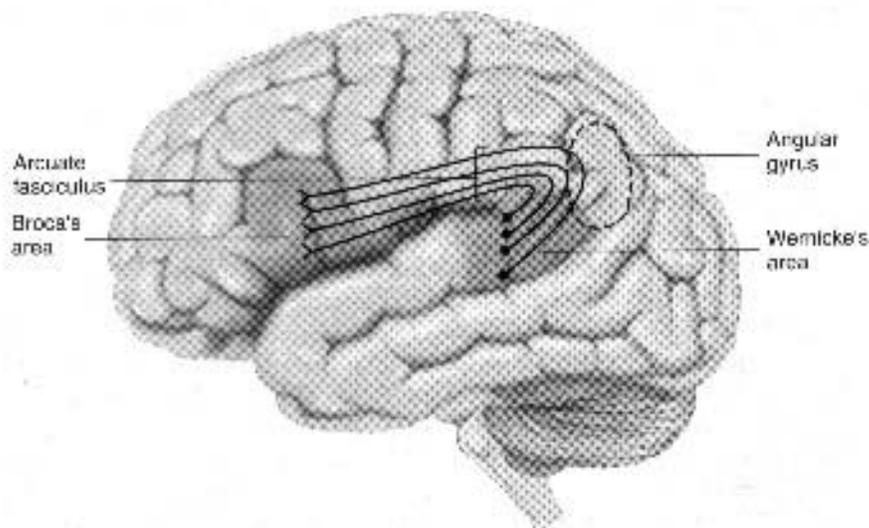


### Ancient origins.

Most modern European languages, and those of South Asia as far east as the Indian plains, all belong to the same group known as Indo-European (Corballis, 1991). The ancestral tongue from which all modern Indo-European languages are derived is thought to have originated somewhere north of the Danube Basin in about 5,000-6,000 BCE. Indo-European is connected to the other language groups of Europe, Asia, and North Africa through an even more ancient precursory language known as Nostratic that probably originated around 13,000 BCE. The speakers of Nostratic appeared to have no words related to agriculture suggesting that they were hunter-gatherers. Linguists have even made attempts to connect all of the existing languages of the world as descendants of the Primordial language called proto-World. Researchers in this area claimed to have discovered about 200 words of proto-World. For example, the word “tooth” is represented in the Congo Saharian as “nigi” in the Austro-Asiatic as “gini” in the Sino-Caucasian group as “gin” and in the Nostratic group as “nigi”, all from which modern words such as “nag” and “gnaw” are thought to have derived.

When we consider the speed at which languages change, this casts some doubt as to the ultimate success of these efforts to find the common proto-language. For example, the English of Shakespeare is only 400 years removed from our own English. But for a large percentage of the English speaking population it sounds almost like a foreign language.



**FIGURE 41** The language centers of the left hemisphere. The language reception center, Wernicke's area, is connected to the language production center in Broca's area by the arcuate fasciculus.

The rapidity with which language changes and diverges into new dialects raises another question. Why is language so flexible and malleable? Hamilton's Theory of

Inclusive Fitness may provide one possible explanation (Dunbar, 1996). So-called altruistic behavior probably arose as a mechanism for promoting the survival of our genes in the bodies of closely related kin. For example, to help close kin is not really a sacrifice because you are promoting the survival of your own genetic material. Such altruistic tendencies, however, may confer a selective deficit if we were living in extremely large social groups. When we put ourselves at risk to aid those who are not related to us and who in turn may not reciprocate the aid, we are hurting our own fitness. If we can identify individuals who have been reared in the same group as our own through their accent and dialect, then they are more likely to share genes with us and are also more likely to reciprocate our actions. Some supporting evidence for this comes from studies of language diversity in West Africa where there are more different languages per square mile in the high density populations among the equator than among the low density populations further to the north. This suggests a direct relationship between population density and the proliferation of new languages and dialects. Because of the tendency of language to move rapidly into new dialects studies of modern languages can tell us little about the ancient origins of language.

Some anthropologists have argued that language did not appear until about 50,000 years ago (Corballis, 1991). This is based on the fact that at that point in time there was an enormous surge in innovative technology. For hundreds of thousands of years prior to that, there was little change in the variety and complexity of stone tools. But, about 50,000 years ago there was a proliferation of a variety of implements including sewing needles, fishhooks, harpoons, buttons, and clasps. Around 30,000 years ago numerous art objects appeared such as Venus statuettes and cave paintings as well as beads and other types of body adornments. Despite the late blooming of utilitarian and non-utilitarian technologies, the idea of a very recent origin of human language does not jive with the anatomical evidence.

The fossil record clearly shows that humans with the anatomical specialization prerequisites for producing and using language appeared by at least 250,000 years ago and possibly as far back as 500,000 years ago (Corballis, 1991). Fossil skulls from this time show evidence of brain asymmetry. In modern humans, the left hemisphere, where language function is typically located, is larger than the right hemisphere. This same pattern was shown in the fossil skulls. Examination of the post-cranial remains of these specimens showed that the larynx was already located in the lowered position necessary for producing the range of sounds associated with modern speech.

Kay, Cartmill, and Balow (1998) found that the bony canal through the skull that houses the hypoglossal nerve is twice as large in humans as compared to chimpanzees after differences in overall size are compensated for. The hypoglossal is the cranial nerve that controls almost all the tongue's movements. The larger hypoglossal displayed by humans is essential to the precision tongue movements that are requisite for speech. The hypoglossal canals in the skulls of Australopithecines are small like those of modern apes, suggesting similar vocal limitations. Archaic *Homo sapiens* skulls over 400,000 years old have large, humanlike hypoglossal canals.

Early members of the genus *Homo* may have been very limited in their speaking ability. MacLarnon examined the thoracic vertebrae of a 1.5-million-year-old specimen of *Homo erectus* and found that the spinal cord was much thinner in this region than it is in modern people (Cartmill, 1998). This part of the spinal cord controls the muscles that move air in and out of the lungs. Therefore, it seems doubtful that early *Homo erectus* had the precise neural control over breathing movements necessary for speech. As to which selective pressures pushed toward the development of language, this is an area that is still subject to speculation. One intriguing theory which has been proposed by Robin Dunbar, and which seems to tie together a number of disparate facts, has to do with group size, grooming, and the neocortex.

Dunbar (1996) showed that there was a direct correlation between the typical group size of a species and the size of the neocortex in individuals of that species, particularly in primate groups. The neocortex comprises most of the forebrain by volume. It has expanded considerably in the course of human evolution and comprises 80% of the human brain. The human neocortex has an area up to 2,500 square centimeters, but a thickness of only 1.5 to 3.0 millimeters. The surface of the cortex is highly wrinkled as a result of cramming a very large area of material into a relatively small space, the limits of which have been set by the birth canal.

Dunbar (1996) has argued that the neocortex expands with the increase in group size because the primary function of the neocortex is to handle social information. In a social group, each individual animal has to keep track of who his friends are and who his enemies are. Moreover, he must be aware of who the friends of his friends are and who the enemies of his friends are, etc.; with each increase in group size these calculations become increasingly complex. There is an ever-increasing demand for Machiavellian intelligence and for a more and more complex theory of mind type processing. Theory of mind refers to the type of conceptual understanding an individual must possess in order to modify his or her behavior in accordance with the assumption that other individuals have minds like their own. In non-human primate societies alliances and coalitions are maintained through the process of grooming. Grooming originally evolved as a mechanism for ensuring good hygiene. One animal will sit and pluck

parasites and detritus from the fur of another, who in return may or may not reciprocate the action. Grooming was co-opted for another function in social primates. Namely, it became a kind of social cement creating a bond between the grooming partners.

Dunbar (1996) has shown that as group size increases more and more time must be devoted to the grooming behavior. In open areas such as the African savanna, larger group sizes are needed to protect against predation. Unfortunately, grooming, being a one-on-one process sets a limit on how much grooming can be accomplished and, therefore, sets an upper limit on group size. Language provides a way to circumvent the limiting aspects of grooming by allowing several alliances to be forged simultaneously.

Studies have shown that groups of two, three, and four individuals comprise the optimal numbers for conversation units (Dunbar, 1996). This has to do with our range of hearing and with our ability to take turns in conversation. If we consider that one human can engage in conversation with three others, but a non-human primate can only groom one other at a time, then the capacity for coalition building is tripled through the use of language. Non-human primates engage in vocalizations called contact calls during the process of grooming. Moreover, as in the vervet monkeys, it has been demonstrated that these animals already have the capacity to associate specific meanings with specific sounds. These pre-existing tendencies could readily be modified into vocalizations that could serve as substitutes for the grooming process.

Some theories of language origins suggest that language evolved as a means to facilitate hunting. For example, telling other members the location of prey animals that have been spotted and directing them to that location. Dunbar (1997), however, suggests that language originated as a means to maintain coalitions in increasingly larger groups. Part of the evidence he presents to support this has to do with the content of most human conversations. Rather than being devoted to technical issues, most casual conversations fall under the rubric of what we would call gossip. The primary content of gossip is observations of other individuals in the social group. A small group of individuals engaging in gossip are emphasizing their common views and exaggerating the differences between themselves and other individuals in the social group. Often times the gossip emphasizes his or her moral superiority over those about whom they are speaking. This all supports the idea that this mechanism exists for coalition building. It probably serves as the source of the in-group, out-group phenomena where members of the in-group emphasize their solidarity and similarity and at the same time emphasize the differences the out-group members exhibit.

Calvin and Bickerton (1998) also emphasize social cognition as the critical selective force for the deep structures of language. They propose that the ability to conceptualize complex patterns of social obligations formed the basis for syntax. They also suggest that the ability to use

symbols arose as a consequence of interpreting signs in the natural world. For example, footprints of a certain size and shape are referents for a certain type of animal.

Corballis (1999) contends that gesture was the first form of language and that it was from here that grammatical structure developed. Observational evidence supporting this theory has been obtained on Taiwanese and American deaf children (Goldin-Meadow & Mylander, 1998). It was noted that deaf children spontaneously introduce language-like structure into their gestures. The 2 cultures had a number of similarities in sign structure that parallel the semantic and syntactic organization of true language. The children's gestures were structured at both sentence and word levels.

In most non-human primate social groups, matriline (lines of descent as traced through the maternal side of a family) form the stable nucleus of these groups. It is the females who do the predominant amount of grooming and it is the females who form the core nucleus of the group. In humans, females appear to have the edge in language skills; they develop language earlier and in more complexity. The greater the numbers of hominid and human infants, the greater the necessity for increased support networks among the females involved in child rearing.

Once language ability started to be selected for to promote coalition building, other selective pressures probably began to operate. One of these was probably runaway sexual selection. In runaway sexual selection the females would come to select males on the basis of their language ability. Language ability, because of its interfacing nature, allows one individual to readily make some assessment of certain cognitive abilities in the other. Through this mechanism, females can not only select for mates with good language abilities, but also those who have somewhat higher intelligence. Males, in turn, with good language skills could use these abilities to exploit tendencies of females to be enamoured of males with high language abilities. With the advent of language, linguistic deception, or lying, was almost certainly soon to follow. Males could conceivably promise commitment and resources and not necessarily follow through with these. This would have set up an arms race in which females would have had to develop better and better detection skills for spotting male deception. This, no doubt, set up a runaway arms race for even greater language abilities and for even greater mental abilities. The adaptive advantages of language are so numerous that once it began there was probably enormous selective pressure for better and better language abilities. At some point, the hypothesis regarding hunting probably became true; language was selected for because hunters were better able to communicate. Inter-group conflict, i.e. warfare, was undoubtedly a source of language selection with those who were better able to communicate and coordinate their movements having an edge over those who could not. Of course, the single greatest boom of language was that it made possible the transmission of

information across time, from generation to generation. In other words, language potentiated the rise of culture.