Social Sciences, Fordham University at Lincoln Center, New York, suggest that learning of artificial languages by apes is more properly compared with the learning of sign language by hearing-impaired children than with the development of spoken language in normal children. However, Ristau and Robbins also report that data on the development of sign language use in children are sparse.¹⁹

Comprehension

Many of the ape language critics report that too much emphasis has been placed on language production and not enough on comprehension. For example, Seidenberg and Petitto claim that none of the projects included formal tests of word comprehension and that all of the studies relied largely on anecdotal evidence.¹⁶ However, the Gardners examined Washoe's response to *Wh* questions, such as "Who," "What," "Where," and "Whose." Washoe's response was appropriate 84 percent of the time, an indication that she understood the meaning of the questions.²⁰ However, Rumbaugh indicated that although Washoe's responses were generally correct, the Gardners judged Washoe's answers to be correct as long as they were in the right category of response.²¹

More recent research by psychologist Tetsuya Kojima, Primate Research In-

stitute, Kyoto University, Inuyama, Japan, examined the interaction between receptive and productive language skills.²² Kojima used a language training system similar to the one used by Rumbaugh and Gill.¹⁴ The researcher found that in the chimpanzee Ai, productive language skills, such as naming, and receptive skills, such as understanding, developed independently of each other. And, although these two language modes were independent in early language acquisition, Kojima found that in later stages they helped one another. That is, receptive language skills helped in the acquisition of productive skills and vice versa, implying that the name became symbolic of the object in the chimpanzee's mind.

Syntax

The two basic components of English are the word and the sentence. Each word has a separate meaning; a sentence expresses specific meaning by combining words in a particular order. The meanings of sentences, unlike words, cannot be learned one by one. When learning English, children master grammatical (syntactical) rules that allow them to express a thought by arranging words in a particular order. However, Edward S. Klima, University of California, La Jolla, and Ursula Bellugi, Salk Institute for Biological Studies, San Diego, California, indicate that sign language uses inflection and markers, rather than word order, to relate meaning.²³ John Limber, Department of Psychology, University of New Hampshire, Durham, noted that too much ape language research focuses on the word rather than the sentence and indicated that word production is not sufficient evidence to conclude that the animal is using language.²⁴

Several ape language researchers claim their animals create elementary sentences. Terrace and colleagues suggest that the sequences of signs pro-

duced by apes using ASL may at first resemble the early multiword sequences of children. However, they maintain that alternative explanations of the apes' word combinations must be ruled out before we conclude that the learning processes are the same in apes and children. One alternative explanation is that the apes are imitating the trainers' sign sequences.⁸ Anthropologist Jane H. Hill, Wayne State University, Detroit, Michigan, noted that chimpanzees can learn to put things in any order the trainer instructs, but little evidence exists that these order requirements serve the same syntactic function that they serve in human language.²⁵ This is especially true for the artificial language experiments.

In fact, Patricia M. Greenfield, Department of Psychology, University of California, Los Angeles, and Savage-Rumbaugh suggest that since there is increasing skepticism about the capacity of the chimpanzee for syntactic language, communication, rather than formal linguistic structure, may be the place to look for child-chimpanzee parallels.²⁶

A review of data from the Washoe project in 1974 led psychologist David McNeill, University of Chicago, to conclude that Washoe imposed her own formula on the sentence structure she observed in her trainer's signs.²⁷ And the order of words in her sentences probably depended on the prominence of the things she was discussing. Greenfield and Savage-Rumbaugh suggest that the pattern of chimpanzee word use does not imply that utterances beyond one word are memorized or imitations.²⁶ They found that the chimpanzees using computer-controlled language have a tendency to mention the variable while leaving the constant or redundant unsaid. Greenfield and Patricia G. Zukow, University of California, Los Angeles, reported that this is also true for children.²⁸ For example, in food requests, the location of the food is presumed

after the initial request and linguistic specification is omitted, while the name of the food is repeated. Savage-Rumbaugh's chimpanzees, Sherman and Austin, used words to clarify ambiguity rather than to comment on the obvious. And depending on how ambiguous the situation was, the more likely they were to use more than one word.²⁶

Other criticisms were directed toward the sign-language studies. Interpretations of novel word combinations were said to be too elaborate. One of the most-cited examples is Washoe's signing "Water bird" on first seeing a swan on a pond.²⁹ Ristau and Robbins, among others, question Washoe's intent. Was she actually calling the bird a water bird or was she indicating that the bird was on water?¹⁹ However, anthropologist Suzanne Chevalier-Skolnikoff, University of California, San Francisco, suggests that some novel sign combinations made by the gorilla Koko cannot be explained this way. For example, Patterson reported that Koko signed "White tiger" for a zebra. That this would refer to white and tiger does not seem a likely explanation. Chevalier-Skolnikoff further suggests that this utterance may even represent a grammatical phrase, since white alone is not contextually relevant.³⁰ In fact, Roger S. Fouts, Department of Psychology, University of Oklahoma, Norman,²⁹ and Terrace and colleagues⁸ also presented evidence of grammatical structure in the two- and three-sign utterances of their chimpanzees.

Cuing

Criticism of the methods used in ape language experiments centers on the possibility that trainers inadvertently give cues or hints to the animal through a process known as the Clever Hans phenomenon. This phenomenon was first recognized in the early part of this century, in Germany, in a very early case of animal "learning." A horse named Hans, belonging to an animal trainer named

von Osten, seemed able to count and solve arithmetic problems. While most observers were amazed, some remained skeptical. One of those skeptics was psychologist Oscar Pfungst at the University of Berlin, who determined that the horse perceived von Osten's involuntary head movements when the number of hoof-taps corresponded with the correct answer. On seeing this unconscious cue, the horse stopped tapping.³¹ The animal was skilled in perceiving human body language, not in arithmetic.

Linguists Jean Umiker-Sebeok and Thomas A. Sebeok, Indiana University, Bloomington, believe that almost all of the ape language projects present ample opportunity for Clever Hans cuing. Premack tried to eliminate the Clever Hans effect by using a trainer unfamiliar with the symbolic language used by his chimpanzee, Sarah. Under these conditions there was a decrease in the animal's accuracy, which Umiker-Sebeok and Sebeok note is what one might expect if the chimpanzee was searching for cues from the experimenter.³² Dalbir Bindra, Department of Psychology, McGill University, Montreal, Quebec, Canada, suggests that the Clever Hans phenomenon may even play a role in the assessment of a child's language abilities.³³ Despite the evidence that cuing may play a role in ape language acquisition, Premack concluded that while approximately 10 percent of Sarah's performance might be attributable to cuing, her performance was still above what one would expect if social cues were the only source of her knowledge.³⁴

The Clever Hans effect can be eliminated by using a double-blind procedure such as the one used by the Gardners in testing Washoe's vocabulary. This procedure required that the people administering and scoring the vocabulary tests be blind to the correct answer. Washoe's responses were scored by two independent observers who could not see the test slides.³⁵ Results from these vocabulary tests demonstrate that Washoe

could communicate information; that is, she could tell the trainers things they didn't know—something that Clever Hans could not do.

Although the possibility of inadvertent cuing exists, Savage-Rumbaugh and colleagues suggest that, whether or not the apes understand the symbolic meaning of their words, "their behaviors are too complex to be controlled by a simple 'go' or 'no go' cue."³⁶ From an analysis of the Clever Hans phenomenon, Chevalier-Skolnikoff concluded that the ape's use of ASL requires more advanced cognitive abilities than could be accounted for by cuing alone.³⁰ In fact, Miles reported that the signing orangutan in her laboratory attempts to communicate with nonsigning humans from whom he could not be receiving cues.¹³

In an analysis of the data from the LANA project, psychologists Claudia R. Thompson and Russell M. Church, Brown University, concluded that Lana's behavior is due to paired association learning and conditional discrimination learning. In paired association learning, the animal couples a symbol with an object or person. In conditional discrimination learning, the animal selects a proper sequence of words to form a sentence based on situational cues.³⁷ However, James L. Pate, Language Research Center, Georgia State University, and Rumbaugh indicated that Lana's language was more complex than a simple discriminative learning model would allow.³⁸

Robert Epstein and Robert P. Lanza, along with B.F. Skinner, Department of Psychology and Social Relations, Harvard University, claim to have taught two pigeons to communicate information in a manner similar to that of Sherman and Austin. Epstein and colleagues suggested that these communication skills in the pigeons were a conditioning effect and that a similar explanation can be given for the skills acquired by Sherman and Austin.³⁹ Savage-Rumbaugh and Rumbaugh, however, note that the

Epstein experiment cannot be compared with their work with Sherman and Austin since, unlike the two chimpanzees, neither of the pigeons was taught the referential nature of the symbols. The chimpanzees used symbols to mediate requests and select and give food.⁴⁰ The pigeons, on the other hand, were rewarded with a specific food, not a selection they chose through the use of symbols.

Conclusions

Part of the problem with ape language experiments and the data analysis is that there are changing criteria for language acquisition. When the apes are shown to meet one set of criteria, more demanding ones are devised. This makes one wonder whether anthropocentrism plays a role in the acceptance of this research. How much resistance exists to the notion that something besides a human can ideate and "speak"? Part of the problem with this research is derived from the fact that language has not been properly defined. However, Ristau and Robbins suggest that these changing criteria for ape language are necessary until human language is better understood.¹⁹

In the meantime, the chimpanzee language experiments have been useful in a different way. The procedures and computerized keyboard used by Rumbaugh and colleagues to teach language to Lana have been used with retarded children who could not speak. Mary A. Ronski and colleagues, Yerkes Regional Primate Research Center and Language Research Center, Georgia State University, reported that five severely retarded, nonspeaking teenagers were taught language skills with the computer keyboard.⁴¹ One year later, four of these subjects continue to communicate with teachers and unit staff in their institution.⁴² Premack also used his artificial language to teach communication skills to an autistic child and to patients with

language impairment.⁴³ Robert L. Fulwiler and Fouts, then at the University of Oklahoma, Norman, reported that ASL training facilitated speech in an autistic boy with auditory-visual association problems.⁴⁴

The difficulty that comparative psychologists and linguists have in deciding whether apes are indeed using language is derived from an inability to determine which aspects of human communication define language. The lack of a clear definition for language hinders us in determining what is linguistic and what is not. This is especially true when we look at children's language. The question, then, of whether apes learn language is not answered, and according to Herbert F. W. Stahlke, Department of English, Georgia State University, more research will be needed before a definitive conclusion can be drawn.⁴⁵

Despite the controversies, the ape language projects have made a major impact on studies of communication, language learning, and cognition. In particular, these studies have altered our view of the great apes and the relationship between apes and humans. Psychologist Stephen Walker, Birkbeck College, University of London, noted that it would be mysterious if the functions of the human brain were unrelated to those of structurally similar animal brains.⁴⁶ In fact, Terrace recently noted that although there is controversy in the degree of overlap, apes and human beings are more similar than any other two species, especially with respect to their ability to learn arbitrary rules in the use of symbols.⁴⁷ Human language abilities, then, are most likely derived from behavioral abilities that are continuous with those of the great apes and are not completely separate and new functions.

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