

APE TALK: More Than

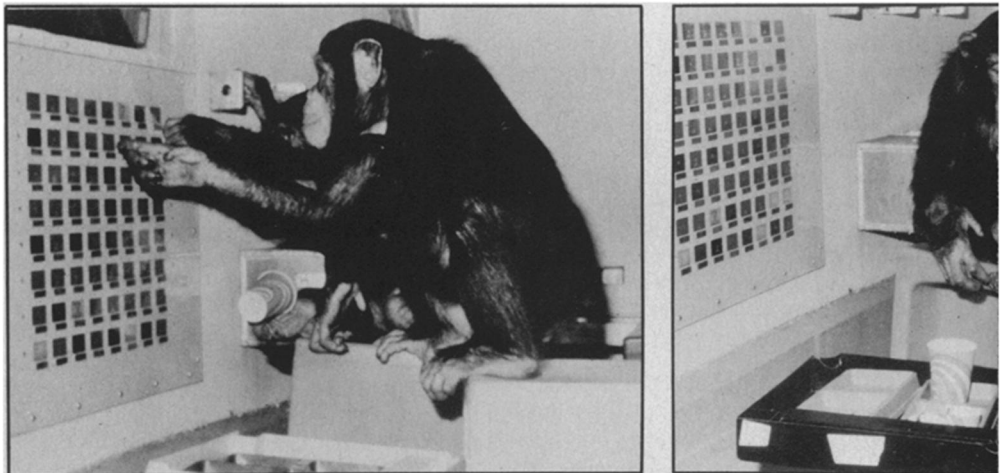
The trials of a chimp named Nim have thrown a sizable monkey wrench into the ape language research field. It now appears that the question of whether apes can learn and use language may not be answered definitively for some time to come.

BY JOEL GREENBERG

For researchers in ape communications, now appears to be the *Age of the Quagmire*. It promises to be an age of excruciating linguistic examination with even some of the most fundamental components of language being questioned. Perhaps the anthem for this era has already been sounded by Duane M. Rumbaugh, who after years of ape language research, recently asked a group of fellow psychologists: "What is a word?"

For Rumbaugh and others in this small fraternity of animal language specialists, it may not be quite back to square one, as his question might suggest. But research-related events within the past year have precipitated at least a sobering reassessment of just how close apes can come to the human ability to learn and use language. And while evidence continues to accumulate on both sides, the debate grows more intense—with Rumbaugh, his colleague-wife E. Sue Savage-Rumbaugh and others staunchly defending the long-term experimental evidence that chimpanzees can master sign and other symbolic language to communicate not only with humans, but with each other (SN: 8/19/78, p. 117).

Triggering this rather sudden detour of the ape-language bandwagon has been the work of Columbia University psychologist Herbert S. Terrace. After five years of work with his own chimp—Neam Chimpsky (Nim for short)—Terrace reported last fall that essentially Nim had failed to acquire language, in human terms; that while chimpanzees can acquire large vocabularies, they cannot produce original sentences; that language is unique to human beings and still stands as a major difference between ape and man. The reports, published in *SCIENCE* (Vol. 206, No. 4421), *PSYCHOLOGY TODAY* (Vol. 13, No. 6) and in a book, *Nim* (Knopf, 1979), represent one of the first extensively documented *negative*



arguments in the ape-language field.

Terrace's conclusions brought almost immediate criticism from long-time researchers in the field, including R. Allen Gardner and Beatrice Gardner of the University of Nevada and Roger Fouts of the University of Oklahoma, all of whom trained Washoe—the first chimp reported to use sign language; Francine "Penny" Patterson of Stanford University, who has reported success in teaching sign language to a gorilla, "Koko"; and the Rumbaughs of Georgia State University (Duane Rumbaugh) and the Yerkes Regional Primate Research Center of Emory University (E. Sue Savage-Rumbaugh), whose latest work has involved the training of two chimps—Sherman and Austin—to use a keyboard of geometric symbols to communicate with one another. The reactions to Terrace's results have ranged from Gardner's labeling of the Nim project as "poor" and a "gross oversimplification" to the Rumbaughs' wait-and-see attitude.

"Contrary to the press and some others, language is not an either-or phenomenon," Duane Rumbaugh said diplomatically while chairing a symposium on ape communication recently in Washington, D.C., at the annual meeting of the Southeastern Psychological Association (SEPA). The occasion was perhaps the first time since Terrace's reports were published that the Rumbaughs, Terrace and others in the field met in the same room to discuss the topic. And as Rumbaugh stated at the start, it was "appropriate" that the confrontation was in the Washington Hilton's "Military Room."

While Terrace also exhibited some diplomacy—conceding at one point that the question is "still open to some extent"—he was adamant in reiterating that what he, the Rumbaughs, Gardner, Fouts, Patterson, the University of California at Santa Barbara's David Premack and others

have achieved with apes is at best "a mere string of words [that do] not necessarily qualify as a sentence."

Terrace and his colleagues began training Nim in 1973, and, as the psychologist puts it, "the chimp was raised as a human being"—Nim was diapered, toilet trained, taught to eat with utensils and to draw; he even went to nursery school three times a week for three years. Specifically avoided were the mechanical-like operant conditioning methods developed by B.F. Skinner and others in which the animal learns to

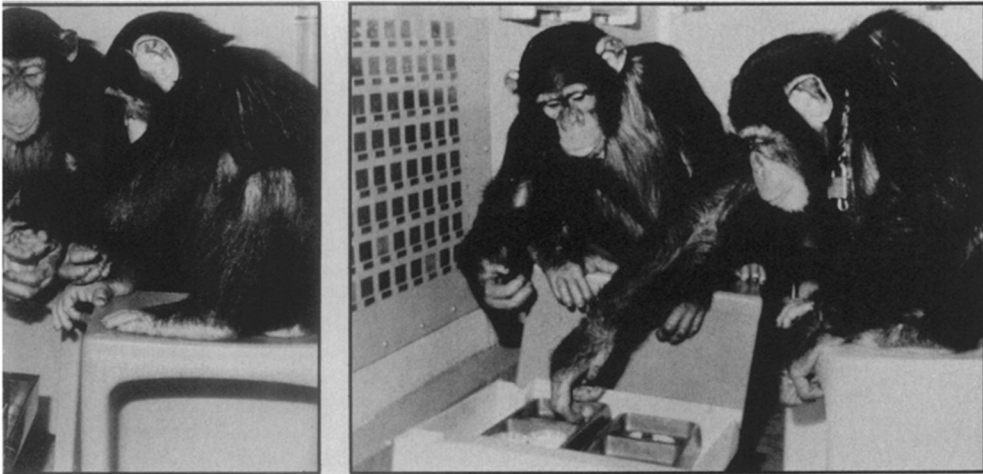


Lana was among first apes to use keyboard.

perform an act to attain a reward, usually food. "Nim was not thought of as a pigeon," Terrace says. In four years, Nim learned 125 language signs, and over a two-year period utilized two or more signs "in a linear manner" more than 20,000 times in communicating with his human trainers.

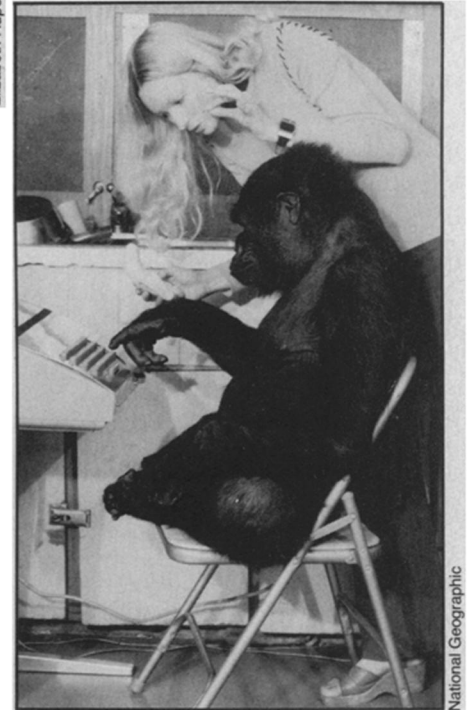
"The chimp was using some kind of rule for combining signs," Terrace says. "We

'Pigeon' English?



Sherman and Austin use a keyboard of geometric symbols to communicate (left to right): Sherman uses keyboard to request a specific food of Austin; Austin selects the food and gives it to Sherman; Sherman does the same by giving Austin an item of food requested via keyboard.

Patterson and Koko, the signing gorilla.



were convinced Nim was not simply imitating [humans]."

However, subsequent, more detailed, examinations by the researchers into the chimp's utterances revealed "problems... not visible to the naked eye":

- The mean length of Nim's word combinations remained essentially constant over several years, compared with observed length increases in the phrases of human children.
- Most of the chimp's three-sign combinations were simple repetitions of his two-sign utterances, with "Nim" added; there was no increase in grammatical complexity.
- In the "most telling evidence" against Nim's language abilities, according to Terrace, the psychologist compared the chimpanzee's linguistic output with that of a group of children. He found that at 36 months, the children were beginning to initiate their own conversations with adults, while 90 percent of Nim's communications were in *response* to human utterances; simple imitations of adults dropped from 20 percent to zero among the children during the first 36 months, compared with an actual increase in imitations in Nim's repertoire; while the children progressively expanded their phrases and increased their word usage, Nim's utterances remained essentially constant in their complexity.

"In most cases, what Nim signed was in response to what a teacher signed," Terrace says. He also found that the chimp was more likely to interrupt his teacher than are children—"There was no sense of turn-taking" with Nim. "It's been suggested that perhaps Nim had too many teachers, or [the training was] not long enough... but I see the same things with other apes and teachers" in other projects, says Terrace. "My conclusion is that these are not grammatical strings, but strings of imita-

tive or general purpose signs.... Perhaps [chimps] can make modest progress, but I think we've [ape language researchers] been too ambitious."

Terrace has his backers. According to linguist, semanticist and anthropologist Thomas A. Sebeok of the University of Indiana, ape-language researchers fall into "three categories: self-delusional and self-deceptive, fraudulent and Herb Terrace... we agree wholeheartedly." Sebeok asserts that apes can neither produce sentences—"if that's what we mean by grammar"—nor use syntax. "In the 1960s it was dolphins; in the 1950s, 800 talking dogs were described in a book; and from 1900 to 1910, horses were thought to talk," he says. "Language paired with nonverbal behavior is distinguishable to man."

More indirect and uncertain support for some of Terrace's conclusions might be found in the preliminary results of Evalyn Segal of San Diego State University. She reports that while her training subject—a macaque called "Mac"—appears to be "capable of rapid conceptual learning [and] discrimination," he is "behaving more like a pigeon so far" by exhibiting little more than rote learning. Terrace goes so far as to speculate that many of the accomplishments of Sherman and Austin— with whom the Rumbaugh have reported achieving "the first instance of... symbolic communication between non-human primates"—could be taught to pigeons.

"If you're going to say that, you should try to teach pigeons the same [way in which] you teach chimps, and not make blanket statements," says Savage-Rumbaugh. The pigeon question is particularly sensitive to the Rumbaughs because B.F. Skinner recently reported that he had basically duplicated Sherman and Austin's feat with two pigeons (SN: 2/9/80, p. 87). Duane Rumbaugh labeled Skinner's exper-

iment "misleading" because what the pigeons had achieved was far "more simplistic" than the more advanced accomplishments of the two chimps.

In her presentation at the SEPA meeting, Savage-Rumbaugh showed videotapes of Sherman and Austin requesting, giving and receiving food from one another via the symbolic communication of the geometrically coded keyboard. With "no human beings present," the chimps made just eight errors—most with new foods the names of which were not well learned at the time—in 228 total food exchanges. (Sebeok argues, however, that even in such personless experiments it is impossible to eliminate the human, or "Clever Hans," effect because "the experiments are all *designed* by humans.")

But what Savage-Rumbaugh says is most important about the study—and what indicates the chimps have progressed beyond rote learning to "com-

prehension" — are the unsolicited gestures by Sherman and Austin, "which amplified or clarified symbolic requests."

In their latest analysis, the Yerkes group observed such gestures—which generally consist of pointing to a specific food or encouraging the other chimp to act through a wave of a hand or other motion—in one-third of the food exchanges.

"I want to suggest that the symbolic interchanges of Sherman and Austin can be said to reflect awareness and intentionality on the part of the chimpanzees, not because of the symbol behaviors themselves—which we *have* taught Sherman and Austin—but because of gestural and visual behaviors which we have *not* taught Sherman and Austin but which have come to accompany symbol usage in these two chimpanzees," Savage-Rumbaugh says. "The difference between a chimpanzee and a pigeon is that the chimpanzee is aware of the content of the intended message and he will seek to amplify and clarify a symbolic request by a glance, gesture or whatever other means are at his disposal... if a pigeon who saw a color and pecked a key was asked, 'What do you mean—green?' he would not readily amplify or restate. By contrast, when a chimpanzee asks for an M&M, he looks you directly in the eye and points to it. If a chimpanzee says, 'Go outdoors' and you say, 'What do you mean?' he finds a collar, puts it around his neck and leads you to the door."

Savage-Rumbaugh's assertion that these glances and gestures—"the very medium of interaction"—are akin to those found in human child-parent relationships appears to be supported by the work of Katherine Nelson of the City University of New York Graduate Center. "If one considers the apes as learners at a beginning stage of language acquisition—rather than as users of a complex mature language—there is more apparent similarity with young children than is currently being suggested," says Nelson.

In addressing Terrace's findings with Nim, Nelson notes that Terrace and others tend to discount repetitions in language—"Thus, many of Nim's productions as reported in *SCIENCE* would not be recorded as 4-, 5-, or 16-word utterances but as 2- or 3-word utterances with repetitions. That repetitions don't count doesn't mean they don't exist," she says. "My transcripts [of children's language] are full of false starts, repeated words, repeated phrases for one reason or another—sometimes for emphasis, sometimes because a wanted phrase cannot apparently be found, sometimes from something like absentmindedness."

"In a transcript that I have been analyzing recently, a 24-month-old girl, told that she was going with her mother to pick up her brother John launches into 'Wait John up,' 'Wait John,' 'Wait John,' 'Wait John' repeated 11 times in succession. This is certainly as redundant as any of the chimp's productions and is no more mean-



Washoe, pioneering ape in sign language.

ingful. Moreover, it was produced without attention to the ongoing conversation of her mother. Anyone who claims children don't repeat has led a sheltered library existence."

Also, children have been noted to use "replacement sequences" in which they use incomplete utterances to build to a more complete thought. "For example, a child says 'chair... pussycat chair' or 'build house, Cathy build house,'" Nelson says. "These do not look very different from Nim's 'banana me eat banana.'" In addition, she adds, children "do interrupt. To suggest that the young child is a restrained, polite and sophisticated conversationalist in contrast to the ape is sheer nonsense. Moreover, it must be much more natural to sign simultaneously as the Gardners suggest than to talk simultaneously since in the former case one signal does not override the other but can in fact be read in concert."

Finally, she says that imitation—a major factor in Terrace's conclusions about Nim—"seems to play a major role in the acquisition of lexical items and for some children also in establishing new grammatical rules." She notes, however, that although some young children have been reported to imitate as much as 30 percent of the time, "there is great individual variability on this matter... Thus the issue for chimps as well as children should be: What is the function of imitations in language learning and use? Does it occur simply because the chimp doesn't know what to say? Does it diminish over the course of the language learning program?"

Overall, says Nelson, "it appears to me that there are few significant differences between the way chimps acquire sign and the way at least some children acquire a first language—differences that are not attributable to characteristics of the languages themselves—up to a point... reached by children at about two years of age. Whether or not this is a final limit on the chimp's achievement remains to be assessed." She proposes that future research attempt to probe the question of "whether the chimpanzee uses symbols as a tool to expand his own mind." One possible sign of encouragement in this area might be seen in the successful application of the chimp-teaching techniques to retarded youngsters.

But Nelson suggests that further studies

must determine if older chimps advance intellectually as they learn more language. "We need to have chimps matched for intelligence preverbally and then compared on cognitive performance after one has been taught a language," she says. "Could a chimp ever play a word game like word associations or engage in free recall of word lists? If so, we could compare the structure of the chimp's subjective lexicon to that of pre-school children. Of course this assumes that the chimp has a subjective lexicon, and we all appear to doubt that that is the case."

Some appear to doubt it more than others, though. Terrace says that while "Sue's [Savage-Rumbaugh's] work is very convincing [in showing] that an ape can think about a word without a symbol being present... there is no evidence that an ape's [linguistic] ability increases with age." At this point, however, neither Terrace nor any other researchers in the field seem ready to unequivocally close the book on the ape-language issue one way or another. Says Brown University psychologist Russell M. Church: "Neither theory [the more simplistic 'association/reinforcement' theory nor the more complex 'comprehension/awareness' explanation] of what is going on has been adequately worked out." Church and colleague Claudia R. Thompson recently analyzed the Rumbaugh's work with Lana, a chimp they trained prior to Sherman and Austin; they concluded that though much of Lana's motivation was the result of experimental reinforcement for learning, "the final level of performance is remarkably complex."

Despite his strong response to Skinner's challenge, Duane Rumbaugh assesses what has been accomplished with apes thus far as an "extremely restricted type of performance which is of unknown value. There is no question at this point that apes do have the capability of learning words... the area is still very, very new. It would be unfortunate to conclude now that this is the limit of what apes can or cannot do," he says. "The four-year-old chimp [the upper age of many language-trained chimps] is still very young [and] the case is clear that the construction of sentences by a child is not the same as that of an adult... We might see the day when an ape can [master] syntax."

But the ape-language case is equally as clear to Sebeok and others who are convinced that true language—albeit impossible to define absolutely—belongs to humans alone. "I have the same DNA as maybe a tree, a giraffe or a paramecium," Sebeok says. "But each species is unique with its own communication system."

Replies Rumbaugh: "Language is certainly a distinguishing characteristic of man, [and man] is the only species that acquires language naturally. But birds are the only species that fly." For now, however, the question of language use by apes is up in the air. □