

language



**language**



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HUMAN BEHAVIOR

# language

BY DAVID S. THOMSON

AND THE EDITORS OF TIME-LIFE BOOKS

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*The Cover:* Aboard a Prague bus bearing the label "výstup" ("exit"), two generations make animated use of their native tongue.

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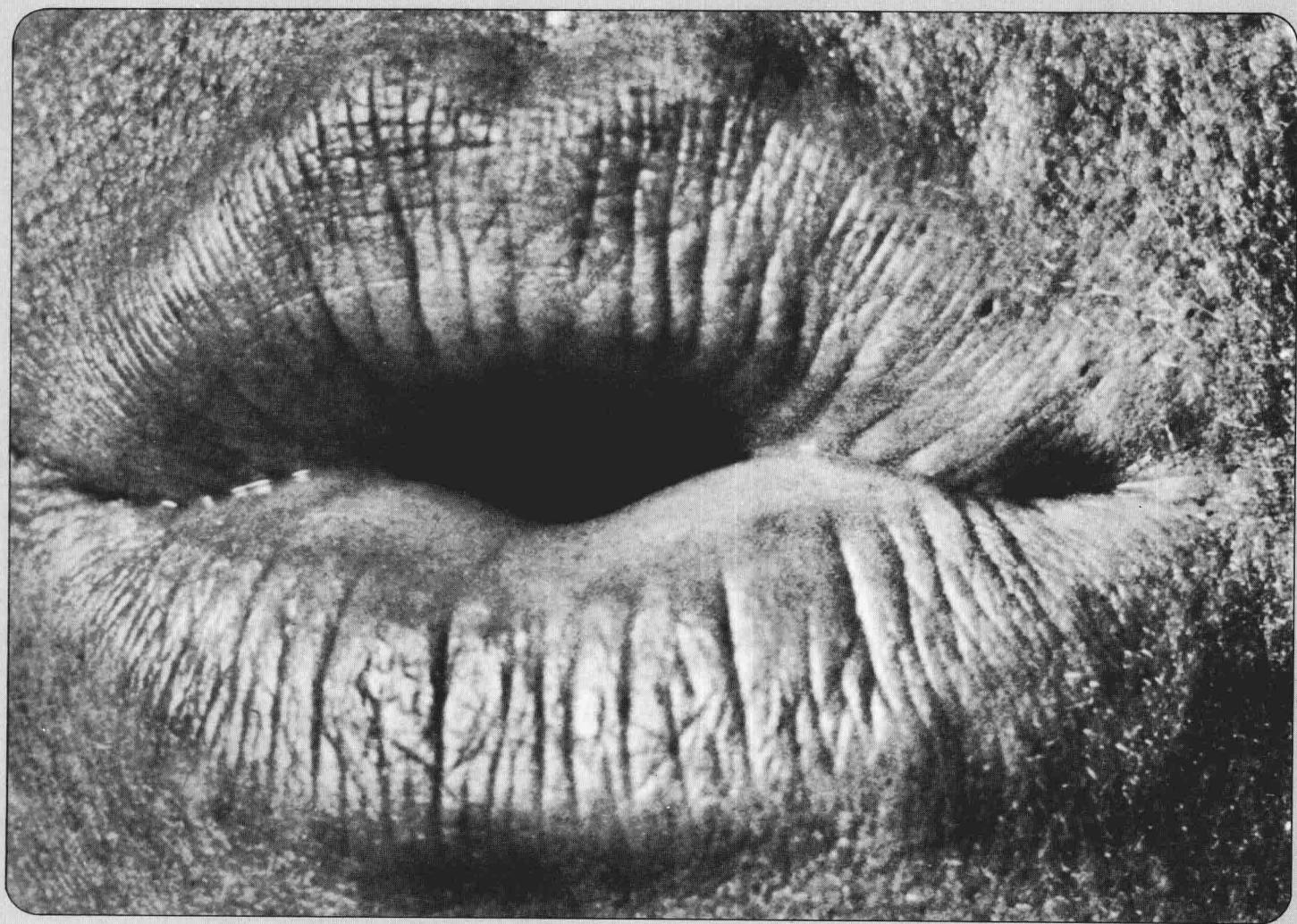
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# 1

## The Gift of Language

Dr. Samuel Johnson's wife, an old story goes, once burst into a room to find the great writer, usually a most faithful husband, kissing the upstairs maid.

"Mr. Johnson," his wife exclaimed, "I'm surprised!"

"No, Madam," said Johnson, "I am surprised. You are astonished."

This probably apocryphal anecdote contains a kernel of truth about language. Few people in any age have been as conscious as was Dr. Johnson of the words they use or the words they hear. Perhaps only Johnson, compiler of the first great dictionary of the English language, would have recalled under such stressful circumstances that the original meaning of "surprised" is "taken unawares."

It is a general truth, in fact, that few people are normally conscious of the complexity of the language they speak so casually and easily every day of their lives. They just speak, almost entirely unaware of the subtleties of the word choices they are making, of the grammar they are using, of sentence structure or emphasis. Somehow the appropriate words are formed in the mind. Somehow the speech organs—larynx, tongue, teeth, lips—enunciate the words, all with no sense of effort. Sentences roll out without the speaker being in the least conscious of the rules of grammar that govern their structure. Emphasis changes as if by magic as the speaker's voice or word choice indicates the emotional tone of his remarks. All normal humans do this automatically, as if by instinct.

This gift of language is even more remarkable considering that the average adult can pick and choose from a reservoir of some 50,000 words, can make the vocal sounds necessary to articulate them all and can string this wealth of expression in meaningful orders according to the complex rules that govern the use of his native tongue. He can usually come up with the words and phrases that are appropriate to every occasion, enabling him to chatter trivialities or to discuss the ultimate meaning of the universe. When voice or vocabulary fail, he calls on ges-



tures that take the place of words. Such mastery of language is an extraordinary achievement. That all normal humans possess the gift deserves to be called a miracle.

It is language that has made it possible for man to erect the civilizations and master the sciences that make human life what it is today. Language is the primary cause of man's swift and ever-accelerating cultural evolution. The human species has not evolved biologically since long before the Sumerians composed the oldest known epic, *Gilgamesh*, some 4,000 years ago. The Sumerians had heads as capacious and brains as large as man has today. Man has apparently grown a little taller and heavier in the last couple of centuries—doubtless the result of improvements in his diet—but he has hardly evolved in the Darwinian sense since Cro-Magnon types appeared in various parts of the world around 40,000 years ago. But man's ability to communicate information through language—and especially to communicate from generation to generation through writing—has transformed a creature hacking a precarious living out of the earth with stone or bronze tools into the incredible polymath of today, master of technologies and sciences that have launched satellites and put astronauts on the moon, created modern medicine and established the electronic communications networks that bind together the whole world.

It is language as much as anything that makes human behavior human. The brain is the master control center for all activity, but language, to a large extent, governs what the brain does. Language incites anger, elicits love, arouses bravery and triggers cowardice. It incites nations to war, sends their armies to battle and eventually negotiates a peace treaty; it orders temples to be built and canals to be dug; it instills moral precepts and clarifies understanding. In all these ways and many more, language guides and directs the way people act; that is, it influences the course of human behavior. But language is more. It is itself behavior, the expression of the brain's commands.

At the simplest level, speaking is a physical action that is comparable to walking or lifting; countless nerve cells located in the brain and beyond it coordinate muscles that create meaningful vocal signals. In addition, words, spoken with various tones and accents, constitute overt behavior. For example, insulting a man with words is an overt act. Despite the old saw, "Sticks and stones may break my bones but words can never hurt me," verbal abuse can often be as painful as physical abuse. Speech also influences much human behavior: Language establishes human relationships, fitting them to the patterns of society. In the end, language gives each man his identity, proclaiming his homeland,

social class, profession and personality. It places him in his world, and it shapes his view of that world.

Language is so essential a part of human nature that every normal human possesses it and no one can be fully human without it. Any interference with the ordinary process of acquiring language in childhood is a severe handicap. Children born deaf suffer a grave disadvantage. Special pains must be taken even with a normal child of deaf parents (*pages 30-41*). And a child who loses both hearing and sight before learning to talk, as did the writer Helen Keller (*pages 55-58*), is so cut off from language that only a supreme effort can rescue him from a life of savagery.

**P**resumably, if to be human is to use language, then the reverse should also be true: To use language is to be human. That is what everyone thought until quite recently. Now scientists are not so sure. For while man is the only creature that naturally makes use of language, he may not be the only one that can learn to do so. Experiments with chimpanzees demonstrate that they can be taught to “talk” to humans and even to one another in ways that seem to transcend the methods of communication ordinarily employed by animals.

All animals communicate with their own kind, even termites, which, if alarmed while gnawing their way through the householder’s beams and sills, have three distinct ways to warn one another of danger. They do a curious dance, they make a scratching sound with abdomen and thorax, and they emit chemical odors. Bees also communicate among themselves. A foraging worker bee that discovers a particularly rich treasure-trove of nectar returns to the hive and does a complex dance that helps to tell the other bees how far away the nectar is and in what direction to travel.

More intelligent animals have correspondingly more complicated ways of communicating. Birds have a variety of cries with which they signal to one another. Many species have an alarm cry, for instance, as well as mating calls and a keep-out-of-my-territory signal that is used at mating time. Anybody who has walked in wooded areas in places where crows congregate knows that they have a rich (and from the sound of it, probably profane) vocabulary of raucous cries. And crows, like many other birds, are now known to use regional dialects. One experimenter recorded the distress and assembly calls of a group of crows in France. He then played the tapes to an American group of crows in the state of Maine. He discovered that the down-East birds did not respond; apparently they could not fathom the cries of their French cousins. It





*Swinging a bell or banging a drum to attract attention, the town crier has carried out the fundamental mission of language—conveying essential information—in small European communities since the 13th Century. In Rudersdorf, Austria, the village drummer continues the tradition as he alerts citizens to the dangers of land mines, planted in nearby Hungary during the Cold War years of the 1950s and washed into Austria by floods.*



seems that a crow from Maine has a distinctive accent, just as do the human beings from that part of the world.

Some birds—parrots, mynah birds, ravens and other avian mimics—are such versatile vocalizers that they can reproduce human speech. Their complex vocal equipment enables them to produce a variety of tones and they can be taught to repeat words or phrases with uncanny fidelity. But not even Long John Silver's parrot or Edgar Allen Poe's raven could recombine the sounds to form an original utterance. The mimic birds have not the faintest notion of what they are saying; they merely repeat a pattern of, to them, meaningless sounds. They do not use language but simply play it back like a recorder—it is a technical trick, not a form of communication.

When birds do communicate, their messages are very simple. The same is true of other less-tuneful animals. Many dog lovers will insist that their pets have distinct barks depending on whether they want food, want to go out or are agitated by the presence of a trespasser on the property. Wild chimpanzees, the closest creatures to man in the evolutionary ladder, have a variety of hoots and cries that they use as an alarm system. However, neither birds nor chimps nor dogs can naturally string their sounds together to form meaningful combinations as man can combine sounds in order to form words and sentences. The wild chimpanzee has a sound that indicates the presence of danger, another that signals a young chimp is missing, a third that indicates the presence of food and so on, for a total of 25 different sounds. And yet no chimp has ever strung three of these sounds together to compose a message of greater complexity. Reflecting on the canine inability to combine the sounds of barks and cries into articulate speech, English philosopher Bertrand Russell once remarked, "No matter how eloquently a dog may bark, he cannot tell you that his parents were poor but honest."

By contrast, a speaker of English easily combines and recombines the 45 sounds of the language into meaningful words. The sounds for *n*, *e* and *d* can be combined to form "Ned," "den," "end." The human language with the fewest sounds is Hawaiian with 13—which is 12 fewer than the language of the chimpanzee. Yet out of their 13 sounds Hawaiians have invented a vocabulary that comprises tens of thousands of words. Animals' natural ability to communicate, one psychologist has said, compares to the human communicative power as a dime compares to a million dollars.

If any genius chimps ever learned on their own to use language, they failed to convey it to their young in order to found a line of talking animals. For 1.5 million years or so, language has been an unchallenged

monopoly of human beings. As recently as 1968 the pioneering linguist Noam Chomsky could say that only humans could acquire even the “bar-est rudiments” of language and that such an ability was “quite beyond the capacities of an otherwise intelligent ape.” But that was before Allen and Beatrice Gardner, psychological researchers at the University of Nevada, succeeded in teaching an amiable female chimp named Washoe to use sign language. Since that time, as psychologist Roger Brown has put it, man has had the “not especially pleasant feeling . . . that another species is gaining on him. In the study of language, one begins to feel the hot breath of chimpanzee.”

**B**efore the Gardners decided to try sign language with Washoe, several experimenters had tried to teach chimpanzees actually to speak. Success was minimal. One husband-and-wife team, Catherine and Keith Hayes, in effect adopted a chimp they called Viki, bringing her up as they would have an infant of their own. They bathed and fed and played with Viki as if she were human and talked with her—or rather, at her—incessantly. The Hayeses kept at this arduous regimen for no less than six years. Finally there was triumph—of a sort. The Hayeses made a movie demonstrating that Viki, with the proper encouragement, could be persuaded to screech out *four words*. This was four more than any previous simian had managed to pronounce, but nevertheless the Viki experiment seemed to prove that Chomsky was right—apes could not really be taught to talk, the “barest rudiments” of language were indeed beyond their grasp.

It was not until the 1960s that such failures were explained. Anatomy, not simply brain power, was the source of the difficulty. It turns out that chimps do not possess the vocal equipment required to articulate words. At birth the human infant’s larynx is in the same position as a chimpanzee’s, up forward in the throat. But within a few months the base of the child’s tongue and his larynx descend downward into his throat, opening up an easy channel for breath and speech sounds. The chimp’s larynx remains where it was, making the control of breath needed for speech difficult. In addition, man is blessed with thin but mobile lips, a light jawbone, a nimble tongue—all required for fluent talking and all lacking in the chimpanzee.

When the Gardners saw the Hayeses’ rather pathetic film of Viki performing her meager set of utterances, they noticed that the chimp’s hands were very active and expressive. They conceived the novel idea of trying to teach a chimp sign language. In 1966 they acquired a year-old chimp from Africa that they named Washoe after the Nevada county



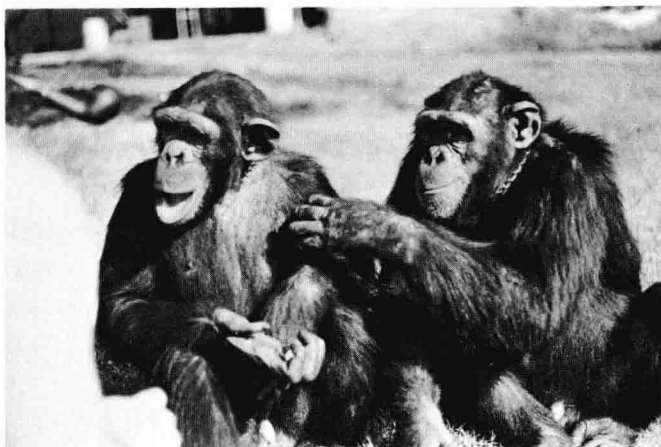
where they lived. Washoe slept in a two-and-one-half-room trailer in the Gardner's backyard and spent each day either in the large fenced yard or in their house. During most of Washoe's waking moments the Gardners or their research assistants were around to interact with her in the American Sign Language, "Ameslan," a language of hand gestures developed for deaf people.

After five years of training, Washoe could use some 150 Ameslan signs. More important, she could string two or three of them together to ask for food, to request that the icebox be opened or to express a desire to play. In other words, she could communicate simple thoughts through a form of language. For the first time a subhuman primate had generated phrases and simple sentences. Washoe could not talk, of course, but no linguist would claim that vocalization is a necessary component of language. After all, the deaf "talk" quite adequately with Ameslan. Man's linguistic monopoly seemed to have been broken.

The Gardners' success with Washoe prompted a number of other investigators to try their hand at teaching chimps to communicate with humans. By the mid-1970s at least a dozen chimps were undergoing courses in Ameslan. Among the most optimistic and determined of these experimenters were Herbert Terrace of Columbia University, his collaborator Stephanie LaFarge and an unusually dedicated team of volunteer assistants. As the Hayeses had done a generation earlier, Terrace started with a very young chimp, Nim, and made arrangements to have him brought up exactly like a human child over a long period of time—perhaps 12 or 16 years—teaching him Ameslan at the same speed that a human child would acquire spoken language. Terrace was convinced that if Nim received the beneficial effects of familial love and affection, and associated with companions with whom he could talk, he would continue to enlarge his linguistic capacity for many years.

Terrace began his long-term experiment when Nim was only two weeks old. Nim moved in with Stephanie LaFarge and her large family, including seven affectionate children. The entire family, along with several outside volunteers, started to take courses in Ameslan to prepare themselves to "talk" with Nim whenever he seemed to be in the mood for language lessons. Terrace supplied the family and their volunteer assistants with lists of words that Nim should learn and a timetable for his progress. Nim proved to be extraordinarily affectionate and responsive, and his initial progress in learning to make the signs for simple words like "eat" was gratifyingly rapid.

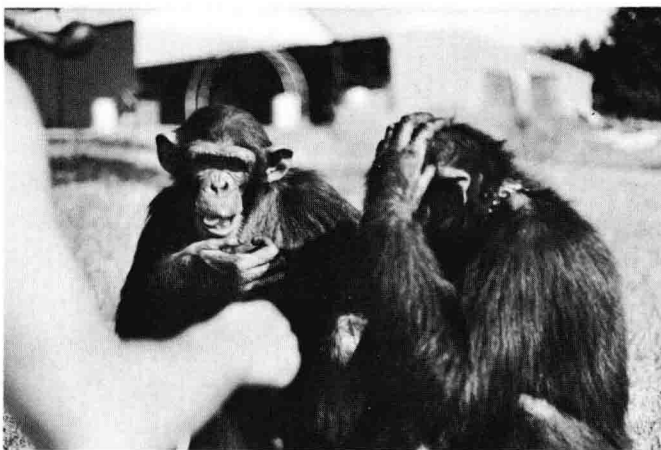
Terrace expects that as the years pass Nim will cross at least five thresholds of language use. "First, I am going to shout 'Eureka' when



"You"



"feed"



"Booee"



## A chat between glib-fingered chimps

The idea that language is unique to man—the one distinction clearly setting him above all other creatures—is crumbling before the chatter of chimpanzees like Booee and Bruno (*above*), who "talk" clearly with their hands. They are among the many who have learned to communicate with what is undeniably a real language: "Ameslan," the American Sign Language for the deaf.

Booee and Bruno were taught 40 gestures, each representing a word, by Roger Fouts of the Institute for Primate Studies, Norman, Oklahoma. They combine the gestures into grammatically correct sentences. Other chimps are even more articulate—one uses 170 words—and some seem to learn sign words from their elders.

*In this sequence of pictures, starting at top left, Booee (the chimp to the right) makes the signs that say "You," then "feed" (top right), "Booee" (bottom left). Bruno complies by handing over an orange slice (bottom right).*

Nim shows solid evidence of an ability to construct gestural sentences according to grammatical rules. Second, when he starts to use a gestural language to talk about his imagination. Third, when he begins to generate hypotheses about people not present. Fourth, when he begins to discuss the past or future. Fifth, when Nim begins to talk about an inner world—his emotions and dreams.”

Whether Nim will prove able to cross these barriers will not be known for years to come. But there is some reason to expect at least partial success. Washoe constructed phrases, if not whole sentences, that often had grammatical English word order, such as “Give Washoe fruit.” Sarah, a chimpanzee trained by David Premack of the University of California, has answered questions and has even handled either-or constructions, using a language Premack invented; it depended on arrangements of plastic tokens of different sizes, shapes, colors and textures, which the animal was taught to associate with particular words. One token meant “apple,” another stood for the word “and”—and so on. Sarah learned to differentiate and use more than 130 of these plastic “words” and to combine them in the proper order about 75 per cent of the time. Meanwhile Lana, a female chimp at the Yerkes Regional Primate Research Center in Atlanta, Georgia, has learned to punch out simple phrases at the console of a computer whose keys are symbolic “words.” Lana has become so accomplished that if she makes a mistake in the sentence she is constructing, she hits the erase button and starts again.

Even if Nim fails to live up to Terrace’s hopes, these other chimps have proved that simians can learn at least the rudiments of language—and that therefore the use of language is apparently not unique to the human species. The blow to human pride may not turn out to be quite as serious as all this implies. Chimpanzees seem to have reached the level of human language competence that psychologists call stage I, which is the level attained by the average child between the ages of one and two years. The chimps, like the children, learn the words for familiar objects such as “ball,” “food” and “dog.” They learn a few action verbs like “eat,” “want,” “give,” “play.” They combine them in the same sorts of simple phrases used by young children: “Give ball”; “Want food.” But no chimp has really gone much further than that in the use of either sign or computer language. Very young children can answer simple questions, as Sarah seems able to do. Unless Nim proves otherwise as he grows up, chimpanzees are unlikely, according to Roger Brown, to “progress beyond the rudiments that are stage I.”

Stage I is not very far considering the extraordinary complexity, the richness, the variability, the subtle shadings and tones that are the hall-