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Apes and Language:

A Review of the Literature

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Apes and Language:

A Review of the Literature

Over the past 30 years, researchers have demonstrated that the great apes (chimpanzees, gorillas, and orangutans) resemble humans in language abilities more than had been thought possible. Just how far that resemblance extends, however, has been a matter of some controversy. Researchers agree that the apes have acquired fairly large vocabularies in American Sign Language and in artificial languages, but they have drawn quite different conclusions in addressing the following questions:

1. How spontaneously have apes used language?

2. How creatively have apes used language?

3. Can apes create sentences?

4. What are the implications of the ape language studies?

This review of the literature on apes and language focuses on these four questions.

How Spontaneously Have

Apes Used Language?

In an influential article, Terrace, Petitto, Sanders, and Bever (1979) argued that the apes in language experiments were not using language spontaneously but were merely imitating their trainers, responding to conscious or unconscious cues. Terrace and his colleagues at Columbia University had trained a chimpanzee, Nim, in American Sign Language, so their skepticism about the apes' abilities received much attention. In fact, funding for ape language research was sharply reduced following publication of their 1979 article "Can an Ape Create a Sentence?"

In retrospect, the conclusions of Terrace et al. seem to have been premature. Although some early ape language studies had not been rigorously controlled to eliminate cuing, even as early as the 1970s R. A. Gardner and B. T. Gardner were conducting double-blind experiments that prevented any possibility of cuing (Fouts, 1997, p. 99). Since 1979, researchers have diligently guarded against cuing.

Perhaps the best evidence that apes are not merely responding to cues is that they have signed to one another spontaneously, without trainers present. Like many of the apes studied, gorillas Koko and Michael have been observed signing to one another (Patterson & Linden, 1981). At Central Washington University the baby chimpanzee Loulis, placed in the care of the signing chimpanzee Washoe, mastered nearly fifty signs in American Sign Language without help from humans. "Interestingly," wrote researcher Fouts (1997), "Loulis did not pick up any of the seven signs that we [humans] used around him. He learned only from Washoe and [another chimp] Ally" (p. 244).

The extent to which chimpanzees spontaneously use language may depend on their training. Terrace trained Nim using the behaviorist technique of operant conditioning, so it is not surprising that many of Nim's signs were cued. Many other researchers have used a conversational approach that parallels the process by which human children acquire language. In an experimental study, O'Sullivan and Yeager (1989) contrasted the two techniques, using Terrace's Nim as their subject. They found that Nim's use of

Because the author (Fouts) is not named in the signal phrase, his name and the date appear in parentheses, along with the page number.

An ampersand links the names of two authors in parentheses.

Brackets indicate words not in original source.

A page number is required for a quotation.

The word "and" links the names of two authors in the signal phrase.

language was significantly more spontaneous under conversational conditions.

How Creatively Have
Apes Used Language?

There is considerable evidence that apes have invented creative names. One of the earliest and most controversial examples involved the Gardners' chimpanzee Washoe. Washoe, who knew signs for "water" and "bird," once signed "water bird" when in the presence of a swan. Terrace et al. (1979) suggested that there was "no basis for concluding that Washoe was characterizing the swan as a 'bird that inhabits water.'" Washoe may simply have been "identifying correctly a body of water and a bird, in that order" (p. 895).

Other examples are not so easily explained away. The bonobo Kanzi has requested particular films by combining symbols on a computer in a creative way. For instance, to ask for *Quest for Fire,* a film about early primates discovering fire, Kanzi began to use symbols for "campfire" and "TV" (Eckholm, 1985). The gorilla Koko, who learned American Sign Language, has a long list of creative names to her credit: "elephant baby" to describe a Pinocchio doll, "finger bracelet" to describe a ring, "bottle match" to describe a cigarette lighter, and so on (Patterson & Linden, 1981, p. 146). If Terrace's analysis of the "water bird" example is applied to the examples just mentioned, it does not hold. Surely Koko did not first see an elephant and then a baby before signing "elephant baby"--or a bottle and a match before signing "bottle match."

When this article was first cited, all four authors were named. In subsequent citations of a work with three to five authors, "et al." is used after the first author's name.

The writer interprets the evidence; she doesn't just report it.

Can Apes Create Sentences?

The early ape language studies offered little proof that apes could combine symbols into grammatically ordered sentences. Apes strung together various signs, but the sequences were often random and repetitious. Nim's series of sixteen signs is a case in point: "give orange me give eat orange me eat orange give me eat orange give me you" (Terrace et al., 1979, p. 895).

More recent studies with bonobos at the Language Research Center in Atlanta have broken new ground. Kanzi, a bonobo trained by Savage-Rumbaugh, seems to understand simple grammatical rules about word order. For instance, Kanzi learned that in two-word utterances action precedes object, an ordering also used by human children at the two-word stage. In a major article reporting on their research, Greenfield and Savage-Rumbaugh (1990) wrote that Kanzi rarely "repeated himself or formed combinations that were semantically unrelated" (p. 556).

The writer draws attention to an important article.

More important, Kanzi began on his own to create certain patterns that may not exist in English but can be found among deaf children and in other human languages. For example, Kanzi used his own rules when combining action symbols. Symbols that involved an invitation to play, such as "chase," would appear first; symbols that indicated what was to be done during play ("hide") would appear second. Kanzi also created his own rules when combining gestures and symbols. He would use the symbol first and then gesture, a practice often followed by young deaf children (Greenfield & Savage-Rumbaugh, 1990, p. 560).

The writer gives a page number for this summary because the article is long.

Source: Diana Hacker (Boston: Bedford/St. Martin's, 2004).

In a later study, Kanzi's abilities to understand spoken language were shown to be similar to those of a 2-1/2-year-old human, Alia. Rumbaugh (1995) reported that "Kanzi's comprehension of over 600 novel sentences of request was very comparable to Alia's; both complied with the requests without assistance on approximately 70% of the sentences" (p. 722). A recent monograph provided examples of the kinds of sentences both Kanzi and Alia were able to understand:

> For example, the word *ball* occurred in 76 different sentences, including such different requests as "Put the leaves in your ball," "Show me the ball that's on TV," "Vacuum your ball," and "Go do ball slapping with Liz." Overall, 144 different content words, many of which were presented in ways that required syntactic parsing for a proper response (such as "Knife your ball" vs. "Put the knife in the hat"), were utilized in the study. (Savage-Rumbaugh et al., 2000, pp. 101-102)

The researchers concluded that neither Kanzi nor Alia could have demonstrated understanding of such requests without comprehending syntactical relationships among the words in a sentence.

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What Are the Implications of the

Ape Language Studies?

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Kanzi's linguistic abilities are so impressive that they may help us understand how humans came to acquire language. Pointing out that 99% of our genetic material is held in common with the chimpanzees, Greenfield and Savage-Rumbaugh (1990) have suggested that something of the "evolutionary root of human language" can be found in the "linguistic abilities of the great apes"

A quotation longer than 40 words is set off from the text. Quotation marks are not used.

A work with six or more authors is cited by the first author's name followed by "et al." in the parentheses or the signal phrase.

(p. 540). Noting that apes' brains are similar to those of our human ancestors, Leakey and Lewin (1992) argued that in ape brains "the cognitive foundations on which human language could be built are already present" (p. 244).

The suggestion that there is a continuity in the linguistic abilities of apes and humans has created much controversy. Linguist Noam Chomsky has strongly asserted that language is a unique human characteristic (Booth, 1990). Terrace has continued to be skeptical of the claims made for the apes, as have Petitto and Bever, coauthors of the 1979 article that caused such skepticism earlier (Gibbons, 1991).

Recently, neurobiologists have made discoveries that may cause even the skeptics to take notice. Ongoing studies at the Yerkes Primate Research Center have revealed remarkable similarities in the brains of chimpanzees and humans. Through brain scans of live chimpanzees, researchers have found that, as with humans, "the language-controlling PT [*planum temporale*] is larger on the left side of the chimps' brain than on the right. But it is not lateralized in monkeys, which are less closely related to humans than apes are" (Begley, 1998, p. 57).

Although the ape language studies continue to generate controversy, researchers have shown over the past 30 years that the gap between the linguistic abilities of apes and humans is far less dramatic than was once believed.

The writer presents a balanced view of the philosophical controversy.

The tone of the conclusion is objective.

Source: Diana Hacker (Boston: Bedford/St. Martin's, 2004).

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For a source with more than six authors, the first six authors' names are listed, followed by "et al."

Source: Diana Hacker (Boston: Bedford/St. Martin's, 2004).