The Bonobo test subject Kanzi

Empirical Kanzi

The Ape Language Controversy Revisited

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INNOVATIVE SCIENCE DEPENDS UPON A potentially volatile mixture of highly creative work and realistic skepticism. In a recent issue of SKEPTIC (Vol. 13, No. 4, "Aping Language: A Skeptical Analysis of the Evidence for Nonhuman Primate Language"), University of Florida psychologist Clive Wynn likened the potential import of the discovery that the chimpanzee named Washoe had learned to produce simple linguistic utterances to humans landing on the moon. If Wynn is correct regarding the importance of ape language research, all truly innovative reports in this field will merit considerable scrutiny, scholarly debate, and informed critique. It is, therefore, not surprising that reports of "talking apes" have been subjected to a level of criticism beyond that of other claims. Such strongly negative reactions stem from the fact that, if the reports are true, their implications are threatening to the long-held anthropocentric conceit of uniqueness for our species based on our language ability.

Science has traditionally viewed human achievements as something peculiar, even accidental, by evolutionary standards. Our societies and our ways of life are said to be completely dependent upon, and mostly determined by, language. If apes are capable of language, it means that we must radically revise our views of who we are and of how we have achieved our current technologically advanced lifestyles. None of these changes will be easy. Much of the Western canon and many of our scholarly disciplines are built upon the assumption that humans and humans alone have language.

A Brief History of Ape Language Research: The Initial Three Chimpanzees

The initial reports that Washoe—a chimpanzee trained by Beatrice and Allen Gardner—was acquiring human sign language were soon followed by news that a second chimpanzee named Sarah (trained by David Premack) was employing magnetic pieces of plastic as "words." Then came reports that a third chimpanzee named Lana (trained by Duane Rumbaugh) was using geometric symbols on a computer-based keyboard to produce multi-word sentences. Washoe generalized her signs to new objects and

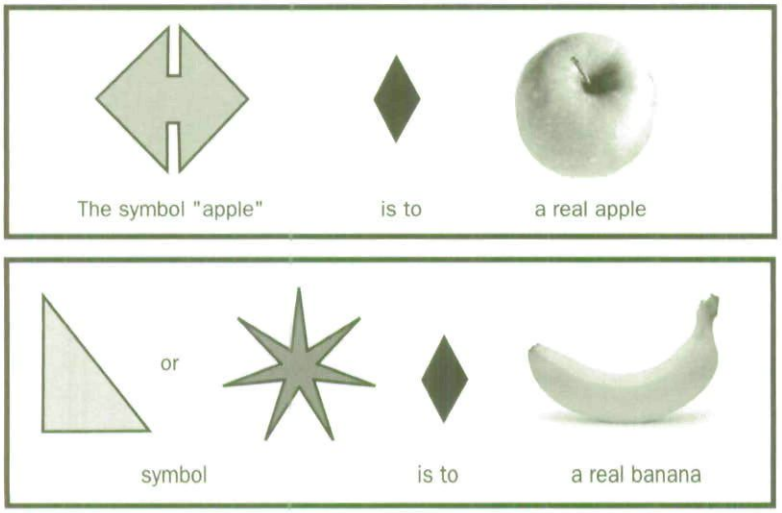


Figure 1: A chimpanzee named Sarah was taught to use plastic shapes as symbols for names of things, such as bananas or apple, and for qualities of things, such as color. She was reported to be able to use this information to solve analogies.

For example, Sarah was said to read the top panel as "This symbol (is) 'the name for' apple". She was then said to use this information to guide her symbol selection from the second panel. That is, she would know (from seeing the first panel) to select the symbol—either triangle or star—in the second panel which represented the "name for" banana.

By contrast, if the symbol in the first panel represented the "color of" the apple, then in the second panel she would know to select the symbol that represented the "color of" the banana (rather than its name). This can also be understood as a second order conditioned discrimination paradigm because the selection Sarah was required to make depended upon the information in the upper panel as well as upon assuming a relationship of similarity between the upper and lower panel.

made spontaneous sign combinations. Sarah answered questions *about* language (such as, *Name of this apple?*), even though she had no language she could employ for the purpose of communication. She was said to able to look at plastic symbols (once they had become associatively paired with objects through training) and solve linguistically based analogies such as those shown in Figure 1.

Meanwhile, Lana was acquiring not only words, but complete "stock sentences" with embedded grammatical rules, such as "Please machine give piece-of bread." Although Lana's "stock sentences" were purposefully trained, she also employed novel structures that were grammatically based, in order to get food items and to control the behavior of humans, such as "Question you give banana which-is black" to indicate she preferred overly ripe bananas to yellow ones.[1]

The reports of other chimpanzees that confirmed the Gardners' findings with Washoe (albeit with different methods) riveted the scientific community. But the widespread fascination with the complementarity of these findings was compromised when disputes erupted between the three original investigators. The initial debates swirled around attempts to determine whether mindless conditioning was producing something that looked like language, or whether the apes were transcending their training and achieving some awareness of the power of words.[2] Linguists, in the meantime, were trying to determine whether or not Washoe's utterances evidenced a primitive grammar. This effort collapsed, however, when they learned that the Gardners had not actually recorded the true *order* of Washoe's signs, because they had focused on *what* Washoe said rather than *how* she said it. Linguists consequently—and quite naturally—were skeptical.

Nim Chimpsky and Noam Chomsky: The Dark Days of Ape Language

Things became more complicated when Herbert Terrace, a committed behavioral psychologist and learning expert, stepped forward with the stated goal of saving the field by training an ape properly to answer the famed linguist Noam Chomsky, who quipped that if man had been intended to fly he would have been born with wings and if apes had been intended to speak they would have been born with language. For Terrace, this meant employing sophisticated conditioning techniques that he thought were absent from the work of his predecessors and beginning the human socialization of a chimpanzee at birth, instead of a couple of years later. Terrace placed his ape subject, Nim Chimpsky, in the home of a friend with seven children. While this provided a truly human social world for Nim, it did not provide Nim with exposure to sign language. Instead, Nim was exposed to sign language in a training cubicle at Columbia University.

When Nim was four years old, Terrace fired a cannonball at the field of ape language when he announced that he had been fooled by his chimpanzee subject. Although he had originally thought that young Nim was actually communicating with him, Terrace now claimed that detailed study of videotapes revealed that Nim had been imitating his teachers. Using the Gardners' footage, Terrace illustrated how, in a number of scenes, Washoe's teachers produced signs that were shortly thereafter imitated by Washoe. Often this took the form of a question

The chimpanzee subjects Sherman and Austin who communicated symbolically with one another instead of just with researchers.

and answer dialogue, for example, Teacher: "Do you want me to open the refrigerator?" Washoe: "Open, open, refrigerator hurry."

Terrace concluded that Washoe's sign combinations, like Nim's, were imitations of the teachers' preceding utterances plus some "wild card" signs that were always appropriate, such as "hurry," "me," or "Washoe." He also observed that Washoe, like Nim, employed her utterances in an instrumental fashion—that is, utterances were nearly always designed to obtain a reward, rather than to convey information to another party.

Thus, Terrace questioned whether it was legitimate to expect that grammar or semantics of the human sort could exist in utterances that were heavily influenced by imitation, overtly laced with "wild card" words, and absent of any obvious communicative intent other than to convey desires for food, objects, games, etc.

Sebeok, Clever Hans, and Sherman and Austin

Terrace's claims were soon embraced by the semiologist Thomas Sebeok, who at the time was the reigning expert on natural communication systems in animals. With Terrrace's "Report to the Academy" as his centerpiece, Sebeok organized a conference at the New York Academy of Sciences for the purpose of banning all further investigations into the field of ape language. His main point was to be that all such phenomena were reducible to the "Clever Hans" effect. Clever Hans was a horse who, in the early 1900s, learned to strike his hoof repeatedly on the ground in response to questions. As long as the questions were about numbers (e.g., What is 10 minus 5?) the horse could be made to appear to know the answer simply by cueing him when to stop his hoof striking. The horse fooled many people until it became known that he could answer questions only if his trainer was present and knew the answer.

Sebeok felt certain that cueing and imitation could explain all the language capacities claimed for apes. The Gardners were invited to defend themselves at the conference, but when they learned what was planned, they declined. With their absence and Terrace's report to the academy on being "duped" by an ape, the field appeared to be on the verge of collapse. Accompanied by magicians, as well as by scientists who had investigated cueing and experimenter expectancy effects, Sebeok publicly called for an end to all funding for ape language studies and for publishers to reject such reports. It was a dark day for ape language.

Sebeok might have succeeded were it not for a paper on two new chimpanzee subjects—Sherman and Austin—presented at the conference (also published in a book by Sebeok[3]), which demonstrated the following:

(a) apes could acquire symbols without being cued and without imitating the experimenter;
(b) apes could comprehend symbols as well as produce them;
(c) symbols could serve as internal representations of objects and foods;
(d) the initial capacities arose through training and rewards, but new skills constantly emerged that went beyond training and required no rewards to maintain; and
(e) apes could employ symbols to communicate specific referential information to one another that they could not transfer by nonverbal means.

These capacities made it possible for them to manipulate symbolic information and to create mental categories of their own. Such mental abilities were, functionally speaking, a lot more like

real language than anything previously reported. Certainly there was something in the field worthy of continued investigation, whether or not it would eventually prove to include all aspects of human language.[4] This paper gave ape language a reprieve in the midst of this skeptical onslaught.

Wordless Symbols

The capacity of apes to learn and employ symbols to communicate with each to another, however, also led to attempts to confound associative responses with symbolic processes. This confusion began when Skinner attempted to emulate the successes of Sherman and Austin by conditioning two pigeons (whom he named Jack and Jill) to respond to lights going off and on sequentially in their electronically-paired conditioning chambers. As long as one failed to examine closely what was occurring, the pigeons appeared to be communicating, because key presses were called "words." The implication was that similar processes could account for what chimpanzees were doing. However, this conclusion is contraindicated if one examines the experimental paradigm closely and refuses to be fooled by the labeling of an associative response as a "word."

The simple fact was that Sherman and Austin needed neither complex lights nor linked conditioning chambers. Once they grasped the true nature of symbols they could transmit information to each other using completely new symbols, or photos, without any electronic assistance. They even assigned new symbols on their own and agreed upon them. The closer the examination of the data and the nature of their communication, the more it demonstrated that their knowledge was not reducible to stimulus triggers or to cued responses. Because their lexigrams had achieved true symbolic status, communicative rules appeared with emergent processes that operated above and beyond any immediate stimulus/response exigencies of the moment. In fact, by symbolically communicating with one another (instead of with the researchers), Sherman and Austin took the language paradigm out of the realm of experimenter-controlled responses and put it into that of language proper. By placing language between apes, who used words to communicate things that were not "given" by the context, it demonstrated that their "words" were products of their own thoughtful minds.

Nevertheless, confusion entered the field a third time when Premak's student Tetsuro Matzuzawa (and later Rob Sumaker with the aid of Ben Beck) began keyboard projects in which ape subjects were taught lists of paired associations between photos and geometric designs. By calling these associations "words," the researchers implied that communication was somehow occurring. Yet what they taught was only a short list of stimulus/response associative pairs. In their training paradigms, the keyboard turned off as soon the subject selected a key in order to prevent the error of a second key press from occurring. Thus, even if the apes were somehow able to intuit words from their paired-associate training regimes, the paradigms employed actively precluded them from engaging in symbolic communication.

In this approach there was no listener, no speaker, no topic, no joint regard, no negotiation, no intent, no new or old information, no exchange of goods or services, nothing to be comprehended, no desires to be manifested through symbolic expression, no opportunity to select more than one design or to combine any designs; in sum there existed nothing of which language is composed. There was simply a list: if you see A, choose B; if you see C, choose D; etc. Yet because designs were given word labels, the illusion that words were being produced was created. Many perceived these apes as possessing vocabularies, even though the central point of Skinner's experiment with Jack and Jill had been to teach experimenters and reviewers to avoid this pitfall.

Nonetheless, with the clearly emergent ability of Sherman and Austin to use symbols *to convey novel complex information to each other,* more scientists finally began to raise questions about what language actually was, what symbols were, what complexity of syntax was required for "real language," what role so-called "nonverbal behavior" played in linguistic utterances, and what it meant to each child to go through a multi-year period as a listener and then to achieve near-omnipresent conversations in his or her surrounding world.

The Sherman and Austin research was the first to try to address these issues in an experimental manner, and its successes as well as its failures made clear that many aspects of language previously taken for granted required

further scientific investigation. The new approach was grounded in the belief that language is not reducible to symbols and grammar. Instead, real words and real rules (as opposed to lists of associations and chained routines), are inevitably embedded deep within the socio-cultural structure of all co-joined and symbolically mediated plans, actions, and perceptually structured realities. This does not mean that associative processes and word chains for habits of speech don't exist. They do, even for humans; and in far great abundance than we generally note. But it does mean that language is more than this, and conscious self-reflective symbolic thought allows the mind to rise above the stimulus/response exigencies of these processes. This allows the language user to contemplate and make judgments about the self, to reflect on past actions and potential future actions apart from actually engaging in them, and thus to become a moral being. That is to say, symbols make possible talk that is "about" things, or even about language itself. It is this capacity that heralds the rise of the symbolic mind, and makes possible the emergence of co-created worlds of ordered symbolic exchanges.

More recently, Terry Deacon, in his book *The Symbolic Species*,[5] eloquently explicated in a depth that humanists could grasp why it is that there can be little, if any overlap between a symbolic world (i.e., human world) and the nonsymbolic associationist world (i.e., animal world). Deacon, like Skinner, emphasized that a qualitative leap is taken when the mind begins to function on the symbolic plane, most notably in a world constructed through deliberate joint reference. Grammar is an added attraction but it does not construct that world. It is symbols that construct the human mind.

While the level of joint communication achieved by Sherman and Austin was not taken beyond the two-word stage, their two-word utterances indicated a sensitivity to linguistic context, an ability to differentiate between old and new information and an awareness of information likely to be possessed by the listener (more recently termed the "audience effect"). The emergence of these abilities defined most of the topics around which the field of ape cognition would revolve for the next 25 years. Additionally, they brought into sharp relief the existence of a vast array of sophisticated cognitive processes that lay, like the bulk of a giant iceberg, just beneath the surface of even the simplest of symbolic exchanges between apes. These are:

1. Theory of mind
2. Indicative gesture
3. Joint regard
4. Nonverbally coordinated utterance timing
5. Distinction between the symbol and the message
6. Turn taking
7. The ability to link symbols to real world actions
8. The distinction between intentional and extensional communicative structures
9. The need to symbolically encode intended action to achieve the coordination of behavioral intentions through symbolic means
10. Rapid symbol mapping
11. The emergence of complex cultural rules such as the circumstances surrounding "food-sharing"

The Grammar Module

As far as the critics were concerned, however, the achievements of Sherman and Austin simply meant that they needed to restructure their argument in order to offer new reasons why it was that apes did not have language. Since imitation, wild cards, conditioning and cueing could no longer account for what apes were doing, the critics decided to emphasize the fact that human children do not require language training, while apes do. In other words, language comes "naturally" to humans, but must be trained into apes. To add special emphasis to this difference, the critics asserted that humans were genetically endowed with a "grammar module" that enables children to listen to any language and decode its grammar. Lacking such a device, they argued, each child would be faced with the impossible task of deducing grammar without any training.

The nativists, as they came to call themselves, also held that grammar operated independently of culture. The grammar module required little more than vocal input. It could then perform its magical analytic work of grammatical construction anew in every child. The difficulty with this approach was that no one could find the grammar module in the brain. Additionally, many developmentally delayed children who did not acquire language on their own, could be trained to use grammatical rules.

Kanzi Answers the Nativists

To answer the nativist's charge, one of us (Savage-Rumbaugh) began working with another ape subject—a bonobo named Kanzi. Unlike the previous "language trained apes," Kanzi was not removed from his mother, nor was he placed in an exclusively human world. Human beings entered Kanzi's world. Language usage, both spoken and on a symbol board, surrounded Kanzi all day long. No requirements of symbol production were demanded of him and no intentional training was provided. All keyboard usage took place in the context of communication. The experimental design was simple—if Kanzi were to acquire language, he would acquire it as naturally and as spontaneously as human children acquired their mother tongue.[6]

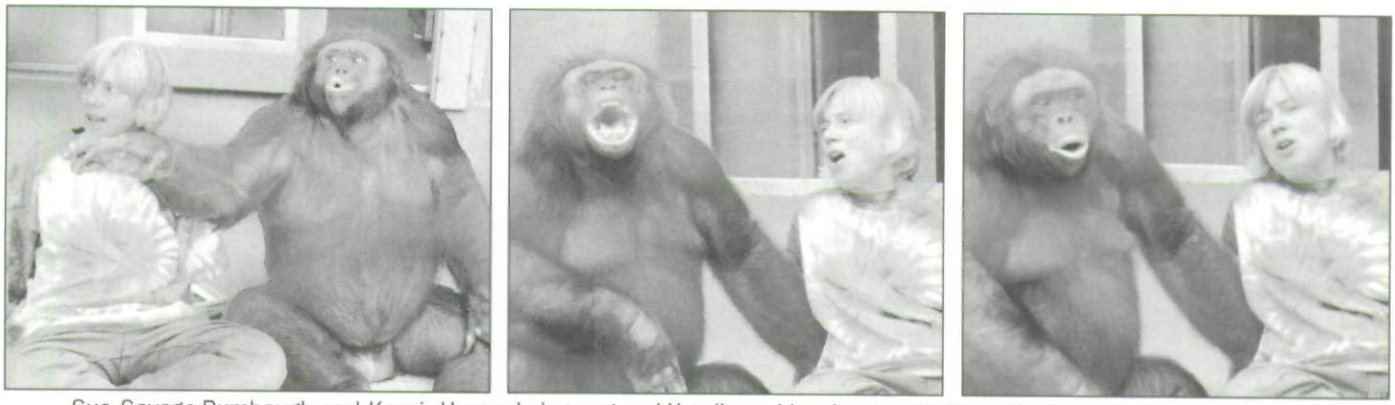
By age five Kanzi had easily mapped over a hundred symbols on his keyboard, and was combining them into simple two and three-word utterances.[7] The utterances were not imitations of his caregivers and they followed ordering rules based, at the very least, on semantic categories if not abstract linguistic categories.[8] By age nine Kanzi was demonstrating comprehension of spoken English at the level of the individual sentence, as well as following the meaning and inferences of multiple sentences across a narrative. He mastered the English abstract grammatical categories of subject, verb, and object and complex grammatical structures such as recursion and possession in tasks of comprehension, but not in his lexical productions.

Kanzi's comprehension of spoken language raced rapidly ahead of his production, only because his vocal utterances were uninterpretable by the human auditory apparatus. In order to be understood, Kanzi *had* to employ his symbol board. The critics conceded Kanzi's acquisition without training, but they labeled his grammar "proto-grammar," as in something that could not be produced by a grammar module, but only by some other (nondefined) process. In response to their critique, Savage-Rumbaugh presented an extensive analysis of Kanzi's syntactical comprehension skills by presenting Kanzi with over 660 novel and unusual sentences during controlled blind tests.[9] Every trial was filmed and Kanzi's ability was compared with that of a child named Alia who had acquired language and lexigrams much as Kanzi had done, and she had done so in Kanzi's world. The child also manifested speech skills normal for her age. During this test both Kanzi and Alia demonstrated mastery of the English syntactical structures listed below.

1. Put X in/on transportable object Y. (Put the ball on the pine needles—the objects in this construction could be reversed because both could be moved.)
2. Put X in/on nontransportable object Y. *(Put the ice water in the potty*—the objects in this construction could not be reversed because one of them was too heavy to move or was attached to the substrate.)
3. Give (or show) object X to animate A. *(Give the lighter to Rose.)*
4. Give object X and object Y to animate A. *(Give the peas and the sweet potatoes to Kelly.)*
5. Do action A on animate Y. *(Give Rose a hug.)*
6. Do action A on animate A with object X. *(Get Rose with the snake.)*
7. Do action A on object X with object Y. *(Knife the sweet potato.)*
8. Take object X to location Y. *(Take the snake outdoors.)*
9. Go to location Y and get object Y. *(Go to the refrigerator and get a banana.)*
10. Go get object X that is in location Y. *(Go get the carrot that's in the microwave.)*
11. Make pretend animate A do action A on recipient Y. *(Make the doggie bite the snake).*

The critics rejected the interpretation of this data by asserting that Kanzi could carry out novel test sentences simply by recognizing any two nouns (for example dog and snake) and then *inferring* the rest of what he was do (i.e., make the dog bite the snake). They granted Alia grammar even though she had more difficulties than Kanzi, simply because she was human. The critics held that the force of their argument lay in its assumption that a correct response to the presented sentences did not require an understanding of grammar. They believed that they could simply dismiss the data by attributing Kanzi's ability to correctly act out novel sentences to his powers of *inference*. They saw no need to offer an explanation for how *inference* could, in fact, account for the data.

To understand what the critics were actually asserting, perhaps it would help to reflect upon what would be required of Kanzi if he were to *inferentially* deduce all that the critics suggest. For even one sentence such as "Can you make



Sue Savage-Rumbaugh and Kanzi. Human beings entered Kanzi's world and surrounded him with language usage all day long.

the snake bite the doggie," Kanzi would need to do the following:

(a) Recognize that the word "snake" was being applied to a plastic toy, not the real snakes he encounters in the forest and which constitute his use of the word.

(b) Recognize that the diminutive term "doggie" was being applied to a stuffed toy, not the real dogs in his world which constitute his usual reference for the term dog.

(c) Guess which of a wide variety of verbs might be *inferred* (chase, bite, take, go get, grab, tickle, put, show, wash, etc.) by the experimenter.

(d) Infer the order of the action or actions which the experimenter wishes to have executed on the objects X and Y.

(e) Select the appropriate objects from a wide array of similar ones and *infer* a specific novel relationship between them—one which he has never seen anyone embody before (that is, he has never seen anyone make a toy snake bite a toy doggie).

(f) Infer that the experimenter wanted the sentence to be enacted on the plane of pretend rather than on the plane of reality.

Moreover, Kanzi would need to want to *infer* all of this for no sentence-contingent reward and he would not be told that he had made a mistake if he was wrong. How could Kanzi, or any living human being for that matter, *infer* what to do time after time, without any comprehension of grammar? What were the exact processes of inference Kanzi was to have employed? If he is capable of such powerful inferential deductive analysis, why would he not be able to infer the operation of grammatical rules? And why would instances never arise in which Kanzi clearly *inferred* the incorrect grammatical relationship? To clarify this point further, let us analyze the sentence "Make the snake bite the doggie." Kanzi could have *inferred* that he was to do any of the things below.

(a) Go to the bedroom and look for the doggie and the snake.
(b) Take both the doggie and the snake outdoors.
(c) Pretend to tickle them both.
(d) Make them both pretend to chase Rose.
(e) Give them both some water to drink.
(f) Make the snake pretend to tickle the doggie.
(g) Put them both in the refrigerator.
(h) Hide them both under the blanket.
(i) Give them both to Liz.
(j) Bite the snake himself, while holding the dog.
(k) Show the snake and dog to Kelly.

But he did not. Why not? Clearly he understood more than two words. He understood the word "bite" and he understood the word "make," as evidenced not only from his performance in this sentence but also from others as well. Alia understood the word "bite" but she did not fully understand the word "make" as evidenced from her performance on this sentence and others.

Each novel sentence in the test had its own form and its own peculiar and novel demand. Sentences tend to derive their peculiar form and function from the role played by the verb form. In this sentence Kanzi had to cope with two verbs, "make" and "bite." Even more interesting is the fact that he had to apply the verb "make" to his own actions, and the verb "bite" to the pretend actions of two pretend animates. In addition, an ordered relationship was implied by the linear order of the words. That is quite a lot to do on the basis of *inference* alone. Yet the multitude of *inferential* processes required to enable Kanzi to guess the appropriate actions for *any*

one sentence differed from those required by any other sentence.

When Kanzi did fail to respond correctly, it was not generally the grammar over which he stumbled, but word meaning or his view of what should be done when odd sentences were presented. For example, the sentence "Can you put the can of coke in the trashcan?" troubled Kanzi. The word "can" was employed in three different ways in this sentence, and this itself seemed to confuse him. Furthermore Kanzi did not consider a can full of coke to be trash and he was never ready to *infer* that he should place a can of coke in the trash. Thus there were many things about this sentence that made it complex for Kanzi, but the grammatical structure of "Put X in Y" was not one of them. The trashcan was large and not easily taken to the coke. If Kanzi were to be solving the sentences by knowing only "coke" and "trash" and then doing the easy thing (taking the transportable to the nonstransportable) this sentence would have been easy for him, but it was not.

Assuming that *inference* could simply replace grammar, the critics proceeded to assert that they could ignore the majority of the 660 sentences and justifiably focus only upon a small subset "Can you put X in Y?" and within that subset they elected to consider only those sentences in which the order of X_a and Y_b were reversed in the 1993 data set (i.e., "Can you put Y_b in X_a?"). In his critique of ape language, skeptic Clive Wynn asserts that Kanzi was correct on only 57% of these sentences. He then couples this percentage with the unsupported assertion that Kanzi could have inferred grammatical intent by knowing only two words and jumps to the conclusion that the 57% figure indicates Kanzi was able to perform only at chance levels on the "really important" sentences.

Let us examine the facts more closely. There were 88 sentences in which word order was inverted and Kanzi was correct on 81% of these sentences. As we have seen, the assertion that many of them could be resolved on the basis of knowing only two words does not hold up. Even in cases such as "Take the snake outdoors" versus "Go get the snake that's outdoors," the argument that Kanzi was forced to do the correct thing because the physicality of the world would not enable him take the outdoors to the snake, does not hold. There was a toy snake (as well as other objects) present in front of Kanzi. Therefore, upon hearing "snake" and "outdoors," he could have taken the snake that was in front of him outdoors, he could have gone outdoors and retrieved a different snake, or he could have gone outdoors, found another snake, and bitten it, etc. The only clues Kanzi had in these situations were the grammatical ones as well as the other words in the sentence ("make," "bite," "the"). To apply the word "make" correctly to himself, and the word "bite" to the pretend animates, Kanzi had to understand grammatical convention. To suggest that *inference* suffices to explain 660 different novel actions is simply to throw around a term that does not even *begin* to explain the data.

Nonetheless if we do just as Wynn suggests and leave out all sentences in which a location is involved, there are still 42 inverted sentences in the database, not 21 as he asserts. Finally, we note that Kanzi was correct on 66% of these sentences, not 57% as Wynn claims. Alia, to whom the critics concede grammar, was correct on only 38% of the same sentences. If we go still further and look at the *kinds of errors* Kanzi made on this particular subset of sentences we find that only four were inversion errors, which are the kind of errors that Wynn would predict if Kanzi indeed understood words but no grammar. *The overwhelming majority of Kanzi's errors were semantic errors, not grammatical errors.* Thus Wynn's view is simply not supportable, even with his own selective interpretation of, and inferences regarding, the data set.

Wynn then argues that even when Kanzi *correctly* carried out inversions, he really did not know what he was doing. He offers as an example Kanzi's response to "Make the snake bite the doggie," and contrasts that with his response to its inversion. Kanzi accomplished the first sentence by pushing the head of the snake against the dog's mouth and the second by placing the snake's head inside the dog's mouth and pushing the dog's mouth closed. For Kanzi these were two very different kinds of attacking events, but to Wynn, they were not because they both involved "mouth parts." Yet Kanzi had spent a great deal of time in the woods and had seen a number of real life dog/snake encounters. His method of "acting out" this sentence reflected his real world understanding of how dogs and snakes actually fight with each other; i.e., they bite and they tend to aim for the head. It also noteworthy that in this particular pair of sentences, Alia, whom Wynn credits with grammar, failed the test sentence because she bit the

doggie on its head. That is, she did not seem to realize that the verb "make" was to be applied to her actions, and the verb "bite" was to be applied to the actions of the pretend toys.

The final critique offered by Wynn is that the scoring criteria are weak because they allow for sentences to be repeated and/or rephrased if the subjects do not listen or hesitate. Wynn does not seem to understand the role of extraneous attention demands during these tests. Neither Kanzi nor Alia was a robot. They were happy free roaming beings who were doing lots of other things besides taking a test. Sometimes they started to carry out a request and then became interested in playing with another object or in doing something else. Repeating the sentence, to draw their attention back to the request, in no way invalidated their response. For example, below is what occurred when Alia heard the sentence "Give Mommy the sparkler and the water."

> First Alia picked up some juice and drank it. Her mother then said, "Sit down and listen" followed by "Give Mommy the water and the sparkler." Alia then said "More juice Mommy." Her mother replied "Not yet. Give Mommy the water and the sparkler." Alia then picked up the water and the sparkler, but she did not give them to the speaker. Instead she set the water down and put her finger in it. Then she picked them both up and took them to her mother.

Alia was scored as correct even though she drank some juice first, asked for more juice, and then stuck her finger in the water, before doing what the speaker asked. The fact that Alia preformed correctly on this sentence, even though she did a number of other things first and even though the sentence was repeated and rephrased, in no way diminishes the validity of the conclusion that Alia understood this sentence and was able to carry it out.

Conclusion

The critics of ape language have gone astray. While the paucity of arguments the critics have offered is illustrated here, there is insufficient space to detail the more recent methods and the more recent array of data that has been set forth since 1993, which critics continue to overlook in their ever tighter focus on locating some specific difference between "ape language" and "human language." No one should expect apes to behave precisely as humans do unless they are raised *as humans*, in a human world. No ape has yet been raised in this way. They have been raised *as chimpanzees*, in caged experimental worlds, not in families and villages. The challenge of the future is not an ever more precise delineation of the grammatical issues, but rather a better understanding of how apes employ language with each other as members of a functioning social community.

Yet it seems that among many, there still resides a lingering discomfort with the idea that the mental and social worlds of apes might be much more like our own than we have given them credit for. Perhaps the 19th-century woman hit the mark when she learned of Darwin's theory that we are descended from prehominid ancestors: "Heavens, let us hope it isn't true, but if it is let us pray that no one finds out." While most people have accepted the fact that we share a physicality with apes, there are still many who refuse to accept the fact that we also share a mentality with them. ▼

Go to: **kanzi.bvu.edu** for footage that illustrates the ape language work that has taken place with Lana, Nim, Sherman, Austin, Kanzi and Panbanisha beginning in 1972 and continuing to the present. It includes testing paradigms, training paradigms and the tangible processes of daily life which embeds, surround and contexts their language comprehension and production.

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