IS LANGUAGE UNIQUE TO THE HUMAN SPECIES?

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INTRODUCTION

The assertion that humans differ from animals in their use of language has been the subject of much discussion as scientists have investigated language use by non-human species. Researchers have taught apes, dolphins, and parrots various systems of human-like communication, and recently, the study of animal language and behaviour in its natural environment rather than in the laboratory has increased. It is my aim to discuss human language within an evolutionary perspective, to step across disciplinary boundaries of different fields of science, and to show how we may consider language only as one of the many forms that animal communication has taken and that it may not be out of reach of other species.

WHAT IS LANGUAGE ?

What is language? A universally accepted definition of language or the criteria for its use does not exist. This is one of the reasons for the disagreement among scientists about whether non-human species can use language. In nature we find numerous kinds of communication systems, many of which appear to be unique to their possessors, and one of them is the language of the human species. Basically, the purpose of communication is the preservation, growth, and development of the species (Smith and Miller 1968:265). The ability to exchange information is shared by all communication systems, and a number of non-human systems share some features of human language. The fundamental difference between human and non-human communication is that animals are believed to react instinctively, in a stereotyped and predictable way. Mostly, human behaviour is under the voluntary control, and human language is creative and unpredictable. It is generally assumed that only humans have language.

Parts of the problem of differentiating man from the other animals is the problem of describing how human language differs from any kind of communicative behaviour carried on by non-human or pre-human species. Until we have done this, we cannot know how much it means to assert that only man has the power of speech. (Hockett 1967:570). In order to contrast human language with animal communication, the linguist Charles Hockett (1967:574-580) introduces a generally accepted check list for language, a set of design features that all human languages possess. His seven key properties are: duality of pattern (the combination of a phonological system and a grammatical system), productivity (the ability to create and understand new utterances), arbitrariness (when signs/words do not resemble the things they represent), interchangeability (the ability to transmit and to receive messages by exchanging roles), specialization (when the only function of speech is communication and the speaker does not act out his message), displacement (the ability to refer to the

past and to things not present), and cultural transmission (the ability to teach/learn from other individuals, e.g. by imitation). Until recently, articulate speech was also considered crucial to language, and the visual grammar of sign languages was not studied or recognized as true language.

One famous view of language is that of the influential Noam Chomsky. He assumes that a kind of language organ within the mind is part of the genetic make-up of humans. A system which makes it possible from a limited set of rules to construct an unlimited number of sentences is not found in any other species, and Chomsky believes that it is an investigation of this uniqueness that is important and not the likeness between human language and other communication systems (Wardhaugh 1993:18-26,60-65). Apparently, linguists should not be concerned with this question because it is outside their field, and it is outside their field because the linguists themselves have defined language as uniquely human. This approach does not operate within an evolutionary perspective and does not consider language within its natural social context. Through ages, philosophy and religion have established mans place in nature, and humans tend to regard nature as the raw material they exploit and manipulate to suit their purposes, not something they should communicate with. In any case, without having intensively investigated any form of animal communication that may resemble human language, e.g. combinations of words/signs, intonation, and body-language, within a natural social context, we cannot claim that language is unique to the human species.

WHERE DOES HUMAN LANGUAGE COME FROM ?

Where does human language come from? Language, being an efficient human adjustment to the environment, evolved by natural selection. This seems indeed the most likely scientific explanation, and unless we believe in a divine origin, there should be no reason to reject a Darwinian point of view. Assuming that new species would emerge when an adaptive variation improved their survival capacity (Wardhaugh 1993:34-36), Darwin argued that the theory of natural selection could explain the evolution of instincts, too. The instincts of animals are prewired in the nervous system, and some of the brain cells, feature detectors, respond to certain kinds of stimuli (Wardhaugh 1993:100-102). Similarly, language is prewired in the nervous system of humans, and the human speech detectors are responding to language. Thus we may regard the Chomskyan language organ as a language instinct (Pinker 1995:17-20). Supporting the Darwinian theory, the embryology reveals structural resemblances between the embryonic stages of quite different species, descending from a common ancestor from whom they have inherited these almost identical stages (Parker 1995:43-50). Other important complements are the studies of genetics, the discovery of the cell nucleus containing chromosomes and a genetic code revealing a common pattern that is shared by all organisms (Husen, Petersen, and Sonne-Hansen 1983:128), the studies of homologous anatomy, and the comparative studies of the molecular structure of living species.

In Eric Lenneberg's view (Smith and Miller 1968:219-225) language has a biological foundation. He argues that the human organism matures according to a fixed maturational process, and that language develops in children during this period. The earliest sounds of a human infant are stimulus controlled (Fromkin and Rodman 1998:319-328). It has a mammalian larynx that can rise, enabling concurrent breathing and eating, and not until the age of three months are its speech organs ready for producing vowels (Pinker 1995:354). Around the age of six months the infant begins to experiment with sounds, and soon after it begins to babble in syllables and to imitate intonation patterns. One year old it produces one-word utterances and sentence-like gibberish, and around eighteen months the first two-word utterances occur (Pinker 1995:265-268). The first utterances longer than two words consist of open-class words carrying the main message. This telegraphic speech is supposed to represent the grammar at that particular stage of the childs language development. Perhaps linguistic accomplishments like babbling, first words, and grammar require minimum levels of brain size, long-distance connections, and extra synapses, particularly in the language centres of the brain. (Pinker 1995:289).

Language acquisition may be like other biological functions, and the differences between the pre-linguistic and post-linguistic stages are caused by the maturation of the individual. Human brain growth is incomplete at birth. The brain-maturation process of all other species reach the adult state at a quicker pace, and the human brain differs in appearance as it has more surface folding of the cortex (Smith and Miller 1968:239-245). Nature tends to improve on former models and processes by building new structures upon the old ones. Mammals and birds descend from reptiles, and the structures of the reptiles brain are still present as the central parts of the adult human brain as the development of the human brain is an enormous enlargement of the cerebral cortex which is barely visible in the reptiles brain (Ellegaard 1982:25-31). The brains of all higher animals are divided into two cerebral hemispheres, and research has shown hemispheric lateralization in humans and other species, too: The control of song is strongly lateralized in the left hemispheres of many birds, and the production and recognition of calls and squeaks is somewhat lateralized in monkeys, dolphins, and mice. (Pinker 1995:306). In the left hemisphere of the human brain two areas of the cerebral cortex have been identified as important for language (Nathan 1982:226-230). Neurologists have observed that people with damage to these parts of the brain show specific language difficulties. Wernicke's area appears to be essential for understanding and producing words, Brocas area to be important for grammar and sentence production. In most people these areas are larger in the left hemisphere than in the right hemisphere. Gannon, Holloway, Broadfield, and Braun (1998:220-222) have examined the area corresponding to Wernicke's area in chimpanzees in order to determine if their brain structures show the same asymmetry between the hemispheres.

Because language is considered unique to humans, it has been widely assumed that the asymmetry, in particular in Wernicke's area, was also unique to humans and that chimpanzees lacked the structures necessary for language development. However, the surface of this area was measured and the left area was found to be larger than the right area of the chimpanzee brains. Humans and

apes adapted the system of communication from a common ancestor to suit different specialized needs, and it seems that the old structures of the human brain have been used for new tasks as humans developed a specialized way of learning in order to acquire language. The human cortical areas have analogous areas in the brains of other species, who may also have been ready for some primitive kind of language.

LANGUAGE IN NON-HUMAN SPECIES

Sceptics consider it simpler to assume that humans are unique, and that the burden of proof should be borne by anyone who thinks otherwise. Any claim of language-like elements for animals is considered a more complicated hypothesis, to be dismissed as unnecessary in the absence of positive proof. Yet the alternative hypotheses by which the sceptics instead attempt to explain animal behaviour sometimes strike me as more complicated than the simple, and often plausible, explanation that humans are not unique. (Jared Diamond 1991:130) Humans still have the old innate call system, existing alongside language. Sounds like laughter and screams are controlled by the older neural (subcortical) structures in the brain, which are also responsible for the call systems of other species. Some non-human species appear to have a system of sounds which involve learning and experience, existing alongside the innate call system.

Birdsong appears to have much in common with human language. Birds have an innate system of calls, but their songs mostly involve learning and develop by later experience (Aitchison 1996:7-9). Like babies experimentally babbling, young birds have a period of sub-song before their songs are fully developed, and they also appear to have a sensitive period in which they learn their songs. Some birds, e.g. the bullfinch, can pick up the song of another species, just like children can learn any language they are exposed to (Fromkin and Rodman 1998:344-345). Also, the song of a single species of bird may have different dialects. Normally, the left hemisphere of the brain controls both birdsong and human language. The sound units of birdsong are strung together and fitted into intonational patterns and rhythm. All languages have some type of speech melodies. Pitch plays an important role in both human tone and intonation languages, but in different ways. Tone languages, like Chinese, have contrasting pitches or tones, i.e. the same sound will have different meanings depending on its pitch (Fromkin and Rodman 1998:241).

The African grey parrot ALEX, studied by Irene Pepperberg, imitates human utterances and seems to relate these sounds with meanings, but his ability to imitate sounds similar to those produced by humans is quite different from the acquisition of syntax (Fromkin and Rodman 1998:23-24). Birds have syrinxes (Michelsen 1977:35-39), which indicates that some articulated speech is possible without a larynx. Studies of communication among whales are limited in scope, but their sounds seem to be motivated by a need to communicate. As they vocalize under water, it is difficult to investigate their communication systems, and many of their sounds are at frequencies that humans cannot perceive. Researchers have tried to teach dolphins forms of language, e.g.

acoustic computer-generated whistles in the water, but so far investigation has not revealed whether they use their calls for any kind of human-like conversation (Lane and Molyneaux 1992:128-130). The use of hydrophones has revealed that the creaking sounds consist of a series of clicks, showing certain patterns which are unique to the individuals producing them (Bonner 1980:121-122). Bottle-nosed dolphins have an impressive auditory memory system, capacities for rule-governed behaviour, and for imitative learning. Investigations of their whistles have revealed different patterns, which have been identified by the pitch contour, e.g. downward glide = distress, upward glide = search, rise-fall-rise-fall = excitement or irritation (Bonner 1980:128-129). Also, dolphins use vocalizations for echo-location (navigation, food location, object identification, etc.). Observations of humpbacks have revealed that they may have complex communication systems utilizing all their senses to varying degrees (Bonner 1980:124). Each song is made up of a constant number of themes repeated in the same order. The themes are composed of phrases and the main difference between successive songs of a particular whale is the number of phrases in each theme. No theme is ever left out completely, but sometimes a whale repeats a phrase many times before going on to the next theme. Phrases may change gradually through the course of a theme, so that a phrase at the end of a theme may be quite different from what it was at the beginning. Most likely, these intelligent marine mammals could be a threat to human uniqueness.

Apes are our closest relatives in nature, and it is not surprising that they attract a special attention. Many researchers have tried to teach apes to communicate with humans and even with one another. The earliest experiments with chimpanzees showed that they were not physically capable of producing articulated speech (Wardhaugh 1993:43-45) although they did understand many spoken words. Other methods were adopted in order to avoid the problems in trying to teach apes to speak, and some of these attempts were remarkably successful. Some researchers (R.A. and B.T. Gardner and H.S. Terrace) taught the apes American Sign Language (ASL) as apes do not find it difficult to control their hands. Others have used keyboards of symbols (D. and S. Rumbaugh) and plastic tokens (D. Premack) varying in shape, size, texture, and colour representing words (Fromkin and Rodman 1998:350-355). Many researchers have some general idea of the kind of results they want, and in the ape-experiments there are some obvious contrasts in the ways the researchers treat their subjects. Some seem biased in favour of apes acquiring language, others go into the studies to prove that non-human primates cannot possibly learn language, each side of the debate is determined to prove the other side wrong, but both sides agree that these animals are communicating. Because of their opposite expectations they disagree as to the extent of this communication.

The chimpanzee WASHOE (R.A. and B.T. Gardner) was taught a version of ASL called Ameslan (Fouts and Mills 1997:87-110). She used combinations of signs similar to the telegraphic speech that very young children use, and a gradual increase in the length of her sign combinations was observed. She spontaneously combined signs creating new words, she used wh-questions and prepositions, she associated between arbitrary elements (manual signs) and concepts, she understood the distinction between proper and common nouns,

she organized words in a classification system, and she was able to express her thoughts and needs and to talk about the past, things not present, and places she could not see. Also she developed a preference of word-order, in 90 percent of the utterances the word-order was: SVO. Washoe thought of herself as human. When categorizing pictures of humans and animals, she placed herself with humans and other chimpanzees with animals. She actually taught other chimpanzees ASL-signs, and her infant LOULIS managed to learn over 50 signs without being taught by humans, simply picking up the signs from his mother and the other ASL-signing chimpanzees when they signed to each other and to themselves. Washoe's signs were more immature than those made by the adult human deaf, but this may be due to the fact that she was not human, and that her trainers were not experts in ASL themselves (Wardhaugh 1993:45-49). However, some deaf children have been much impressed as they have been able to talk with her. Washoe was born wild in Africa and had already been exposed to her native tongue. She was approximately one year old when the language-experiment started, which means that she was learning a second language. Other apes have been older when similar experiments started, some of them may even have passed the critical age, a fact that must have influenced the results. R.A. and B.T. Gardner and Roger Fouts have been very careful not to over interpret the results of their signing chimpanzees, and they have developed procedures in order to test the knowledge and the reliability of the vocabulary of the apes as well as preventing any possible non-verbal cueing. Also, they have taken great pains making the apes feel comfortable, keeping them in a very free and stimulating environment.

Comparison of the language of two-year-old children and chimpanzees: Object-attribute: Childs utterances: Big train. Red book. Washoe's utterances: Dink red. Comb black Agent-object: Childs utterances: Adam checker. Mommy lunch. Washoe's utterances: Clothes Mrs. G. You hat. Action-location: Childs utterances: Walk street. Go store. Washoe's utterances: Go in. Look out. Agent-action: Childs utterances: Adam put. Eve read. Washoe's utterances: Roger tickle. You drink Action-object: Childs utterances: Put book. Hit ball. Washoe's utterances: Tickle Washoe. Open blanket. (Linden 1974:30-48, from R.A. and B.T. Gardner Two-way communication with an infant chimpanzee in Behaviour of Nonhuman Primates, eds. A. Schrier et al., New York: Academic Press, 1971.) There are many parallels between Washoe's utterances and those of two-year-old children, despite the fact that Washoe used ASL and the children spoken language. A comparison between the utterances of ASL-signing chimpanzees and ASL-signing children has not yet been undertaken. Bickerton (1990:110-112) points out that we regard the utterances of the child as a foretaste of adult language, because we know that the child within a few years will construct a grammar based on the language it is exposed to, and as we know that the ape will progress only to a limited extent, we conclude that it has no language. Somehow children have the ability to reconstruct the kind of language they are exposed to.

Language develops over a period of years as the child interacts with speaking or signing adults, and children reared in isolation do not acquire language (Fromkin and Rodman 1998:343). All social mammals learn by

imitating their elders, and children also observe, imitate, and play. Bickerton argues that children under two are not acquiring language but protolanguage and that the preference of word order is just as much a characteristic of apes as it is of children under two. These rules of word order are probably semantic structures preceding the syntactical constructions. Suppose that the neural infrastructure underlying formal syntax crucially involves aspects of the brain that do not develop until after birth and are not completed until the child is approximately two years of age. It would then follow that, at the time a child gains enough vocal control to imitate the utterances of elders (a time that may vary from age twelve months to eighteen months in normal children) that child is still incapable of syntactic language. Bickerton (1990:112) The most obvious differences between the language of apes and humans are the size of their vocabularies and the absence of grammatical items. Mostly the vocabulary of apes has been limited to lexical items. However, Bickerton (1990:106-110) points out that this may be due to the fact that the apes have not been taught grammatical items. The researchers are not linguists, and as they have been making the experiments for rather different reasons (e.g. the development of training procedures for children who do not develop language normally and people who have language difficulties caused by brain damage), quite naturally their interests have been focused on other aspects of language, e.g. semantics. Washoe's trainers draw the conclusion that the chimpanzees capacity for language is similar to that of a human child but may not be exactly the same (Wardhaugh 1993:48-49). The chimpanzees are born with language capacities that are perfectly suited for gestural communication among groups of individuals in the jungle. Human language share some of these origins, but it has become specialized for a very different way of life in much larger communities.

When comparing the ape-reports with the Hockett design features of language, elements of all of the seven key-properties seem to occur. Washoe and the other ASL-signing chimpanzees talked to one another (interchangeability), and the infant Loulis learned 50 signs from the other chimpanzees as no sign language was used by humans in his presence (cultural transmission). The apes spontaneously created new utterances and used metaphors and combinations of signs, e.g. water-bird was Washoe's way of referring to a duck (productivity). There was no similarity between the manual signs or plastic tokens and the real objects or concepts (arbitrariness). The apes were able to talk about the past, things not immediately present, and places they could not see (displacement). Some apes used warnings like angry and bite without attacking (specialization), and they definately related sign and meaning (duality of pattern). Also the use of language to mislead others purposely (prevarication), was found. Falsity of meaning requires a creative and dishonest system as an instinctively induced limited set of calls is honest. Apes are very good at social manipulation. They can interpret the behaviour and intentions of their fellows, and they can deliberately control some facial expressions and body language in order to mislead others. The ability to lie, to hide your feelings and intentions, is a very important human-like behaviour and very much like direct communication. Unless we teach apes some language that humans also know, the only other

possibility is them teaching us their language. No doubt studies of apes in the wild would be very profitable.

Among themselves primates use a wide variety of communication (e.g. olfactory, auditory, tactile, visual, and vocal). The meaning of primate communication depends on the social and environmental context as well as the emotional state of the animals, and their calls appear to be like complete human utterances, e.g. you may mate with me (Bickerton 1990:10-12). The monkeys called vervets have the most sophisticated animal communication that we know of (Diamond 1991:126-128). Frequently, like other wild animals, vervets are in dangerous situations in which an efficient communication system increases their possibility of survival. Also, they have complex social relationships, territorial rivalry and fights, and they have to be able to inform each other about sources of food. The application of new techniques, e.g. modern tape-recordings and the spectographic analysis, has made it possible to detect variations which humans cannot perceive. For instance the vervets produce several distinct alarm calls naming the different kinds of predators, they react differently to dominant and subordinate members of their own troop, to their families, and to members of rival troops. Like humans, vervets have to learn part of their language. The young vervets appear to generalize and cannot produce the distinct calls until they reach a certain age. Also, they have to learn how to react to the various calls. The observations of behaviour by T. Struhsaker and the sound experiments by R. Seyfarth and D. Cheeney (Diamond 1991:128-132) have shown a connection between behaviour and call as a deliberate communication which cannot be explained as stimulus-determined expressions as they are messages given honestly to friends or dishonestly to enemies. Also, this shows how easy it is to underestimate the communicative abilities of other species. So far, no evidence of syntax has been discovered, but this is no proof that it does not exist. Most of the calls seem to be single utterances or repetitions of the same call. Gibbons, too, have calls that differ from each other, similar to those of the vervets. Sometimes they consist of more elements in certain combinations, but the meaning of these have not yet been decoded by humans. Certainly, many other species may have calls, the meaning of which we have not yet recognized. Formerly, it was assumed that the only world was the one bounded by the limits of our senses, but there are sensory worlds outside our own beyond our ability to perceive. The application of new techniques such as the use of spectrograms in order to study animals in the wild may one day reveal other complex systems for receiving, analysing, and exchanging signals, perhaps even using a kind of syntax. Contrasting tones and pitch contour may be important features. A single vowel can have eight different meanings in the Iyau language of New Guinea (Diamond 1991:133-134), and a small variation of pitch can change the meaning of the word mother-in-law into that of snake. A warning call could be modified when given different intonations with distinct meanings, e.g. Watch out! A snake!, Is there a snake?, This is not a snake., etc. (Bickerton 1990:11-13). Travel books from the nineteenth century are full of tales of primitive native tribes who used very few words (Diamond 1991:137), and the European travellers found it just as difficult to understand the unfamiliar sounds of these languages as zoologists find it when trying to decode the sounds of birds, whales, or primates.

INTERMEDIATE STAGES

If language evolved gradually, the theory of natural selection would require some intermediate language systems varying in efficiency. The languages of our human ancestors of millions of years ago would not resemble the languages we speak today.In a less demanding environment they would have had no need for a complex grammar, and the ability to combine a limited number of sounds in different ways would be sufficient. Pinker (1995:352) suggests that calls similar to those of the vervet monkeys may have come under the voluntary control and put together in a rule-governed way for more complicated information exchange. Presumably, the vocabulary was not very large, and grunts and gurgles may have been used rather than modern speech sounds, e.g. chimpanzee pant-hoots, the expressions of solidarity between male primates, very much like the utterances of human male sporting teams (Aitchison 1996:66-67). From the early stage of grimaces, gestures, and sounds, gradually a sophisticated language may have evolved as it turned out to be a supremely efficient means of communication.

Bickerton (1990:122-126) argues that there is a primitive variety of language, a protolanguage, existing alongside fully developed language (e.g. the language of signing apes, children under two, language acquired by wild children after the critical period, and pidgin). He assumes that this primitive variety evolved first and that humans are prewired at birth with a kind of creole that can develop by later experience. Pidgin and creole are based on existing languages, but they are similar all over the world, showing how a simple system may develop (Aitchison 1996:11). Pidgin languages are based on nouns, verbs, and adjectives, they are simplified in sounds, vocabulary, and syntax, and characterized by short rule-governed constructions of words. Pidgin utterances are like big true, me no lie meaning it is absolutely true, I am not lying (Bickerton 1990:118-122). When pidgin takes over as a native tongue it develops into creole.

CONCLUSION

Human and non-human communication have been investigated from a great variety of perspectives within science, and very few disciplines seem to agree on a definition of language. It is of crucial importance that we know exactly what language is if research in non-human communication is to be accepted as evidence of linguistic ability. Some linguists would rather redefine language in order to defend human uniqueness than accept a linguistic continuity on a biological basis. This rigid view reflects a long bias and is not getting us anywhere. Many linguists agree with Chomsky's theory, but the primary function of language is that of communication, and the biological and social context cannot be ignored. In the search for a plausible scientific explanation, we should look closely at the non-human systems of social communication in order to find out whether they share the rules and principles of human languages, by observing how they are used, how their components are put together, and how they interrelate with other things.

If we accept a linguistic continuity, language cannot be without some kind of intermediate stages, and it seems obvious that animal communication has been the precursors of human speech. The fact that chimpanzees are able to learn a human sign language indicates that our common ancestor must have had a capacity for this kind of communication and that nature has built up signed and spoken language on these ancient foundations. The question whether non-human species in a state of nature have developed a kind of communication similar to that of humans remain open. The communication of the wild animals who would be most likely to use grammar have not yet been investigated. When deriving our information from laboratory experiments and observations of animals in captivity, we cannot equate our results with what can be observed of animals living free in the wild. The reports on apes in captivity show that trained apes to some extent are capable of acquiring human language, but human children would probably find it just as difficult to acquire any system of primate-communication if they were removed from their natural environment and exposed to any such experiments controlled by members of other species.

The maturation of certain language centres in the brain could explain why syntax seems to be absent in the utterances of two-year-old children and trained apes. Apparently, the brains of chimpanzees do not lack the structures necessary for language development, but they may lack the structures resposible for syntax. It seems that their brains reach a fully developed stage when they are similar to those of very young children. Naturally, chimpanzees are not capable of mastering a language that has taken us centuries to develop. However, no experiments have involved adult chimpanzees as they grow too big to handle, e.g. Washoe received no further training after the age of four and may not have reached the limit of her abilities. Within an evolutionary perspective, it seems a plausible scientific explanation that the language of trained apes represents an early stage of language development, a protolanguage similar to that of very young children and speakers of pidgins. Conclusively, we may regard human language as a further development of communication systems also found among other species rather than being uniquely human.

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