

I talk to the animals

A chimp and her computer are attempting to prove that humans do not have a monopoly on language capability

by Robert J. Trotter

An infinite number of monkeys pecking away at an infinite number of typewriters would eventually write the complete works of Shakespeare. . . . Even if this old saying is true, the process might take an infinite amount of time. To speed things up, various researchers have attempted to teach primates methods of communicating with humans. Chimpanzees, because they have a more highly developed brain than the lower primates, have been the students in most of these experiments.

In the 1930's Winthrop and Luella Kellogg raised a female chimpanzee with their infant son. The chimp never learned to talk but after 16 months was able to recognize almost 100 words. In the 1940's Keith and Cathy Hayes repeated the feat and even taught their chimp to speak or mouth the words "mama," "papa" and "cup." Progress stopped there, however, because the mouths and throats of the animals are not built for human speech. Realizing this, researchers turned to other modes of communication. R. Allen and Beatrice T. Gardner of the University of Nevada in Reno knew that, in the wild, chimps use their hands and arms to communicate with each other. Taking this as a cue, the Gardners taught a young female chimp to communicate with her hands. The chimp, Washoe, learned American Sign Language, the sign language used by the deaf in the United States. After more

than four years Washoe was able to use 130 signs. She could ask for things, apologize for mischief and talk to herself (SN: 11/6/71, p. 313).

In another experiment, Ann and David Premack of the University of California at Santa Barbara taught a chimp to use plastic symbols as words for communication. The colored plastic pieces with metal backing could be placed on a magnetic board to form sentences. The chimp, Sarah, learned to use almost 130 words. "Her understanding," said the Premacks, "goes beyond the meaning of words and includes the concepts of [word] class and sentence structure."

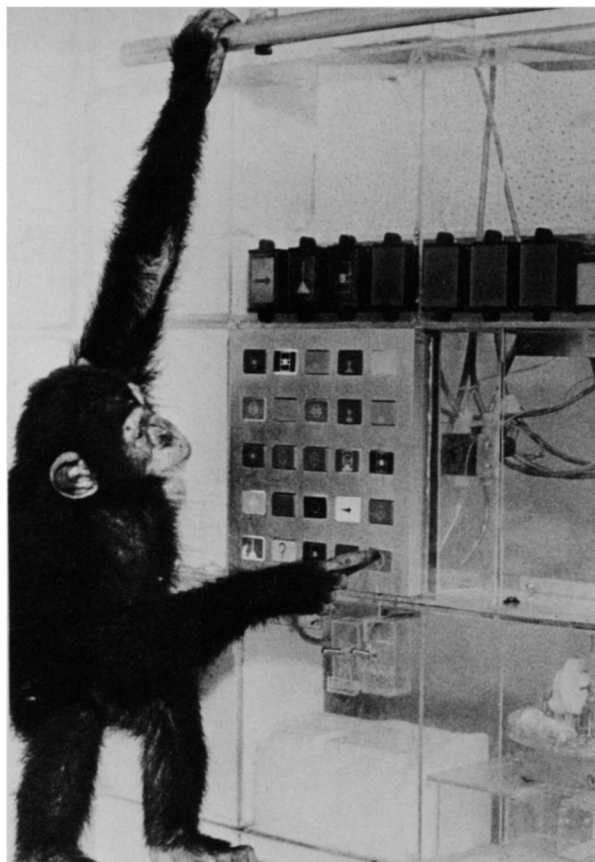
Skeptics and human chauvinists, however, were not convinced by all of this. Only humans, they said, can create and use a language in an intelligent manner. These chimps, doubters argued, are just being conditioned to respond for a reward. Given enough bananas, any chimp could learn to do tricks or put signs and symbols together in a certain way. Real language capability, it is argued, requires a demonstration of knowledge of sentence structure and syntax along with use of this knowledge for something other than the promise of a material reward.

Researchers at the Yerkes Regional Primate Research Center at Emory University in Atlanta have taken up this challenge and are attempting to teach a chimp to read and write

with the aid of a computer. Duane M. Rumbaugh of Georgia State University is in charge of the project (SN: 4/22/72, p. 264). "Basically," he says, "we want to know if the chimpanzee is capable of linguistic production." Working with Rumbaugh are Ernst von Glasersfeld of the University of Georgia, Josephine Brown of Georgia State University, Piero Pisani of the University of Georgia's Computer Center and Harold Warner, Charles Bell and Timothy Gill of the Yerkes center. The star of the project is the chimp Lana.

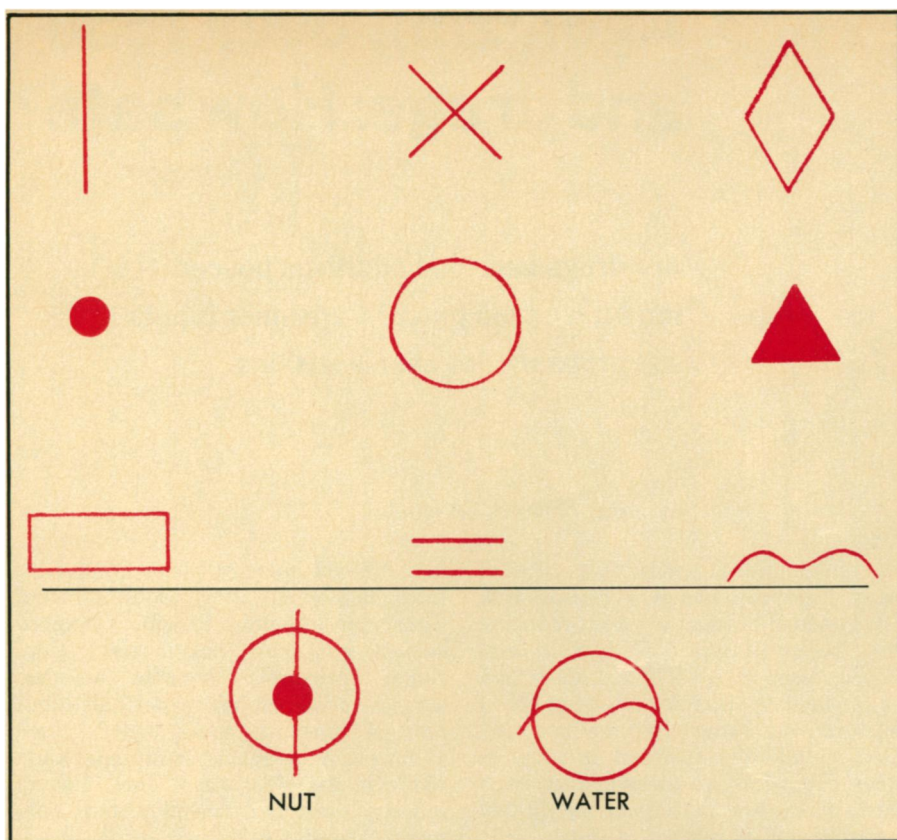
In order to teach Lana to communicate, a special language, Yerkish, had to be designed. It is made up of nine simple geometric figures that can be superimposed on each other to form lexigrams that stand for various concepts. The lexigrams are displayed on a typewriter-like computer keyboard that Lana has learned to use to type out grammatically correct requests for food and entertainment. A possible 256 lexigrams can be handled by the present computer system. So far the scientists have created 125. To avoid ambiguity, explains von Glasersfeld, each lexigram has only one meaning, unlike English in which most words have more than one definition. After five months of training Lana had mastered between 35 and 40 of the Yerkish symbols.

In order to use these words, Lana



Yerkes

Lana makes her requests on the Yerkes computer.



Daemon

The nine Yerkish geometric symbols and how they combine to form words.

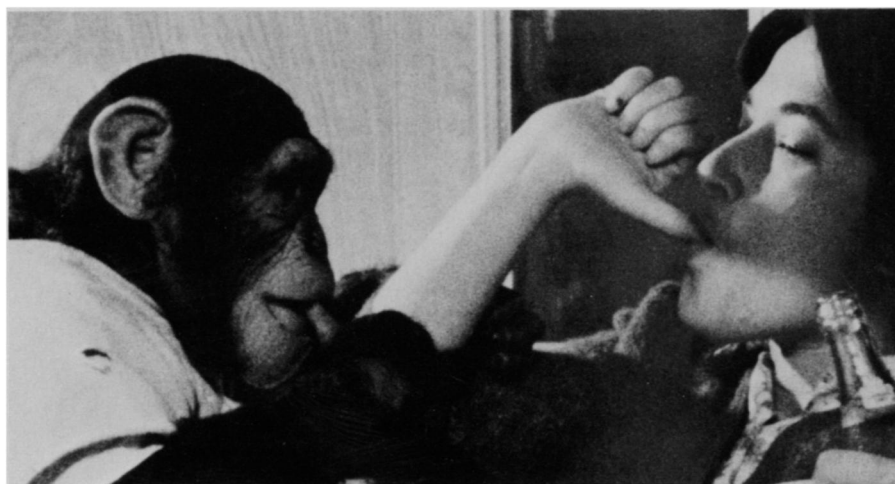
must first pull a bar above the computer. She then punches out the proper signs in the proper order. (In Yerkish, word order is decided by classes of words. Banana, for instance, can follow eat but it can not follow drink.) Above the computer console are seven small projection screens on which the symbols appear in the order in which they were punched. If the sentence is completed correctly, including a period, the computer automatically triggers a dispenser and gives the chimp what she asked for. If there has been a mistake the computer sounds a buzzer, erases all images from the screen and Lana must begin again. All attempts at communication are recorded for future study. The computer's objectivity eliminates the possibility that human prejudices or sympathies toward the animal will interfere with judging Lana's progress or competence.

Does all this mean that Lana is learning a language, or does it mean that she is being conditioned to perform for a reward? At present, says Rumbaugh, Lana is in a very advanced stage of conditioning. "In fact," he says, "nothing we have so far is productive language." But, he continues, there are a number of things happening that are very encouraging. The researchers know, for instance, that Lana hasn't simply memorized the proper sequence to punch on the keyboard because, when they change the posi-

tion of the symbols, she consistently picks out the right ones in the right order to make a request. Proof that she reads and understands the visual symbols is shown when Lana accidentally hits the "please" key while hanging on the activating bar. If she notices the "please" image on the screen she does not strike the key again but continues to add her request to it. Or, if one of the scientists punches the first two or three keys of a sentence, Lana can finish it correctly. The fact that she notices and understands the visual symbols is important, says von Glaserfeld, because the researchers

hope eventually to use the screens to ask Lana questions and engage her in conversation. "It might be possible," he says, "to set up a facility for man-ape communication and maybe even ape-to-ape communication." The four-year project, sponsored by the National Institute for Child Development, will eventually be extended to include other great apes such as orangutans and gorillas.

Past attempts to communicate with chimps have demonstrated that these animals do have the capability of acquiring a vocabulary and perhaps that they are able to use words in novel ways (ways that they have not been conditioned to). The Yerkes project is designed to go beyond word learning. "Our situation," says Rumbaugh, "has a grammar and a syntax and we want to see if the animal can learn to use words in novel ways to be productive linguistically." But why, other than the fact that it might be fun to talk to a chimp, would anyone want to do this? The Gardners were examining the extent to which another species might be able to use human language as a study in comparative psychology and as a way of looking at what language is. The Premacks also were attempting to better define the fundamental nature of language. "Ultimately," they said, "the benefit of language experiments with animals will be realized in an understanding of intelligence in terms not of scores on tests but of the underlying brain mechanism." The researchers at Yerkes have similar reasons, explains von Glaserfeld: "We want to find out if, in a controlled environment, chimps, gorillas and orangutans can be taught to communicate spontaneously through the use of a language-like system for their own purposes. We hope to find out something about the basic problems many children have in learning their language." The works of Shakespeare, no doubt, will come later. □



Gardner/NSF Mosaic

Beatrice Gardner helps Washoe practice sign language for the word 'drink.'