

# Language in the Ice Ages

## When Did Europeans First Speak?

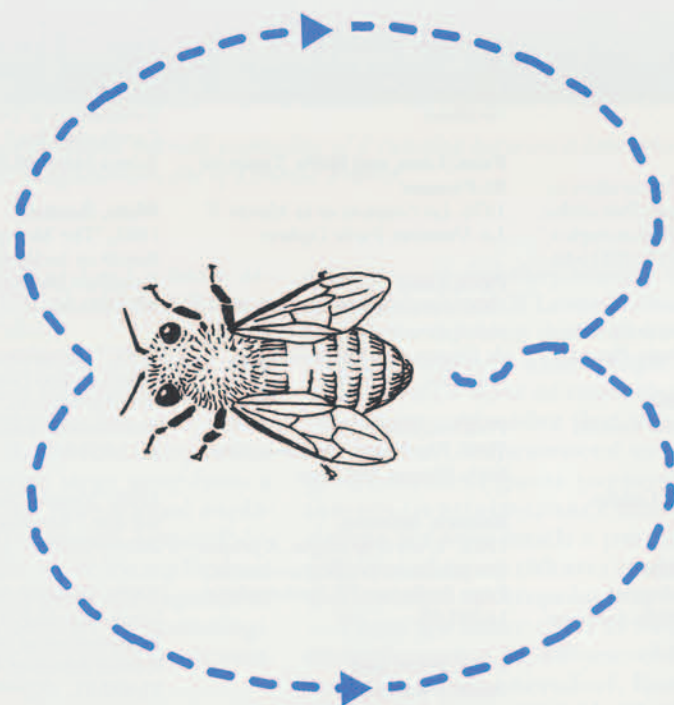


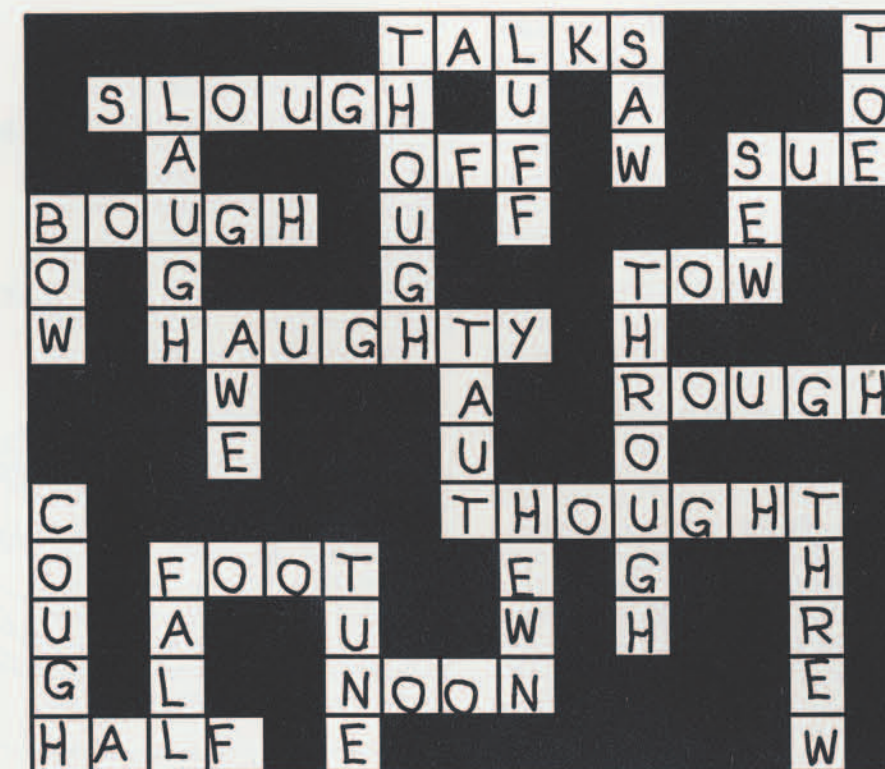
Figure 1. To communicate the location of a food source, a worker bee runs in two loops connected by a wiggling run. If this takes place outdoors on a horizontal surface, the direction of the run indicates the direction of the food. Inside the hive, on a vertical surface, the direction is indicated relative to the position of the sun, with straight up representing the direction of the sun. In this picture, the bee is telling other workers to fly with the sun directly to their right. Amazingly enough, if the other bees do not leave until the next morning, they will still fly in the right direction, having corrected for the new position of the sun. This form of communication seems to have all the arbitrariness of language, except that it is genetically controlled.

PHILIP G. CHASE

Using language is part of being human, and of all living species, we alone possess this ability. It is crucial to us because it underlies the way we deal with each other and with the world around us. The same must have been true in the past—but it is also certain that before some point in prehistory people lived either without language or with some less developed version of it, and that in consequence their lives must have been very different from ours.

Without language, things we take for granted would have been impossible. People could not have passed on vital information such as, "There are fresh deer tracks on the other side of the ridge, and the berries there will be ripe in a few days. If no one has seen anything better, we should go there." Without language, they could not have taught their children that "You can ask him for help because he's your father's brother's son, and a member of your clan," and, without language, they could not have created the myths or ex-

Figure 2. We owe the pastime of crossword puzzles to the fact that all words are made up of just a few sounds. However, with written languages such as English, there is an additional complication. The letters that represent these sounds do so imperfectly. One letter or combination of letters may indicate different sounds, while the same sound may be represented in several different ways.



pressed the beliefs that living peoples use to define and enforce social values.

We are not sure just when it was that language appeared or when it began to play its crucial role in human life. Almost everyone agrees that by the Upper Paleolithic language was a regular part of everyday life, but we are not so sure about the Lower and Middle Paleolithic. Language is crucial, but it is also ephemeral. As soon as a word is uttered, it disappears completely, leaving no trace in the archaeological record. The only way it is preserved is through writing—and the earliest writing dates to millennia after the Ice Ages.

We archaeologists face a difficult task. We have to find out about language, but we have no direct evidence to work with. We thus have no choice but to search for indirect clues among the stones and bones of the archaeological record. What follows, then, is a detective story—although the reader who likes a mystery neatly solved in the last chapter will be disappointed. When it comes to the origins of language, there are many detectives with many ideas, but

none of them has yet presented a jury-proof case. This is not for lack of effort. So many scholars have written about the origins of language that a bibliography published in 1975 is itself two volumes long (Hewes 1975). The topic has attracted archaeologists, physical anthropologists, linguists, psychologists, comparative cognitionists, semioticians, cultural anthropologists, ethologists, primatologists, neurobiologists, and philosophers. Perhaps there is no consensus simply because there are so many experts with so many different perspectives. Still, their work makes for interesting reading, and it is enlightening if not conclusive.

### What Is Language?

Most animals communicate, but we are the only ones to do so with language. As we will see below, a few other species come close, but language is a very special and very human kind of communication.

In the first place, language is by its nature *symbolic*. That is, the connection between a word and what it means is, almost always, arbitrary rather than natural. This is not true

of the way animals communicate (Fig. 1). The family cat hisses because she is afraid and angry, and the family dog whimpers because the last time the cat hissed his nose got scratched. Both the hiss and the whimper are determined by genetics; they are natural and not arbitrary. Language is different. The word "dog" means dog purely by convention, a convention that anyone speaking English must memorize. Other languages use different sounds to mean the same thing. No one is born knowing the words of a language—each must be learned. This puts a burden on our memory, but it also means we are not forced to make do with the few hisses and whimpers provided by our genes. Instead, we can create words and can use them to talk about an almost infinite number of topics, things no dog or cat could ever discuss.

Language has another special property. It uses a mere handful of sounds for a huge number of words. Not all communication, not even all symbolic communication, works this way. A red traffic light and the word "stop" both mean the same thing, but the redness of the traffic light is



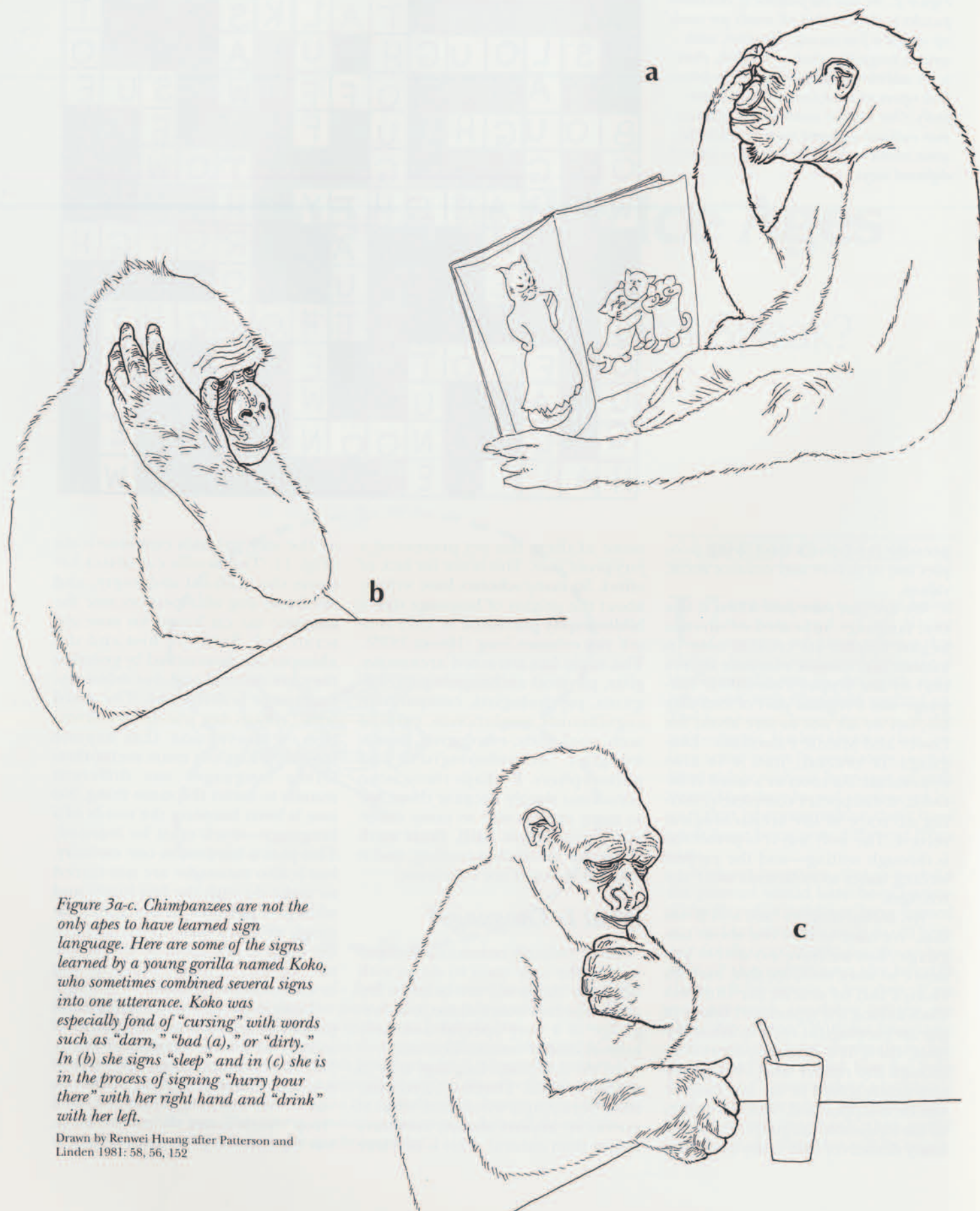


Figure 3a-c. Chimpanzees are not the only apes to have learned sign language. Here are some of the signs learned by a young gorilla named Koko, who sometimes combined several signs into one utterance. Koko was especially fond of "cursing" with words such as "darn," "bad (a)," or "dirty." In (b) she signs "sleep" and in (c) she is in the process of signing "hurry pour there" with her right hand and "drink" with her left.

Drawn by Renwei Huang after Patterson and Linden 1981: 58, 56, 152

a single unit; it cannot be broken down. The word "stop," by contrast, is made up of four sounds that can be recombined to make at least five other words: "tops," "pots," "spot," "opts," and even "sopped." This property makes language extremely flexible—a very few sounds produce an almost infinite number of sentences (Fig. 2).

Finally, language is governed by grammar, rules we all learn as children (even if our high school grammar teacher later makes us learn slightly different rules). Like words, grammatical rules are arbitrary. Thus, English makes heavy use of word order, while Latin relies more on changing suffixes. For example, "Julia loves Marcus" and "Marcus loves Julia" mean very different things; but in Latin, "Julia amat Marcum" and "Marcum amat Julia" both mean that Julia loves Marcus (with only a change in emphasis), while "Marcus amat Juliam" means the opposite. What these rules do, though, is to let us use the grammatical connections between words to express the logical connections between the ideas those words stand for. Whether we are speaking English or Latin, we can make it clear who loves whom, and we need only a limited number of sounds and rules to do so.

These three properties are not the only ones that separate language from animal communication, but they are responsible for the crucial role language plays in our lives. They permit us to talk about what is present ("This meat is spoiled"), about what is not present ("There are deer on the other side of the hill"), about what lies in the past or the future ("The berries will be ripe in two days"), about what might be ("We won't be able to fish if the pond freezes over"), about abstractions ("Persistence is as important as experience when you're trying to find deer"), or even about what is not ("The mammoth wouldn't have escaped if you had speared it in the chest instead of the hindquarters").

These features of language are very abstract ones, but they do give us some idea where to look for clues about the origins of language. There are two broad categories of evidence

available. Some scholars study material remains from the past: the archaeological artifacts and the skeletal remains of Ice Age peoples. Others study living species, humans and non-humans, looking for clues to how language must have developed. Each line of evidence has provided information that complements the other. By combining all the strands, scholars hope eventually to come to some sound conclusions.

### Apes and Language

Obviously, the first thing we need is some idea of exactly how far along the path to language our ancestors were when our lineage branched off from that of our nearest relatives. Because this happened long before the Pleistocene, we can assume that if these ape-like ancestors had reached a certain linguistic level, then all our

*"Language plays no part in the way of life or mode of survival of any species but our own."*

Ice Age ancestors were also at least that far along. To help get an idea of what this level was, scientists have turned to our nearest living relatives, the great apes, particularly chimpanzees.

In the wild, apes communicate much like other mammals. They use sounds and gestures that, while not entirely stereotyped, are easily understood in terms of the emotions that provoke them, and that show none of the arbitrariness of linguistic symbols. It is true that some monkeys do use something like symbols. On the basis of ingenious experiments in the field, two University of Pennsylvania researchers, Cheney and Seyfarth, have shown that vervet monkeys have a basic repertoire of calls, a repertoire that is apparently genetically determined (1990). However, they must learn the meaning of these calls. Young monkeys frequently make mistakes, using, for example, the warning call for flying predators

either when they see harmless birds or even when they see terrestrial predators. Moreover, Cheney and Seyfarth were able to show that the monkeys did not use such calls simply as a by-product of their emotional state, but that they used them intentionally to influence the behavior of others. What they were unable to demonstrate, however, was that the monkeys were trying to change the ideas or knowledge (as opposed to the behavior) of other individuals, yet this intention is inherent in the use of language.

In captivity, chimpanzees and gorillas have in fact been able to learn a rudimentary form of language. For decades, experimenters tried to teach apes to speak. They had no success until it occurred to Beatrice and Allen Gardener, a husband and wife research team, that the problem was not a lack of mental ability but rather that apes were physically unable to reproduce the sounds of human speech. Using sign language, they were able to teach a now-famous chimpanzee named Washoe to make and understand words, and even to combine them into something resembling sentences. In fact, Washoe even made up names for things she had never seen before—she called ducks "water birds" and radishes "cry fruit" or "hurt fruit." These experiments were repeated, not only with other chimpanzees and with gorillas (Fig. 3), but also with other languages, including artificial ones where the words were symbols on a keyboard or plastic chips of different shapes and colors.

It would seem, then, that apes and monkeys do share with us the ability to use symbols. However, the number of symbols any one animal learned was limited (Washoe learned slightly over a hundred), and there is considerable debate as to whether they ever learned any real grammar. Moreover, they never combined smaller units to form "words" in the way that humans do (although in fairness to the apes it must be admitted that no one ever asked them to do so; it may be that the natural calls of one kind of ape, gibbons, are constructed in this way).

Thus, these are probably capaci-



ties that evolved during the past 5 million years rather than before, and one must remember that, whatever their capacities may be, chimpanzees living in the wild do not use symbols, much less grammar. Language plays no part in the way of life or mode of survival of any species but our own.

### Language and Archaeology

It is therefore interesting that there is no solid evidence in the archaeological record that symbols played an important role in human lifeways before the Upper Paleolithic. Starting about 35,000 years ago, we find abundant evidence of sym-

bolism in Europe in the form of figurines, items of personal decoration such as beads, and signs engraved on rock (see the article by White in this issue). Before that time, by contrast, the evidence is so scanty as to be totally unreliable.

It is true that there are a few scattered items that are suggestive and—to the romantic mind—convincing. A skeptical mind will usually find more mundane and more likely explanations. For example, we have tens upon tens of thousands of fragments of animal bone bearing marks left by the stone tools of Middle Paleolithic butchers. On a handful of these, the marks form patterns that catch the eye (Fig. 4). One could, if

one so wished, interpret such patterns as "art." But given the huge number of bones we have, the law of averages almost dictates that eye-catching patterns will occur now and then, even if the butchers had no intention of making art.

Some archaeologists believe they have evidence of religious ritual as early as the Middle Paleolithic. Religion, of course, implies language, because both language and religion make use of symbols and because language is needed to express religious ideas. Yet the Middle Paleolithic evidence of religion is weak and open to more prosaic interpretations. For example, there are apparent interments of bear skulls and

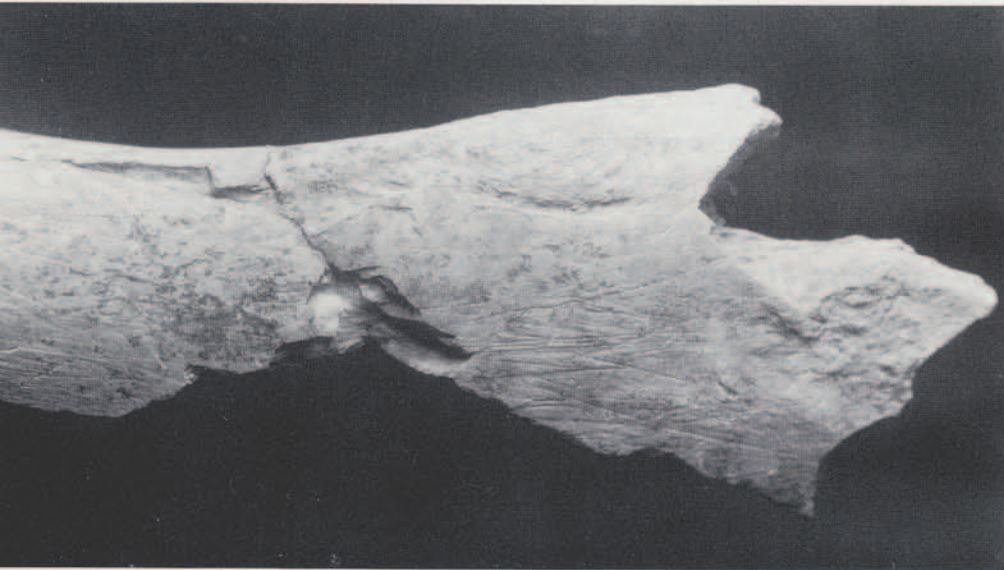


Figure 4a, b (left). Two fragments of animal bone from the Middle Paleolithic site of La Quina, near Cognac, France. While almost all archaeologists would agree that the marks on specimen A (above) were made during butchering, romantic observers might be tempted to interpret the stone tool marks on specimen B as art or decoration. Yet there are so many Middle Paleolithic bones with tool marks on them it is almost inevitable that patterns such as this will occur by chance. In fact, it is easy to imagine that this specimen was simply used as some sort of cutting board.

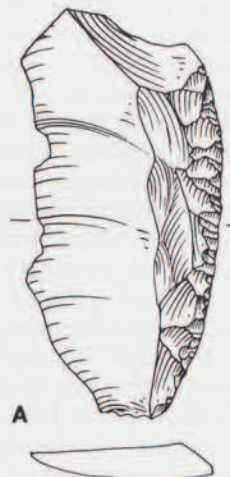
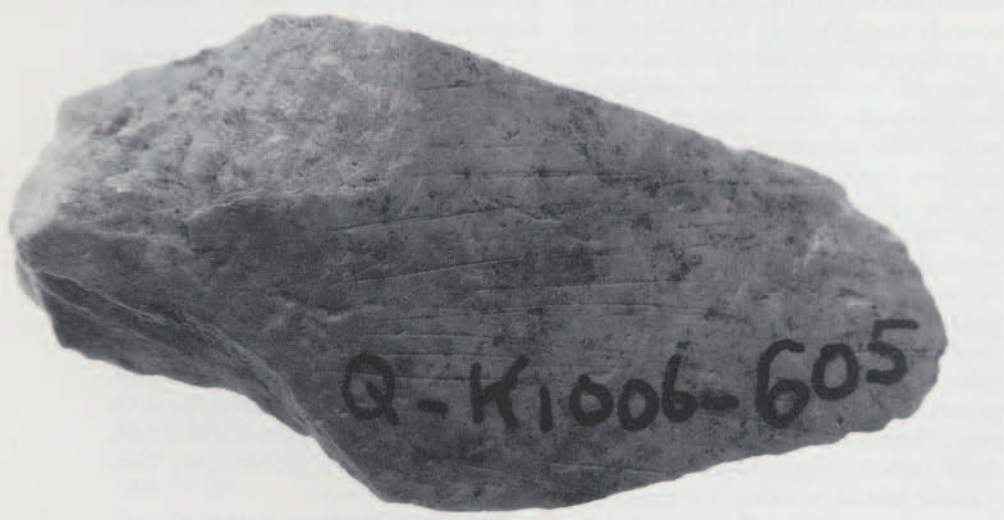


Figure 5a, b. (a) Two reindeer toe-bone "whistles" from the Middle Paleolithic site of La Quina in southwestern France. Some such specimens can still be used as whistles today. However, carnivores gnawing on bones are known to produce such "whistles." (b) A mule deer toe bone from a coyote scat in Oregon is a modern example. Because many archaeological specimens bear tooth marks and because many with similar punctures could never have been used as whistles, these are probably natural phenomena, not whistles.



strange juxtapositions of bear bones that have been interpreted as vestiges of an ancient bear cult. Yet these are probably the result of natural geological processes having nothing at all to do with human activity (see Chase 1987). By the same token, what are thought to be bone whistles are almost certainly just deer toe bones punctured by the teeth of wolves or hyenas feeding on the "garbage" left at abandoned camps (Fig. 5).

Still, a few things from the Middle

and even Lower Paleolithic are quite intriguing. Abraded lumps of ochre and similar materials demonstrate that people were using color before the Upper Paleolithic. We do not know, however, what they were using color for, or if its use had symbolic meaning. There are also occasional traces of butchering on human bones, indicative of cannibalism. Cannibalism need not be part of a ritual, though. Even in recent times cannibalism has probably more often been a desperate attempt to avoid

starvation rather than a religious act, and even chimpanzees have been guilty of cannibalism. Finally, there are a few human burials from the Middle Paleolithic, but burial by itself does not necessarily indicate a system of religious beliefs. If burials were the only manifestation of religion during tens or even hundreds of thousands of years in the entire Old World, then Middle Paleolithic religion was amazingly stagnant. It is much more likely that the dead were buried for emotional rather than

Figure 6. Harold Dibble (1987) has argued that many of the "types" of stone tools recognized by archaeologists do not reflect "types" of tools recognized by their makers, but just different degrees of resharpening (which is done by removing a series of small flakes from along an edge). This illustration shows how sharpening one edge of a stone flake will produce what archaeologists call a "single scraper" (a). Sharpening the second edge will produce a "double scraper" (b), while further resharpening will transform this into first a "convergent scraper" (c), and then a "Mousterian point" (d). These several stages are shown superimposed in (e).

Illustration courtesy of Harold Dibble



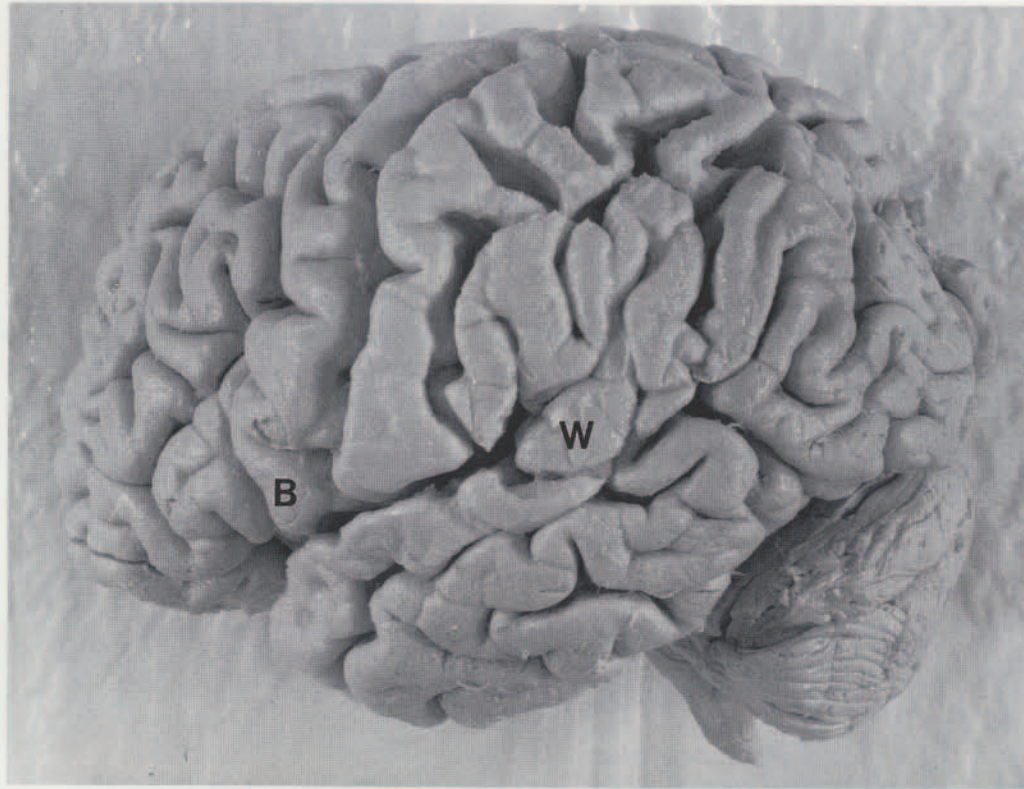


Figure 7. Two areas of the outer cortex of the brain are directly involved in language. As in this picture, these areas are usually on the left side of the brain. Wernicke's area (W), which is located just behind the auditory portion of the cortex, seems to do two things: it lets us store and retrieve words, and it lets us grammatically code and decode sentences. Broca's area (B), which lies between the parts of the cortex governing hearing and motor control, is where words and sentences are translated from a purely mental form into movements of the vocal tract and from sounds picked up by the ear back into a mental form. Wernicke's and Broca's areas are indistinguishable in terms of structure from the surrounding cerebral cortex. Neuroanatomists have been able to delimit them only by observing language deficiencies in patients with localized brain damage. If you look closely at this specimen, you will see a different surface texture in and above Wernicke's area. This was caused by a stroke that undoubtedly left the victim with a language impairment.

Photo courtesy of Nancy Minugh-Purvis

symbolic reasons, to protect the body of a loved one from scavenging carnivores.

Some scholars infer the existence of language before the Upper Paleolithic from a subtler aspect of the archaeological record—the apparently standardized shapes of many stone tools. The logic is not always expressed explicitly, but there seems to be a belief that such standardization reflects mental categories that must have been defined linguistically. That is, a flint worker had a concept matched by the word “den-

ticulate” (or some such word—no one claims it was English), and whenever he set out to make a “denticulate” the result was similar to all other “denticulates” he or his tribesmen made. But there are at least three problems with this argument. First, no one has demonstrated that the *idea* of a denticulate depends on the existence of the word “denticulate.” Second, what archaeologists do when they study stone tools is to define categories and then put all tools into one or another of them. However, just because an archaeologist can

fit tools into categories of his own making does not mean that the prehistoric toolmaker had the same categories in mind. Finally, much of what appears to us to be standardization is probably the result of more mundane factors such as the use for which the tools were intended, the materials from which they were made, or the degree of resharpening they underwent (Fig. 6).

All in all, then, the archaeological record provides little if any sound evidence for language or symbolism before the Upper Paleolithic. In all present-day societies, symbolism is so important that it inevitably finds expression in the things people make. It would therefore seem reasonable to conclude that before about 35,000 or 40,000 years ago people did not use symbols to any significant extent, and that they, like chimpanzees, made do without language.

This may be wrong, though. Perhaps people used symbols in language long before they used them in a wider context. Peoples living today and those we know historically interpret their world or their emotions in religious or ideological terms and order their social lives by means of ritual. Our prehistoric ancestors probably could not have done so without expressing such ideas in symbolic artifacts. We must remember, however, that every other species manages very well without religion and ideology, and the same may have been true of earlier humans. From a purely theoretical point of view, then, we may be wrong to assume that a lack of symbolism in the archaeological record indicates an absence of language. In this case, we must turn to other kinds of evidence in our search for the origins of language.

### Language and the Fossil Record

Language involves three biological systems. The first is the brain, where sentences are put together and deciphered; the second is the auditory system; and the third is the vocal tract. The first and last have provided further clues to the origins of language.

Not all parts of the brain are equally involved in the use and understanding of language. To a considerable extent, linguistic functions are restricted to certain parts of the cerebral cortex (the outer surface of the brain, where most of the higher or more “intellectual” functions take place; Fig. 7). This localization of language shows up in certain details of the anatomy of the human brain—in a particular asymmetry and in details of the folding of the cortex. We cannot observe the evolution of such anatomic details directly, because no brains survive from the Paleolithic. However, there are skulls whose interiors we can study. To some extent, the shape of the brain leaves its mark on the braincase (Fig. 8). Although the fit between brain and skull is not tight enough to reveal all details, there is little doubt that the kind of asymmetry we see in the human brain appeared long before humans (of whatever species) migrated into Europe.

This should be conclusive evidence for language, but it is not. The problem is that functions other than language are governed by one side of the brain. In righthanded people, the left side of the brain controls both language and the use of the right hand. We know that our ancestors had come to depend on tool-making and tool use very early on, and it may be that the asymmetry of their brains reflects not the use of language but the use of tools. In fact, by analyzing patterns of flaking on very early stone tools from Africa, an archaeologist named Nicholas Toth has found indications that their makers were righthanded (1985).

Another form of evidence comes from what fossils can tell us about the vocal tract. According to linguist Philip Lieberman, human language is characterized by the production of specialized acoustical patterns, and this production depends upon certain features of the anatomy of the vocal tract. These features are in turn reflected in the anatomy of the

skeleton, particularly in something called basicranial flexion (Fig. 10).

Some scholars have taken this to mean that the absence of modern basicranial flexion reflects an absence of language, something Lieberman himself denies. Language would have been possible without the anatomical specializations in question, but it would have been slower and more prone to misunderstanding. The real implication of Lieberman's argument is that any fossil population with modern basicranial flexion had at least the potential for a fully modern form of language.

If Lieberman is right (and his work is highly controversial; see Fig. 9), then language in fully modern form may well predate the Upper Paleolithic and all reliable manifestations of symbolism in the archaeological record. While the classic Neanderthals of Europe did not have modern basicranial flexion, earlier specimens from Africa and Europe look quite modern in this respect.



Figure 8. Physical anthropologists study the interior of fossil skulls to learn about the anatomy of the brains they contained. Here a venerable cast of a Neanderthal skull found at La Chapelle-aux-Saints, France, provides a backdrop for a cast of the interior of the same skull. Because layers of tissue and fluid intervene between the skull and the brain, details of the latter are not always clear. Compare this picture with Figure 7. The cast of the exterior of the skull is not entirely accurate. The actual skull is that of an old man with most of his teeth missing. The University Museum Casting Project, which owns both of these casts, now makes much more accurate ones (Mann and Monge 1987).



This would serve to confirm what was said above, that symbols in artifacts and symbols in language may be very different phenomena. The fossil record may have more to say about language in the Ice Age than does the archaeological record.

### Linguistics and the Evolution of Language

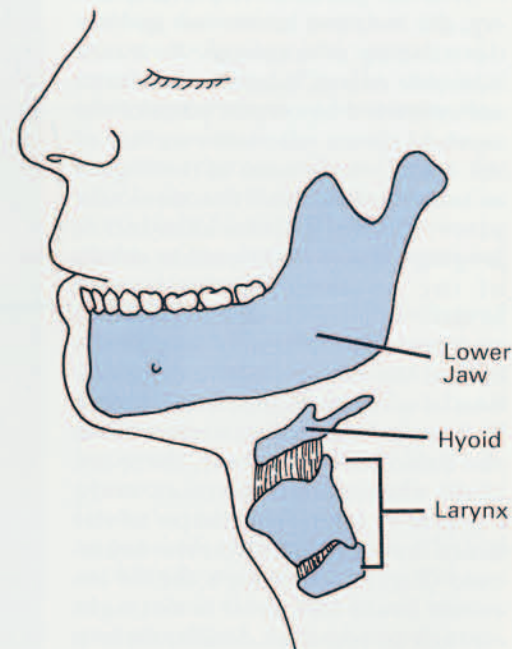
Strangely enough, those specializing in the study of language have often been the least eager to discuss its origins. Maybe they are just more prudent than the rest of us. Still, a few linguists have been willing to speculate about language origins.

Recently, a number of scholars have attacked the problem using methods originally developed to study the ancestry of living languages such as English and of recently defunct languages such as Latin. (See Allman 1990 or Wright 1991 for a layman's review of this work.) They argue that all known languages had a single ancestor in the not too distant past (a finding that would also support a recent origin for all modern humans). However, it is not clear that their methods are reliable over such huge amounts of time. Links that can be made with confidence between languages still spoken today are more tenuous when they are made between the reconstructed ancestors of the reconstructed ancestors of living languages. This is—and will continue to be—a subject of lively debate among linguists.

Moreover, linguists disagree about whether language evolved gradually or suddenly. Some of them are impressed by the complexity of language and argue that it could not possibly have sprung up suddenly and fully developed. Others, by contrast, are more impressed by a similarity in underlying structure among all languages and by the interdependence of all aspects of a language. These linguists argue that language could not have developed piecemeal but must have arisen (quite rapidly) as a single genetically determined neurological change.

An alternate possibility is that language developed in a series of fits and starts. Language is not necessari-

Figure 9. There are many who disagree with Lieberman and Laitman that Neanderthals did not have modern vocal tracts. For one thing, a skeleton recently excavated at the site of Kebara in Israel has a hyoid bone of fully modern form. Since the hyoid bone is attached to both the larynx and the base of the tongue, this would imply a modern form for the Kebara vocal tract. The Kebara fossil has been classified as a Neanderthal, although all of the skull except the lower jaw is missing. Another bit of fossil evidence comes from a recent reconstruction of the Neanderthal skull from La Chapelle-aux-Saints which shows a modern degree of basicranial flexion. The earlier reconstruction (see Figure 8) showed much less flexion.



ly a single system, an all-or-nothing phenomenon. We have already seen that living apes can use language-like symbols. It is quite possible, as linguist Derek Bickerton points out, that our early ancestors used such symbols much as trained apes do, more or less without grammar (1981). This would have limited the usefulness of language, but even without grammar, words would have been useful. Grammar might have developed later, perhaps in stages. Testing such a notion is not simple, however, and for the next few years at least, it seems that linguists will continue to disagree on this question.

### Interpreting the Indirect Evidence

I warned the reader at the beginning of this article that there was no certainty about when language originated. Specialists agree on only one point: by the Upper Paleolithic people were fully modern in biology and similar to living hunter-gatherers in terms of behavior. The symbolism evi-

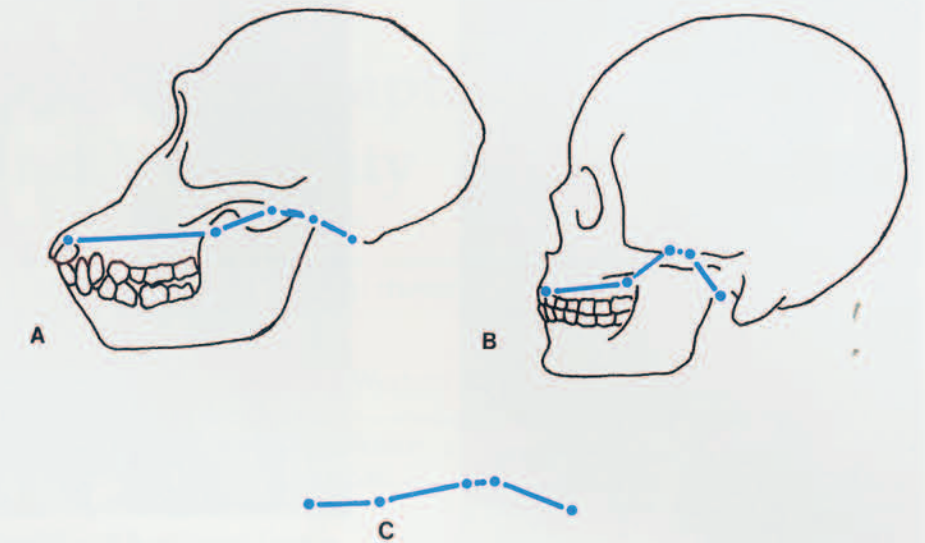
dent in their art makes it clear that their linguistic abilities were as highly developed as our own.

For earlier time periods there is no such agreement, nor is there likely to be for a long time. So many kinds of evidence are relevant that no one person can possibly understand and evaluate them all. A competent neuroanatomist will probably have a naive or incomplete understanding of the archaeological evidence, and vice versa. Even among specialists in the same field, however, there is as much disagreement as agreement. This is probably inevitable. We have, after all, no direct evidence: every word uttered in Ice Age Europe is gone forever. Nor can we fall back on the scientist's main tool, experiment. With nothing but indirect evidence, we must rely heavily on complicated chains of reasoning—a sure formula for disagreement.

I will nevertheless venture a guess, but only on the condition that I have the right to change my mind in the future. I am skeptical that the first symbols in the archaeological record

Figure 10. The shape and positioning of the vocal tract are closely related to the anatomy of the base of the skull. Jeffrey Laitman has used a measure called basicranial flexion to compare different living and fossil species. Basicranial flexion is measured using a series of five anatomic landmarks on the skull. The difference between a chimpanzee (A) and a modern human (B) is clear. Laitman also measured basicranial flexion on a number of fossil skulls, including a Neanderthal from Gibraltar (line C). Notice how different this flexion is from that of the modern skull.

After Laitman 1983: Figs. 4, 5



mark the beginnings of language, so it may be that language originated before the Upper Paleolithic. There are two reasons for my skepticism. It seems to me that archaeologists have been overly impressed by the fact that the first good evidence for symbolism appears in Europe about the same time as both anatomically modern *Homo sapiens* and some rather striking technological changes. Seen in a world-wide perspective, art and symbolism actually appear in widely separated parts of the world at very different times, without any apparent connection to biological change. This would imply, since there is certainly a biological basis to language,

that at least in some places people were using symbols in language before they treated their artifacts as symbols.

Thus Middle Paleolithic life in Europe may in some ways have been more sophisticated than the artifacts alone would lead us to believe, with people exchanging information and ideas much as they do today. Yet in other ways it must have been very different from life in later times, since some aspects of intellectual life that we living humans take for granted would have been absent or at best rudimentary. This presents an interesting new problem. If art, religion, and the like postdate the origin of

language, then they did not appear automatically as soon as people began to create and use symbols. Why, then, did they develop, and what must life have been like among fully linguistic people without art or religion?

In any case, however inconclusive or unsatisfactory our understanding of the origins of language, it is a good illustration of something all scientists are aware of: the more we learn, the more questions confront us. Certainly the topic is one that will remain controversial and interesting for a long time, and with no lack of surprises still in store.

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