THE EVOLUTION OF SPEECH

Three contrasting views can be taken of how speech and language evolved.

a Evolution of the brain and body

Human beings came to need a sophisticated form of communication because they began to live in societies. Consequently, their brains and vocal apparatus evolved to support this survival need. After many generations, they evolved a capacity for language which is innate i.e. is transmitted at birth.

b Evolution of language

Language began with simple noises to express pleasure, pain, etc. It gradually evolved in ways that reflected how the human brain operates and the possibilities and limitations of the human vocal apparatus. As societies became more and more sophisticated, so did language. There were slow evolutionary modifications to the brain and the vocal apparatus in order to accommodate these new demands.

c The 'big bang'

Language came about when human brain evolution took a lucky direction and we developed an innate language faculty.

Which view do you lake and why? Consider the different timescales of evolutionary change and of linguistic change.

This article presents an **overview** of some issues in language evolution. In reading it, try to establish clearly:

1 What is the writer's position on the evolution of language?
2 What is the writer's view of animal cognition?
3 Why, according to the writer, have animals not developed language?

The origin of language and cognition

Ib Ulbaek **(in J. R. Hurford. Studdert-Kennedy. M. and Knight. C. (eds)** ***Approaches to the Evolution of Language.*** **Cambridge: Cambridge University Press, 1998. Abridged with permission of the author*.**

Two kinds of theories have dominated recent discussion of the origin of language (see Pinker & Bloom 1990): a continuity approach and its counterpart, a discontinue approach. The continuity approach has often labeled itself Darwinian and looked fur predecessors of language, typically in animal communication systems. It claims that language is such a big system that it could not have evolved out of nothing *(Je novo).* Just as we cannot conceive of the eye jumping into existence, so we cannot conceive of language as having no precursors.

The opposite position argues that language is unique among the communication systems of the biosphere, and that to claim continuity between, say, bee language and human language is to claim 'evolutionary development from breathing to walking' as pointedly remarked by Chomskv (1972: 68). Language is a task- and species-specific module in the human mind, a 'language organ' (1980a: 76).

Beside the Chomskyan position another anti-evolutionary and discontinuity position exists, which could be called *culturally.* Sociological theories often separate human biological nature from human social nature. The culturalists reject Chomsky's strong innatism, arguing that, basically, humans are unconstrained learning machines who create a culture from which all relevant properties of the human mind (including language) derive. Neither Chomsky nor the culturalists have developed a detailed account of language origins, perhaps partly because their central concerns lie elsewhere. Chomsky has suggested a mutation or plain accident, whereas culturalists have some-times hinted that a 'leap' from the natural order to the social order must have taken place. Neither explanation is satisfactory and neither will be discussed further.

. . . Some continuity theorists also emphasize learning as a fundamental aspect of human mind and language. The reasons for this are, first, their strong anti-Chomskyan altitude — some of them are learning psychologists - and second, the simple fact that language is undeniably learned. The position of these theorists was revealed most clearly in the *ape language controversy* in the 70s and early 80s. Their position was supported by experiments in which different kinds of non-spoken languages were taught to various apes, mostly chimpanzees. Researchers emphasized that even though apes do not speak in the wild, they have a mind capable of learning. By means of a sign language, apes can symbolize external (and internal) slates of affairs, and can communicate about these things — primarily with the researchers and lab staff, but also with fellow chimpanzees and their own offspring (the controversy is documented in several places, including Linden 1986). . . .

. . . It is [not necessarily] contradictory to claim both continuity and innate-ness. These are vague (and relative) terms after all. How continuous does the continuity have to be? Some kind of discontinuity must exist if things are different and not the same. And innateness comes in degrees. Even Chomsky does not claim that language is wholly innate: to do so would fly in the face of the diversity of the world's living and extinct languages. What Chomsky *has* claimed is that without a strong innate component, language cannot be learned. To my mind his arguments are convincing. I will not defend the position extensively here. But if the child had only inductive strategies for constructing the rules of language, it would either be stuck in an enormous search space looking for consistent rules, or (perhaps) would come up with a language structure different from its parents. Some prestructuring in the child's search lightens the burden of induction and explains why parents and children speak the same language after all.

1 From cognition to language

The correct theory of evolution of language, in my opinion, is this: *language evolved from animal cognition not from animal communication.* Here lies the continuity. Language grew out of cognitive systems already in existence and working: it formed a communicative bridge between already-cognitive animals. Thus, I not only reject the seemingly natural assumption that language evolved out of other communication systems, but I adopt the far more radical assumption that cognitive systems were in place before language. Although times are changing this has not been the most popular point of view in this century - quite the contrary. . . . The traditional stance is that the hallmark of human rationality, thinking, is not only strongly influenced by language, but is even determined by language, or exists solely in language. . . . I cite Saussure because he is clear: 'Without language, thought is a vague, uncharted nebula. There are no pre-existing ideas, and nothing is distinct before the appearance of language* (Saussure 1966: 112). . . .

[I suggest that] we need a theory that does not rule out animal thinking *a priori.* Animals are not just instinctual machines or learning machines . . . ; they are thinking creatures. . . . Wolfgang Koehler demonstrated elaborate problem-solving behaviour in the chimpanzee as early as the beginning of this century. Even rats evidently do more than just learn a route when running a maze. . . . Especially in the apes, many findings point to their high intelligence, and therefore support a view of these animals as cognitive creatures beyond . . . behavioural modification through learning. I do not have space to go through the data in detail, and simply note some of the relevant[M1] areas.

1.1 Tool-using and making

Apes not only use tools, but also make them. They prepare sticks for fishing for termites (and are seen carrying around "good sticks'). . . .

1.2 Cognitive maps

Apes show a sophisticated knowledge of their territory and use this knowledge to plan routes between food areas (Menzel 1978).

1.3 Learning through imitation

Primates arc virtually the only order that learn by (social) imitation (Passingham 1982: 176). Ladder-climbing in an enclosure spread rapidly in a group of captive chimpanzees; the spreading of potato-washing from one individual, Imo (a Japanese macaque), to its group is another example (Passingham 1982: 182).

1.4 Social knowledge

Monkeys and apes conform to a pecking order in their groups, with a dominant alpha male and lower-ranking males and females, and they know each other's place within the hierarchy. . . .

1.5 Deception

Cheating, or feigning, is known throughout the animal kingdom by the name of mimicry and camouflage. Birds of some species will feign a broken wing to get rid of an unwelcome predator, but this is probably a non-conscious, non-cognitive program, rather than problem-solving behaviour. Anecdotal evidence does exist, however, pointing to deliberate, intentional lying among apes and monkeys (Whiten & Byrne 1988).

1.6 Theory of mind

One question is whether the ape itself is an intentional animal, creating and acting on goals; another is whether it treats its fellow apes as intentional. David Premack has answered the second question in a series of experiments by showing that a chimpanzee can treat others as having intentions (Premack & Woodruff 1978). His chimp, Sarah, could watch a videotape of a person trying to solve a problem and then find among alternatives the right tool to solve the problem. Here it is important to remember that the problem could not be described in purely physical terms, so that the chimpanzee could not solve it merely by looking. It had to 'imagine' the person (not another chimpanzee) as having a problem and trying to solve it. Since it did so, we can conclude that the ape has a theory of mind.

1.7 Capable of learning a language-like system?

Apes in the wild do not speak, but several experiments have tried to teach them language. . . . Although chimpanzees have not been able to learn any sophisticated language (say, beyond the stage of a two-year-old child) they have demonstrated a degree of language capacity by using arbitrary symbols to denote physical objects. Evidently apes can encode mental content into physical tokens (manual signs, plastic symbols, pictograms) but do not have the syntactic machinery for stringing words into sentences. If human language does indeed comprise an innate module for pro-ceasing syntactic information, it is hardly remarkable that apes cannot do syntactic processing. Otherwise, they would have a complete language faculty that they never use - which is scarcely plausible.

On the basis of these diverse indications of ape intelligence, I conclude that, if language developed from cognition, the ape has the means to fulfill the role, and *so had the last common ancestor between ape and man.*

2 The function of language

The scenario is this: in some distant past (approximately 6 to 8 million years ago) an apelike primate existed which became the last common ancestor between apes and humans. The two lines separated. In one, language evolved, in the other it did not. Why? In the *Homo* line several things happened, while the apes remained relatively static. The ape's brain, for example, seems to have changed and grown very little since the split, suggesting that the ape was already well adapted to the pressures of its habitat. Not so for the line of *Homo,* where many things changed, even though they took several millions of years to happen; upright walking, freeing of the hand and changing manual function (especially of the thumb), handedness, lateralization

and rapid growth of the brain, conquest of fire, tool making, weapons, changing social structure, culture. All these things surely contributed to the origin of language, and a total account of language origins would have to take all these things into consideration. I have not tried to do that and will not do so here. Instead I have asked why humans, but not apes, have language. This question can be given a plausible answer if we understand correctly the biological role of language. What is its survival value? My answer is that language had — at the time it began to evolve or get a foothold - the function of communicating thoughts among group members. To use language is to share information as deliberately as the sharing of food is deliberate, and contrasts with the involuntary giving away of information of, say, a monkey displaying that it is scared when approached by an aggressive male. . . .

If we can substantiate [this] functional view, some of the answers to the question of language origin may fall into place. We can ask: why did chimps not get a language? We now know that they have enough intelligence to use simple symbols. Either they did not need a language or they were prevented from getting it. . . . The need is indeed there today, as is shown by apes patrolling, hunting, moving to new food sites, and so on. We may expect the same need in prehistoric times. So they were prevented - by whom or by what?

3 Sharing of information from a Darwinian perspective

Presumably, language was blocked in the chimpanzee by the impersonal forces of Darwinian evolution. Every trait that enhances one's fitness enhances (by definition) one's chances of survival and chances of reproduction and so of passing one's genes to the next generation. [Language would seem to be such an improvement for us that we are tempted to extrapolate into thinking that language would be an advantage for every species . . .

It is easy to see that this should not be generalized: a bee talking would have such a big head that it could not fly! In other words, having a language is a question of cost and benefit, or, in Darwinian terms, of losing and gaining fitness. We are so used to focusing on the benefits that we tend to forget the costs.

Loosely speaking, some of the costs are: extra brain tissue, reorganization of the brain, changes in the respiratory system, and many more. What are the benefits? The one benefit that we tend to take for granted is that language enables us to co-operate, to speak to and help each other. From a Darwinian perspective, this is also, paradoxically, its main cost. . . . Why should we share information in the first place, if evolution demands that we enhance our fitness, not our neighbors'? If we look at animal communication, it seems that most of it has a selfish purpose. If territorial songs are an easier way of keeping competitors away, it seems preferable to patrolling and beating up other male(s). . . . Mating calls have a similar selfish purpose. . . . Perhaps indeed selfishness has kept animal communication at a minimum. . . . Wilson (1972) finds the static nature of animal communication striking: 'By human standards the number of signals employed by each species of animal is severely limited. One of the most curious facts revealed by recent field studies is that even the most highly social vertebrates rarely have more

than 30 or 35 separate displays in their entire repertory' (p. 56). It is striking indeed: both compared to human language and to the evolution of intelligence.

4 The last obstacle

To co-operate, as we all know, is often more efficient than letting each work on his own. But working together and cheating the others out of their fair share is even better — except for those who are cheated . . .

Luckily, we have a loophole: *reciprocal altruism* (Trivers 1971). Through reciprocal altruism, co-operation becomes possible, but at a price, the price of keeping track of cheaters and freeriders . . . The good side is that a favour is returned by another favour, a friend can always trust a friend. The point is that, although some form of reciprocal altruism is found in many species, including primate species, it is of particular and fundamental importance to the working of a social system [like the human one] based on co-operation. . . .

. . . [T]he impetus lor sharing information is small in chimpanzee society, except for occasional sharing and reciprocal altruism based on friendship. As Jane Goodall observed, young chimpanzee males have the patience and ingenuity to open boxes of bananas laid out by researchers, but the older and stronger males take the bananas, leaving little incentive for the youngsters to go on (Goodall 1972).

So this is the whole story: language is cognitive whereas animal communication is not. Cognitive intelligence is an earlier and more widely spread property of mind than language because evolution selects tor effective information-gathering. Language's proper function is to communicate, which here means sharing of information. But information-sharing would seem to be prohibited by natural selection, except in extraordinary conditions. Only under the extraordinary conditions of reciprocal altruism can information-sharing take place without loss of fitness to the speaker. In the human lineage, social co-operation based on obligatory reciprocal altruism has evolved, a system which rewards people for co-operating and punishes them (morally and physically) for cheating. In such an environment language is finally possible.

Glossary

innatism (also **nativism**): a view that a capacity for language is born within us.
induction: working out general rules from examples, **cognition:** thinking and reasoning.
theory of mind: the ability to identify with the point of view of another. To give a simple linguistic example, if somebody says: ***The newspaper's here,*** the listener has to recognise that the HERE in question relates to the speaker's position and not to the listener's own.
fitness: in the Darwinian sense means 'suitability'.
reciprocal altruism: being good to another person in the expectation that they will be good to you.