

Copyrighted Material

# The Seeds of Speech

Language Origin  
and Evolution

JEAN AITCHISON



**Jean AITCHISON**

*The Seeds of Speech*  
*Language origin and evolution*

---

© Cambridge University Press, 1996.

---

## **Chapter 1: How did language begin?**

The origin of language has long been a disreputable study, but recently there has been a new upsurge of interest. Numerous pieces of evidence, both linguistic and non-linguistic, must be pieced together as if in a gigantic jigsaw puzzle.

Human language is bizarre: it can cope with any topic, even imaginary ones, and has more in common with bird communication than with the calls of our ape cousins. The similarities of language and birdsong suggest that sophisticated sound systems may independently acquire similar features.

The amoeba question is a key issue: whether language started out simple and then became elaborated, or whether it was intrinsically messy and then got neatened. This ties in with the question of speed, as to whether language emerged fast, like a rabbit out of a hat, or slowly over millennia. This and other questions of language origin need to be discussed against further background information about language.

## **Chapter 2: What is language for?**

This chapter looked at the role of language. The uses of language are so numerous and complex in modern society, that its original role was considered by looking at what language is good at, and what it is bad at.

In spite of the widespread view that language is primarily for conveying information, language is not particularly good at this: it is poor at handling spatial information, and information about emotions. And even factual information may be false, as humans often lie. But lying reveals an important property of language, that of displacement-dealing with absent phenomena.

Language is particularly good in social roles, at maintaining social ties and influencing others.

The social roles of language lead to a crucial question: is language a cultural artefact, such as table manners, or is it a special inbuilt skill?

## **Chapter 3: Why do languages differ so much?**

This chapter asked why languages differ so much. Flexibility and variation was pointed out to be an advantage in the animal world, and rigidity a disadvantage, so differences

between languages are potentially useful.

Two long-standing views on differences between languages were considered. The Swiss army knife (hard-wired) view proposes that language is a special skill, but has variety preprogrammed into the system. The Auntie Maggie's remedy (soft-wired) view suggests that language is acquired via general intelligence, and that it presents problems which are solved differently by different languages.

But hard versus soft wiring is now a largely outmoded controversy. Many examples of animal behaviour are a mixture of nature and nurture. Bees recognizing flowers, birds learning about predators, and human language are examples of innately guided behaviour, in which the outline framework and learning mechanisms are provided by nature, and the details filled in by experience.

## **Chapter 4: Is language an independent skill?**

This chapter considered the question of language independence. A number of case studies have shown that language can be separated from general intelligence. Brother John and Genie could think clearly even when they were unable to speak their thoughts. Laura, Christopher and others can talk fluently, even though they are severely mentally handicapped in other respects. This suggests that language has its own specialized circuit within the mind/brain.

## **Chapter 5: The evolutionary background**

Humans are cousins of apes, not descended from them. Humans split off from the apes maybe more than 6 million years ago. Modern humans evolved around 200,000 years ago, and modern language possibly emerged even later, perhaps around 100,000 years ago.

Humans may have separated from apes when the Great Rift Valley split Africa. Apes remained happily swinging in trees. Hominids in their harsher landscape were forced to adapt, scavenge and live on their wits. At some point, they developed language. The 'out of Africa' hypothesis for humans is supported by evidence from mitochondrial DNA and blood groups.

Over language origin, neither the fast development (rabbit-out-of-a-hat) supporters nor the slow haul (snail-up-a-wall) proponents are likely to be entirely right. The emergence of language may have been like a bonfire: slow beginning (from around 250,000 BP), fast development (from around 100,000 BP), then gradual slowing down into a long-term steady glow.

Many groups of speakers might have had an 'embryo language' but full language may have developed among a small group whose language had evolved further than those of

others. This could have enabled them to outwit existing groups, to whom they may have taught their language.

## **Chapter 6: Basic requirements for the development of language**

This chapter considers some of the basic prerequisites for the development of language. Two foundation stones are shared with our chimp ancestors. First, friendly involvement with others, originally helped along by grooming, then by language which partially replaced it. Second, an aptitude for tactical deception which is in turn based on the possession of a 'theory of mind', the ability to understand the intentions of others. This underlies the property of displacement in language, the ability to talk about people, things and events removed in time and place.

Some researchers have proposed an intermediate gesture stage of language before a full range of sounds was developed. This is unlikely. Gestures probably simply aided communication then, as they do now. The 'brain causes language' view is also unlikely.

## **Chapter 7: Physical prerequisites of language**

This chapter looks at the basic requirements for human language, Sound-producing, sound-receiving, sound-planning and sound-interpreting components are needed.

Sound-receiving mechanisms are shared with our ape cousins, and other primates can distinguish between some human language sounds. Sound-producing equipment (lungs, larynx and mouth) are present in all primates, though they have been greatly modified in humans, perhaps partly because of our upright posture. Only humans can produce the key vowels [i], [a], [u], which act as anchor-points in perception.

The human brain, which contains the sound-planning and sound-interpreting components, has some overall similarities to that of other primates, though the detailed modifications seem to be present only in humans. Humans have an extra-large brain, perhaps partly due to language. They have modified it for language in a number of ways. In particular, humans are able to suppress automatic vocalizations, and produce fine-tuned voluntary ones. Above all, they are able to co-ordinate the multiple strands involved in language in an efficient way. The co-ordination may have become possible because of the extended childhood of humans.

## **Chapter 8: Small beginnings: First steps**

Ontogeny (the development of an individual member of a species) only sometimes correlates with phylogeny (the history of the species).



This happens physically with the lowering of the larynx, and it happens mentally in the development of the 'naming insight', the realization that things have names.

Humans were probably already using a range of vocalizations from various sources even before the naming insight. These included work chants which involved consonant-plus-vowel syllables, easy to produce sounds such as *ma* which evolved from lip-smacks, and some imitations of natural sounds.

The naming insight and the development of a large number of words laid the foundations for combining them.

## **Chapter 9: The emergence of rules**

This chapter examines the emergence of rules. The naming insight possibly stimulated a huge number of names for objects, but true language began when words were combined.

A primitive grammar could have arisen partly out of 'buildups', putting individual words together, as in *mummy - open*, and partly out of a re-analysis of combined nouns such as *mi danis* 'me dance', which could be interpreted either as two nouns or as a person participating in an action.

At first, many word combinations were possibly repetitive and inconsistent. The chimp Nim Chimsky, the bonobo Kanzi, and Vincent the hearing child of deaf parents, show how rules may have become fixed: optional orders became strong preferences which became rules.

The original preferences were probably based on pre-linguistic 'mind-sets', which may explain why so many languages show similarities, such as a tendency to place animate actors first, and patients (objects) near the verb affecting them. But sometimes natural principles clash, which partially explains why languages differ.

## **Chapter 10: The expansion**

This chapter considers how language expanded. First, language made use of the world, as filtered through human experience. Above all, it made use of the human body and its location in space to move outwards to the surrounding environment, and inwards to inner ideas. This presumably happened at the beginning of language, and is still happening now.

Second, it discussed how language acquired extra parts of speech. Adpositions (prepositions and postpositions) are few in number. Their sparsity is due to the human mind-set, but these few are stretched to cover a wide range. They developed via re-analysis' either of verbs or nouns.

The middle ground between nouns and verbs is handled by languages in two ways: either

by subdividing verbs into two types, non-stative and stative, or by developing adjectives, words which deal with properties. Adjectives arose via re-analysis, but they could not be clearly distinguished from verbs until further linguistic devices evolved, some of which are discussed in the next chapter.

## **Chapter 11: Time travelling: Extra attachments**

This chapter considers how verbs acquired attachments. These developed via grammaticalization, in which a full lexical item developed into a grammatical marker, or gram.

The main evidence comes from pidgins and creoles. Tense-mood-aspect (TMA) systems tend to be similar in all creoles, suggesting that similar events happen whenever a new language comes into being, whether nowadays or when language first emerged.

A basic controversy exists, as to whether a new language starts out simple, and is then elaborated (a bioprogram approach), or whether it is first messy, and then streamlined (a spaghetti junction view).

The developing TMA system in Tok Pisin shows that language develops by sprouting out various options, followed by narrowing down and neatening. The spaghetti junction view represents a more realistic view of what happened than the bioprogram view, which describes the final outcome.

## **Chapter 12: Keeping going**

This chapter examines ways in which language keeps going. Language has the property of generativity: the use of finite resources to produce an infinite variety of sentences. It re-uses its own structures, so that there is in principle no end to the length of a sentence.

Languages develop sentences embedded inside other sentences. They do this by re-using words already in use in simple sentences.

They also endlessly form words out of other words.

## **Chapter 13: Moving outwards**

This chapter outlines the diffusion of language around the World. Roughly 75,000 years ago, humans moved out of Africa, probably first into Asia Minor, then westwards to Europe, eastwards to the Far East and Australia, and eventually to America via the Bering Strait.

Standard methods of comparing languages can take us back only around 10,000 years, though older links between language stocks have been proposed, and attempts have been

made to correlate them with DNA samples. A new method, 'population typology', which plots selected independent constructions, may provide even earlier glimpses.

## **Chapter 14: The hunt for universals**

Many linguists hope to find language universals: features common to all languages. Yet this is a problem, apart from the fact that the term 'language universals' is used in more senses than the one above.

Absolute linguistic universals, features common to all languages, are rare, unless one takes an over-broad view of the word 'universal'. Even when apparently found, they differ in details from language to language.

Linguists argue about how to find universals. A shallow scraping approach collects specimens from numerous languages and attempts to find features which they have in common. A deep delving approach looks at one language, formulates hypotheses about how it might work, and tests the hypotheses against other languages. The first approach is useful for early stages of research the second for later stages.

Universals can be profitably explored along various dimensions. One is degree of firmness, in which absolute universals are contrasted with statistical universals, features which figure in most languages, but not all. Another is degree of independence, in which independent universals are contrasted with implicational universals if X, then Y. These can reveal important constraints on language, as will be discussed further.

## **Chapter 15: Ruling the rules**

Language must have constraints, which prevent it from flying apart in different directions. Some constraints are absolute prohibitions, others are preferences-though distinguishing one from the other is not always easy.

Constraints are hard to find. But a promising approach is the search for constraining links. Language constructions are often linked to one another in implicational chains: if a language has X, it will also have Y. Noam Chomsky's 'parameter setting' is perhaps the best-known implicational theory, but it is not the only one.

Some constraints are related to processing needs, but not all, as are discussed in Chapter 16.

## **Chapter 16: Separating the strands**

Traditionally, language has three basic components: phonology (sound structure), syntax (word organization) and semantics (meaning). The level of autonomy of these relates to conscious awareness. Meaning interacts with conscious thought, but sound patterns



mostly do not. Syntax comes somewhere between the two.

But language does not always split itself neatly into these components, as is shown by a family who can use some linguistic structures, but cannot handle on-line processing.

Structure and processing interact in language, though some current controversies exist because linguists tend to examine stable components, whereas psychologists concentrate on processing.

# 1. How did language begin?

We humans have evolved into quite strange beings. Whatever happens in the future is unlikely to be any odder than what has already happened in the past. We differ from other animals in that we cook our food and wear clothes. Other unusual characteristics are a tendency to kill each other, and a mild preference for making love face to face. But perhaps the most important distinguishing feature is human language. This extraordinary system allows us to communicate about anything whatsoever, whether it is present, absent, or even non-existent. This is quite strange, compared with the communication systems of other animals, which are mostly confined to messages about everyday events, such as food, danger, mating and territorial rights.

Humans are the odd ones out. We are a zoological curiosity, as bizarre in our own way as the hoatzin, a South American bird with a bright blue face, big red eyes and orange crest, which inhabits the Amazon rain forest. Alone among birds, the hoatzin has developed a digestive system similar to that of a cow. We humans are equally strange, because language with its fast and precise sounds has more in common with birdsong than with the vocal signals of our ape relatives.

## Lunatic lovers

So how did it all begin, this powerful, weird communication system of ours? Frustratingly, we do not know. The origin of language is criss-crossed with controversy and befogged in mystery. Our earliest written records are around 5,000 years old, though most are more recent. By comparing different early languages, we can reconstruct what some languages may have been like up to 10,000 years ago, according to the standard view.<sup>[1]</sup> Yet language must have evolved at least 50,000 years ago, and most researchers propose a date around 100,000 years ago. Until recently, how it all began was an unfashionable question.

Curious theories abounded. Take the Noah's Ark view, that Chinese was possibly the primitive language of humankind. It was spoken by Noah and his family in the Ark, and so survived the flood. At least, this was the opinion of the seventeenth-century writer, John Webb, in 'An historical essay endeavouring the probability that the language of the Empire of China is the Primitive Language'. He is a typical 'lunatic lover of language', a name given to the crazy fringe who promote private and peculiar ideas about speech and its origins (Yaguello 1984/1991).

Or consider the views of James Burnett Lord Monboddo, an English aristocrat, who in 1773 published a book in six volumes on *The origin and progress of language*. He maintained that humans learned how to spin and weave from spiders, how to construct dams from beavers, and how to sing and speak from birds. The cuckoo, the raven and the

parrot, he noted, produced almost alphabetical sounds. Therefore in his view human articulation was the result of imitating such birds. 'Lord Monboddo gives the impression of being an English gentleman accustomed to having even his most eccentric and fanciful ideas listened to with deference', an Italian researcher aptly commented (Fano 1962/1992:155).

Or take the Abbé O'Donnelly, a Frenchman who claimed in the mid nineteenth century to have deciphered the hieroglyphs on an obelisk brought to Paris from Luxor in Egypt. He boasted of his 'new and prodigious discovery of the original universal language', asserting that he had shed light on the 'form of words at the birth of speech'. His translation 'was sufficient to open the eyes of a mole', he noted-though he lamented that his discoveries had not yet been acknowledged, with his 'words and results being blown away by the wind' (Yaguello 1984/1991: 145-6).

As absurd claims sprouted like puffballs, the question of language origin was shunned by serious scholars. In 1866, a ban on the topic was incorporated into the founding statutes of the Linguistic Society of Paris, perhaps the foremost academic linguistic institution of the time: 'The Society does not accept papers on either the origin of language or the invention of a universal language' (In Lyons 1988: 141).

Inquiry into language origin was considered a waste of time. The American linguist William Dwight Whitney noted in 1893:

No theme in linguistic science is more often and more voluminously treated than this ... nor any ... with less profitable result in proportion to the labour expended; the greater part of what is said and written upon it is mere windy talk, the assertion of subjective views which commend themselves to no mind save the one that produces them, and which are apt to be offered with a confidence, and defended with a tenacity, that is in inverse ratio to their acceptableness. This has given the whole question a bad reputation among sober-minded philologists (Whitney 1893:279).

Yet scholarly disapproval did not stop speculation. Hewes (1977) counted twenty-three 'principal theories' of language origin. Holloway (1976: 330) acidly commented: 'The very fact ... that human animals are ready to engage in a great "garrulity" over the merits and demerits of essentially unprovable hypotheses, is an exciting testimony to the gap between humans and other animals'.

It's like a juicy fruit dangling just out of reach. Humans have a natural curiosity about it seemingly built into their minds: 'Few questions in the study of human language have attracted so much attention, provoked as much controversy, or resisted so resolutely their answers as that of the origin of language', as noted by Ruhlen (1987:261).

So what has changed now? The origin and evolution of language has suddenly become a respectable topic. In the past few years, there has been an explosion of papers in reputable journals, as well as several books. There is a twofold explanation.

First, religious dogmatism has declined. At one time, respectable scholars were often unwilling to contradict the view found at the beginning of the Bible, that God formed all living things, and then assigned the naming of them to Adam, the first man: 'And out of the ground the Lord God formed every beast of the field, and every fowl of the air; and brought them unto Adam to see what he would call them: and whatsoever Adam called every living creature, that was the name thereof. And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field' (Genesis. 2.19-20). The eighteenth-century philosopher Jean Jacques Rousseau had to argue for the double invention of language to counter this problem: 'Adam spoke, Noah spoke; but it is known that Adam was taught by God himself. In scattering, the children of Noah abandoned agriculture, and the first common tongue perished with the first society'.[\[2\]](#)

Second, and more importantly, sufficient progress has been made in the study of humans and their place in the animal world to be able to approach the topic in a useful way. All primates, the animal 'order' to which humans belong, have some overlap in their sound-producing and hearing abilities. But the vocal output of our primate relatives is less illuminating than was once hoped: 'Quite simply, the normal state of affairs is not to find unequivocal correlations between the sound and its behavioral context. Instead, the same sound often occurs in apparently different situations, and a variety of sounds can be found to occur in a given situation' (Owren, Seyfarth and Hopp 1992: 103). In addition, classification of the sounds is difficult: 'Boundaries are blurred by intermediate or transitional acoustic forms' (ibidem). In the circumstances, a straight comparison between, say, chimp and human vocalizations is limited in what it can reveal.

More informative, perhaps, is a comparison with the animal communication system which has most in common with human language. As mentioned earlier (p. 4), this may be birdsong. Let us consider the matter further.

## A bird-like skill

'I happen to be acquainted with an anti-social African gray parrot in England named Toto, whose owner brings him out now and then in the evening to show him off to guests', wrote E. Hahn, a *New Yorker* journalist. 'After a few minutes of bad-tempered staring at the company, the bird usually says, "Toto go bye-byes now," and his owner carries him back to the proper room and puts him in his cage, safe and private under a tea towel. Is Toto really talking?' (*New Yorker*, 24 April 1978).

Toto is talking, but he does not have 'language' as humans understand it. Yet Toto, like humans, has an ability to make distinctive sounds that is rare in the animal world-even though the method Toto uses to produce them is rather different from that used by humans (Nottebohm 1975). But this is not the only similarity between birds and humans. There are several others.[\[3\]](#)

Many birds emit two types of sounds: calls, such as a danger call or a congregation call, which are mostly innate and songs, which often involve learning. Humans also have inbuilt 'calls', the cries uttered by babies, at least two of which are distinguishable worldwide: a pain cry and a hunger cry (Lester and Boukydis 1991). But language itself requires learning, and it exists alongside this old 'call' system. Birds and humans therefore share a double-barrelled system, with one part in place at birth, and the other acquired later.

In birdsong, each individual note is meaningless: the sequence of notes is all-important. Similarly, in humans, a single segment of sound such as *b* or *l* does not normally have a meaning. The output makes sense only when sounds are strung together. So this double-layering (known as duality or double articulation) provides a further parallel. And in both birds and humans, sound segments are fitted into an overall rhythm and intonation pattern.

As with humans, the song of a single species of bird may have different but related 'dialects'. The white-crowned sparrow, a Californian resident, has dialects so different, even within the San Francisco area, that 'someone with a cultivated ear would be able to tell where he or she was in California, blindfolded, simply by listening to their songs' (Marler 1991b: 38). And both birdsong and human language are normally controlled by the left side of the brain, even though the mechanisms by which this control is exercised are quite different.

Young birds have a period of sub-song, a type of twittering which emerges before the development of full song. This is like the 'babbling' of human infants who experimentally produce repetitive *bababa*, *mamama* type sequences when they are a few months old. Many birds have to acquire their song during a shortish 'critical period' when they are young, otherwise they never learn to sing normally. Similarly, humans acquire language best during a 'sensitive period' in the first few years of life.[\[4\]](#)

In short, both birds and humans produce fluent complex sounds, they both have a double-barrelled, double-layered system involving tunes and dialects, which is controlled by the left half of the brain. Youngsters have a type of sub-language en route to the full thing, and are especially good at acquiring the system in the early years of their lives.

But some very real differences also exist. Mostly, only male birds sing. Females remain songless, unless they are injected with the male hormone testosterone (Nottebohm 1975). And considerable variation is found between the songs of different birds, more than between different languages (Marler 1991a). In addition, bird communication is a fairly long-distance affair, compared with the intimacy of human language. Sometimes, the effect can travel over several kilometres, as with the New Zealand kakapo, a flightless parrot which makes spectacular sonic booms, somewhat like the note produced by blowing across the top of a bottle, in its efforts to procure a mate (Merton, Morris and Atkinson 1984). These kakapo booms can go on all night, and leave the kakapo in such a

state of arousal that it has attempted to copulate even with the feet of the ornithologists studying it.

As the kakapo's behaviour suggests, the purposes for which birds vocalize are somewhat narrower than those of humans. Birds sing in order to attract a mate, or to repel trespassers (Nottebohm 1975).[\[5\]](#)

A link between language origin and mating, and between language and song has sometimes been proposed: 'Language was born in the courting days of mankind-the first utterances of speech I fancy to myself like something between the nightly love-lyrics of puss upon the tiles and the melodious love-songs of the nightingale', suggested the Danish linguist Otto Jespersen (1922:434) though this theory has been damned by others: 'If our hominid ancestors used song in sexual advertisement and courtship, more recent selective forces have made such a habit much rarer', was one response to Jespersen's ideas (Nottebohm 1975: 86). Or as another noted: 'As for courtship, if we are to judge from the habits of the bulk of mankind, it has always been a singularly silent occupation' (Diamond 1959: 272). At the most, perhaps, language was an additional aid: courtship was not its primary role.

In short, humans use language for many more purposes than birds use song. The similarities between birdsong and human language show that parallel systems can emerge independently in quite different species. Certain features have apparently proved useful for sophisticated sound systems. Yet this observation raises as many problems as it solves. Let us now consider how we might explore the origins of our extraordinary communication system.

## The pieces of the puzzle

The origin of language is like a vast prehistoric jigsaw puzzle, in which numerous fragments of evidence must be painstakingly assembled.

The pieces of the language puzzle are of two main types, external (non-linguistic), and internal (linguistic), that is clues from outside human language on the one hand, and information gleaned from languages on the other (see Fig 1.1).



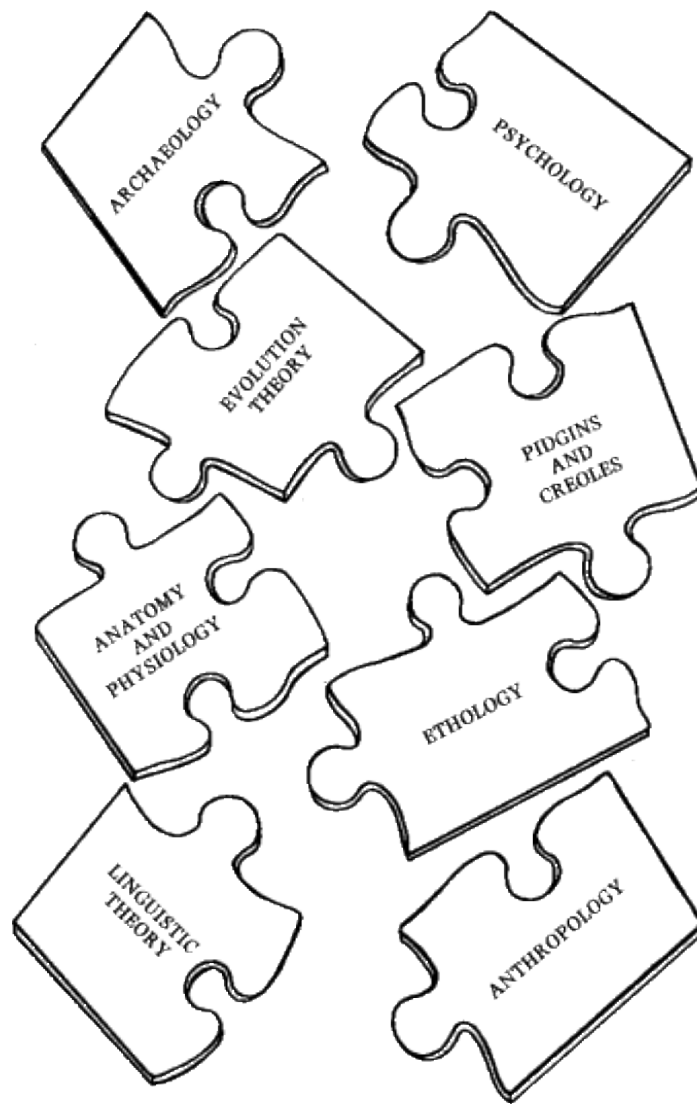


Figure 1.1

External evidence comes from at least half a dozen different areas of knowledge: origin of species (evolution theory), digging up remains (archaeology), how bodies work (anatomy and physiology), animal behaviour (ethology), human minds (psychology) and human societies (anthropology).

Linguistics, the study of language, provides the internal evidence. Among its multiple branches, pidgins and creoles are particularly valuable sources of information.

Pidgins are subsidiary language systems, spoken by people with no common language. They have a small vocabulary: a few basic words are stretched to cover a wide range. For example, in Tok Pisin, spoken in Papua New Guinea, *pik man* 'pig man' is a male pig, *pik meri* 'pig woman' is a sow, and *pikinini pik* 'child pig' is a piglet. *Pul bilong kanu* 'pull of canoe' is a canoe paddle, *pul bilong pisin* 'pull of bird' is a bird's wing, and *pul bilong pis* 'pull of fish' is a fin. The grammar is simple: word endings are few, so the order of words is important. *Yu mas pul strong* 'you must pull strong' means 'You must paddle (your canoe) energetically', *Mi go painim pis* 'I go find fish' means 'I'm going fishing'.

Creoles are pidgins which have become someone's first language - usually when speakers of different languages have married, and communicated via a pidgin, which has been learned by their children as a first language. At this point, the creole expands dramatically, and is eventually indistinguishable from any other language.

Pidgins and creoles are in one way unlike early language in humans, as they are based on one or more existing languages. But they are in other ways illuminating, because they are similar the world over. They may show how humans 'naturally' devise and elaborate a simple system.

External and internal fragments of evidence overlap and interweave, and the external versus internal distinction is not always clearcut: the comparison between human language and birdsong contained a mixture of both. But the overall message is clear: evidence has to be assembled from both outside language and inside it, much as a detective in a murder enquiry must not only hunt widely for clues, but must also examine the corpse with care. This leaves a problem. How is all the evidence to be woven together?

'Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house', said the French scientist Jules Poincaré (In Mackay 1991: 198). In house-building, it's essential to have an overall plan, and not just heap up stones randomly. Similarly, in research, it's important to have a theory, a framework into which to place the pieces. If they do not fit, the old theory has to be abandoned, and a new one proposed. But how can the stones be structured, when it's unclear what kind of a building is under construction?

Sometimes, an intermediate stage is needed, before a full plan is possible. An architect starts by asking basic simple questions, such as: 'What is the building for?' An answer such as: 'To provide shelter from the weather' leads to other questions, such as: 'What kind of weather, hot or cold?', 'How many people must it shelter?', and so on. Similarly, preliminary questions on the nature of language can be asked, which will lead onwards. At the same time, key questions can be identified, some of which have been asked for decades. Let us consider some of these.

## The amoeba question

Did language evolve like an amoeba, as a simple outline which gradually became elaborated? Or was it a sprawling mish-mash which slowly neatenened itself up into a coherent system?

The best-known nineteenth-century theories about language origin took the amoeba viewpoint. The so-called 'pooh-pooh' theory traced language back to instinctive cries of pain or joy, perhaps 'Ooh!', 'Ee!', 'Ah!' The 'bow-wow' theory assumed that the noises of animals were all-important, as ancient hunters imitated the growls and squeaks of a beast

they planned to track down. The 'yo-he-ho' theory suggested that words such as 'Heave!' came first, originating in the involuntary grunts which occur in heaving and hauling.[\[6\]](#)

But language need not have started with single words, it could have begun with whole melodies: 'For moving a young heart, or repelling an unjust aggressor, nature dictates accents, cries, lamentations ...', Rousseau proposed, 'and that is why the first languages were singable and passionate before they became simple and methodical'. This idea was taken up by Otto Jespersen with his 'puss upon the tiles' scenario (pp. 8-9): 'The speech of uncivilized and primitive men was more passionately agitated than ours, more like music or song' (Jespersen 1922: 420).

More recently, the amoeba question has arisen again, though in a more sophisticated guise. According to one view, proposed by the linguist Derek Bickerton, an innate 'bioprogram' caused simple basic distinctions to leap into place, both in the development of language in the species, and in creoles (e.g. Bickerton 1981, 1984, 1990). This bioprogram is supposedly part of the human mind-set.

But according to an alternative, 'spaghetti junctions' view, various possibilities were tried out, like a car with numerous possible exits on a motorway: 'Spaghetti Junction' is the nickname given to a particularly complicated British motorway intersection (cloverleaf). Maybe different routes were chosen on different journeys. In the long run, several factors converged to make speakers more likely to choose some options rather than others (Aitchison 1989c; Bybee, Pagliuca and Perkins 1994). But the final route selected was not automatic. It may have taken generations to become firm, and was probable rather than inevitable.[\[7\]](#)

## The rabbit-out-of-a-hat problem

The rabbit-out-of-a-hat problem links in with the amoeba question. According to one view, language emerged fairly suddenly, like a rabbit pulled out of a hat. Reasons for this viewpoint differ. Some propose a remarkable mutation in the early hominid gene pool, others suggest that an already enlarged brain found itself an extra use: 'Such a conception of language emergence is reminiscent of the Roman myth, where Minerva sprang forth from the head of Jupiter, fully armed and wonderfully wise', it has been suggested.[\[8\]](#)

In contrast, others assume that language evolved slowly and piecemeal, over multiple millennia, like a mosaic being painstakingly assembled out of various bits and pieces.[\[9\]](#)

This debate has been rumbling on for over a century, as when Whitney disagreed in 1872 with Heymann Steinthal, a professor at the University of Berlin:

We think our appreciation of the wondrous character of language a vastly higher one than Professor Steinthal; for while he holds that any two or three human beings, putting their heads together, in any age and under any circumstances not only can,

but of necessity must, produce it in all its essential features, we think it a possible result only of the accumulated labor of a series of generations, working on step by step, making every acquired item the means of a new acquisition' (Whitney 1872, in Nerlich 1990: 36).

But the amoeba question and the rabbit-out-of-a-hat problem cannot be solved in isolation. Considerably more background information is needed about the nature of language before they can be unravelled.

In the remaining chapters in part 1, 'Puzzles', three puzzling but important questions about language will be considered. First, what is language for ([chapter 2](#))? Second, why do languages differ so much ([chapter 3](#))? Third, does language depend on general intelligence, or is it an independent skill ([chapter 4](#))?

These issues will prepare the way for part 2, 'Origin', which will in turn lead to part 3, 'Evolution'. Finally, part 4, 'Diffusion', will consider how language diffused around the world, and what holds all languages together, in spite of their geographical dispersal.

## Notes

[1] Methods of reconstructing early languages are outlined in chapter 13.

[2] His essay on language origin was not published until 1852. It has recently been reprinted (1966).

[3] Nottebohm 1975; Gould and Marler 1987; Marler 1991b. On similarities and differences between other types of animal communication and language, see Aitchison 1989a.

[4] For summary, see Aitchison 1989a.

[5] The kakapo's behaviour is more like communicatory yodelling than true speech (Hall-Craggs 1969).

[6] The three types of theory were first summarized by the German linguist F. Max Muller; they possibly became widely known via Jespersen 1922.

[7] The amoeba question will be discussed primarily in chapter 11.

[8] Wang 1982: 16. The myth was originally a Greek one, in which Pallas Athene sprang from the head of Zeus. Noam Chomsky is the main supporter of the mutation view, e.g. 1972: 70, and Stephen Jay Gould of the 'brain causes language' view, e.g. Gould and IRwontin 1979.

[9] The rabbit-out-of-a-hat question will be discussed primarily in chapters 5 and 6, and its relation to the development of creoles in chapter 11.



## 2. What is language for?

What exactly is language FOR? To many people, the answer seems obvious. It's for the transfer of useful facts, such as 'Dinner will be served at eight o'clock', 'Peter's uncle has twisted his ankle', and 'Kangaroos live in Australia'. The belief that 'information talking' is the primary role of language dates back at least to the seventeenth century, when the English philosopher John Locke argued in his influential *Essay concerning human understanding* (1690) that language is 'the great conduit, whereby men convey their discoveries, reasoning, and knowledge to one another'. But language does not necessarily involve the transfer of information, often it is just polite chatter.

Even when information is apparently transferred, its reliability is not guaranteed. The speaker might have been lying, or even misunderstood: 'We are now at take-off', said the pilot of a Boeing 747. He meant: 'We are now in the process of taking off.' The air-traffic controller assumed he meant: 'We are waiting at the take-off-point.' In consequence, 583 people died as two aeroplanes collided on a runway in Tenerife (Cushing 1994).

Weaker claims about the purpose of language seem superficially plausible: 'Language ... was invented by man as a means of communicating his thoughts, when mere looks and gestures proved insufficient', proposed the nineteenth-century scholar Max Muller (*apud* Nerlich 1990: 43). Yet the notion of 'thought' is vague, and could cover the intention behind just about every possible utterance, from commands to apologies to poems.

This chapter will therefore consider the purpose problem, and discuss how it relates to the origin of language.

### Multiple purposes

The question 'What is language for?' can be divided into two: 'For what purpose did language develop?' and 'For what purpose is language used nowadays?' The answers to these two questions may not coincide. A poet today might answer: 'To write poetry', yet this may not have been an early use.

Language today is used for so many purposes, that the basic one is hard to perceive. Introductory books usually list a range, typically:[\[1\]](#)



- (1) providing information:  
The train at platform five is the London-York Express
- (2) giving commands:  
Don't shout!
- (3) expressing feelings:  
Oh what a beautiful morning!
- (4) social talking:  
Hi, how are you doing?
- (5) word play and poetry:  
The apple made cider inside her inside.
- (6) talking about language:  
Donking isn't a word!

And more could be added, such as asking questions, getting rid of superfluous nervous energy, and so on (see Fig. 2.1).

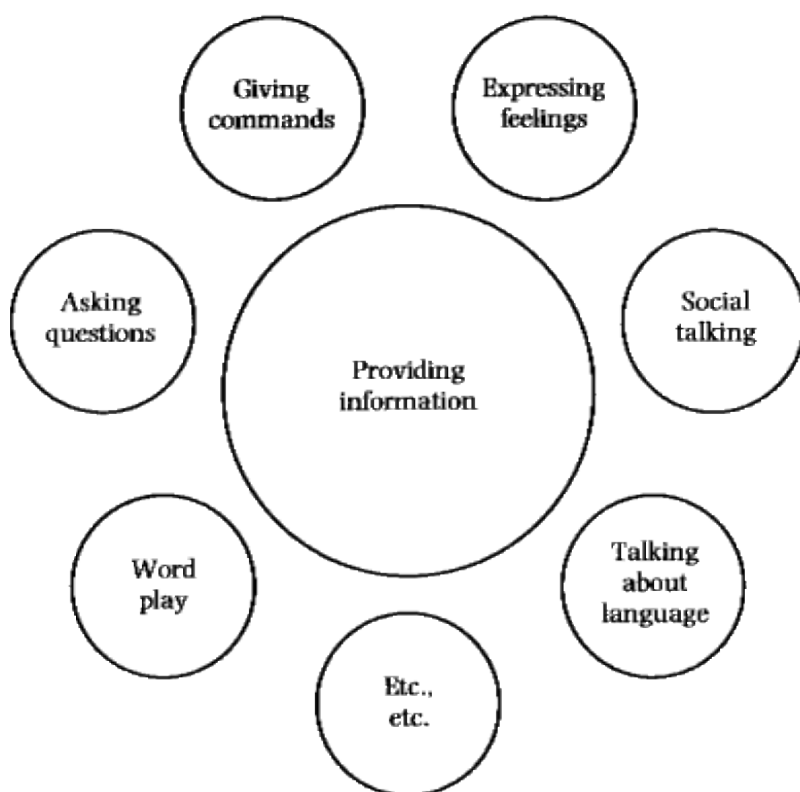


Figure 2.1 Traditional view of language functions

The original role of language is therefore unclear. But this needs to be identified in order to understand why language developed. One way forward is to look at what language today is good at, and what it finds difficult to express. This may provide clues about its early functions.

## A conveyer of information?

Language is moderately good at conveying simple pieces of factual information, such as 'Bob is Petronella's cousin', providing the speaker is telling the truth. Such information talking is usually assumed to be at the core of language, as mentioned above. Yet its efficiency in this role depends on the type of information being conveyed.

Language is bad at handling spatial information, whether for tying knots, following routes or learning about the circulation of the blood. The English writer Hilaire Belloc once said: 'If you can describe clearly without a diagram the proper way of making this or that knot, then you are a master of the English tongue'. Perhaps he should have said: 'Even if you are a master of the English language, you will have considerable difficulty describing a knot.' Consider the instructions for doing one of the simplest knots, a figure of eight:

1. Pass the end of the rope over the standing part.
2. Take the end under the standing part away from the loop.
3. Bring the end of the rope back up over itself towards the loop.
4. Pass the end down through the loop.
5. Pull tight.

Without its accompanying diagram, this description is difficult to follow, although accurate. In this case, a picture is truly 'worth a thousand words'.

Or take the following information from a widely used guidebook to Brazil:

The hike begins ... where a paved jogging track runs for 1200 metres ... At the end of the track pick up the trail on the other side of the cement tank in the tall grass. Follow this trail (always taking the uphill forks) for 100 metres. At the old foundations, some 30 metres above the water, the trail ascends steeply for 60 metres until levelling off on the narrow ridge ... The trail to follow is up the far left-hand side ridge. At the base of the rock the trail deviates slightly to the right.[\[2\]](#)

These instructions are possibly as clear as language allows, but a map would have made things clearer.

Language is also poor at conveying information about sensation or emotion. There is no language for pain, except bad language and swearing.

Language is therefore poor at conveying spatial information and information about feelings. And there are other problems too, as will be discussed below.

## A propensity for lying

Officially, lying is often discouraged. Yet 'little white lies' (trivial untruths told for social

reasons) are common, especially in cultures where politeness requires a reply: 'How far is it to the top of the mountain?' asked a visitor to Greece, at wooded Mount Pelion. 'About an hour's walk' was the answer she received from a villager at the foot of the mountain, from a shepherd half-way up, and from a goatherd two-thirds of the way to the summit.

Even in cultures where lying is officially discouraged, people are still 'economical with the truth' (a phrase coined by a government official to deny he was lying). Lying is so common, a whole anthology of real-life lies was recently published.[\[3\]](#)

Indeed the ultimate goal of language learning may be the skill of lying, the ability to talk convincingly about something entirely fictitious, with no back-up circumstantial evidence, since, according to this view, 'real lying ... is the deliberate use of language as a tool ... with the content of the message unsupported by context to mislead the listener' (De Villiers and de Villiers 1978: 165). This is quite odd, compared with the communication systems of other animals, which are mostly confined to fixed messages about everyday events, such as food, danger, mating and territorial rights.

Yet the skill of lying is a valuable one, since it involves displacement (reference to absent or non-existent events). This is an important characteristic of language. A cat cannot relay information about past happenings, nor warn another of a future danger. Displacement is especially useful for talking about negative information: 'Sorry there's no milk: it hasn't arrived yet'.

A human could do all this and more. Furthermore, narrating stories is deeply ingrained in all human cultures: most of literature is based on the ability to make non-existent events plausible. So an ability to talk about non-reality is a useful skill, which may be used for good or evil purposes. It is crucial to language, and its origin will be discussed in [chapter 6](#).

But, to conclude, even when language contains information, this may be false or misleading. Information transmission, therefore, may not be the main or original role of language, even though it is nowadays an important one. Let us now turn to what language is good at.

## Talking for the sake of talking

Language is particularly good at promoting interaction between people, It 'oils social wheels', even when nothing of substance is said, as pointed out by the anthropologist Bronislaw Malinowski, who argued against 'the false conception of language as a means of transfusing ideas from the head of the speaker to that of the listener' (Malinowski 1935: 9). He stressed the social importance of 'talking for the sake of talking', which he labelled 'phatic communion'.

It's easy to think up examples. Ritual words and gestures are exchanged when people

meet, and there are standard topics of conversation. In Britain this is traditionally the weather. In other cultures, it may be the health of relatives, for example.

Conversational interaction between friends often supplies a minimum of information, but a maximum of supportive chat. This often takes the form of repetition, both self-repetition and other-repetition. Meaningless words, or even misunderstood words can also keep a conversation going.

So solidarity talking (talking to maintain social contacts) is widespread and important. It may be one of the major original roles of language, as will be outlined in [chapter 6](#).

## Smooth tales

Language is a major tool in power struggles. Its persuasive force in private and public life has been recognized throughout the ages. In recent times, the power of persuasion is obvious in advertising: 'You can fool all the people all of the time if the advertising is right and the budget is big enough', commented the American film producer Joseph E. Levine. And political language, according to George Orwell, 'is designed to make lies sound truthful and murder respectable, and to give an appearance of solidity to pure wind'.

An important role of language, then, is to influence others. As Catania (1990) notes, 'language is an efficient way to change another's behavior ... By talking, we can change what someone does. Sometimes what gets done involves nonverbal consequences, as when we ask someone to move something or to bring something to us. Sometimes it involves verbal consequences, as when we change what someone else has to say about something'.

In conclusion, language is particularly good at interaction and persuasion. The question of how other primates interact and persuade, and how this relates to the origin of language will be explored in [chapter 6](#) (see Fig. 2.2).

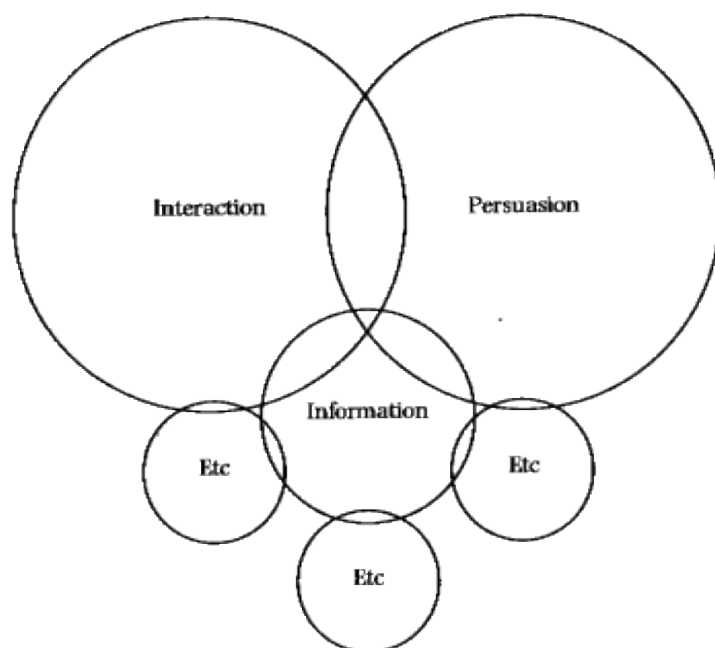


Figure 2.2 Realistic view of language functions

But these observations raise an important question: if language is so good at handling these social aspects of our lives, is it just something humans have invented as a social device, a cultural artefact, similar to table manners? Or is language ability a special inbuilt skill? This question might be answered if another puzzle is considered. Why do languages differ so much? This will be the topic of the [next chapter](#).

## Notes

[1] This list is based on Holmes 1992: 286, where the functions are labeled referential, directive, expressive, phatic, poetic and metalinguistic. Many such lists are based on work by Michael Halliday (e.g. Halliday 1978).

[2] A. Draffen, R. Strauss and D. Swaney (1992). *Brazil: a survival kit*. 2nd edn. Hawthorn, Vic., Australia: Lonely Planet, p. 160.

[3] P. Kerr (ed.) (1994). *The Penguin book of lies*. London: Penguin.

### 3. Why do languages differ so much?

Nobody knows exactly how many languages there are in the world, partly because of the difficulty of distinguishing between a language, and sub-languages or dialects within it. But those who have tried to count usually end up around the 5,000 mark (Comrie 1989). And many of these languages appear remarkably different from one another, so much so that some early linguistic researchers claimed that 'languages could differ from each other without limit and in unpredictable ways' (Joos 1957:96).

For a start, consider two sentences from Mohawk, an American-Indian language once spoken around the Mohawk River in New York State:

*ieksá:'a raksá:'a wahonwá:ienhte'*

girl boy hit

'The girl hit the boy'

*ieksá:'a raksá:'a wahshakó:ienhte'*

girl boy hit

'The boy hit the girl' (Mithun and Chafe 1979)

The immediate response of an English speaker is to ask how any Mohawk speaker knows who is doing what to who, since the words for 'boy' and 'girl' come in the same order in both sentences, and in exactly the same form. The answer is: 'Look inside the verb.' In the first sentence, the sequence *-honwá-* in the verb shows that a female did something to a male, and in the second the sequence *-hshakó-* indicates that a male did something to a female.

Or think about Mam, a language spoken in western Guatemala. This language has no general word for *lie*, as in 'lie down', 'lie on the ground', 'lie in bed'. In Mam, there are numerous different words. A Mam speaker has to note not only who or what is lying - human, animal or thing - but also the position adopted, as in the following partial selection of terms for a human male (Canger 1986):

mutsl

'he is lying on his stomach'

pak'l

'he is lying on his back'

tsaltš

'he is lying on his side'

qinl

'he is lying outstretched'

loql

'he is lying sprawled (probably intoxicated)'



kutsl

'he is lying alone in a house (probably sick)'

And the same thing is true of standing: speakers need to observe whether the person was standing up without support, or was leaning forwards or backwards against anything, whether they were standing upright or with their head bent, whether they had their legs apart, or were standing on one leg. And so on. And further words are required for different types of sitting. As the writer of the article from which the above examples are taken noted: 'Why the speakers of Mam have an insatiable need for an ever finer elaboration of various visual impressions remains to me fascinating, but unexplained' (Canger 1986:20).

Or going further afield, consider the Guugu Yimidhirr language, spoken in the north-eastern tip of Australia (Haviland 1979). Guugu Yimidhirr has a weird system for handling full nouns, by English standards. Look at the following sentences:

Billy-ngun nganhi nhaadhi

Billy me saw

'Billy saw me'

Ngayu Billy nhaadhi

I Billy saw

'I saw Billy'

Billy dhadaa

Billy going-to-go

'Billy is going to go'

In Guugu Yimidhirr, the order of words is fairly variable. To distinguish between the person who saw and the one who was seen an ending is added. This is unsurprising, even though Gungu Yimidhirr adds the ending *-ngun* onto Billy, the person seeing, rather than the person seen, as is more usual in European languages.

But now consider the third sentence above. Billy is the person going, but he does not have an ending. Why? There is no need for any special ending on Billy, it transpires, *except* when Billy does something which involves someone else, a so-called ergative system.[1]

These examples from Mohawk, Mam and Guugu Yimidhirr provide a brief glimpse of some of the differences found between human languages. This leads to a serious question: why do languages differ so much?

The 'Tower of Babel' solution is possibly the oldest response. This widespread myth claims that one primitive language existed until some event destroyed this unity. In its best-known form, found in the Bible (Genesis 11.9), humans tried to build a tower which would reach the sky. God, in anger at this presumptuousness, 'did there confound the

language of all the earth: and from thence did scatter them abroad upon the face of all the earth'. These days, this old myth has relatively few supporters. It also mistakenly implies that fixed systems are an advantage.

This chapter will first point out why rigid systems are a disadvantage. It will then consider reasons why languages might differ.

## The blue-footed booby problem

'If it moves, salute it; if it doesn't move, paint it.' This rigid rule-of-thumb is allegedly used by sailors on board ship. A similar type of rule is used by the blue-footed booby, a seabird which inhabits the Galapagos islands (Gould 1984). Its 'nest' is a ring of guano (birdshit) marked out on the ground. Here, booby parents work by a strict application of the rule: 'If a chick is inside the ring, care for it; if it is outside, ignore it.' A booby chick which has flopped or been pushed outside will simply be ignored, no matter how much it struggles and twitters, even if it is less than a meter away from its parents.

As booby behaviour shows, owners of rigid systems face a serious problem. They cannot handle new situations, and are obliged to choose between a fixed set of options. Consider the grasshopper which has to choose between six messages in its chirps (Sebeok 1965):

- (1) Isn't life good!
- (2) I feel like making love
- (3) You're trespassing on my territory
- (4) She's mine
- (5) Would you like to make love?
- (6) How nice to have made love!

It's as if humans had to choose between 'Hallo', 'Goodbye', 'Please', 'Thank you', 'I love you' and 'Hurrah!'

In human language, an obsessive desire for exactness is likely to be a sign of mental illness, as a bizarre case history shows.

Sixteen-year-old Alice 'keeps asking questions', her father informed the psychiatrist: 'Nothing we say seems right' (Rapoport 1990). For months, she asked about leaves, starting with 'Are the leaves green?' As her father described it:

Of course I'd say 'Yes the leaves *are* green.' And then she'd ask 'Are they dark green or light green?' So I'd say 'Well some are dark green and others light.' But that doesn't satisfy her. She points to a particular tree and a particular leaf on it, and wants to know exactly what colour green that leaf is. When I can't answer just right, she gets upset and starts screaming (Rapoport 1990: 200).

Alice found her mother as irritating as her father. 'Mum confuses me', Alice informed the

psychiatrist, 'she can't make up her mind ... I asked her if she thought Sue, my best friend was pretty ... first she said Sue was quite pretty. Later I asked her again. She said she thought she was really pretty. Then again, that she was very pretty' (Rapoport 1990: 201).

Alice was diagnosed as suffering from obsessive compulsive disorder: she had to have an exactness and consistency in words that was impossible. Alice's decision-making problems over language might spread to everybody if a rigid system were imposed.

A rigid system would effectively stifle creative thought, as George Orwell realized in his futuristic novel *Nineteen eighty-four*. Syme, a philologist, was one of a team of experts compiling a dictionary of Newspeak, the official language:

'The Eleventh Edition is the definitive edition,' he said. 'We're getting the language into its final shape ... We're destroying words - scores of them, hundreds of them, every day. We're cutting the language down to the bone ... 'His thin dark face had become animated, his eyes had lost their mocking expression and grown almost dreamy.

'It's a beautiful thing, the destruction of words ... Don't you see that the whole aim of Newspeak is to narrow the range of thought? In the end we shall make thought-crime literally impossible, because there will be no words in which to express it. Every concept that can ever be needed, will be expressed by exactly *one* word, with its meaning rigidly defined and all its subsidiary meanings rubbed out and forgotten'

The blue-footed booby, the grasshopper, Alice and Orwell's philologist all show that systems which allow some flexibility are better than rigid ones. The Babel myth was probably wrong in regarding language diversity as a bad thing, a divine punishment. Differences between and within languages are signs of a flexible, adjustable system.[2]

## Swiss army knife or Auntie Maggie's remedy?

Differences between languages form the basis of a long-standing controversy. A 'Swiss army knife' view proposes a specialized linguistic system, which allows variation. An 'Auntie Maggie's remedy' viewpoint suggests that languages vary because they are a product of human general intelligence.

Swiss army knife supporters argue that the human mind resembles a gadget which incorporates numerous specialized devices, each of which has its own special task: a cork-screw uncorks bottles, a knife cuts, and a file smooths off rough edges, and so on (Cosmides 1993). According to this view, humans acquire language by utilizing a dedicated language-handling mechanism. Languages differ because a degree of flexibility is built into the system.

Auntie Maggie's remedy supporters, on the other hand, regard the human mind as a multi-purpose reasoning device which can handle numerous different tasks. It resembles

the powerful cure-all which treats all ailments in the old music-hall song:

It's my Auntie Maggie's home-made remedy,  
Guaranteed never to fail.

Rub your mental powers onto any problem, and it will be solved, just as Auntie Maggie's remedy cured any physical illness. According to this view, language is just one of the many different puzzles which children encounter. They use their all-purpose powerful minds to sort out how it works, just as they also discover how to build up bricks or multiply ten by five. Human languages therefore differ because they are the product of human general intelligence, which can solve puzzles in alternative ways.

A much discussed question, then, is whether language is 'hard-wired' or 'soft-wired' in humans. Hard-wired abilities are those that are *preprogrammed* to emerge, such as flying in pigeons. Soft-wired abilities are those that an animal is *capable* of acquiring via learning, as when pigeons can be trained to peck at letters of the alphabet to get food. A hard-wiring versus soft-wiring distinction is therefore a fashionable way of referring to a long-standing 'nature-nurture' debate over instinctive versus learned behaviour which has been going on for centuries (Aitchison 1989a). (See Fig. 3.1.)

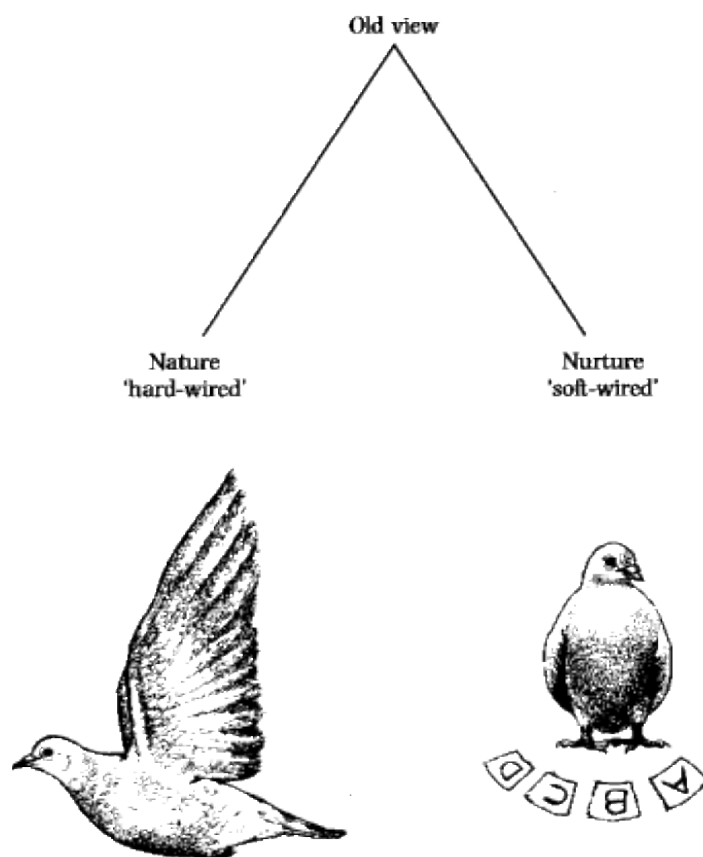


Figure 3.1 Old nature-nurture view

Hard versus soft wiring can sometimes be distinguished by the ease with which an animal acquires a particular type of behaviour. Hamsters quickly learn to scrabble or rear

up in order to get a food reward, but they cannot be persuaded to wash their faces for this purpose.[3] Humans readily learn to be frightened of snakes, a fear which is thought to be innate, but they do not normally fear cars, even though cars are potentially more dangerous in modern cities.[4]

But this criterion is not easy to apply to language. Children learn language fast and easily from one viewpoint, in that it takes less than one tenth of a normal lifetime to learn to speak fluently. But they acquire it slowly and with difficulty from another. It takes around five years to get a basic knowledge of language, another five to grasp routine subtleties, and a further ten for a really useful vocabulary range. Mastery of most animal communication systems is achieved much faster, even allowing for the longer life-span of humans.

And in recent years, the 'Swiss army knife' (hard-wiring) versus Auntie Maggie's remedy' (soft-wiring) controversy has been on the verge of collapse. It turns out that there's a fuzzy border between hard (instinctive) and soft (learned) skills. For example, young pigeons hard-wired for flying have to spend time learning how to do this, and they acquire the soft-wired skill of distinguishing alphabet letters mainly because they have been hard-wired with acute eyesight.[5] The next section will outline some further examples which show how instinct and learning interact.

## The birds and the bees

The notion of 'innately guided behaviour' largely sweeps aside the old nature-nurture, hard-soft, instinct-learning controversies.

Most behaviour requires some learning, which 'is often innately guided, that is, guided by information inherent in the genetic makeup of the animal. In other words, the process of learning itself is often controlled by instinct' (Gould and Marler 1987: 62).

Bees and birds provide good examples of this. Their behaviour can shed light on the working of flexible systems which are partly hard-wired, and partly soft-wired.

A bee's ability to remember different colours, patterns, shapes and odours was tested by checking how reliably bees returned to particular artificial 'flowers' (Gould and Marler 1987). The bees, it turned out, first learned about odour. Mostly, they had to smell a 'flower' only once to remember it, though not all odours were learned with equal ease. Next, bees learned about colour, though this took longer, about three visits, depending on the colour. Thirdly, bees learned about flower shapes, though this took them longer still, about five or six visits, and they preferred 'busy' patterns to simple ones.

The order of importance (odour, then colour, then shape) is probably based on cue reliability. The odour is fairly fixed, but the colour can fade or alter in different lighting conditions, and the shape can change from the wind or the viewing angle. And bees also

have to learn the time at which food is available from each flower.

Honey bees are therefore guided to particular targets by instinct, but they then have to memorize further details. They sort and remember this new information according to preordained principles (see Fig. 3.2).

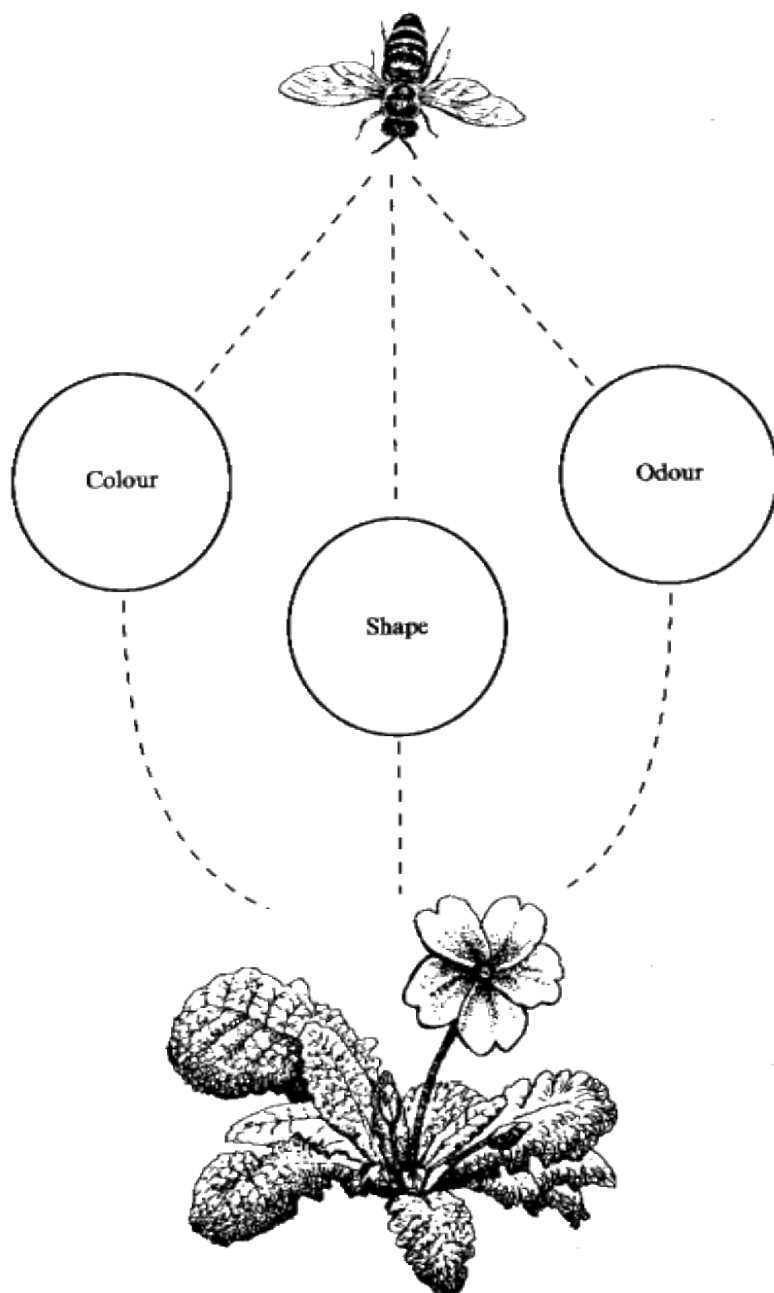


Figure 3.2 Innately guided behaviour

The bird and nest-robber problem parallels the bee and flower problem. Most birds have an inbuilt alarm call, and some have a variant, a so-called 'mobbing call' which summons other birds to attack and mob a predatory bird such as a jay which is liable to steal eggs and nestlings. But birds need to distinguish nest-robbing owls, crows and jays from harmless birds such as robins. They cannot have a complete bird book in their minds,



and they cannot afford to make too many mistakes. So how do they do this?

European blackbirds, it turns out, learn from one another, as was shown by an ingenious experiment. Two groups of blackbirds were each shown a stuffed bird. The blackbirds could see into each others' cages, but they could not see the bird being shown to the other blackbird group. At first, both groups were shown the same bird. When they were shown a stuffed owl, they all emitted the mobbing call, and tried to attack the owl. When they were shown a harmless bird, a stuffed Australian honeycreeper, they showed very little interest. Then the experiment changed. One group was shown the owl, while simultaneously the other was shown the honeycreeper. The group exposed to the owl became agitated, emitted the mobbing call, and tried to attack the owl. The blackbirds shown the honeycreeper stayed quiet-but only for a moment. When they heard and saw the frenzied behaviour in the other cage of birds, they too joined in. They emitted the mobbing call, and tried to attack the honeycreeper. Moreover, this behaviour did not disappear. On future occasions, they always tried to mob the harmless honeycreeper. And they passed this honeycreeper aversion to the next generation, who all mobbed honeycreepers (Gould and Marler 1987).

Both the birds and the bees, then, show how innately guided learning works: nature lays down the framework, and organizes the learning scheme, but experience fills in the details. Birds and bees reveal that 'much learning ... is specialized for the learning of tasks the animal is likely to encounter. The animal is innately equipped to recognize when it should learn, what cues it should attend to, how to store the new information and how to refer to it in the future' (Gould and Marler 1987: 73).

The birds and the bees provide lessons that can be applied to human language, as the authors of the study point out. Language also is an example of innately guided learning, learning guided by information which is an intrinsic part of human genetic make-up. The outline framework is ready-made, and so is the learning scheme. But the finer points are filled in by experience. This explains why languages differ.

This is perhaps not surprising: language is a type of biologically controlled behaviour, that is, behaviour which develops naturally providing that children are exposed to speech. This has been known since at least 1967, when Eric Lenneberg wrote a pioneering book, entitled *Biological foundations of language*. He pointed out that such behaviour emerges before it is strictly needed for survival, that it is not the result of a conscious decision, and is not triggered by immediate external events. Direct teaching and intensive practice have relatively little effect, and a regular timetable of language 'milestones' is found among normal children.[6]

But these observations raise a further question. If humans are preprogrammed to develop language, at least in outline, can a 'language component' be identified in the mind? This will be the topic of the next chapter .

## Notes

[1] In Gungu Yimidhirr, as in many other languages, the ergative system affects full nouns, rather than pronouns. Further examples of ergative languages will be discussed in chapter 15.

[2] Of course, some limited standardization may be useful within a language, otherwise its speakers might fail to understand one another: but this cannot normally be easily imposed, though it may happen naturally in the course of time. On this question see Aitchison 1991, Milroy and Milroy 1991.

[3] Shettleworth 1975; see also Gallistel, Brown, Carey, Gelman and Keil 1991. On the soft-wired versus hard-wired distinction, see Medin, Ahn, Bettger, Florian, Goldstone, Lassaline, Markman, Rubinstein and Wisniewski 1990.

[4] Morris 1967 argues that snake fear is innate.

[5] This eyesight is also partially soft-wired, in that it takes practice to develop it.

[6] Lenneberg 1967; for a summary, see Aitchison 1989a.

## 4. Is language an independent skill?

'The general law of organization ... is that distinct duties entail distinct structures', said the nineteenth-century philosopher Herbert Spencer (*apud* Mackay 1991). In its broad outlines, this is obvious. A car's electrical system does not work in the same way as its gears, nor does the human heart perform the same function as the liver.

Undoubtedly the human mind/brain works in a highly compartmentalized way, at least for some tasks: the human eye relays what it registers to a specific brain location, a portion at the far back.[\[1\]](#) And within that area, quite minute specialization is found: an artist who became colour-blind as the result of a car accident: had suffered damage to 'bean sized areas' in his brain, for example (Sacks 1995).

But the eye is a very old part of the brain and body, and it has had multiple millennia to evolve. Human language is very recent in evolutionary terms, 250,000 years ago being the earliest guess, 100,000 the average, and 50,000 the latest. It has pressed into service different peripheral organs (the mouth, the ear) and various brain regions, both in the outer brain (the cerebrum) and in deeper layers. So it may not have had time to evolve its own structure.

Language appears to be innately guided behaviour, in which inbuilt guidelines help the learner ([chapter 3](#)). But to recognize that there are innate furrows still leaves the independence question largely unanswered. To what extent is language an independent skill, and to what extent is it linked to other aspects of cognitive ability? On this issue, language is a key bone which academic dogs fight over.

As a next step, therefore, it's important to discover whether language can be separated from other human mental abilities. This appears to be so. Language can fail when other aspects of general intelligence remain unaffected. And, more interestingly, language can sometimes exist when other systems have failed. Let us consider these bizarre and rare phenomena.

### The speechless monk

Take the case of Brother John, a monk who throughout the 1970s had had epileptic seizures. This fifty-year-old native speaker of French worked on the editorial staff of his order's pious periodical, reading and answering up to fifty-five letters to the editor a day. He had frequent epileptic episodes, which varied in severity. When a short 'spell' took place, lasting five minutes or less, he felt bizarre, kept very quiet, did not understand spoken language and did not talk.

More dramatic were his longer spells, which occurred a dozen or more times a year, and lasted several hours. During these, he remained conscious, unless he chose to sleep. He

lost his ability to use language, and was aware of this, yet he was otherwise able to think and act normally, and kept a small transistor radio at hand in order to assess when his comprehension returned. On his spoken speech, he noted: 'I know that certain words I say are not correct, but I do not know which ones and I do not know how I pronounce them. Sometimes, instead of talking nonsense, I prefer not to talk at all (Lecours and Joannette 1980: 5).

When his spoken speech was tested during a spell, similar sounding nonsense words tended to recur, often variants of the nonsense sequence *tuwari*. When shown a picture of a telephone, he immediately pointed to the telephone in his room and said (with the few real French words translated into English): 'That's it, there. The furi twar. No. Glarity tuware tuwa tuware ari tuware tuware tuware tu tuware tu'. He was, however, fully capable of tape-recording his own deviant speech, as he had been requested to do. After a spell, he discussed his earlier inability to name a television: 'I knew what it was (this is why I could point at the TV set in my room) but I could not tell you the word since I could not tell it to myself'. His reading and writing were also affected. He once had difficulty finding his way, and explained: 'I knew where to look for the names of the streets, I could see them but I could not read them'.

Brother John's Swiss hotel episode possibly illustrates most clearly the narrow linguistic nature of his disabilities. Once, while travelling from Italy to Switzerland, he had a seizure. He managed to disembark from his train at the correct stop, together with his suitcases, and find a hotel. This first hotel turned him away, and he moved on to a second, which accepted him. He gave the receptionist his passport, indicating the page where she could find the information to fill in the registration form. He was then shown his room, and given his key. Later, still suffering from his spell, he felt hungry, and found the hotel restaurant. There he was able to order a meal by pointing to a section on the menu where he guessed main courses were listed. He was disappointed to discover he had ordered fish, which he disliked, but still ate potatoes and other vegetables. He then returned to his room, and slept the rest of his spell away. Hours later he woke up, with his speech restored. Feeling foolish, he apologized to the receptionist for his previous behaviour, and she was apparently sympathetic.

Brother John therefore shows that language can be detached from other mental skills. As the authors of this study note, the Swiss hotel event 'is strikingly demonstrative and ... compels assent as to the language specificity or near specificity of our patient's paroxysmal episodes as well as to his state of mind and mental capacities in the course of such episodes'.

There are numerous similar cases in the literature of stroke victims and others whose language is damaged, while many aspects of their intelligence remain intact, or nearly so. Perhaps the best-known case is that of Genie, the Californian teenager who was kept isolated by her father until the age of almost fourteen.<sup>[2]</sup> She was found in 1970, thin, undernourished and speechless. She eventually learnt to speak in a rudimentary fashion,

though what she wanted to say clearly outstripped her ability to say it, as in:

Ruth Smith have cat swallow needle  
'Ruth Smith has a cat who swallowed a needle'

Father hit Genie cry long time ago  
'My father hit me and made me cry a long time ago'

Water think swim think swim  
'I'm thinking about taking a swim'

But even more remarkable than Brother John and Genie, perhaps, are cases of people who can talk fluently, but have other crippling mental problems.

## The cocktail party syndrome

'She was thinking it's no regular school. It was just good old no buses.' This now-famous sentence was produced by Laura, an American teenager (earlier known as Marta). She is one of an increasing number of children who speak fluently, but whose intelligence is so low that they can't look after themselves, they can't sort objects, they can't handle money, and may not even know their age: 'I was 16 last year, and now I'm 19 this year', Laura once announced.

The phenomenon is known appropriately enough as 'the cocktail party syndrome' or the 'chatterbox syndrome', since the talkers seem to be talking for the sake of talking, sometimes without making sense, as in one of Laura's longer passages:

It was kind of stupid for dad, an' my mom got um three notes, one was a pants store, (of) this really good friend, an' it was kind of hard. An' the police pulled my mother out of (there) an' told the truth. I said, "I got two friends in there!" The police pulled my mother (and so I said) he would never remember them as long as we live! An' that was it! My mother was so mad! (Yamada 1990: 58)

But Laura is not just stringing together phrases she has heard other people produce, even though several ready-made sequences recur, such as 'this really good friend'. Original grammatical errors show that she is creating her utterances afresh, as in:

It was *gaven* by a friend  
I don't know how I *catched* it  
These are two classes I've *tooken*  
Three tickets were *gave out by a police* last year

Laura is not the only child of this type, though she is perhaps the one we know most about. There are reports of two boys, Antony and Rick (Curtiss 1988), and a hydrocephalic girl, known as D. C. (Cromer 1991), though D.C. is puzzling. Her

utterances make superficial sense, even though she invents the stories she relates, as in:

We go to this river to do canoeing and I fell in the river once ... that wasn't funny; that was frightening. I said I'd never go ... I said I'd never go canoeing again, and I still go canoeing now. And that's three years later that was. But my dad's got a canoe and we go canoeing. I threw my dad in once. Me and my brother threw him in together ... That was funny that was (Cromer 1991: 133).

The way these children use language suggests that there is a specialized linguistic circuit in the mind, which is partially separate from other circuits.

Some further bizarre cases support this view. Consider Christopher, a twenty-nine-year-old man, who is unable to look after himself, yet is obsessed by languages other than his own. Apart from English, which he learned as a child, he can cope with Danish, Dutch, French, German, Greek, Hindi, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish and Welsh, as well as having a smattering of Finnish and Turkish (Smith and Tsimpli 1991, 1995). Here is a translation by Christopher from Swedish, followed by an accurate version:

(1) Christopher's version: 'Mia is sitting, crouched down in the kitchen sofa with her knees bent and her feet tied up in the lovely night-shirt The cat spins in her knee.'

(2) Accurate translation: 'Mia is curled up on the kitchen sofa with her knees drawn up and her feet tucked into her stripey nightie. The cat is purring in her lap.'

Christopher's main mistake is to use the word spin which resembles the Swedish word for 'purr' in place of the English word purr Christopher's effort is pretty impressive for someone whose non-verbal IQ is around 60.

A further set of interesting children are those with a little-understood disorder known as 'Williams Syndrome' (Bellugi, Bihrie and Corina 1991). The sufferers are severely impaired in many cognitive tasks, especially those that involve spatial orientation, where they cannot integrate separate items into a coherent whole. For example, they are unable to organize the components of a bicycle into a picture of a whole bicycle, nor can they handle a test in which a triangle has to be formed by the arrangement of smaller circles. Yet their language is often elaborate and sophisticated, as in the following description of a brain-scan by a seventeen-year-old Williams Syndrome girl:

There is a huge magnetic machine. It took a picture inside the brain. You could talk but not move your head because that would ruin the whole thing and they would have to start all over again. After it's all done they show you your brain on a computer and they see how large it is. And the machine on the other side of the room takes pictures from the computer. They can take pictures instantly. Oh, and it was very exciting (Bellugi, Bihrie and Corina 1991: 386).

Williams Syndrome sufferers, like the other cases mentioned, indicate that language is a

separate ability, which can be dissociated from other cognitive abilities.

## The master manufacturer

All the cases outlined above suggest that the mind is like the master manufacturer, who divides the work to be executed into different processes. As the Greek philosopher Plato suggested, it may be possible to 'carve the mind at its natural joints' (*Phaedrus* 265e). The human mind contains a number of different components or 'modules', a term borrowed from computer terminology. Each of them has its own particular task. A dedicated language-handling mechanism appears to be one of them (see Fig. 4.1).

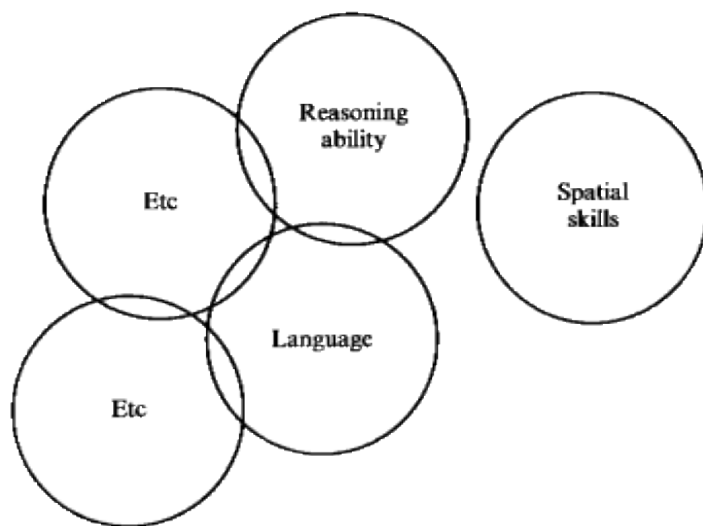


Figure 4.1 Modules in the mind

The term 'module' may imply a spurious rigidity. Perhaps the alternative phrase 'domain-specific specialization' is a better one: this suggests that the human mind has developed specialized circuits to handle particular 'domains'. Just as the heart handles the pumping of blood round the body, and the kidney filters out certain poisonous elements, similarly, in the mind, different mechanisms handle different problems.[\[3\]](#) Yet another possible phrase for this is 'functionally isolable subsystem' (Shallice 1984).

Within a complex structure, there are several advantages of specialization (Shallice 1988). One is that the breakdown of one component does not normally lead to a total collapse. A person who is blind is not necessarily deaf. In a house, a telephone failure does not usually cause a collapse of the central heating system. In fact, all complex systems, from cars to Sydney Harbour bridge work on this 'components' system: breakdown in one portion does not lead to a general catastrophic failure of everything.

Another advantage is speed: just as a central heating system in a domestic house has a limit on the number of radiators it can effectively heat, so a response which has to travel round the whole system in a human would take too long: a human can often dodge swiftly out of the way of a hurled brick, but would probably be unable to respond this

fast if the whole brain was involved.

A further advantage is efficiency: 'Do you want a machine which will clean all of your house reasonably well? Or do you care most about spotless carpets? If so, get a specialized carpet cleaner.' This type of advice is handed out in consumer magazines. But it is a fairly general rule: the more widespread the function, the less good a gadget is at particular tasks. The more specialized something is, the less easy it is to apply it across-the-board: a dedicated carpet cleaner will not be good at cleaning drains or polishing silver.

## The language circuit

Faced with evidence such as that discussed in this chapter, many linguists believe, like the pioneering American linguist Noam Chomsky, that 'the principles [of language] do not generalize, that they are in crucial respects specific to the language faculty' (Chomsky 1986: xxvi), which has its own 'specific properties, structure, and organization' (Chomsky 1986:13). In short, they argue for a hard core of specialized linguistic knowledge. Chomsky claims that the mind is 'constituted of "mental organs" just as specialized and differentiated as those of the body' (Chomsky 1979: 83), and that language is one of these. Of course, just as the heart can be separated into different chambers, so language itself may be made up of distinct components: this question will be discussed later ([chapter 16](#)). The point here is that language is to a large extent separable from other cognitive abilities.

But it may be unrealistic to speak of a language 'organ', because language uses numerous different parts of the brain. So 'language circuits' might be more appropriate, as neurologists point out ([chapter 7](#)). Perhaps language should be regarded as a London sightseeing bus, which has its own specialized preordained routes: language in the brain is more like the blood which moves around the body than a static organ like the kidney or liver (see Fig. 4.2).

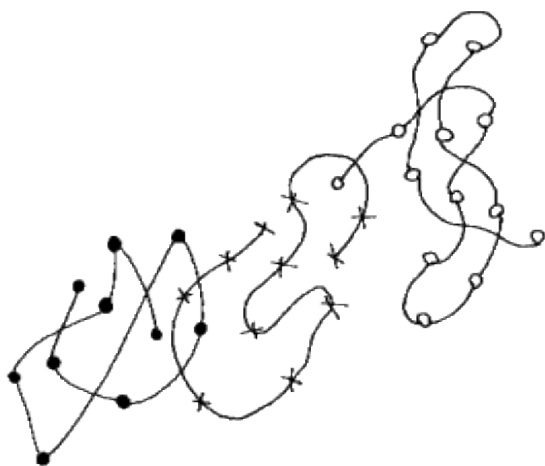


Figure 4.2 Modules as circuits



Language, then, either utilizes, or devises, its own special circuits. Some of these are pre-set, others probably develop in the course of life. As one researcher notes: 'In human development, a process of modularization can arise as a *result* of development, and not merely as part of the mind's innate specification' (Karmiloff-Smith 1991: 183). Habits and non-habits utilize different pathways within the brain (Posner and Raichle 1994). The British physiologist, Henry Maudsley, once pointed out: 'If an act became no easier after being done several times, if the careful direction of consciousness were necessary to its accomplishment on each occasion, it is evident that the whole activity of a lifetime might be confined to one or two deeds' (*apud* Posner and Raichle 1994: 129). So practice can lay down new pathways.

Yet such pathways can be laid down only if they fit in with an animal's pre-set preferences, as shown by the hamsters which could not be trained to wash their faces, and the bees which were innately guided to learn about flowers ([chapter 3](#)).

But the special language circuits are not the whole story. Humans can use their huge intelligent brain to think about their linguistic skills. This is perhaps the difference between a child such as Laura and a normal speaker: 'Although the fluent-speaking retarded child probably has an intact linguistic module, the normal child also has the potential to become a grammarian' (Karmiloff-Smith 1991: 182).

If the mind has its own language circuit, then the next question is to ask how this evolved. This will be the topic of the [next chapter](#).

## Notes

[1] Technically, the occipital lobe.

[2] Curtiss 1977, 1988; Rymer 1993; summary in Aitchison 1989a.

[3] See Cosmides and Tooby 1994, Garfield 1987, Maratsos 1992 for general discussions of modularity; also Fodor 1983, 1985, 1990.

## 5. The evolutionary background

Evolution is often thought of as a ladder. Yet this may be misleading. Ladders allow only a single-file ascent. So the ladder-image can lead to the wrong assumption that humans 'grew' out of monkeys or apes, who are 'below' us on the rungs.

But today's great apes are not so much our ancestors, as our relatives cousins from whom we diverged 6 or more million years ago - and monkeys are even further removed. A better image is one of a bush with multiple branches (Gould 1993/1994; Pinker 1994). The only surprise, perhaps, is that humans are the only ones on the primate bush who talk. Let us begin by considering who else inhabits our bush, and how long ago they diverged from us.

### The biological bush

Our biological bush is that of primates, the animal 'order' to which we humans belong, a subdivision of the class of mammals (breast-feeders). As a group, primates have good eyesight with forward-directed eyes, acute hearing, flexible hands and feet, nails rather than claws, and relatively large brains. Different primate families inhabit the bush: hominids (human-like creatures), panids (chimpanzees), and pongids (gorillas) are perhaps the best-known, of whom the chimps are our closest relatives (see Fig. 5.1).

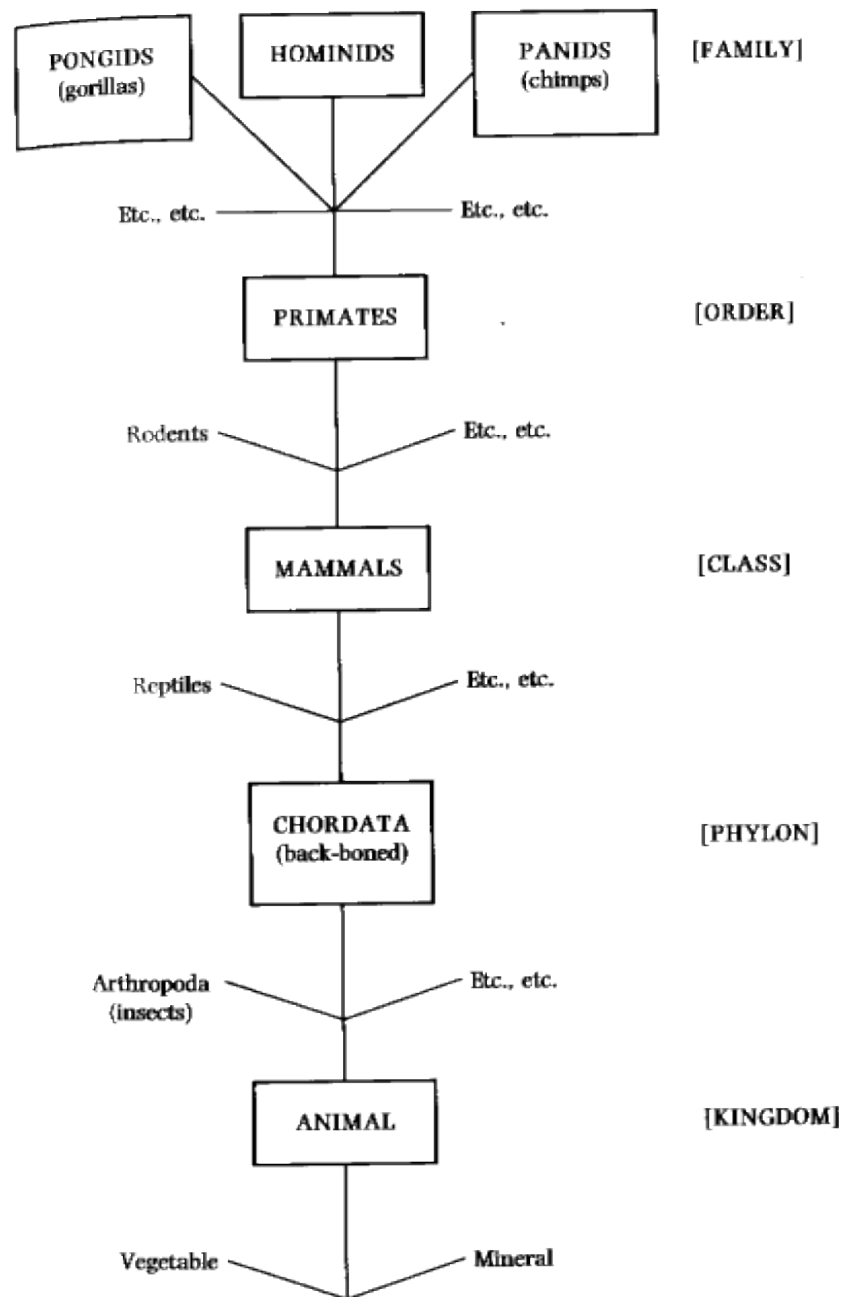


Figure 5.1 The primate bush

The apparently huge gap between chimps and hominids set off a hunt in the last century for a 'missing link' between the two, but no definitive intermediary has yet emerged. Until recently, the earliest known hominid was '*Lucy*', *Australopithecus afarensis* (southern ape of Afar), who lived in Africa around 4 million years ago. Unlike the apes, she walked on two feet. She is usually regarded as a direct ancestor of humans, though she may have been a cousin (Johanson and Edey 1981/1990; Leakey 1994).

But some recently unearthed bones in Ethiopia are even earlier. Bone fragments first found in 1993 dating from almost 4½ million years ago are the earliest hominid remains. They belong to an animal about the size of a bonobo (pygmy chimp). The first bones found were all from above the waist, and it is still not clear if this small creature, named

*Australopithecus ramidus*, could walk upright or not (T. D. White, Suwa and Asfar 1994). Additional findings from the area, including hip joints, are still being checked, assembled and argued over.[\[1\]](#)

Our own genus *Homo* (Man) is a subdivision of the hominid family, and probably split away from the australopithecine (southern apes) around 3 million years ago (see Fig. 5.2).

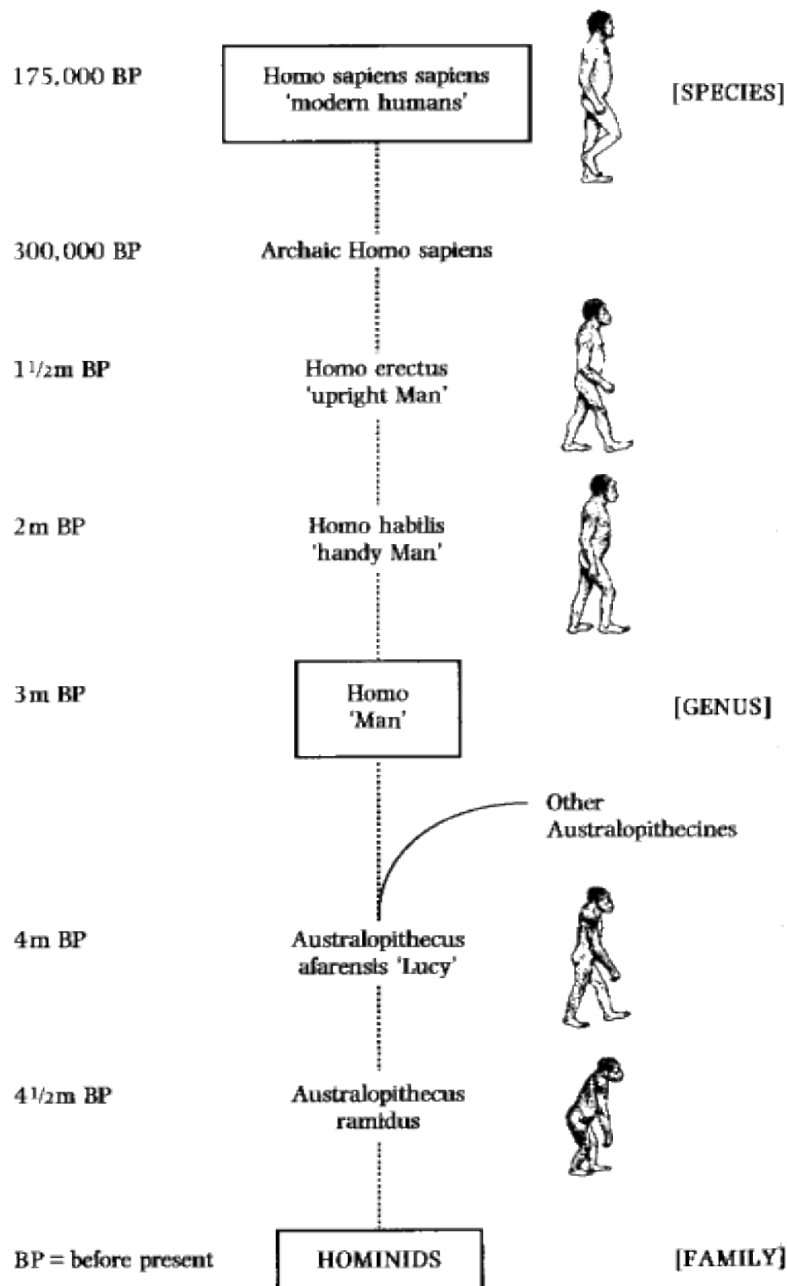


Figure 5.2 The genus *Homo*

Around 2 million years ago, a tool-using *Homo* emerged, known as *Homo habilis* (handy Man), an odd-looking person by today's standards: 'Put him on the subway and people would probably move to the other end of the car'. About 1 1/2 million years ago came

*Homo erectus* (upright Man), who used fire, and looked fairly ordinary: 'Put him on the subway and people would probably take a suspicious look at him' (Johanson and Edey 1981/1990: 24).

About 300,000 BC (before present), *Archaic Homo sapiens* (archaic wise Man) arrived on the scene, and around 200,000-150,000 BC modern humans, *Homo sapiens sapiens*, emerged.

The development of language was somewhere between 250,000 BC and 50,000 BC, with the average estimate being around 100,000 years ago (Lieberman 1984), all recent dates in evolutionary terms. Language may have been the trigger which activated a dramatic and widespread advance in technology and culture from around 50,000 BC.[\[2\]](#) Humans began to use not just stone, but also other raw materials such as antler, bone and clay. Paintings were made on cave walls, and living sites increased in size.

This explosion of language and culture is at first sight mysterious. But ever since the pioneering work of Darwin, the process of evolution has gradually become clearer.

## The book that shook the world

The 'book that shook the world' was Charles Darwin's *On the origin of species*, published in 1859. Darwin demonstrated that humans were the products of evolution, not individual creation. 'The worldview formed by any thinking person in the Western world after 1859 ... was by necessity quite different from a worldview formed prior to 1859', it has been claimed (Mayr 1991/1993:1). Darwin was not the first to propose evolution, but was probably the first to fully propound it.

Darwin in 1859 spoke of his theory as the principle of Natural Selection:

Any variation, however slight and from whatever cause proceeding, if it be in any degree profitable to an individual of any species ... will tend to the preservation of that individual. and will generally be inherited by its offspring The offspring, also, will have a better chance of surviving ... I have called this principle, by which each slight variation, if useful, is preserved, by the term Natural Selection.

According to Darwin, evolution happened very slowly: 'As natural selection acts solely by accumulating slight, successive, favourable variations, it can produce no great or sudden modification; *it* can act only by very short and slow steps'. This slow progress made it unobservable, he assumed: 'We see nothing of these slow changes in progress, until the hand of time has marked the long lapses of ages, and then so imperfect is our view into long past geological ages, that we only see that the forms of life are now different from what they formerly were'.

This mystifying process has been argued about for decades.[\[3\]](#) But Darwin was wrong. It is possible to see changes in progress Evolution is not, after all, unobservable: it is a case

of knowing where to look. And a number of studies have demonstrated natural selection in action.

The beaks of Darwin's finches provide a showcase for evolution. These birds were named after Darwin, though detailed study of their behaviour has taken place only in the last quarter-century.[\[4\]](#)

Thirteen species of finches live on the Galapagos islands, all of which are assumed to have evolved from a common ancestor. The birds are darkly coloured, are of similar shape, and vary in length between about three and six inches. They vary also in their diet and habitat - often reflected in their common names, tree finch, ground finch, cactus finch, mangrove finch, and so on. More importantly, the shape of their bills differs, some deep, large and hooked, others narrow and slender.

Darwin himself suggested that climate was a major factor in evolution, and this proposal is strongly borne out by these finches. Their home islands are sometimes drenched by rains, sometimes parched by drought, and this has had massive effects on their survival rate. On one of the small islands, Daphne Major, only two finch species reside, one being the medium ground finch. Just about every ground finch was briefly caught and banded with highly visible leg-bands by two researchers: Peter Grant, a professor of zoology at Princeton University, and his wife Rosemary.

In 1977 and again in 1982, there was a drought, and many birds disappeared - only 15 per cent of the ground finches remained. The most conspicuous feature of the survivors was their large beak size. During normal wet seasons, grasses and herbs produce an abundance of small seeds. But in dry seasons, the small seeds get eaten fast, and birds with bigger, deeper beaks are better equipped to crack open the large seeds which remain. If droughts continue the cumulative effects of selection in the direction of deep beaks could lead to an alteration in the appearance of a species - though intervening wet years, with an abundance of easily available small seeds, might favour smaller, shallower beaks, resulting in long-term oscillation.

The finches show how weather conditions strongly favoured certain birds - and if one particular type of weather had persisted, then those with suitable beaks for surviving would predominate, and the others possibly die out. The beak variation is partly genetic, partly environmental: birds inherited beak size from their parents, but in the case of the large beaks, adequate nourishment was a contributory factor.

Bird-beaks might seem a long way from humans and language. But a similar event (a radical change in climate) is now thought by many to be the trigger behind language. Let us consider this scenario.

## East Side story

Evolution is often thought of as descent down different branches of an upside-down tree. But descent down different sides of a mountain might be a more useful way of envisaging human development. In the distant past, a group of ape-like creatures were perched metaphorically on the top of a mountain. They decided to come down, and split into two groups, each group choosing a different side of the mountain. Once descent had started, then the routes turned out to differ substantially. There was no turning back, and the differing terrain forced quite different life styles onto each group.

This 'different routes down' scenario is not so far-fetched. Something very similar may have happened when we split from our cousins the apes, according to one increasingly influential view. We were all living together in Africa, until a catastrophic event occurred, probably a series of major earthquakes or a 'tectonic crisis', as it is sometimes referred to (Coppens 1994). This created the Great Rift Valley, which separates the wet forests of west Africa from the relatively dry grasslands of east Africa. The Rift Valley itself sank, but a line of peaks formed on the western rim of the valley, splitting Africa's inhabitants into two major groups.

'As for humans, we are unquestionably a pure product of a certain aridity', it has been claimed (Coppens 1994: 69). After the catastrophe, our ape cousins were left in the lush and pleasant tree-terrain of the humid west. Our own ancestors were stranded in a relatively treeless savannah in the increasingly dry east, where they were forced to adapt, or die. An unfavourable climate forced a deprived species to live on its wits and, in the long run, develop language.

'East Side story' is the apt name given to this Rift Valley hypothesis. It is supported both by climatologists, and by the archaeological evidence: chimpanzees are found only to the west of the Rift Valley, and hominid fossils are found only to the east.

A transition to an even drier climate may have been the triggering factor in the divergence of the australopithecines (southern apes) and the genus *Homo* (Man). The australopithecines remained vegetarian. Our ancestors possibly broadened their diet, perhaps scavenging for meat. This led to a better-nourished brain, a greater degree of social organization, and an increase in brain size (Aiello and Wheeler 1995). A long-term trend towards drier, harsher weather required increasing adaptation from the surviving hominids. And one of these adaptations was language.

This East Side story supports the claim that humans came 'out of Africa'. This is backed up by further evidence. Let us consider some of this.

## Genetic blueprints

DNA, short for deoxyribonucleic acid, is responsible for the transmission of genetic information. A small proportion of human DNA slices and shuffles itself relatively fast. It can provide vital information on the movements of early humans.

Each of a human's multi-million cells has a nucleus, and most of an individual's 100,000 or so genes are located on DNA molecules in this nucleus, to which males and females contribute equally. This nuclear DNA is highly stable, and individuals from different sides of the planet barely differ.

But a handful of genes (a mere thirty-seven according to the count of Wilson and Cann 1992) are found elsewhere, on the mitochondria. These are specialized structures attached to the cell, whose purpose is to provide cells with energy. Their DNA carries information primarily about their own manufacture. Mitochondrial DNA derives only from the female, and so can reveal an individual's maternal ancestry. Its sequences mutate relatively rapidly, and it has therefore been referred to as a 'fast ticking clock' (Wilson and Cann 1992: 23).

Arguably, evolution can be measured by concentrating on these fast-mutating genes. Measuring is possible on the assumption that the rate of change is fairly uniform-though this is sometimes queried.[\[5\]](#)

A tree of early human relationships can therefore be established, by examining samples of mitochondrial DNA from around the world. The general pattern seems clear, though details are disputed. Humans originated in Africa.[\[6\]](#)

The Africa conclusion is supported by another piece of evidence: the homogeneity of the human data compared with that of chimpanzees, which show as much as ten times the genetic variation of humans. 'That fact alone suggests that all of modern humanity sprang from a relatively small stock of common ancestors' (Wilson and Cann 1992: 23).

The DNA evidence ties in with that from blood. All humans have one of a limited number of blood groups. In addition, they are either 'positive' or 'negative' for the so-called 'rhesus factor' (Rh), a blood antigen - an antigen being something which stimulates the production of an antibody. Relatively good worldwide information is available about this, for practical reasons. A pregnant Rh-negative woman carrying a Rh-positive fetus needs to be identified so that treatment can be carried out immediately after delivery, otherwise the baby will die.

The proportion of Rh-negative individuals differs from population to population. It's very low in Australia and the Far East (0-1% of the population). It's quite high in northern Africa and Europe (9-25%) It's somewhere between these two extremes in most of Africa



and the Middle East (1-9%). Africa, then, is most probably the base from which the other levels developed (Cavalli-Sforza 1991).

But this scenario still leaves a number of how and why questions unanswered. Let us consider these.

## A language bonfire

Did language emerge suddenly like a rabbit out of a hat? Or slowly like a snail creeping up a wall?

The rabbit-out-of-a-hat view suggests that there was a sudden evolutionary leap, in which language emerged as if pulled by a conjurer out of a hat. This proposal is particularly associated with the linguist Noam Chomsky. Humans are endowed with an innate language faculty, claims Chomsky, and he argues that this 'poses a problem for the biologist, since, if true, it is an example of true "emergence" - the appearance of a qualitatively different phenomenon at a specific stage of complexity of organization' (Chomsky 1972: 70).

Chomsky is not the only rabbit-out-of-a-hat proponent. The abrupt origin of language is sometimes supported for a quite different reason: that a large brain could have suddenly invented an extra use for itself. This brain-first or language-first controversy will be discussed in the [next chapter](#).

'What use is half a wing for flying?' is the question asked by those who believe in leaps in evolution. But just as half a wing is probably helpful as a parachute, enabling a future bird to jump off a high branch and come down slowly, similarly, half a language probably had its uses. Something as complex as language is unlikely to have suddenly popped out of the evolutionary hat.

The opposing view is that language developed very very slowly, creeping upwards in complexity over millennia, like a snail making its way slowly slowly up a very high wall. On a graph, this would appear as a slow upward slant, as language capacity gradually increased among hominids. But this smooth upward movement does not tie in with our general understanding of how evolution works, in which progress tends to be more uneven.

A fits-and-starts view comes somewhere in between these two extremes: periods of relative stagnation alternating with periods of fast growth. This scenario is consistent with the notion of 'punctuated equilibria', put forward in a now-famous paper by the evolutionists Niles Eldredge and Stephen Jay Gould.<sup>[7]</sup> They argue that in evolution there were periods of rapid development, interspersed with long periods of little or no evolutionary change, which they label *stasis*. Yet stopping and starting like an old-fashioned elevator is a somewhat unlikely scenario for language. Once it started to

evolve, it probably kept going, as its usefulness became apparent.

The rabbit-out-of-a-hat, snail-up-a-wall, and fits-and-starts viewpoints therefore all present problems. But there is a solution, which combines all three scenarios-that of a language bonfire.

A language bonfire is a compromise solution, but it is also the most likely. Probably, some sparks of language had been flickering for a very long time, like a bonfire in which just a few twigs catch alight at first. Suddenly, a flame leaps between the twigs, and ignites the whole mass of heaped-up wood. Then the fire slows down and stabilizes, and glows red-hot and powerful.

This slow~uick-quick-slow scenario, with its gradual beginning explosive growth - eventual slowing down and stabilizing, is represented on a graph as an 'S-curve', an upward swing in the shape of a letter S. It underlies many world happenings, such as tides rising and falling. As a tide runs out, at first just a few gallons of water seep out. Then the vast majority of water surges seaward. Then the remaining few gallons eddy out slowly (see Fig. 5.3).

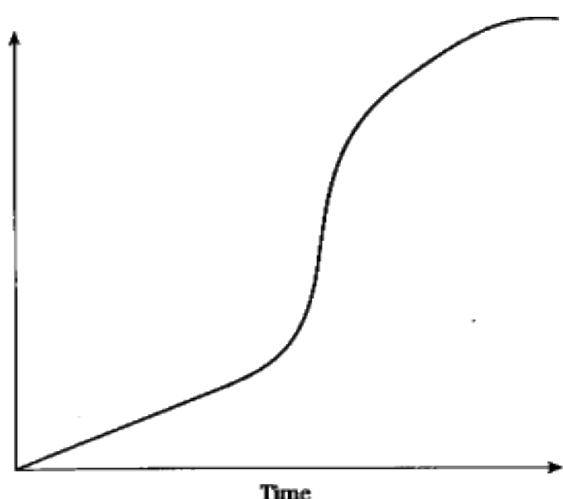


Figure 5.3 S-curve

For the language blaze to take hold, the foundations must have been laid, but probably not fully exploited. In human discoveries, the basic insights have sometimes been around for decades or more, but their possibilities not realized. Stationary steam engines, for example, had existed for around a century, used at first to pump water out of mines, before Richard Trevithick set one on wheels and ran it along rails at the beginning of the nineteenth century.[\[8\]](#)

Probably, a simplified type of language began to emerge at least as early as 250,000 BC.[\[9\]](#) Piece by piece, the foundations were slowly put in place. Somewhere between 100,000 and 75,000 BC perhaps, language reached a critical stage of sophistication. Ignition point arrived, and there was a massive blaze, during which language developed fast and dramatically. By around 50,000 BC it was slowing down and stabilizing as a

steady long-term glow. This would tie in with the sudden flowering of culture from around this time ([chapter 13](#)).

## The bush fire

But there's a distinction between language emergence (the bonfire) and its diffusion - the spread to other humans (a bush fire). In language change, there's usually a ripple effect. A change spreads out like ripples on a pond. In the early stages of language, before 'take off' point, progressive waves of embryo languages might have rippled through the hominid population, who became accustomed to a simplified type of verbal exchange.

A small isolated band of individuals might then have formed the core of a new group of super-efficient talkers. It's a scenario found in William Golding's novel *The inheritors*: an earlier race with a limited form of language is eventually eliminated by a new group with Superior language skills. The old group use language sparsely: 'Wait, Ha there. Fa there. Nil too. Lok!'. Later, Lok and Fa, Survivors from the old group, watch the new people, 'the inheritors', whose language is more developed: 'They did not gesticulate much nor dance out their meanings as Lok and Fa might have done but their thin lips pattered and flapped'. At the end of the book, the old group die out because the inheritors kidnap Lok and Fa's only surviving infant.

The development of an extra-efficient form of language in an isolated area is highly likely, parallel to the way a new species may emerge when geographical isolation has separated a small group from the main population, 'the main work of splitting populations into incipient species occurring mainly by accident, usually a caprice of geography' (Cronin 1991: 382). Speciation due to geographical separation is known as allopatric speciation, and is usually claimed to be the most common mode of speciation. Sympatric speciation, without geographical isolation, is rarer. Once evolved, language could have swept through the hominid world like a bush fire. It would have given its speakers an enormous advantage, and they would have been able to impose their will on others, who might then learn the language.[\[10\]](#)

## Inspired selection

There's one final question. How did humans hit on something as bizarre as language, a type of communication that has more in common with birdsong than with the grunts of other primates ([chapter 1](#))?

Nature is over-prolific in providing possible pathways along which animals may travel. Most species are over-endowed with possible courses of action, according to recent research. Waiting in the wings, as it were, are a range of behaviours which could be triggered, given the right set of circumstances.

This insight started in biology, especially in work on immune systems.[\[11\]](#) Species are

endowed with many more possible antibodies than they can ever expect to use to combat diseases. Indeed, if a new disease came along, and antibodies did not already exist, then the species would be wiped out before any started to develop successful evolution may be a case of inspired or even accidental selection. An animal chooses, sometimes by forced choice, to go along one route, rather than another.

Humans are exploratory animals with initiative - maybe partly because only hardy and creative individuals survived in the testing East Side. Out of the numerous routes available, these early humans took an innovative one.

Once a path is chosen, then this constrains future choices. An animal which selects to give birth to live animals, could not go back to producing eggs, just as a tree which started to drop its leaves could not go back to keeping them all the year round. Once humans came down from the trees and started walking and talking, they were obliged to continue.

But just how did humans happen to have available the basic abilities which allowed them to choose language as an option? This will be the topic of the [next chapter](#).

## Notes

[1] For a brief summary of the arguments surrounding this and other early hominids, see Wavell 1995.

[2] R. White 1985; Mellars 1993. For a useful outline account, see Lewin 1993. This technological advance will be discussed further in chapter 13.

[3] See Mayr 1991/1993 for an account of the arguments; see also Dawkins 1995, Dennett 1995, Ridley 1993, for outline overviews of evolution.

[4] Grant 1986; for popular accounts, see Grant 1991, Weiner 1994.

[5] Not all researchers agree with the clock rate, or the notion of a small stock, e.g. Thorne and Wolpoff 1992.

[6] Cann, Stoneking and Wilson 1987; Wilson and Cann 1992. See Lewin 1993 for a useful summary of the evidence.

[7] Eldredge and Gould 1972. See also Eldredge and Gould 1988, Gould and Eldredge 1977.

[8] This example was pointed out by Weizenbaum 1976/1984: 32

[9] Possible evidence for this will be discussed in chapters 6 and 7.

[10] Language diffusion will be discussed in chapter 13.

[11] This viewpoint is well summarized in Gazzaniga 1992, also Piatelli-Palmarini 1989. Within evolution in general, proliferation followed by paring down is discussed in Gould 1989/1991.

## 6. Basic requirements for the development of language

The words 'thought' and 'reason' are wide-ranging. But increasingly, we humans are found to share with our ape relatives some basic aspects of thought and behaviour, including some that are crucial to language.

Humans, like other primates, are often called social animals. But this vague term applies equally well to herds of cows. The quality of the links is what counts. Primate social structure is characterized by strong family ties, active interaction at the group level, and a well-defined ranking or 'pecking order'. To promote these, two types of behaviour have emerged: a predisposition to groom one another, and, among the more intelligent species, an ability to make guesses about the mental state of others. This ability to 'put oneself into another person's shoes' can be used to aid others or to deceive them.

These key properties may underlie the development of language. They tie in with the two things language is especially good at: aiding interaction with others, and influencing them ([chapter 2](#)).

This chapter will explore the matter further. It will then assess an oldish theory, but one which still surfaces at intervals-that gesture was the missing link between primate communication and human language. Finally, it will discuss a brain-first versus language-first controversy: was a big brain a prerequisite for language? Or did language cause the large human brain?

### Gossip not grooming?

'Do gossip and lack of grooming make us human?' is a question asked by some researchers (Glezer and Kinzey 1993). Social chit-chat may be the human equivalent of the friendly grooming found in other primate groups. It's even been called 'grooming talking' (Morris 1967).

Widespread grooming may be feasible only when groups are small, and substitute procedures may have to be found when they get large. Dunbar (1993) claims that a group size of 150 led to its abandonment. A more sophisticated social structure could have led to increased brain size. This larger brain made language possible, and also desirable, given the need to find a grooming substitute.

The grooming theory fits in with the observation that language is an intimate type of interaction, better at close quarters than across vast spaces (chapters 1-2). But group size alone may not be particularly important, and bands of 150 may have occurred earlier, with no language development (Hyland 1993). The quality of the interactions matters

more than overall numbers: the bleating of sheep might turn into language if herd-size alone was crucial.

Gossip rather than grooming might have been promoted by several factors. Humans are 'naked apes', with little hair for grooming. Spoken language leaves the hands free for other activities, perhaps important in open savannah where humans possibly lived at one time ([chapter 5](#)). Sounds can be heard in the dark, and messages can be transmitted rapidly.

Parent and baby contact may also have played a part. Mothers and fathers probably smiled and cooed at their infants even before language evolved. 'It would have made excellent biological sense for any new communicative displays to "piggy back" onto this open channel, to take advantage of a long-standing commitment to maternal-infant attachment by embedding new information in the same stream of clues ... I have speculated that this is what our ancestors did when they invented spoken language', as suggested by J. L. Locke (1995: 289).

Quite how humans hit on language is still unclear in its details, but chimp pant-hoots give a clue. They show that expressions of solidarity via vocalization come easily to primates. These deep huhh-uhh huhh-uhh in out pants are uttered primarily by male chimpanzees. At one time, they were thought to be a simple cohesion call, but this turned out not to be the case. So primatologists were left with a problem: 'Males seemed to be communicating something to each other, but just what it was nobody quite understood' (Small 1994:33). Some recent research may have solved the question.[\[1\]](#) Males pant-hoot most often when they are close to other males with whom they have some type of alliance. This indicates that the pant-hoots are connected with male-male bonds. They also differ slightly from group to group, suggesting that group membership is reinforced by hearing them.

## Man of many wiles

The ability to deceive may be an important prerequisite for language. But it's not confined to humans, in spite of popular sentiment. In the last century, animals were often assumed to be straightforward, and humans to be dishonest self-seekers. Take the nineteenth-century biologist T. H. Huxley:

A man has no reason to be ashamed of having an ape for his grandfather. If there were an ancestor whom I should feel shame in recalling it would rather be a man ... who ... plunges into scientific questions with which he has no real acquaintance. only to obscure them by an aimless rhetoric, and distract the attention of his hearers from the real point at issue by eloquent digressions and skilled appeals to religious prejudice.[\[2\]](#)

The extent of animal deception is only now becoming clear. Stick insects, for example,



have a natural camouflage which makes them hard to spot among twigs. But some animals can intentionally deceive: they can knowingly alternate their behaviour between the misleading and the straightforward.

A wide variety of animals deceive intermittently: 'There is no doubt that clever dogs can dissemble up to a certain point', noted the famous ethologist Konrad Lorenz (1950/1977:167). His dog Stasi had an inflamed front paw. If Lorenz bicycled in a direction which was uncongenial to her, she limped pitifully. But the pain appeared to disappear if he turned in a direction she liked. Old dog Bully had failing eyesight, and sometimes inadvertently barked at homecoming members of the family. After realizing his mistake, he would push past Lorenz, and bark furiously at a neighbour's gate, as though he had been addressing an enemy in that garden from the beginning. Such anecdotes led to the realization that intentional deceit was not confined to humans.

But the deceit of dogs is not well-planned. True deceit involves 'tactical deception': 'Acts from the normal repertoire of the agent, deployed such that another individual is likely to misinterpret what the acts signify, to the advantage of the agent' (R. W. Byrne and Whiten 1988, 1992: 612). Such intentional deceptive behaviour can properly be called 'lying' (R. W. Byrne and Whiten 1992 614). Most primates can do it. Humans are very good at it ([chapter 1](#)).

The *ability* to deceive is not necessarily a bad thing. In order to hoodwink intentionally, it is essential to understand someone else's point of view. This is a powerful skill, which may be used selfishly or unselfishly. To exercise it, it's necessary to mentally 'put oneself into another person's shoes'. Humans can do this: they can imagine alternative possible worlds, and treat others as if they had 'mental states'.

Those who can represent the minds of others in their own minds are said to have a **theory of mind**, something possessed by all normal humans.[\[3\]](#) A few unfortunates suffer from a puzzling deficit, an inability to understand another's point of view. This condition is sometimes referred to as 'mindblindness', and it is a major symptom of autism.[\[4\]](#) To 'mindblind' humans, the world is a confusing place which they never 'get the hang of'. Some can talk, but they have great difficulty in fully understanding other people.

Animals who possess a theory of mind are good at social manipulation. A recent survey carried out by researchers at the University of St Andrews has assessed which primates, alongside humans, are particularly good at hoodwinking one another (R. W. Byrne and Whiten 1992). Successful deceit often involves secrecy, so the task was a difficult one. But the results were surprisingly clearcut. Intentional deception was found among most primate species, but some are much better at it than others. Monkeys are fairly poor at it. Baboons and great apes are good at it. Among the great apes, chimps, our nearest relatives, turn out to be exceptionally skilled deceivers. And it starts young. An infant chimp may scream as if it is being attacked in order to persuade its mother to comfort



and feed it. An older chimp may lead others away from hidden food, then double back and scoff the lot itself while the others are elsewhere.

Great apes engage in complex social manipulations which show remarkable cunning, the researchers concluded. The manipulations are always selfish, at least in non-humans. This ability to deceive has been labelled 'Machiavellian intelligence' (R. W. Byrne and Whiten 1988; R. W. Byrne 1994a).

Open-country living may have aided this aptitude for deception, since both chimps and baboons who are good deceivers are less tree-oriented than monkeys who are poor deceivers (R. W. Byrne and Whiten 1992). Away from the trees, more social organization among large groups might be needed, with more opportunities for deception. The use of cunning perhaps helped to cause an enlarged brain, which in turn made it possible to use this large brain for developing a superb manipulative device: language.

Possibly only one primate branch, the great apes, has a true theory of mind, the ability to attribute intentions to others. Among them, only the *Homo* line made the final step to language. But we are not so far away, perhaps, from our ape cousins: 'Modern great apes may completely lack the formalizing systems of language, but they do not appear to lack understanding of what this kind of communication is about' (R. W. Byrne and Whiten 1992: 525).

Arguably, humans may not be as self-seeking as other primates. Our enlarged brain allowed a greater awareness of others, and the brain's use for unselfish, as well as selfish, purposes. Almost certainly, a theory of mind is a desirable acquisition, even if it can be used for deceit: it allows human language to discuss people and events removed in time and place. This property of displacement is one of language's most valuable characteristics.[\[5\]](#)

## The search for the missing link

But there's a missing link. Exactly HOW did language get started? According to one controversial view, sign language provided a stepping-stone. Humans with their pliable, tool-making hands devised a system of gestures before the human vocal tract could handle a full range of sounds. At a later date, the signs were transferred to vocal noises (Kimura 1976; Lyons 1988; Corballis 1992; Armstrong, Stokoe and Wilcox 1995).

The gesture theory is an old one. The eighteenth-century French thinker Abbé Etienne Bonnot de Condillac suggested that early humans might instinctively point at something they wanted.[\[6\]](#) The gesture became conventionalized, as 'little by little they succeeded in doing deliberately what at first they had done only by instinct'. These gestures were sometimes accompanied by sounds, he surmised: 'One, for example, who saw a place where he had been frightened, would imitate the cries and actions which were the signs of fright in order to warn the other not to expose himself to the same danger'. The original

preference for gesture, Condillac suggested. was because primitive humans did not suspect that the human voice could be far more variously modulated and articulated than those few natural cries. Consequently they opted for 'action language' which was, he assumed, easier and more natural than phonetic language. In the long run, the sounds became more important than the gestures, though Condillac does not fully explain this mysterious process.

Modern supporters of the gestural theory emphasize four points. First, language is not inevitably spoken. Second, gestures are universal and obvious (a mistaken belief). Third, signs are easier to acquire than full languages. Fourth, language and gesture may be linked in the brain. Let us consider these.

'Language is independent of speech, and does not presuppose its prior existence' notes the linguist John Lyons (Lyons 1988:149), pointing out that language is 'a multi-layered or multi-stranded phenomenon, each of whose layers or strands may be of different antiquity and of different origin' (*ibid.* 156). He proposes a gestural origin of speech, though he accepts that evidence in favour of it is 'admittedly, not very strong' (p. 159). Certainly, the observation that language need not be spoken provides very little support for the idea: alternative media, such as sign, writing and touch (braille) are found only partially around the world, compared with spoken language which is everywhere. The existence of sign language, now firmly recognized as a 'full' language, simply emphasizes that language is biologically inbuilt in modern humans: the urge for it to emerge is so strong that it can be transferred to different modalities.

The idea that gestures are the same the world over has a wide appeal. The apparent naturalness of gestures such as pointing gives the hypothesis a superficial plausibility. In the words of the nineteenth-century writer Franz Grillparzer: 'The only signs that are intelligible prior to all convention are gestures, and so the first language will have been a gesture-language. This comes so naturally to man that even today we accompany our speech with gestures' (*apud* Wells 1987: 26).

Similar arguments are still put forward: 'In some respects it is more natural to communicate with the hands than with the voice ... Even today, of course, we resort to gesture when we wish to communicate with those who speak a different tongue', claims a modern researcher (Corballis 1992: 215-16).

Yet this view is a mirage. Apart from a few gestures such as pointing, the remainder are not particularly obvious. Reportedly, some English students who had hired a rowing-boat were arrested off the coast of Greece as they unknowingly approached a military installation: locals had tried to warn them, but the students had interpreted the local 'go away' gesture as a 'come hither' one. As for sign languages, there are hundreds of them, and more than fifty are described in detail in a recent encyclopaedia (Van Cleve 1987).

Gestures, then, are neither obvious nor universal. But the 'signs as stepping stones' supporters defend the supposed 'naturalness' of signing in another way: signs can be

'picked up' more easily than speech, it is sometimes claimed, judging by the relative ease with which primates such as the famous signing chimp Washoe and others have acquired a language-like system based on American sign language.[\[7\]](#) Some mentally handicapped children have also found signs easier to grasp than ordinary language (Dever 1974). But humans have never automatically taken the easiest way forwards, especially if it is inefficient: signs cannot be seen in the dark, and they occupy the hands.

Deaf children have been brought into this argument: children born without hearing spontaneously produce sign-like gestures at a time when hearing babies go through a vocal 'babbling' phase, the production of *bababa*, *mamama* type sequences, it has been claimed. Sign 'babbling' therefore apparently replaces sound babbling (Petitto and Marentette 1991). But the study of these deaf infants is inconclusive: the authors observed the phenomenon in only two nine-month-old children, both of whom had signing parents, whom they might have been imitating.

Brain structure is another factor used by supporters of a sign-language origin for language. The left hemisphere of the human brain is specialized both for right-handedness and for language, suggesting a neurological connection, especially as hand movements tend to occur during speech (Kimura 1976). In addition, babies between nine and twelve months old sometimes gesture towards an object as they attempt to pronounce some type of word, though not necessarily a real word. This involves an area at the front of the brain which in monkeys plays a role in the visual guidance of reaching. It's a brain area activated also when people mentally look up the meaning of isolated words. But it plays a relatively small role in complex language processing (Posner and Raichle 1994).

Let us therefore summarize. Gestures are regarded by some as a 'missing link', adopted before humans were capable of making a wide range of vocal sounds. Supporters of this view point out that language is not inevitably spoken, that signs are easily learnable, that humans are skilled with their hands, and that words in isolation activate a brain area used in reaching and pointing. Some mistakenly argue that sign language is universal and obvious.

But these are fairly flimsy arguments. They show only that language is often supported by visual aids, such as winks, hand-waving, and shrugged shoulders, as well as tactile aids, such as pushes, pats and kisses. These gestures presumably aided vocal communication millions of years ago, the same as they do today. But they were probably not elaborated into a complex system.

But perhaps some people cling to the gestural theory because it allows them to think of themselves as industrious and conscientious tool-users, who used their hands as extensions of their tools, and their voices as extensions of their hands. It provides a happier self-image than the probable truth, that we are a race of manipulative persuaders, albeit friendly ones.

## The pop hypothesis

Our brain is three times as large as we would expect for a primate of our build', according to Passingham (1982: 78). But there's a crucial chicken-and-egg question. Is our big brain the cause of language? Or did language cause our big brain? This is a major controversy.

The brain-causes language supporters suggest that language is a by-product, an afterthought which made use of an existing powerful mental apparatus. Recently, it's become known as the 'pop hypothesis', following on from a discussion on the electronic bulletin board LINGUIST, when one contributor asked: 'But how do we know that human language didn't just "pop" into being after the mind crossed a certain threshold for other reasons?'. It's a view supported by the prominent evolutionist Stephen Jay Gould.[\[8\]](#)

According to Gould, anyone who believes in the purposeful evolution of language is putting forward a topsy-turvy argument, and saying in effect: 'Our brains were made to carry language, so we have language'. He labels their opponents' ideas 'Panglossian' (from Dr Pangloss, a character created by the eighteenth-century French satirical writer Voltaire. Dr Pangloss argued that 'Our noses were made to carry spectacles, so we have spectacles'). What we should be saying, they claim, is: 'We have this amazing brain, so we might as well use it for language' (Gould and Lewontin 1979).

'Exaptation' is the key to language, they believe: the adaptation of an existing structure for a new purpose. The spandrels in the San Marco cathedral in Venice are used to demonstrate this point. Spandrels are the inevitable by-product of mounting a dome on rounded arches which are placed at right angles to one another: they are the tapering triangular spaces formed between the arches. In the cathedral, these have been adorned with eye-catching and delightful paintings: one, for example, depicts a seated evangelist above a slender water-pourer. So stunning are these murals, that they are often the first thing noted by a visitor, who might as a first impression assume that the pillars and dome were designed purely as a mounting for the paintings. On second thoughts, however, it becomes clear that the spandrels were a by-product of the cathedral's basic design, and the murals must have been a lucky afterthought (see Fig. 6.1).

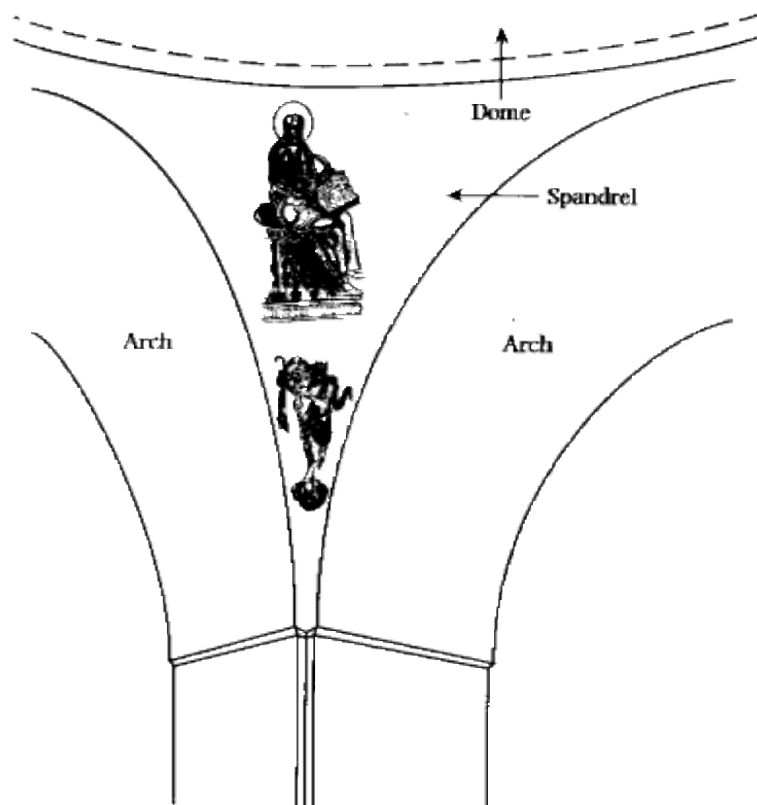


Figure 6.1 A spandrel, based on a spandrel in the San Marco cathedral in Venice

So according to the 'language is a spandrel' view, language is an ingenious afterthought, something which simply made use of a pre-existing powerful brain. Perhaps this happened when walking upright freed the hands to carry food and tools: 'What were the hominids to do with their mouths rendered thus relatively idle except when they were eating? The answer is: they chattered' (Hockett and Ascher 1964: 141).

But this by-product view is highly unlikely, as language is too complex. Exaptation (a reuse of an existing structure) is undoubtedly a powerful force in evolution. But in all documented cases, complex structures are used for simple purposes, and not vice versa, A type of wading bird uses its wings as a sunshade: there is no evidence of any bird using what was originally a sunshade as wings. You can use a television as a paperweight, but you cannot use a paperweight as a television (Pinker and Bloom 1990). The complexity of language, and the interwoven adaptations of the mouth, larynx and brain make it unlikely that language could have developed as an accidental by-product.

The brain-first vs language-first controversy may be an artificial one. Language and the human big brain may have emerged simultaneously (as suggested, e.g., by Deacon 1992), though the initial enlargement was possibly due to other factors. Physical prerequisites of language (mouth, ears and brain) will be discussed in the [next chapter](#).

## Notes

[1] Reported in Small 1994.

[2] Replying to Samuel Wilberforce, Bishop of Oxford, in a debate on Darwin's theory of evolution.

[3] The term 'theory of mind' is the commonest label for insight into the minds of others, though several other names are found, for example, 'metarepresentations' 'mind-reading', 'the intentional stance'. A fuller list of labels is given in Baron-Cohen, Ring, Moriarty, Schmitz, Costa and Ell 1994.

[4] Baron-Cohen, Leslie and Frith 1985; Baron-Cohen 1990; Frith 1993; Baron-Cohen, Ring, Moriarty, Schmitz, Costa and Ell 1994; Baron-Cohen 1995.

[5] For a discussion of other thought processes which may be related to language, see Donald 1991, 1993.

[6] Condillac (1715-80) wrote *De l'origine et du progrès du langage* (1746), part 2 of *Essai sur l'origine des connaissances humaines* (Condillac 1798). His views are summarized and discussed in Wells 1987.

[7] The achievements of Washoe and other signing chimps are outlined in Aitchison 1989a, Wallman 1992.

[8] Gould and Lewontin 1979; the view is supported also by Piatelli-Palmarini 1989.

## 7. Physical prerequisites of language

Speech is highly complex, and requires a range of physical structures for handling it. Speech is a hotch-potch whose ingredients probably evolved at different times in human prehistory.

At least four interlinked parts are needed. For outgoing sounds (production), there must be an organizer which decides what sounds are needed, and a sound-producing device to make them. For incoming sounds (reception), there must be a device to receive them, and another to interpret them. The organizer and interpreter are the key to the whole operation. But to be effective, they must be attached to the sound-producer and the sound-receiver-or some efficient substitute (see Fig. 7.1).

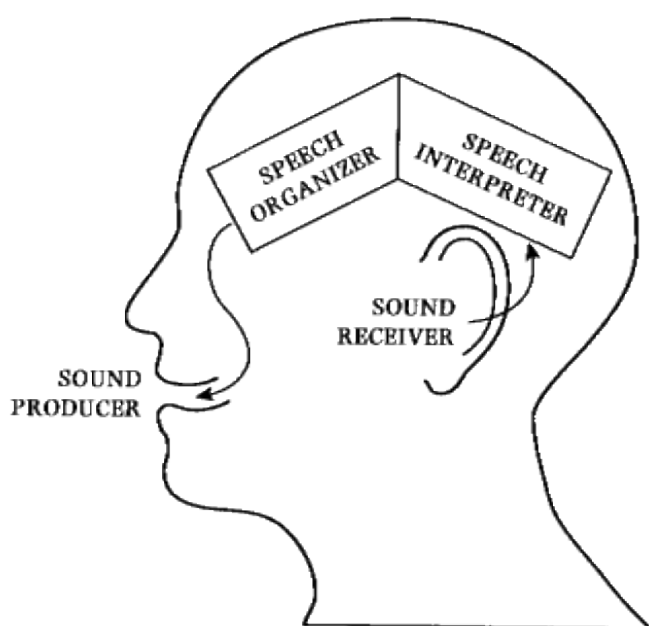


Figure 7.1 Basic ingredients for speech

All these ingredients are partially present in our chimp cousins, some of them in a highly developed state. Our hearing mechanisms seem to be more similar to theirs than dissimilar. Our mouth and larynx are streamlined versions of those of other primates. Our large brain is similar in structure to theirs, but much bigger, and with more voluntary control over vocal output. The size may be partly the result of humans 'getting it all together' acquiring the networks which link up the various language components (Deacon 1988, 1992).

This chapter will consider the various bits and pieces, starting with the probable oldest, those which appear to be most strongly shared with other primates.

## Telling noise from signal

Humans are 'tuned in' to the sounds of their own species. Manufacturers of hearing aids have not succeeded in capturing something which our ears do naturally: pick out human voices from other noises. Just as bullfrogs respond to bullfrogs, and macaque monkeys tune in to other macaques, human babies are able to recognize human voices with ease, twelve hours after birth (according to Mehler, Jusczyk, Lambertz, Halsted, Bertoni and Amiel-Tison 1988). In general, animals tune in to sounds which they themselves are capable of making, and, in particular, to those of their own species.

But there's an imbalance. Ability to recognize calls is often far in advance of an ability to produce them. Sometimes also juvenile calls differ from adult ones. This is fairly clear in human children, but it's also found in other primates. Baby squirrel monkeys emit a call, when separated from their mother, which disappears as the animal gets older (Symmes and Biben 1992). And young vervet monkeys learn to distinguish vervet calls before they can properly produce them, a skill which takes at least two years to acquire (Seyfarth and Cheney 1986).

Reception and production skills are therefore separate. Many mammals learn to discriminate between sounds they can never make, as Charles Darwin noted in 1871: 'That which distinguishes man from the lower animals is not the understanding of articulate sounds, for, as every one knows, dogs understand many words and sentences', And even though primates cannot produce the sounds of human language, they may be able to hear them.

Basic properties of the ear are common to humans and other primates. In a now-famous experiment, human infants between one and four months old were able to hear the difference between [p] and [b] quite easily, but were unable to distinguish between different types of [b], when in physical measurements the [b] differences were quite substantial. And similar results were later obtained with [b] versus [d] versus [g], which the infants also distinguished from one another. This phenomenon has been called **categorical perception**, because the babies appeared naturally to place certain speech sounds into one category or another.[\[1\]](#)

A few years after this experiment came a surprise finding. Other Primates, in this case rhesus and chinchilla monkeys, were able to do the same thing.[\[2\]](#) Both children and monkeys were given pacifiers to suck, each of which was wired to a pre-set sound (Eimas, Siqueland, Jusczyk and Vigorito 1971). At first this was one sound, say [p], so as the subjects sucked, they heard [pah-pah-pah]. They gradually got bored and sucked more slowly. Then the [p] was changed to [b]. An increase in the sucking rate showed they had noticed the difference. This demonstrates the highly sensitive nature of primate ears, and their similarity across species.[\[3\]](#)



The humans and monkeys may not have heard the sounds in exactly the same way.[\[4\]](#) Humans listening to the calls of Japanese macaque monkeys pay attention to different aspects of the sound signal: humans notice the duration of the sounds, but this does not seem to be so important for the macaques (Owren, Seyfarth and Hopp 1992). But one thing is clear: the primate ear is highly sensitive, and can normally discriminate far more sounds than the animal is able to produce.[\[5\]](#)

Quite why primates developed such acute hearing is unclear. But the pitch frequencies needed for recognizing consonants may correspond to the range found in the breaking sounds of dry branches and leaves. So our sensitive ears perhaps reveal our tree-top origins (Wind 1983).

Speech reception involves more than simply distinguishing between different sounds. Humans can tell who is speaking, and also the mood of speakers: whether they are angry, sad, and so on. But so, it appears, can other primates (Marler 1976). These different abilities (voice recognition and understanding emotional effect) are apparently handled by different brain areas (Etcoff 1989).

The hearing prerequisites for language were therefore mostly in place before humans split from chimps. Perhaps only integration of the various parts and fine-tuning were necessary in order for sounds to be fully discriminated.

## Making noises

Speech mostly uses exhaled air, so lungs are required to puff out wind (the respiratory component). A voice-box (the larynx) is needed to transform the air into noise (the phonatory component). A muscular tongue, even-sized teeth and powerful lips are necessary for a wide range of sounds (the articulatory component).[\[6\]](#)

Lungs are of very great antiquity. According to Charles Darwin, lungs developed from swim bladders, inflated sacs which allow fish to float. But swim bladders arose from lungs, judging from recent research. A few fish even retain the connection of the swim bladder with their windpipe, and can inflate the bladder by gulping air at the surface.[\[7\]](#)

The larynx is another antique feature. It contains the vocal folds (or chords), thin strips of membrane deep in the throat. Humming sounds are made when these folds just touch one other and vibrate as air is pushed through them. The vibration can be felt if a finger is placed on the Adam's apple while saying *hmm* or *bzz*. The vocal folds were probably in origin a valve which closed off the lung/swim bladder in water, so preventing flooding (Ploog 1992). In primates, this valve evolved into a membrane used for closing off the lungs in order to make the rib-cage rigid when extra effort was needed. It's still used today by any human swinging from a beam, but also in more mundane activities such as lifting a suitcase and defecation, as well as in speech.

The human larynx is more streamlined than that of other primates, in that it contains fewer appendages (Lenneberg 1967). It is also lower in the throat, though why this happened is unclear. Walking on two feet may have been the trigger that set in motion a cascade of anatomical changes, including a lowered larynx (Du Brul 1977). Other researchers as Lieberman 1984, dispute the link with bipedalism. According to one theory, primates developed hand-eye coordination for food gathering, leading to sophisticated sight, but weaker smelling capacities. Consequently, primate muzzles became shorter, which in turn reduced the size of the upper jaw, but not of the tongue. As this became thicker and more muscular in humans, it may have pushed the larynx down in the neck.[\[8\]](#) (See Fig. 7.2.)

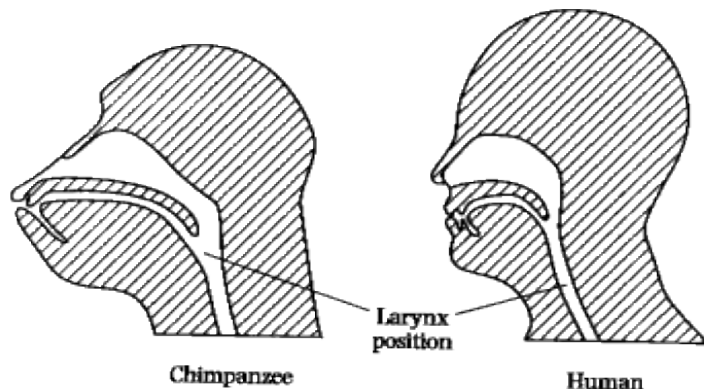


Figure 7.2 Chimp vs human vocal tract

The lowered larynx was an advantage for speech, but at a price. Unlike other primates, humans can choke to death, since we cannot close our lungs off when we eat. This was noted even by Darwin, who commented on 'the strange fact that any particle of food and drink which we swallow has to pass over the orifice of the trachea (windpipe), with some risk of falling into the lungs'.[\[9\]](#)

Nobody knows when the larynx reached its current low position, and the archaeological evidence is disputed. A modern-shaped hyoid bone, a bone normally located at the top of the human windpipe, has been found recently on a skull which may or may not be human dating from around 100,000 years ago (Houghton 1993). But it's unclear whether the bone was located in the same position as in modern humans.

In the long run, the lowered larynx led to our modern-day human vocal tract: the section shaped like an upside-down letter L which runs from the top of the larynx to the mouth. This L-shape increased the number of sounds which could be pronounced. and also their clarity, as will be explained in the next section.

## Vowels and consonants

The hoots of chimps are embryo syllables, which provide the basic frame for speech sounds. The core of a syllable is the vowel, and primitive vowels are found in numerous animals as well as primates. Vowels have been described as 'simple', in that 'some of the

sounds that very simple animals like bullfrogs make are really short, isolated vowels ... the acoustic properties and physiology of human sustained vowels and bullfrog mating calls are similar' (Lieberman 1984: 129). Chimps also can produce vowel-like sounds, but not very distinct ones (Lieberman 1992).

Vowels are made by altering the flow of air from the lungs via different tongue shapes. In this, humans have at least two important advantages over chimps. First, humans have a chunky muscular tongue, over which they have good control. Second, they can produce vowels via the mouth, rather than the nose. The L-shape caused by the lowered larynx allows humans to seal off the nasal cavity by raising the soft palate. Before this happened, nasalized sounds only would have been possible: these nasal sounds are more difficult to recognize than non-nasal ones (Lieberman 1984, 1991).

These advantages allow humans to produce three fairly extreme vowels: [i], [a], [u]. These are stabler than others, in that they vary relatively little. They provide 'anchor points' for identification. The vowel [i] is particularly important. It is produced with the tongue pushed forward with the front part raised, a so-called high front vowel. It is counterbalanced by [u], a high back vowel, in which the tongue is pulled back, with the back part raised. The third of the trio, [a] is produced with the mouth fairly open, and the tongue low and fairly central. Relatively few words would have been easily distinguishable without these key vowels, and only humans can articulate them (see Fig. 7.3).

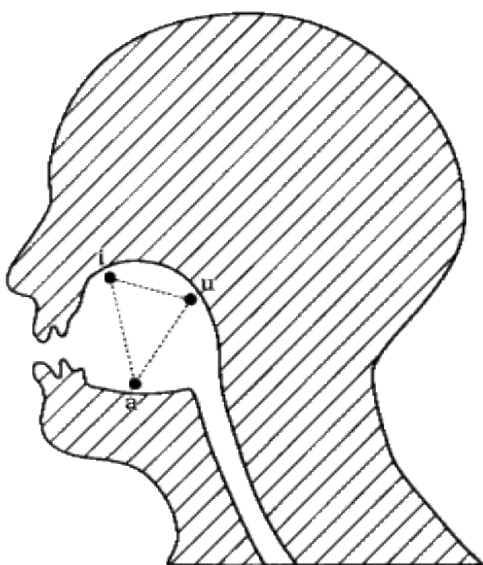


Figure 7.3 Vowel triangle

Before the key vowels were possible, clear words were unlikely.

As for consonants, primate lip-smacks use essentially the same mechanism as humans do for [p], [b] and [m], and these are among the first sounds reliably produced by human infants. Less reliably, primates can move the tip of the tongue up against the teeth and roof of the mouth to produce sounds such as [d], [s], [t]. But only humans can produce

[k] and [g], which even now are relatively unstable sounds in that they tend to change.

Modern humans have even-sized teeth, a thick, muscular tongue, and interlaced facial muscles, all used in making precise speech sounds. It's unclear how much these features owe to language, because they are also useful in other ways. Even-sized teeth are helpful for grinding up grains and roots so they can be easily digested. Tongue musculature aids in gathering together fragments of food in the mouth. Face and lip muscles are required for social interaction, allowing a wider range of facial expressions, especially smiling. Probably, the effect was cumulative, each function helped develop others. All these muscles allowed a rapid rate of delivery to develop. This is important, otherwise messages might be forgotten before they had been properly delivered.

Overall, nothing in the human vocal tract can be singled out as being specialized solely for the purpose of producing speech, except perhaps for one muscle in the larynx (the posterior cricoarytenoid muscle, according to Laver 1994). In animals, this muscle helps control the intake of breath.

But sounds are not everything. Human speech has a rhythm and intonation which forms a scaffolding for the syllables. Chimps can vary the pitch, rate and amplitude of their vocalizations, suggesting that the basic mechanisms for intonation were available before humans split from them (Snowden, Brown and Petersen 1982).

Finally, an overall control system is needed to coordinate it all: According to Thelen 1991, 'the utterance of even a simple one-syllable word requires the coordination in time and space of over 70 muscles and 8 to 10 different body parts, ranging from the diaphragm to the lips'. The next section will therefore move on to the brain, where this coordination happens.

## The proper brain

In words of Barber and Peters (1992: 344), 'without the proper brain to run it ... a new mouth was of no help'. The new mouth, relocated larynx, and fairly old ears, needed to be coordinated by the most important component, a developed brain.

We modern humans have a brain around three times the size of that of the average chimp, twice as large as that of *Homo habilis*, a third as big again as that of *Homo erectus*.[\[10\]](#) (See Fig. 7.4.)

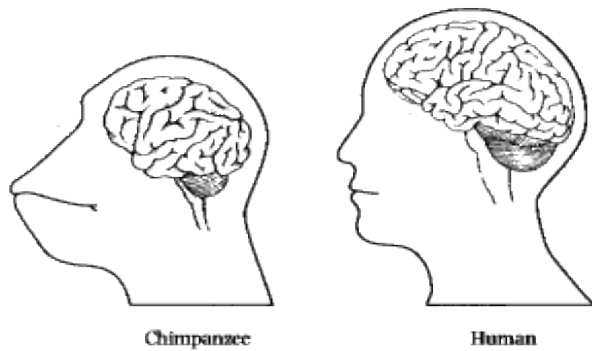


Figure 7.4 Chimp vs human brain

The relationship between brain size and language is unclear ([chapter 6](#)). Possibly, increased social interaction combined with tactical deception gave the brain an initial impetus. Better nourishment due to meat-eating may also have played a part (Aiello and Wheeler 1995). Then brain size and language possibly increased together (Deacon 1992). 'If humans weren't using and refining language I would like to know what they *were* doing with their autocatalytically increasing brains', in the words of Falk (1989: 142).[\[11\]](#)

Like the brain of many other animals, the human brain is divided into two halves or hemispheres, each of which has its own tasks. A major advantage is that damage to one side does not inevitably mean lost faculties in the other.

The left hemisphere controls movement in the right side of the body, and also language in most humans (see Fig. 7.5).

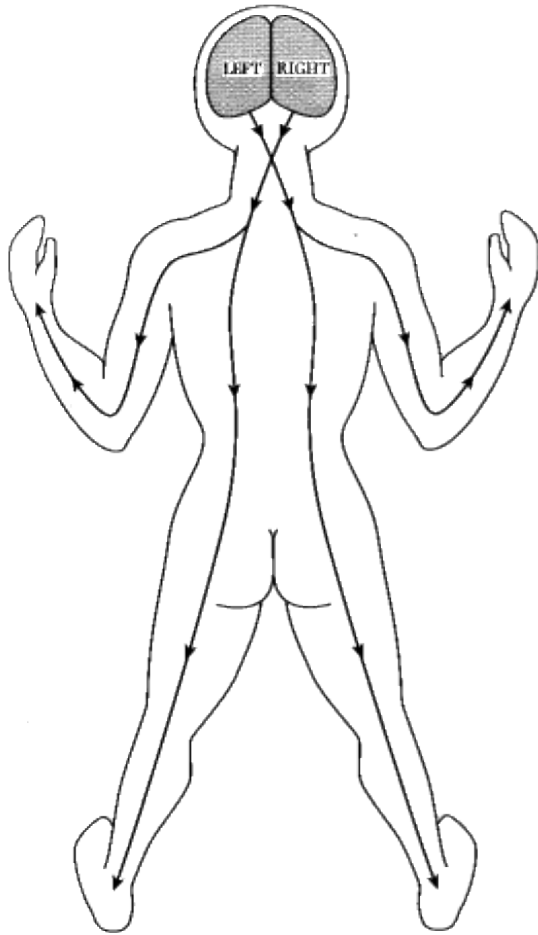


Figure 7.5 Handedness

But exactly how language and handedness are linked is disputed.[\[12\]](#) It's also unclear how this link ties in with our ape cousins. Primates do not show a consistent hand preference, according to some researchers. Others say they change hands, depending on the task, using their right hands for manipulation, and their left hands for reaching (MacNeilage, Studdert-Kennedy and Lindblom 1987). This may have a 'postural origin'. When an animal is clinging in a vertical posture, the right hand is typically used for holding on, the left for stretching and reaching-behaviour seen today in the lesser bush baby, for example, a small primate which clings vertically (MacNeilage 1991). This theory does not tie in obviously with language. But it fits in with a claim that speech with its detailed mouth movements would 'come under the direction of the hemisphere already well developed for precise motor control' (Kimura 1979: 203).

More crucial, perhaps, is the type of specialization found in the human left hemisphere: sequencing is one of its specialities. Perhaps the hemisphere which helped the right hand to place things in a careful left-right order was also the one which came to arrange sounds and words one after the other.[\[13\]](#)

But before humans could voluntarily put things in order, they needed to suppress instinctive vocal responses to external events. Let us consider this suppression more carefully.

## The dog that didn't bark

The dog that didn't bark in the night is famous. The event went unnoticed, until the famous fictional detective Sherlock Holmes pointed out the significance. And in language too, what does not happen is sometimes as important as what does. One odd thing about humans, compared with other primates, is that we can stay quiet whenever we want to, apart from occasional cries, such as the little screams uttered by passengers when an aircraft drops into an air pocket. But mostly, sound emissions are under our conscious control.

Yet this control is rare in primates. In general, utterances come into three categories: the lowest level corresponds to a reflex action such as involuntary coughing due to a tickle in one's throat. The intermediate level is when the vocalization is innate, but the trigger (stimulus) has to be learned, like the alarm calls of some monkeys. At the highest level, both the vocalization and the stimulus have to be learned, as in human language (Jürgens 1992a).

Even humans cannot control reflex actions, except by drugs. But suppression of semi-automatic responses is important for language to develop. Other primates find this difficult, though they can sometimes do it if the reward is large enough. Papoose, a female gorilla, wanted the attentions of the young male Titus, rather than those of the older dominant male in the group. She solicited Titus's company, persuaded him to hide with her, then suppressed normal copulatory calls during their mating (Byrne 1994b). In another case, Figan, an adolescent chimp, was given some bananas out of sight of others. His excited calls instantly brought the big males racing to the scene, and Figan lost his fruit. A few days later, he was again given some bananas when on his own. This time he made no loud sounds, but the calls could be heard deep in his throat, almost causing him to gag (Goodall 1986:125).

Once suppression is possible, then the reverse route also becomes available, making particular sounds at will. In laboratory experiments, primates have been trained to emit a particular type of sound in order to get a food reward. Rhesus monkeys learned to utter a coo-call if one coloured light was shown, a *bark* in response to another, and to keep quiet at the showing of another (Sutton 1979; Jürgens 1992b).

In language, then, as in many other human activities, suppression of once-automatic responses (the ability NOT to do something) plays an important role.

## The language kitchen

Language in the brain should perhaps be envisaged as a restaurant. There's a cooking area where food is prepared, and an eating area where it's consumed. The production of language (the kitchen) is handled primarily by front (anterior) portions of the left

hemisphere, an area in both humans and animals which deals with voluntary movement. Comprehension (the eating area) is dealt with mainly by back (posterior) portions, because this is the area which deals with incoming impressions. Traditionally, the anterior production portions are referred to as Broca's area, and the posterior reception portions as Wernicke's area, after the nineteenth-century neurologists who recognized their importance (see Fig. 7.6).

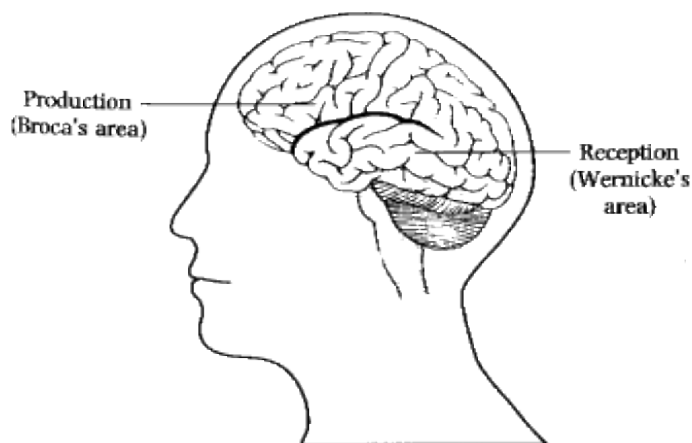


Figure 7.6 The human brain: production and reception areas

However, Broca's area is not a brain 'unit', and should possibly be regarded as a cover term for a cluster of interconnected areas. At least four subsections can be identified (Deacon 1992). First, an area which deals with the muscles controlling speech, mainly those of the mouth.

Further forward is an area which controls sequential order, that is, the arrangement of things one after the other. Further forward still, another area deals with conditional connections, as in: 'IF it rains, THEN put up an umbrella'. Further forward still, another handles associations between words. The first three of these are probably important in the brains of other primates (Deacon 1992), though humans have extended their use: 'Language functions have recruited cortical circuits that evolved for very different purposes in our primate ancestry' (Deacon 1988:376). (See Fig. 7.7.)



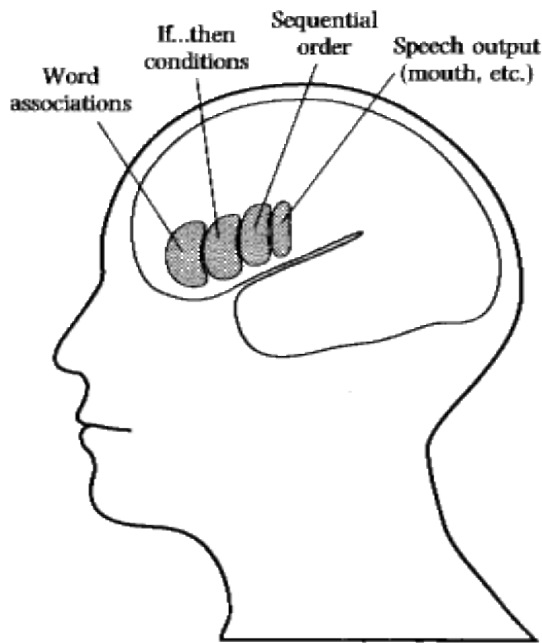


Figure 7.7 Divisions within Broca's area (from Deacon 1992)

But Broca's area needs to be backed up by contributions from other portions of the brain, including deeper sections (Posner and Raichle 1994).[\[14\]](#) And above all, links between areas matter: the waiters who carry round the plates. Increasingly, neurologists minimize talk of locations, and refer more to messengers: Coordination of it all may be the key to human language.

The human race may have been able to achieve this degree of coordination because of their extended childhood, known as **neoteny**. Compared with other primates, human children grow up very slowly. They are born in a helpless state and take longer to reach maturity: they seem to have come into the world too early. The apparent premature birth of humans is due partly to the large size of the human brain, and partly to the narrowing of the birth-canal due to walking on two feet. Consequently, birth would be difficult and dangerous if it was further delayed.

But this tardy maturation has two big advantages. First, the brain does most of its development after birth: a newborn's brain weighs only about one quarter of its final weight. It therefore retains its youthful flexibility for much longer, and allows humans to learn more than they otherwise would.[\[15\]](#) Second, helpless newborns must be kept near their mothers: In words of Locke (1995:287), 'The human infant's brain therefore does most of its forming during a protracted interval of intense social stimulation. It is hard to think of a developmental circumstance that would more favorably affect development of linguistic capacity'.

This raises the question of whether children, as they develop language, can help shed light on the development of language in the human species. This will be the topic of the [next chapter](#).

## Notes

[1] Work on categorical perception dates back to the 1950s. Liberman, Harris, Hoffman and Griffith 1957 was highly influential, and there is now a huge literature (for a summary, see J. Miller and Jusczyk 1990); work on infants is particularly associated with Eimas and his colleagues, e.g. Eimas, Siqueland, Jusczyk and Vigorito 1971 (for a summary see Eimas 1985). For an overview of categorical perception, see Harnad 1987.

[2] For a summary, see Kuhl 1987, Molfese and Morse 1991.

[3] Primates, of course, are not the only animals with sensitive ears: barn owls, for example, also show acute perceptual discrimination, with an ability to form perceptual equivalence classes from variable input stimuli; Sussman 1989.

[4] Differences between human and monkey perception are discussed in Kuhl 1987, Molfese and Morse 1991, Ploog 1992. See also Savage-Rumbaugh, Murphy, Sevcik, Brakke, Williams and Rumbaugh 1993.

[5] On this imbalance, see also Savage-Rumbaugh, Murphy, Sevcik, Brakke, Williams and Rumbaugh 1993.

[6] For details and their relation to evolution, see Aiello and Dean 1990.

[7] Liem 1988; this is well summarized by Gould 1993/1994: 114.

[8] Summary in Wind 1983.

[9] On the larynx, see Aiello and Dean Isgo Lieberman 1984, 1991, 1992. Also Corballis 1991, 1992.

[10] See Falk 1991, Lewin 1993 for figures.

[11] Gibson 1994 argues controversially that quantitative expansion is the key to language.

[12] Aitchison 1989a, Springer and Deutsch 1993 outline the link between handedness and language, including a discussion of left-handedness.

[13] On handedness in general, see Springer and Deutsch 1993.

[14] In particular, the basal ganglia are thought to be deeply involved in speech.

[15] On neoteny, see Gould 1977.

## 8. Small beginnings: First steps

'Every child as he develops is retracing the whole history of mankind, physically and spiritually, step by step'. This assertion occurs in a popular twentieth-century manual on child-rearing (Spock 1968:229). The author, expresses a widely held belief which dates back more than a century.

In 1866, Ernst Haeckel, Professor of Zoology at Jena, claimed to have discovered a 'biogenetic law': 'During its own rapid development ... an individual repeats the most important changes in form evolved by its ancestors during their long and slow palaeontological development' (Haeckel 1866: vol. II, 300). More succinctly, 'Ontogeny is the short and rapid recapitulation of phylogeny', he stated, using his own invented terms **ontogeny** for the development of an individual and **phylogeny** for the development of a species.

The notion that ontogeny recapitulates phylogeny caught on widely, and Haeckel's work had enormous influence. But he turns out to be both right and wrong: ontogeny sometimes recapitulates phylogeny, but it does not necessarily do so. Modern children do not manufacture language from scratch, they are exposed to the speech of their caregivers. And, mentally, they are never blank sheets. Infants learn continuously (Carey 1985, Keil 1989), often guided by their elders, who are themselves possibly more sophisticated than early humans. The idea of recapitulation is therefore unlikely to be 'the thread of Ariadne', as Haeckel claimed.

But there are at least two important ways in which language ontogeny may recapitulate phylogeny. The first is physical, the lowering of the larynx. The human larynx is higher in the throat in infants than in adults. Its position is similar to that found in chimps ([chapter 7](#)). This enables babies, like chimps, to both feed and breathe at the same time. The larynx descends to its mature location several months after birth.

The second recapitulation is mental, the development of the 'naming insight'. Modern humans just assume things have names. But youngsters do not automatically know that the sounds coming out of people's mouths might be names for things, they have to discover it. It's something that chimps find hard to grasp, and is an important stage which our ancestors had to go through.

This chapter will discuss the development of the naming insight, both in children and primates. Then it will assess theories about how the first words of humankind might have come into being.

### Taming the wilderness

Humans need to know the names of things. Yet this naming passion takes time to

emerge, as noted earlier. Very young children are unlikely to be naming things when they utter their first 'words': 'The 6-month-old child is faced with having to discover what talking is all about' (Griffiths 1986: 281). The same was true of humans discovering language for the first time.

Babies around ten months old sometimes mouth sounds as they gesture towards an object, activating a brain area used for single words ([chapter 6](#)). In spite of the pointing gesture, these youngsters are unlikely to be naming things (Halliday 1978; Griffiths 1986; Carter 1979), and the meaning of these early child vocalizations is fairly wide. A repeated *oo-oo* could be a general attention-getting device, though it may be interpreted by adults as 'Look! A cry of *ba* may mean 'I want that', but might be assumed by a proud mother to be a word such as 'Mug (containing milk)'. Primitive humans also might have built up a small vocabulary using similar broad 'proto-words', a possible precursor to real language.

Youngsters' first recognizable words-typically uttered around the age of a year; are often bound to a whole situation, rather than an individual item. *Car* might be used only when looking out of a window at a general traffic scene, or *papa* might be uttered when the doorbell rings (Barrett 1995). The 'naming insight' (narrowing a name down to a single object) takes time to develop.[\[1\]](#)

The 'naming insight' is a major leap. The realization that things have names comes to children at various times, but usually before eighteen months. It seems so normal, most parents do not notice it or comment on it, even though it may lead to a 'naming explosion' (McShane 1980): a desire to name everything around.

Late discovery reveals the momentous nature of the naming insight, as in the case of some deaf children. Jean Massieu, an eighteenth-century French boy, was deaf and languageless until the age of almost fourteen, when he came under the care of Abbé Roch-Ambroise Sicard, a pioneer in the education of the deaf. Sicard drew pictures of objects, then wrote their names on the pictures. At first, the boy was mystified. Then quite suddenly, the 'naming insight' came to him. Sicard describes Massieu's subsequent hunger for names:

We visited an orchard to name all the fruits. We went into a wood to distinguish the oak from the elm ... the willow from the poplar, eventually all the other inhabitants ... He didn't have enough tablets and pencils for all the names with which I filled his dictionary, and his soul seemed to expand and grow with these innumerable denominations ... Massieu's visits were those of a landowner seeing his rich domain for the first time. (*apud* Lane 1984: 83-126).

Helen Keller is perhaps the most famous case. She was deaf and blind from the age of two. As a child of six, she suddenly understood that words have meaning, when her teacher held her hand under a flow of water:

As the cold stream gushed over one hand she spelled into the other the word water, first slowly, then rapidly ... and somehow the mystery of language was revealed to me. I knew then that 'w-a-t-e-r' meant the wonderful cool something that was flowing over my hand. That living word awakened my soul, gave it light, hope, joy, set it free! ... Everything had a name, and each name gave birth to a new thought ... every object which I touched seemed to quiver with life. That was because I saw everything with the strange new sight that had come to me.[\[2\]](#)

Humans, after achieving the naming insight, want to keep naming things. They enjoy naming for the sake of naming. This is where humans and primates may differ. Other primates do not share this enthusiasm for naming, as will be outlined below.

## When is a name not a name?

The danger calls used by the vervet monkey may represent a first stage in the evolution of naming. This agile African animal with black face, hands, chin and feet, and a long tail, has warning calls which distinguish different types of predator: at a 'chutter', vervets stand on their hind legs and look around for a snake; at a 'rraup' they dive into the undergrowth as if hiding from an eagle; at a 'chirp' they climb a tree, and peer around for a lion or leopard (Seyfarth, Cheney and Marler 1980a, 1980b). But vervets are not alone. Similar specialized alarm calls are found among South American squirrel monkeys, a long-tailed species with white rings round their eyes. Some youngsters reared in isolation responded without teaching to two of them: a 'peep' warning of a threat in the air caused the animals to freeze, and a 'yap' warning of enemies on the ground such as snakes or cats made them flee to higher places (Ploog 1992).

These monkey danger calls are a complex mix of a cry of fear, a warning to others, and perhaps partly a symbol for the dangerous animal: the calls are not pure naming (Scherer 1992; Marler, Evans and Hauser 1992).

Naming is a major hurdle for chimps who have been taught language-like systems with signs or symbols for words.[\[3\]](#) Kanzi, a bonobo (pygmy chimp) readily learned a set of geometric symbols on a keyboard. But when he pointed to a symbol for banana, he expected to get a banana: 'Knowing how to use the symbol "banana" as a way of getting someone to give you a banana is not equivalent to knowing that "banana" represents a banana ... Full communication would require that the chimp be able to use the symbol "banana without expecting to receive one' (Savage-Rumbaugh and Lewin 1994: 67).

Chimps CAN apparently name for the sake of naming. Washoe, a female chimp who was taught signs for words, signed 'toothbrush' on coming across a toothbrush (Gardner and Gardner 1969). She was certainly not asking for a toothbrush, since she hated cleaning her teeth. It was an apparently spontaneous naming gesture.

Yet chimps mostly don't WANT to name things just for the sake of it. Naming things for

primates is perhaps like swinging in the trees for humans. Humans can sometimes do it, but most of them do not particularly want to. You can teach a chimp the word for an object, but you cannot make it appreciate the power of naming. And this may be the barrier which has prevented chimps from acquiring language, a barrier stronger than the lack of sophisticated vocal organs.

Early humans acquired the 'naming insight' at some point. How it happened is a mystery. The following hypothesis, from Jespersen, is plausible, but still a guess:

Suppose some dreaded enemy has been defeated and slain; the whole troop will dance round the dead body and strike up a chant of triumph, say something like 'Tarara-boom-de-ay!'. This combination of sounds, sung to a certain melody, will now easily become what might be called a proper name for that particular event ... Under slightly altered circumstances it may become the proper name of the man who slew the enemy (Jespersen 1922: 440).

And other mysteries surround early human words, such as where the sounds came from in the first place. Inventing new words is a problem. Even today, words which are invented out of nothing are extremely rare: Bauer (1983) was able to find only six words of this type, and some of them had been generated by a computer.

The problem of inventing words inspired the 'bow-wow', 'pooh-pooh' and 'yo-he-ho' proposals of earlier writers: that language was in origin either imitation of animals, cries of emotion, or grunts of effort.[\[4\]](#) Let us consider these proposals.

## Imitation of animal sounds

'May not some unusually wise ape-like animal have imitated the growl of a beast of prey, and thus told his fellow monkeys the nature of the expected danger? This would have been a first step in the formation of language', suggested Charles Darwin. He is echoing the recurring suggestion that early language began by imitating animals, the so-called 'bow-wow' theory.

This view was held by the eighteenth-century German philosopher Johann Gottfried Herder: 'The first vocabulary was ... collected from the sounds of the world. From every sounding being echoed its name' (Herder 1891/1966: 132). Herder imagines the scene:

The sheep comes again. White, soft, woolly ... the sound of bleating ... as the distinguishing mark of the sheep became ... the name of the sheep ... And what is the entire human language other than a collection of such words? (*ibid.* 117)

Herder extended animal mimicry to other natural sounds: 'The tree will be called the rustler, the west wind the fanner, the brook the murmurer - and there, all finished and ready, is a little dictionary, waiting for the imprint of the speech organs' (*ibid.* 130).



But Herder does not elaborate on how this mysterious 'imprint' materialized. Understandably, primitive hunters might need to decide whether they planned to hunt buffalo or deer, and develop a signal distinguishing them, perhaps based on the animal's bellows or squeaks. Yet speech sounds do not easily correlate with animal squawks, whose representation differs from language to language: English and Spanish pigs go *oink-oink*, but French pigs say *groin groin*, Japanese *buubuu*, Thai *ood ood*, Korean *kkool-kkool* and Ukrainian *hrju-hrju*.[\[5\]](#)

Maybe only bird-names consistently arise from onomatopoeia. For example, in one dialect of Ojibwa, an American-Indian language, *baaghaakwaanh* is 'chicken', and *jigjigaaneshiinh* is 'chickadee', an English word which is itself onomatopoeic (Rhodes 1994).

But even if an occasional word such as *cuckoo* is widespread among those who hear cuckoos, one cuckoo doesn't make a language: 'Words of this kind are, like artificial flowers, without a root', commented the nineteenth-century linguist Max Müller. The onomatopoeic theory goes very smoothly as long as it deals with cackling hens and quacking ducks; but round that poultry-yard there is a high wall, and we soon find that it is behind that wall that language really begins'.[\[6\]](#)

In short, imitation of animals and other types of sound symbolism may contribute, but probably had a limited use. Cries of emotion (the Pooh-pooh idea of language origin; cf. [chapter 1](#)) are also types of sound symbolism. They raise similar problems to animal noises. Other routes to sounds need to be considered.

## Pant-hoots and lip-smacks

Chimp-type pant-hoots ([chapter 6](#)) may be the forerunners of syllables, and so may the yells of babies. Broadly speaking, syllables are pulses of voiced breath, resulting in vowel-like sounds: *ah! ah! ah!*[\[7\]](#)

In language, syllables usually have some degree of breath obstruction at their onset: typical syllables have a consonant-vowel structure: *ba*, *ma* and so on. Early consonants in the species were probably developments of primate lip-smacks, and may be similar to those found in the babbling of babies. Infants typically go through a phase when they utter *mamama*, *babababa* sequences. Fond parents gleefully assume their child is referring to them, which is why words such as *mama* and *papa* are found the world over as pet names for parents (Jakobson 1962/1971). In fact, the child is instinctively exercising its vocal organs in an enjoyable and non-meaningful way. But all these exercises contribute to the habit of making vocal noises, whether among infants or early humans.

But adults also contribute. The involuntary grunts which emerge from the closing and opening of the vocal folds in effortful heaving and hauling might have promoted this

basic syllable shape, which is found in rhythmic work songs the world over. This ties in with the old 'yo-he-ho' theory of language origin, which proposed that language began with words involving cooperative effort. It's likely to be one among many factors which encouraged the habitual use of vocalization.

But language is not just a sequence of syllables spoken in a monotone it has additional rhythm and intonation, which are interwoven with the sounds. The next section will consider this aspect.

## Singing creatures?

'Words well up freely from the breast', wrote the nineteenth-century German philosopher-linguist Wilhelm von Humboldt, and there may well have been no wandering horde in any desert that did not already have its own songs. For man, as a species, is a singing creature' (Humboldt 1836).

The 'primitive song' idea recurs in suggestions about language origin. The eighteenth-century French philosopher Jean Jacques Rousseau claimed that 'the first languages were singable and passionate before they became simple and methodical', and, in the twentieth century, Otto Jespersen (1922: 420/434) proposed that: 'The speech of uncivilized and primitive men was more passionately agitated than ours, more like music or song ... the first utterances of speech I fancy to myself like something between the nightly love-lyrics of puss upon the tiles and the melodious love-songs of the nightingale', as pointed out earlier ([chapter 1](#)).

This seems unlikely, even though long-range signalling such as yodelling may have developed alongside language, or even prior to it.[\[8\]](#)

But the link between language and song may not be so far-fetched, if singing is taken in a wider sense than may have been intended by these early writers. All languages have some type of 'song'. Either they have tones, that is, different pitch levels for syllables, as in Hausa, an African language, where, for example, *kuka* 'a cry' and *kukà* 'baobab tree' are distinguished only by the pitch level of the last syllable. Or they have intonation, that is, different 'tunes' for sentences, as in English. Sometimes, they have both, as in Mandarin Chinese.

In addition, different emotional attitudes can be expressed. Sensitivity to them develops young. At around six months, children react positively to speech melodies expressing approval, and negatively to those expressing disapproval, which seem to be similar across a range of languages (Fernald 1992). At around eight months, a child heard from the next room may appear to be having a 'real' conversation with himself or herself, but is in fact imitating the 'tunes' of human speech.

Speech tunes and the understanding of emotional nuances are dealt with primarily by the



right hemisphere of the human brain. unlike mainstream language skills which are normally located in the left hemisphere ([chapter 7](#)).<sup>[9]</sup>

The perception of pitch and voice gradations appears to be an extension of a similar sensitivity found in chimps. The human race, like human infants, may have produced a range of vocal sound with a variety of intonations long before language began.

## Putting it all together

There is probably no single route by which humans arrived at early words. Commands used in effort, mama-type sounds which evolved from lip-smacks, occasional animal imitations, as well as other intermittent types of sound symbolism probably all contributed. Once a few of these had become accepted in a community, others would follow. Rough equivalents for 'Heave ho!', 'Hi!', 'No!', 'Help!' and several dozen other proto-words might have been in use for a long time. But it's unlikely that there was any systematic sound structure until quite a large number of individual words had been devised (Studdert-Kennedy 1991).

As this chapter has shown, children can provide occasional pointers to the emergence of language, cases where ontogeny (the development of an individual) may have recapitulated phylogeny (the development of the species).

But right back at the beginning, the infants of the species are unlikely to have initiated language. Adults probably did this, then their tentative speech steps were picked up by the next generation, who expanded their parents' skills.<sup>[10]</sup> This process can be seen when deaf parents give birth to deaf children. The first generation, the parents, acquire sign language fairly slowly, and never become truly proficient. The second generation, the children, pick up their parents' signing system easily, and eventually carry it on further (Newport 1990). Once humans had achieved the 'naming insight', and had started to develop a repertoire of different sounds, there may have been an explosive growth of vocabulary, as with children. Eventually, early humans started to combine these words. This will be the topic of the [next chapter](#).

## Notes

[1] Aitchison 1994c provides a summary.

[2] H. Keller (1903). *The story of my life*. New York: Doubleday.

[3] The abilities of these chimps are summarized in Aitchison 1989a, Wallman 1992.

[4] See Chapter 1. As mentioned in the notes to chapter 1, these ideas were commonplace, though were possibly first summarized by Max Müller, and made widely known via Jespersen 1922.

[5] Information about the sounds of the world's animals on the World Wide Web, <http://www.georgetown.edu/cball/animals/animals2.html>.

[6] In Jespersen 1922: 414. Against this view, Hinton, Nichols and Ohala 1994a argue that sound symbolism plays a larger role in language than has been hitherto recognized.

[7] The definition of the syllable is highly problematic, e.g. Laver 1994.

[8] On the characteristics of long-range signalling, see Hall-Craggs 1969.

[9] On the complex relationship of language to music, see Handel 1989, Lerdahl and Jackendoff 1983, Rosner 1995.

[10] On the role of an early 'sensitive period' for language, see Aitchison 1989a; on the evolution of a sensitive period, see Hurford 1991, Newport 1990, 1991.

## 9. The second word: The emergence of rules

Human beings do not simply combine sounds and words at random when they talk. Instead, they ring the changes on a relatively few basic patterns.[\[1\]](#)

Humans understand one another because they subconsciously know the patterns found in their own language, which are often referred to as **rules**. It is a rule of English that the word *the* comes before the noun to which it refers: *the fish* not *\*fish the* (with an asterisk denoting an impossible sequence), though in Ponapean, a Micronesian language, it would be *mwahmwa-o* 'fish-the' not *\*o-mwahmwa* (Hopper and Thompson 1984). It is another rule of English that a word cannot start with *mw-*, though this is quite all right in Ponapean.

A language needs rules. Communication would break down if there were no agreed ways of combining linguistic units.

Any full language has narrowed down the range of overall possibilities to a relatively few allowable combinations. Linguists often refer to the sum total of these permitted patterns as a **grammar**, with the word used interchangeably to mean both the rules subconsciously used by speakers, and those codified by linguists. At some point, early humans must have started to put words together in a rule-governed way, in an early grammar. Whole words were probably put into some overall order first. The organization of sounds probably came at a later date (Studdert-Kennedy 1991).

Simple rules have two requirements: first, different types of basic unit must exist; second, ways of combining them must be agreed. This chapter will consider how these requirements might have been fulfilled.

### Bundles of things

There is a primacy of nouns, as far as the evolution of language is concerned. The 'naming insight' is the main evidence for this, the realization that things have names ([chapter 8](#)). This revelation probably caused a naming explosion, and names of things may therefore have outnumbered other types of early words.

The basic status of nouns is supported by other evidence. In the languages of the world, it's normally easy to change a noun into a verb (Hopper and Thompson 1984). A noun can often be used directly as a verb, as in numerous English examples:

Angela *shipped* her car to America  
Henry *bicycled* home  
Betty *bottled* the jam

It's less easy to make a verb into a noun, and usually requires a special ending:

Paul *discovered* the treasure  
Paul's *discovery* of the treasure...

Geraldine *met* a bear  
Geraldine's *meeting* with a bear...

Felix *arrived*  
Felix's *arrival*...

Since this ease of making nouns into verbs is so widespread, but not vice versa, it suggests that nouns may be in some sense primary.

Most languages have many more nouns than verbs. In English, there are approximately three times as many nouns as verbs, according to G. A. Miller and Pellbaum 1991 (though this figure perhaps exaggerates the difference: verbs are more polysemous than nouns, that is, each verb has on average approximately three meanings attached to it. but each noun only around two. But there's still an imbalance).

Nouns refer primarily to physical things which we can point at. Consequently, people, animals and things have been called **first-order entities**.[\[2\]](#)

Other nouns, which include those such as *truth*, *happiness*, *beauty*, are felt to be less basic, and how they are classified 'may well depend crucially upon the structure of the languages that we use to talk about them' (Lyons 1977:443).

Within first-order entities, 'persons are more strongly individualized than animals, and animals more strongly individualized than inanimate things' (Lyons 1989: 169). The dividing line between persons, animals and inanimates is sometimes unclear. Rivers, winds and mountains are classified in various ways in the languages of the world. A similar fuzzy distinction is found between concrete and abstract (Lyons 1989). But the message is clear: that 'ordinary things' are basic.

Nouns alone might be useful as a communication device: a primitive grocery list would have its uses. Yet language cannot be properly considered to have emerged until there was at least a primitive grammar. For this, there had to be other words to go with the nouns. A smallish vocabulary relating to verb-like happenings had presumably existed for a long time. Words meaning maybe 'Heave', 'Come', 'Go', 'Eat', 'Open' might have been in use. But they were possibly not as numerous as the names for things, nor were they at first combined with names in a reliable way.

## The bare minimum

Nouns and verbs together probably constituted the first grammar. Nouns and verbs,

however, are not totally distinct, they are on a continuum: In words of Givón (1979:321): 'The *most time-stable* percepts, the ones that change slowly over time ... are lexicalized as nouns. The *least time-stable* percepts, events, and actions, which involve *rapid change* in the universe, are lexicalized as verbs'. It's a universal tendency (Hopper and Thompson 1984).

Nouns tend to be people and objects, which have time stability verbs to be actions and events which do not:

The dinosaur (N) yawned (V)

Henry (N) swallowed (V) a snail (N)

Though some exceptions can be found: verbs occasionally denote time-stable situations:

The mountain *loomed over* the town

and nouns sometimes involve unstable ones:

There was a sudden *flash* of lightning.

Nouns and verbs are usually regarded as universal categories in language (Robins 1952; Hopper and Thompson 1984). As Schachter (1985: 7) noted, 'the distinction between *nouns* and verbs is one of the few apparently universal part-of-speech distinctions ... there are no languages that cannot be said to show a noun-verb distinction', though Nootka, an American-Indian language, is sometimes claimed to be an exception.[\[3\]](#)

But grammar emerged only when noun-type words were reliably combined with verb-type words. Let us consider how this might have happened.

## Nouns plus verbs

The human mind did not burst into bloom with language like a bush suddenly ablaze with blossom in the spring. Putting words together in a rule-governed way might have happened slowly. There are two routes by which nouns and verbs could have been combined: build-ups on the one hand, and re-analysis on the other.

The 'build-up' route assumes that a large number of single words accumulated, but words of different types, some involving things, others actions. Then at a later stage these were combined just as a child might say *mummy open* as a request: 'Mummy please open this'.

The re-analysis route assumes that words, mainly nouns, were already being combined, but that sometimes more than one interpretation was possible. Take the word *singsing* in Tok Pisin, a pidgin spoken in Papua New Guinea ([chapter 1](#)).

A *singsing* is primarily any festival which involves dancing and singing. The words *mi*

*singsing* meaning 'I went to the song and dance festival' could easily be reinterpreted as 'I sang and danced'. And there are numerous other similar words, such as:

mi danis	'me - dance'	→ 'I danced'
mi bilas	'me - adornment'	→ 'I adorned myself'
mi pait	'me - fight'	→ 'I fought'
mi wok	'me - work'	→ 'I worked'
mi brum	'me - broom'	→ 'I swept'

Both the build-up route and the re-analysis route may have been utilized in early language. But there's a missing step. Before either could take place, consistent ordering must have evolved. A repetitious jumble such as *mummy open open mummy, mi danis mi* or *singsing mi singsing* would not provide a basis for any grammar.

There are three types of clue as to how a firm word order might have happened: first, in the signing of chimps; second, in the utterances of Vincent, a hearing child who first learned sign language from his deaf parents before switching to spoken language; third, in the predispositions of humans to think about some things in a particular sequence. Let us examine these.

## Nim eat Nim

Nim Chimpsky is a male chimp who was for several years taught a sign language based on ASL (American Sign Language) by Herbert Terrace and his co-workers at Columbia University (Terrace 1979). When the project ran out of money, Nim was returned to a chimp colony in Oklahoma. Terrace then had time to analyze carefully the huge amount of data from Project Nim.

At first sight, Nim's signing was quite unordered. He signed *Nim eat* almost as often as *eat Nim*. But the order was not completely random, because Nim had some preferences, though they varied in strength. If a food was involved, it was almost always placed first, as in grape eat, banana *Nim* eat, *apple me* eat. (See Fig. 9.1.)

banana me	97
sweet Nim	85
gum eat	79
grape eat	74
banana Nim	73
grape eat Nim	37
banana Nim eat	33
banana eat Nim	26
yoghurt Nim eat	20
banana me eat	17
apple me eat	15
nut Nim nut	15

Figure 9.1 Nim's food requests

Nim always put the word *more* at the beginning in two-word sequences: *more eat*, *more tickle*, *more drink*, though '*more* first' was not a firm 'rule', because *me more eat* occurred as often as *more eat Nim* among three-word combinations.

Nim had a mild preference for placing his own name at the end, as in *eat me Nim*, *grape eat Nim*, but it came in the middle as well, as in *banana Nim eat*, and sometimes at the front, as in *Nim me eat* (See Fig. 9.2.)

play me Nim	81
eat me Nim	48
eat Nim eat	46
tickle me Nim	44
grape eat Nim	37
banana Nim eat	33
banana eat Nim	26
me Nim eat	21
hug me Nim	20
yoghurt Nim eat	20
more eat Nim	19
finish hug Nim	18
Nim eat Nim	17

eat Nim me	15
nut Nim nut	15
drink me Nim	14
hug Nim hug	14
sweet Nim sweet	14

Figure 9.2 Nim's name

But there's a problem: Nim often repeated words, as in *eat Nim eat, Nim eat Mm*. He may have believed that 'more is better', as in his longest recorded utterance: 'Give orange me give eat orange me eat orange give me eat orange give me you'.

But Nim's intermittent ordering is instructive, because it resembles the process found when a language acquires new word-order rules: mild stylistic preferences change into strong preferences which eventually stabilize. One or two very common utterances become a habit, which forms a pattern which influences the formation of others.

The bonobo, Kanzi, also developed a preferred word order in his use of lexigrams (the symbols on his computer keyboard, often one geometric shape on top of another, such as a line running across a diamond, which was the sign for 'jello').[\[4\]](#) (See Fig. 9.3.)

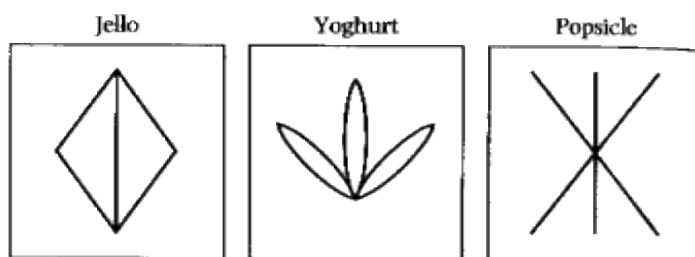


Figure 9.3 Some of Kanzi's signs

At first he used *hide peanut* as often as *peanut hide*. But he soon picked up on the order used by his English companions, and settled on *hide peanut* as standard. This shows that he is sensitive to order but does not show how ordering could have developed in the first place.

But Kanzi invented at least one personal ordering rule, a 'lexigram-point' rule. This involved first, a symbol for an action, such as *tickle*, *chase*, then a pointing gesture to indicate who should do the action, perhaps his trainer Sue. He may have invented a second rule, though this is more doubtful: he tended to use the order of occurrence in the game he was playing when two actions occurred together. So *tickle bite* occurred more often than *bite tickle* and *chase hide* more often than *hide chase*.[\[5\]](#) So Kanzi, like Nim shows how a preferred order could become a habit which could be regarded as a 'rule'.[\[6\]](#)



## You broken car

Vincent was the hearing child of deaf parents who taught him sign language as a first language (Todd and Aitchison 1980). He became a fluent signer, but did not speak in spite of regularly watching television, whose accompanying sound effects appear to have had very little effect on him. He was first exposed to 'live' English when he was just over three years old. His speech was barely intelligible at first, though his output slowly became relatively clear.

Most of Vincent's utterances were short: *You - uh-oh* 'You made a mistake', though a few were much longer: *I want puter you go home you* 'I want you to take me to your house'. His vocabulary was sometimes idiosyncratic: *puter* was a general, all-purpose verb, perhaps originally from *put*; *you* sometimes meant 'you', but could also mean 'he', 'she' or 'it'. But the way he put words together was bizarre by ordinary standards.

At first sight, Vincent's strange output looked unanalyzable especially when sequences such as *You rrr* 'It goes rrr' existed alongside others such as *Rrr car* 'The car was towed'. He also had a tendency to 'copy-around' a word, that is to put one form on both sides of another, as in: *You house you?* 'Do they [those buses] go to your house?'

But when his repeats and copying-around were omitted, a clear word ordering preference appeared. Vincent constructed many sentences according to a basic, but private, plan:

1. Pointing-out word (often a pronoun)
2. Verb-like word
3. Noun-like word or adjective

Sometimes all three elements were present, sometimes only two. The result could be fairly normal:

<i>You Sandra</i>	'You're called Sandra'
<i>I puter keys</i>	'I'll unlock the door'
<i>I see-it fire</i>	'I saw a fireman'

But at other times the result was strange, because he did not consistently put the actor, the person who initiated the action, at the beginning. Sometimes it was at the end:

<i>You daddy</i>	'It's daddy [who's sleeping there]'
<i>You broken car</i>	'The car got broken'
<i>What-do puter Howard?</i>	'Why did Howard do it?'
<i>Where go bus?</i>	'Where do you get the bus from?'
<i>See over-there airplane grandma</i>	'That's the aeroplane grandma flew on'

Vincent, like Nim, shows a pattern seeping through. A default structure underlies his superficially odd utterances. It is not fully consistent. But it reveals a human tendency to categorize words, and to order the categories into a sequence, though one which has not become totally firm.

Both Nim Chimpsky the chimp and Victor the human show that an optional, intermittent word order can become a preferred order, and that a preferred order can become a near-rule. But their output raises a question about where the order came from in the first place.

## Human mind-set?

Humans do not consciously decide how to chop the world up, it is already partly done for them by their minds. Philosophers sometimes argue over whether the 'external world' is real. Most of us assume that it is, but that our human mind-set dictates how we see it.

Humans recognize certain broad categories that exist for them known, as **ontological categories**. These categories cover notions such as people, things actions, events (Jackendoff 1983, 1993/1994). They provide 'a presumably universal initial structure of the language of thought' (Braine 1992:90) on which language is superposed.

The innate thought structure covers not only basic categories but also the way in which they may be combined. Consider the following sentences:

*The cat sat on the mat*  
*The dog lay under the table*  
*The train chuffed up the track*

Why don't we say instead:

*!The mat lay under the cat*  
*!The table stood over the dog*  
*!The track was under the chuffing train*

These sentences are not impossible, they're just rather odd-and would be in any language. (An exclamation mark signals an unusual, but not impossible, sentence.) It's normal to locate something small in relation to something large, rather than vice versa. It's not just because the small item is the theme of conversation: it is perfectly possible to envisage the large item as the topic, in which case the sentence order would probably be switched around:

*On the mat sat the cat*  
*Under the table lay the dog*  
*Up the track chuffed the train*

The location of small onto large may be due to the human way of envisaging things

(Landau and Jackendoff 1993; Jackendoff 1993/1994). Indeed, if you ask anyone, they tend to say: 'But it's obvious it has to be that way round, that's the way things are', confirming the notion of a human mind-set: 'The world is not only queerer than we imagine, it is queerer than we *can* imagine', is an apt remark attributed to the biologist J. B. S. Haldane.

Human thoughts therefore run along pre-ordained grooves, which are likely to affect the order of participants in a grammar. Let us consider what these may be.

## Horses before carts

There is a natural tendency to place live things first. This 'animate first' preference is sometimes so strong, that a sentence may get switched around to preserve it. Almost 5,000 English descriptions of an inanimate thing doing something to an animate being were collected by one group of researchers (Bock, Loebell and Morey 1992). In almost three-quarters of them, the sentence had been switched into the passive. It was more normal to say:

*Patsy was hit on the head by a cabbage*

than

*A cabbage hit Patsy on the head*

The 'animate first' preference is not due to any obvious linguistic factor, such as word length or word rhythm (McDonald, Bock and Kelly 1993). The human mind-set plays a major role. A 'me first' principle is a possible explanation, a suggestion that humans put first the thing that is most closely connected to them (Cooper and Ross 1975).

Often, the 'animate first' preference ties in with an 'actor (initiator of action) first' principle, partly because in real life animates act on lifeless things more often than vice versa: *Harriet ate the egg*, rather than *!The egg ate Harriet*; *Alfonso chucked a stone*, rather than *!A stone chucked Alfonso*.

In an ingenious experiment, children were shown some carts and horses, each of which were given nonsense names, such as *zot* for a horse and *tep* for a cart. The experiment was carried out in both English and Fijian which, unlike English, places actors at the end of sentences. When asked to recall the horse and cart words, all the children were more likely to recall them in a horse-cart order, even when they had been originally taught them in the cart-horse order (B. Byrne and Davidson 1985). This result suggests that 'animate actor first' may be a strong pre-linguistic preference. However, the fact that 'animate first' and 'actor first' do not always work together shows that natural preferences may sometimes clash. This is one reason why languages do not all end up with the same rules.

## Ducks quack, and other natural principles

A 'participant-event framework becomes an 'actor-action' sequence which eventually turns into a noun-verb order, according to one scenario (Hopper and Thompson 1984).

An actor-action order is overwhelmingly more common than action-actor as a major sentence pattern in the languages of the world. It's a strong preference. English, like many other languages, has the order *The frog jumped*, *The duck quacked*, rather than *\*Jumped the frog*, *\*Quacked the duck*. The reverse is possible: *Up jumped the dog*, *Loudly quacked the duck*, but it is a 'marked' (less normal) order. A few languages even prefer the uncommon order. Welsh regularly starts sentences with verbs, and several languages do so intermittently: in Spanish, *Vino un coche* 'came a car', is more usual than *Un coche vino* 'a car came'.

If two participants are involved, the actor usually comes before the patient, the thing or person to whom something is done. A sequence *Tom hit Jerry*, or *Tom Jerry hit* would be interpreted as Tom hitting Jerry in the languages of the world, unless there was strong evidence to the contrary, such as use of word endings. These Tom and Jerry examples oversimplify the situation, however, because two 'full' nouns tend not to be together as actor and patient in the same clause, at least not in spoken speech: 'Tom arrived, then he hit Jerry', would be more likely, with the 'full nouns' spaced out (Du Bois 1987).

The patient (recipient of action) is normally placed near the action which affects it. In the world's languages, an order *Pigs eat apples* or *Pigs apples eat* is more likely than *Eat pigs apples*. Some languages take this action-patient bonding to extremes, and swallow up patients into the verbs, a process known as **noun incorporation**. Siberian Koriak, for example, has a verb *qoyanm* 'to reindeer-slaughter', formed by combining *qoya*- 'reindeer' with *-nm*- 'to kill' (Mithun 1984). (See Fig. 9.4.)

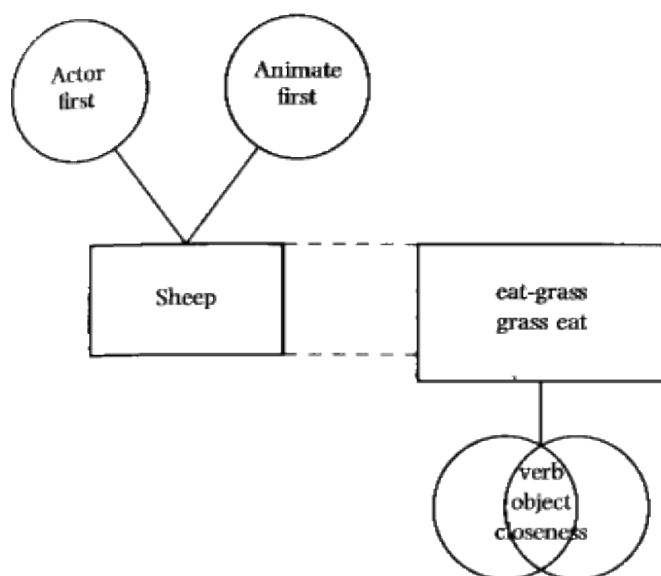


Figure 9.4 Ordering preferences

The 'actor first' and 'action-patient bonding' preferences coincide to produce two likely orders:

ACTOR - ACTION - PATIENT

or ACTOR - PATIENT - ACTION

This partly explains why the majority of human languages have a preferred word order of subject-verb-object, as in English, or subject-object-verb, as in Turkish:

English: *Alan cooked the fish*

Turkish: *Ahmet baligi pisirdi* (Ahmet fish cooked)

In one sample of 402 languages which were chosen to be representative both of language families and world areas, over 85% came out as one of these two orders (Tomlin 1986):[\[7\]](#)

SOV	180	(45%)	SVO	168	(42%)
VSO	37	( 9%)	VOS	12	(3%)
OVS	5	(1%)	OSV	0	

These figures are rough ones only, because configurational (strict word order) languages are not inevitable. Word order is sometimes fluid in inflectional languages, those which use word endings to mark subjects and objects. And problems are caused by so-called **ergative languages**, those which mark the actor only when something is done to a patient, as in Guugu Yimidhirr ([chapter 3](#)).[\[8\]](#)

'Actor first' and 'verb object bonding' appear to be strong human preferences. Other principles have been proposed, though these are controversial. For example, a hypothesized 'theme first principle' (Tomlin 1986) is problematic: arguments concerning it are partly circular, with the theme identified as the theme mainly because it is placed first.[\[10\]](#)

But so far, only two- or three-word combinations have been considered, and also only nouns and verbs. Language combines many more words, of many more types. The [next chapter](#) will consider how this enrichment might happen.

## Notes

[1] Sound patterns are known as phonology, word patterns as syntax.

[2] Lyons 1977: 442-3; Lyons 1989. Lyons first distinguished between first-, second- and third-order entities in 1977. He rediscussed the matter in 1989, drawing a slightly different division between second- and third-order entities.

- [3] As will be discussed in [chapter 14](#) on universals.
- [4] For Kanzi's lexigram board, see Greenfield and Savage-Rumbaugh 1990: 548-9.
- [5] Greenfield and Savage-Rumbaugh 1990; Savage-Rumbaugh and Lewin 1994.
- [6] Care has to be taken when comparing short utterances of different types, see Aitchison 1995a.
- [7] S=Subject, mostly corresponding to Agent; O=Object, mostly corresponding to Patient, V=Verb; on the difficulties involved in identifying a sentence subject, see Keenan 1976, Dixon 1989.
- [8] For further examples of ergative languages, see [chapter 15](#).
- [9] On word order in general, see Payne 1992a. 1992b, Mithun 1992.
- [10] For critical reviews of Tomlin 1986, see Noonan 1988, Blake 1988.

## 10. The expansion

Once the ball of language started rolling, it probably kept moving, at first slowly, then faster and faster, like a snowball which accumulates snow, and tumbles ever more quickly down a hill.

But nothing ever comes out of nothing. Humans can adapt only what is already there, both in the human mind, and in the existing language: 'The mind does not manufacture abstract concepts out of thin air ... It adapts machinery that is already available, both in the development of the individual organism and in the evolutionary development of the species' (Jackendoff 1983: 188-9).

And these adaptations are not random. Language moves in a predictable direction. The same patterns recur all over the world, influenced by the human mind-set.

This chapter will consider how our human mind-set affected the expansion of language. It will outline, first, how vocabulary probably grew, and second, how language acquired extra parts of speech, in addition to nouns and verbs.

### Inwards and outwards

Humans probably named themselves, their body parts and their intermediate environment early in the development of language. As today, the human body, and the space surrounding it, presumably formed the basis of further meaning extensions (Johnson 1987). Metaphor is at the heart of language, and the direction of the metaphors is important.[\[1\]](#) The body's influence spreads outwards, to features of the environment, and inwards to the mind.

Words for human body-parts easily move outwards, as shown by pidgins. Take the Tok Pisin word *het* 'head',[\[2\]](#) which has been extended to various natural phenomena:

<i>het bilong diwai</i>	'top of a tree'
<i>het bilong maunten</i>	'top of a mountain'
<i>het bilong wara</i>	'spring, source of water'

Or consider the extensions of *han* (hand, arm):

<i>han hilog diwai</i>	'branch of a tree'
<i>han bilong pik</i>	'front legs of a pig'
<i>han bilong pisin</i>	'bird's wing'
<i>plantihan</i>	'centipede', literally, 'many hands'
<i>han wara</i>	'tributary of a river', literally 'hand water'

But words move inwards also. Outer behaviour is a regular source for talk about the inner mental self, as when physical sight expressions are used for intellectual understanding:

I *see* what Helen means  
 It all became *clear* to Albert  
 Can you *enlighten* setty?  
 Peter's still *in the dark*

Such examples show that 'Deep and pervasive metaphorical connections link our vocabulary of physical perception and our vocabulary of intellect and knowledge' (Sweetser 1990: 21). Physical grabbing and holding stretches to mental grasping:

Did you *grasp* what your father meant?  
 Paul *held on* to his point of view  
 Fenella *seized on* what Albert said

Travel through space is extended to speech and mental exploration:

Let's *go over* that idea again  
 How *far have we got* in our plans?  
 I think Lois is *getting somewhere* with that problem  
 What conclusion has Henry *reached*?

Differences of detail exist between cultures. Heard utterances are swallowed among the Dogon of West Africa. In the case of good speech, the intestines digest the verbal fluid, extract the nutritive value, and distribute it to other parts of the body (as reported in R. Harris 1990). Yet this is not unlike our own concept of 'inwardly digesting' what is said to us. The body is still the basis of metaphors about the mind for the Dogon, even though the exact image differs from our own.

The human body therefore probably always has been and always will be used to extend language meanings: 'It would have been ... fantastic for humans not to begin describing the world of their experience in terms of the human body and its everyday experiences; this is exactly why languages are anthropocentric'.[\[3\]](#)

## Wider patterns

Space affects time: 'Spatial vocabulary universally acquires temporal meaning rather than



the reverse' (Sweetser 1990: 9). Spatial prepositions get reapplied:

*From* flower to flower → *From* year to year

*In* the garden → *In* the evening

*On* the table → *On* Saturday

And space has other, far-reaching effects. Some general spatial schemata may be universal: an up down verticality scale permeates our thinking. 'Up' correlates with 'more', and 'down' with 'less':

The crime rate is *rising*  
Interest rates are *up* again  
House-sales *fell* last month  
Export orders are *down*

This schema presumably has a basis in experience: a heap of apples rises as more are added to it. No essential value is attached, as bad things such as crime can rise, and good things can decline. Yet, quite often, verticality involves a value judgment, *up* is good, and *down* is bad

Andrew's going *up* in the world  
Marion's *down* on her luck  
Helen's *on a real high*  
Bob's *down* in the dumps  
Nigel always aims *high*  
Stella *lowered* her sights

But verticality is only one example of a general spatial schema and there are several others. A movement forward and back, or more accurately, in and out, is all-pervasive:

Nathaniel woke suddenly *out* of a deep sleep. He got *into* an argument with his brother, then backed *out* of it by burying his head *in* a book.

A path schema is common, with purpose as a physical goal:

You've still got a *long way to go*  
Don't get *sidetracked*  
*Keep plodding on, you'll get there* in the end

And life itself is commonly referred to as a journey, as in the famous first lines of Dante's *Divine comedy*:

In the middle of the path of my life,  
I found myself in a dark wood,  
Through which the direct route had been lost.

The journey of life is sometimes attached to the passage from life to death. In Greek mythology, the ferryman Charon transports the dead across the river Styx.

In short, humans orient themselves in physical space in predictable and recurring ways, and then apply this space to other areas of experience: 'Image schemata are pervasive, well-defined, and full of sufficient internal structure to constrain our understanding and reasoning' (Johnson 1987: 126). They 'are not internally "mushy"; on the contrary, they are one of the chief means by which our understanding is structured to give us a more or less comprehensible, patterned world that we can partially make sense of and function within' (Johnson 1987: 127). These schemata represent the way humans think about the world. They may have been in existence in embryo even before the origin of language. Language made use of them, and possibly carried them further.

However, more parts of speech were required before full use could be made of the spatial extensions outlined above. This development will be discussed below.

## In and out

Links in space are often expressed by a particular type of word, an adposition. This term covers both prepositions, placed in front of a noun, as in English, or postpositions, placed after, as in Hindi:

*mez pēr*  
table on  
'on the table'

Each language uses primarily either one, or the other, though the major pattern is occasionally supplemented by a few examples of the other. Latin, for example, has mainly prepositions, as in:

*ad silvam*  
towards wood  
to the wood'

but occasional postpositions, as:

*honoris causa*  
of-honour for-the-sake-of  
'for the sake of honour'

Adpositions are sometimes separate words, as in English, and sometimes they are bound to the neighbouring noun, as in Turkish:

*ev-dan*  
house-from  
'from the house'

Postpositions, it turns out, are more usually bound than prepositions, which will be discussed further in [chapter 16](#).

But there are never many adpositions, maybe twenty or so, as opposed to many thousands of nouns and verbs: roughly 10,000 names for things occur in an average English adult's vocabulary according to Landau and Jackendoff (1993).

The small number of adpositions is due to the human mind-set (Landau and Jackendoff 1993). A language with many more can be imagined, in which adpositions standardly include some notion of the objects to which they applied: one word for 'in' might be used when going into something big like a house, another for something small and cosy like a rabbit hole, another for something which is not a container, such as a garden, and so on. A few prepositions are like this, but not many:

*!Paul went along the circle*

This is weird, because *along* has to refer to something which has length.

*!The tight-rope walker walked around the wire*

This is odd, because *around* usually requires a space to circulate in or round.

The limited number of prepositions must be due to the way humans think (Landau and Jackendoff 1993; Jackendoff 1993/1994). Humans re-apply old ones, instead of inventing new ones, as when spatial prepositions are routinely stretched to cover time (see above).

Adaptation is the key to prepositions. Consider the history of the English word *along* in Australia and Papua New Guinea. It was at first probably used as a general spatial preposition, as suggested by some Australian records from the last century:

*Boatswain tell me to come up along Queensland and work sugar*  
'The boatswain told me to come to Queensland and work the sugar' (1885).

Tok Pisin, spoken in Papua New Guinea, shortened this word to *long* and used it as an all-purpose link word:

mi go <i>long taun</i>	'I go to town'
mi kam <i>long taun</i>	'I come from town'
mi wokabout <i>long taun</i>	'I walk around in the town'
mi stap <i>long haus</i>	'I stayed at home'
mi rait <i>long pepa</i>	'I write on the paper'
mi kam <i>long kanu</i>	'I came by canoe'
mi paitim dok <i>long stik</i>	'I hit the dog with a stick'
mi kam <i>long nait</i>	'I came during the night'
mi sori <i>long yu</i>	'I'm sorry for you'
mi save <i>long planti samting</i>	'I know about a lot of things'

Confusion is usually avoided by paying attention to the surrounding vocabulary: *kam* means 'come towards, arrive', and *go* means 'go away, depart', for example, and other clarifying words can be added:

mi go *antap* long tri  
I go on-top of tree  
'I climbed the tree'

mi sidaun *ananit* long tri  
sit-down underneath of tree  
'I sat underneath the tree'

A similar general-purpose preposition might have emerged in the evolution of language, possibly via reanalysis of a verb or noun. As an example of how a verb can get reanalyzed as a preposition, consider English *belong*. Early Australian records of plantation-workerst speech retain signs of its verbal origin:

Yes; good fellow gun, box, plenty something *belong a white man*  
Yes: a good gun, a box, and lots of the Europeans things' (1885)

In Tok Pisin it surfaced as true preposition *bilong* (of):

*papa bilong mi*  
father of me  
'my father'

*han bilong diwai* arm/hand of tree  
'branch of tree'

Bislama, the pidgin spoken in the Republic of Vanuatu, in the southwest Pacific Ocean, provides further examples of verb reinterpretation resulting in prepositions (Crowley

1990b), as with *agensem* (to oppose), where the ending *-em* shows that the word is a verb, even though it probably came from the English preposition 'against' at an earlier stage:

mi no *agensem* yu  
I not oppose you  
'I am not opposing you'

huia i toktok *agensem* yu?  
Who PRT talk to-oppose you (PRT is a meaningless particle)  
'Who spoke against you?'

In the second sentence, *agensem* can be equally well interpreted as a verb 'to oppose' or a preposition 'against'.

The verb *raonem* (to go round), is following a similar pattern:

bae yumi *raonem* aelan long sande  
FUTURE you-and-I go-round island on Sunday  
'We'll go around the island on Sunday'

oli pulum wan fanis *raonem* yad bilong mi  
They put a fence to surround yard of me  
'They put a fence round my yard'

Prepositions arise out of verbs quite often, even in English, where *regarding*, *concerning*, *following* were once verbs, but are now prepositions:

Cuthbert saw the lawyer *regarding* his claim  
Pauline saw the travel agent *concerning* her ticket

Compare:

Bill saw the doctor *about* his knee

But adpositions are not always derived from verbs, sometimes they come from nouns. Hausa, spoken primarily in Nigeria, has prepositions which are derived from body-parts, with *cikin* 'in' coming from the word for 'stomach', and *baayan* 'behind, after' from the word for 'the back'. And a similar pattern is found in several African languages (Heine, Claudi and Hünemeyer 1991). But the overall picture is clear. Adpositions, when they first developed, were likely to have come from verbs or nouns. At first, there may only have been one or two, which were stretched to cover a wide range. Later, others were added via reanalysis.

Adpositions show two things. First, the human mind has certain inbuilt constraints, which is why there are so few prepositions. Second, language is flexible: it adapts what is already present to express new ideas, which is how so few prepositions get stretched so

far.

This is also true of the development of other parts of speech, such as adjectives, as will be considered below.

## A swing-category

Nouns are at one end of a continuum, with words which retain their identity through time. Verbs are at the other end, with words which involve rapid change (see [chapter 9](#)). In the middle come properties, some semi-permanent, as in a *large elephant*, a **round** pond, a *green frog*, and some temporary, as in an *angry bull*, a *happy baby*, a *hot day*. These property-words are less time-stable than nouns, but more time-stable than most verbs (see Fig. 10.1).

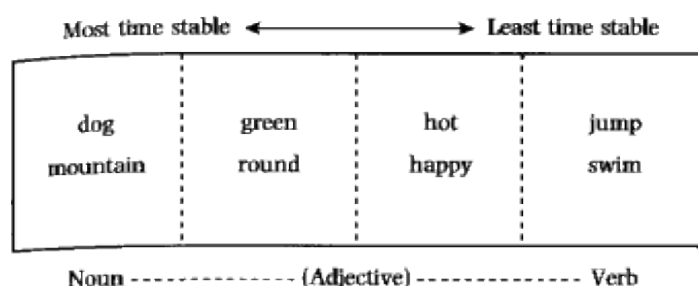


Figure 10.1 Noun-adjective verb continuum.

Faced with this in-between group of words, languages follow one of two routes. Some subdivide verbs into those which deal with events, such as *hit*, *kill*, versus those which deal with states, so called stative verbs, such as *(be) green*, *ill* (Dixon 1982). Mandarin Chinese chooses this path:

ta pao  
she/he/it run  
'(s)he runs'

ta hao  
she/he/it good  
'(s)he's good'

A similar pattern is found in numerous West African languages, as in Kru, spoken in Liberia (Holm 1988:85):

kpákà  
'he is-old'

or Yoruba, spoken mainly in Nigeria:

*ó tóbi*

'he is-big'

But other languages take a different route. An extra category, adjective, deals with the middle-range words. As Givón (1979:13) stated, 'the class of adjectives is a notorious swing-category in languages'. The border-line between nouns and adjectives, and between adjectives and verbs, often seems arbitrary. Some adjectives seem more like nouns, as in *a gold watch*, *a tin tray*, others more like verbs, as in *a lasting peace*, *a whistling kettle*. As Givón (1979) notes: 'It is, of course, no accident that the lexical class 'adjective' has remained problematic, exhibiting even within the same language some "more noun-like" properties and some "more verb-like" ones'.

Sometimes, it's difficult to decide whether a word is an adjective or a verb describing a state. Tok Pisin shows the dilemma:

*mi sik*

'I (am) sick'

*yu longlong*

'you (are) mad'

These could be regarded as stative verbs, 'be-sick', 'be-mad', or as adjectives, with the copula *be* missing, as happens in Russian:

*Marija krasivaja*

'Mary (is) beautiful'

And similar examples come from the other side of the world, for example Miskito Coast Creole English (Holm 1988:85):

If yu wud sief, yu wud ron

'If you want to be safe, you had better run'

In the early days of language, verbs and adjectives were probably indistinguishable, as in the pidgin/creole examples above. At some point, a verb expressing a state might be reinterpreted as an adjective. But no clear distinction between the two could be formally made until further linguistic devices, such as word-endings, were added.

The lexical mosaic is therefore always being stretched, and always being reinterpreted. The [next chapter](#) will consider how this led to more sophisticated linguistic devices, especially markers for verbs and nouns.

## Notes

[1] On metaphor, see Lakoff and Johnson 1980, Ortony 1993, Gibbs 1994.

[2] Tok Pisin is a pidgin/creole spoken in Papua New Guinea, as noted in [chapter 1](#).

[3] Remark attributed to Keith Allan, unpublished paper, quoted by Heine, Claudi and Hünemeyer 1991: 123.



# 11. Time travelling: Extra attachments

All languages have verbs. And the verbs usually have extra appendages

Again and again, the same types of gram (grammatical marker; Bybee, Perkins and Pagliuca 1994) get attached to verbs, both in pidgins and creoles, and in full languages. And the attachment always happens in the same way: a full lexical item develops into a gram. This process is known as **grammaticalization**, a term coined by the French linguist Antoine Meillet, who defined it as 'the attribution of a grammatical character to a previously autonomous word'.[\[1\]](#)

But how these grams first emerged is controversial. Arguments centre round the amoeba question ([chapter 1](#)). Did language start out simple, like an amoeba, and then gradually expand? Or was it a sprawling muddle which was only gradually neatened up into a coherent system?

According to a 'bioprogram view', proposed by the linguist Derek Bickerton (Bickerton 1981, 1984, 1990), an innate blueprint caused some basic grams to leap into place fast.[\[2\]](#) According to a 'spaghetti junctions' view, early language was like a motorway intersection which provided numerous options. In the long run, several factors converged to make some options more viable than others (Aitchison 1989c).

This controversy has centred around the origin of language, and also, more strongly, around pidgins and creoles.[\[3\]](#) As already explained ([chapter 1](#)), a pidgin is a subsidiary system used by people with no common language, and a creole is a pidgin learned as a first language. These can show how an embryo system, with minimal resources, expands into a full system, as with the prepositions discussed in the [previous chapter](#).

This chapter will discuss the key topic of verb attachments.

## Time and the verb

Creoles tend to develop three basic appendages: grams for tense, mood and aspect. Tense specifies the time of an action, mood expresses an attitude towards an event, and aspect carries information about the 'contour of an action'.[\[4\]](#)

A typical creole tense-mood-aspect (TMA) system marks three basic distinctions:

TENSE    *anterior* vs non-anterior

MOOD    *non-real* vs real (non-actual or actual event)

ASPECT *non-punctual* vs punctual (non-sudden or sudden)

In each of these three, the meaning placed first is usually marked by a special ending.

This pattern is probable, though it is not inevitable.[\[5\]](#)

Tense, the time of an event, is perhaps the most straightforward of the verb's attachments. Languages usually specify if the verb's action happened in the past, as in English, which usually adds *-d* on the end: *Drusilla laughed*.

Past tenses everywhere develop via predictable pathways. As a first stage, a word meaning 'finish' is often adapted to express a completed action. This has happened worldwide (Bybee, Perkins and Pagliuca 1994), from Cocama, spoken in the Andes, to Koho in Southeast Asia, and to Tok Pisin:

Kaikai *pinis*, mi go long wok  
Food finish I go to work  
'After I've eaten, I go to work'

Completion leads to anteriority, the marking of the earlier of two actions, as in the Tok Pisin example above. According to many (e.g. Bickerton 1981), anteriority precedes a true past tense.

But full tense marking takes time to emerge. Typically, such markers start out as optional extras, then become habits, then become obligatory ([chapter 9](#)). In pidgins, an action is specified as fast only when necessary. Tok Pisin *Mi pundaun* (*me* fall-down) 'I fell down, need not have a past marker attached, but *mi sik* (*me* ill) 'I am/was ill' would probably need one. In creoles, grams increasingly get inserted even when they are not essential.

Tok Pisin has evolved a past tense. It followed the 'spaghetti junction' scenario, in that at least two potential past tenses developed, then one of these won out over the other. The competitors were *pinis*, mentioned above, and *bin* from English 'been':

mi kikim pukpuk *pinis*  
I kick crocodile finish  
'I kicked a crocodile'

*mi bin sik*  
I PAST sick  
'I was ill'

Historically, *pinis* possibly developed earlier than *bin*. It had several uses. It was used for anteriority, as explained above. It also denoted completion or finality: the word *dai* means 'to faint', but *dai pinis* is 'to die'.

Partly because of these other *pinis* uses, *bin* gradually came to be used as the 'ordinary' past, and won out over *pinis*. This also fitted in with other developing verbal attachments, which were placed in front of the verb. Language, in the long run, tends to be consistent.

At first, *bin* was used only when extra clarity was needed. But gradually *bin* came to be

used even when the action obviously happened in the past, as when a secretary described a holiday trip away (PRT is a meaningless particle):

*Moskito i bin kaikaim mi nogut tru*  
Mosquitos PRT PAST eat me no-good truly  
'The mosquitos bit me badly'

So in Tok Pisin, two possible past-tense forms were whittled down to one, with the other retained as a useful way of expressing anteriority.

This case history shows how optional features compete. One word becomes relegated to minor uses, the other wins out. The winner becomes used more often, increasingly inserted where it is not strictly necessary. The words *pinis* from 'finish' and *bin* from 'been' were not adopted by chance. Words meaning 'to finish', or 'to be finished, ready, complete' are possibly the commonest source of past tenses in the world's languages, though *be*, *have* and *come* are also prominent (Bybee, Perkins and Pagliuca 1994).

The general picture is clear. Past tenses start out as full lexical items, which in their origin were often connected with a notion of completion. The idea of finishing something, and ordering it before another event, may be part of the human mind-set. To find it surfacing in language is no surprise.

## Non-reality

Many people assume that human languages operate a three-way system, in which time is split into past, present and future. This happens in Latin, but is not particularly common overall. Many languages instead distinguish between fact and probability. A non-reality (*irrealis*) marker expresses something which might happen, rather than something which must happen. In the long run, non-reality markers may turn into future tenses.

Me sow piccaninny taty - *by by* he jump up big fellow!  
'I plant little potatoes; in time, they'll grow into big plants'

This use of *by by* by a Western Australian potato planter dates from the mid nineteenth century (1842). It shows an early use of the phrase 'by and by', which developed into an *irrealis* marker in Tok Pisin.

In Tok Pisin, the phrase 'by and by' was borrowed as *baimbai*, then shortened to *bai*. It's found both with future intentions and in hypothetical future events (IR stands for *irrealis*):

Ating *bai* mi watchim ragbi  
I-think IR I watch rugby  
'I think I'll watch rugby'

*Would* is the best translation when a hypothetical event is discussed:

*Bai* mipela kisim ol lip  
IR we get PLURAL leaf  
'We would get leaves'

Na *bai* kamarapim long lip banana gen  
And IR cover with leaf banana again  
'And we would cover it up with banana leaves again'

The position of *bai* in a sentence is still not fully stabilized. It is found either in front of a pronoun: *bai mi go* 'IR I go' or after it, as in *mi bai go* 'I IR go'. But it is gradually neatening up. Increasingly, it is placed before the pronoun, as in *bai mi go*, perhaps because it tends to get confused with *bin* in fast speech when placed after. But when *bai* occurs with *em* 'he, she, it', it follows the pronoun more often, as in *em bai go*, perhaps because it would coalesce with *em* if placed in front. So this is not sorted yet, it is taking generations.

But *bai* is not the only future found. A second Tok Pisin construction involving the immediate future is the verb *laik*, which has in some areas been shortened to *la*, with the meaning 'be about to go':

Mi *laik* go  
'I want to go'

which has become

mi *la* go  
'I am about to go'

Desire, leading to intention, leading to futurity, is a widespread pattern (Bybee, Perkins and Pagliuca 1994), found also in the English word *will*, which has followed the same route.

## Contours of actions

In many languages the 'contour' of the action expressed as an intrinsic part of the verb, its **aspect**. More widely, 'aspects are different ways of viewing the internal constituency of a situation (Comrie 1976: 3). A typical 'contour' is a distinction between an action which happens once, and an ongoing action:

*Albert coughed* versus *Albert was coughing*

An ongoing action could have several overlapping interpretations, at least:

Albert coughed *for a long time* (duration)

Albert coughed *repeatedly* (iteration)

Albert was *in the habit of* coughing (habituality)

According to the bioprogram view, a single distinction was split into several. According to the spaghetti junction view, several distinctions were streamlined into one, as happened in Tok Pisin. Tok Pisin started out with a main verb *save* (know), which still exists:

mi no *save* tumas long kokim

I not know much about to-cook

'I do not know much about cooking'

But when *save* was followed immediately by another verb, its dominant meaning came to be 'know how to', in the sense of 'be skilled at':

mi *save* kukim kaukau

I know to-cook sweet-potato

'I know how to cook sweet potato' or 'I am skilled at cooking sweet potato'

Gradually, 'be skilled at' came to have the weaker meaning of 'be accustomed to', 'habitually do something', though sometimes both meanings would be possible, as in: (PRT is an untranslatable particle)

planti switpela kaikai na loli i *save* bagarapim tit hariap

Lots-of sweet foods and sweets PRT are-skilled-at/are-accustomed-to wreck teeth fast

Lots of sweet foods and sweets wreck teeth fast'

But in many cases, only the eventual meaning of 'be accustomed to' is possible:

Yu *save* smok?

You know to-smoke

'Do you smoke?'

*Save* in its new meaning of 'be accustomed to' was eventually shortened to *sa*:

mi *sa* kukim long paia

I am-accustomed-to-cook on fire

'I customarily cook it on the fire'

So an original verb *save* split into two: *save* remained as a main verb 'know', but *sa* became a verbal particle which preceded the main verb, meaning 'be accustomed to', 'habitually'. At first, use of *sa* was optional. But, gradually, its use increased, and it was inserted even when habituality was obvious from the context.

But habituality was not the only type of non-punctual event found in Tok Pisin. Long-term and repetitive events could be expressed, but by other methods. The verbs could be

repeated:

mi *singaut singaut*

I shout shout

'I shouted and shouted', 'I kept shouting'

Alternatively, another sequence, often *i go*, sometimes repeated several times, could be added after the verb:

mi *singaut i go i go*

I shout PRT go PRT go

'I shouted and shouted', 'I kept shouting'

Gradually, this construction is fading, as the *sa* construction starts to cover all non-punctual events. The phrase *i go* may in the long run become a single word *igo* meaning 'and so on', 'continuously'. optionally added to a sentence, but no longer part of the basic verbal system. This is suggested by cases in which *sa* and *i go* occur in the same sentence:

mi *sa stap long haus i go i go*

I customarily stay at home PRT go PRT go

'I stayed at home continuously'

To summarize, there has been a 'bleaching' or weakening of the original meaning of the verb, from 'know how to', towards 'be skilled at', ending up as 'be accustomed to'. Once the original meaning had been lost, the word became shortened, and reanalyzed as a particle attached to the verb. It was used increasingly frequently and redundantly, and gradually took over the functions of a postverbal marker expressing repetitive or long-lasting actions (see fig. 11.1).

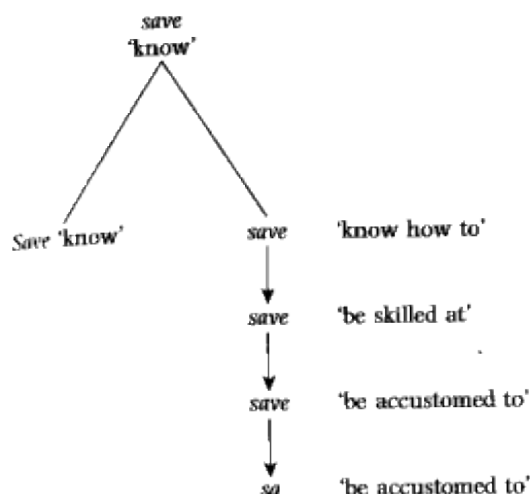


Figure 11.1 Tok Pisin *save* to *sa*

Occasionally, *sa* is found in the same sentence with *bin*. When this happens *sa* is nearer

the verb, probably because habituality is more closely associated with the events of the verb than the time at which they occurred:

mi *bin sa* stap long haus  
I PAST customarily stay at home  
'I stayed at home'

Verbs meaning 'know' tend to become grams the world over, though not necessarily with the same final result as in Tok Pisin. In English, a word meaning 'know' was the forerunner of the auxiliary verb *can*. Here, the meaning has bleached into 'be able to', rather than the Tok Pisin 'be accustomed to'. In other pidgins, non-punctual markers have resulted from verbs meaning 'stay', 'be there', 'sit', 'sleep': all common verbs which express a prolonged state (Givón 1982).

As Tok Pisin *sa* shows, human language moves in two directions, both splitting and streamlining. Tok Pisin added extra grammatical machinery, as when *sa* split from *save*, and became a new preverbal gram. At the same time, streamlining took place: overlapping distinctions expressed by different linguistic items on different sides of the verb were narrowed down to one.

## Bioprogram vs spaghetti junction

In the case of Tok Pisin, the spaghetti junction view provides a realistic account of how verbal grams developed. The bioprogram summarizes the outcome.

Slow neatening up has been found in other creoles, and across a range of constructions. Arends (1986: 117) comments on Sranan, spoken in Suriname, on the Atlantic coast of South America: 'Creoles do not always become stabilized systems within one generation. Long after the transition from the pidgin stage, they are still amenable to large scale restructuring ... The language, as a not yet fully stabilized and relatively young system, is still in search of its mature form ... Viewed this way, creolization would not be a discrete, one-generation process, but rather one which is gradual, extending over a number of generations'.

Derek Bickerton, the chief bioprogram proponent, would possibly disagree. In his view, Tok Pisin developed too slowly for it to be regarded as a standard pidgin/creole. However, his favoured creoles may not have developed as suddenly as he assumes (Goodman 1985). So Tok Pisin may not be as abnormal as he has claimed.[\[6\]](#)

Overall, creoles behave no differently from any other language, though their processes of change are accelerated. Splitting and streamlining are found everywhere. So are bleaching, reanalysis and neatening up. And optional grams repeatedly become obligatory. The human mind-set guides language in certain broad directions and makes some developments more likely than others.

The tense-mood-aspect grams which develop early in creoles are those with the greatest generality: they are widely useful and applicable to a large number of words. But within these broad outlines, there are numerous possibilities. Multiple branches, as it were, sprout out, and are gradually whittled down to a rule-governed system. The end result is a matter of trial and error and compromise, predictable in its outlines, but not in its details. This is true of pidgins and creoles, and is likely to have been true of human language at its outset.

But a language is still not complete with just a few parts of speech, and various attachments for its verbs. Other essential developments will be the topic of the [next chapter](#).

## Notes

[1] Meillet 1912/1948: 131. On grammaticalization, see Traugott and Heine 1991, Hopper and Traugott 1993.

[2] For a review of Bickerton 1981, see Aitchison 1983.

[3] On Tok Pisin in general, which will figure largely in the discussions, see Dutton 1973, Dutton and Dicks 1985, Mühlhäusler 1985, 1986, Wurm and Mühlhäusler 1985.

[4] On tense, mood, aspect in general see Hopper 1982, Binnick 1991, Comrie 1976, 1985.

[5] Muysken 1981; Givón 1982; for a fuller account of the developments discussed in this chapter, see Aitchison 1989c; see also Bybee, Perkins and Pagliuca 1994, Singler 1990.

[6] On the speed controversy, see also Bickerton 1991.



## 12. Keeping going

Languages can never start again: they have to patch up and expand what is already there. But for language, this is not such a disaster. Language has endless possibilities within itself, which it perpetually reuses: it is an 'inexhaustible store', to quote the nineteenth-century thinker Wilhelm von Humboldt: 'But just as the matter of thinking, and the infinity of its combinations, can never be exhausted, so it is equally impossible to do this with language ... At every single point and period, therefore, language, like nature itself, appears to man ... as an inexhaustible storehouse' (Humboldt 1836).

The Port Royal schools, a group of seventeenth-century French religious and educational foundations, may have been the earliest to comment coherently on the open-endedness of language. They produced a famous grammar, which spoke of 'that marvellous invention by which we construct from twenty-five or thirty sounds an infinity of expressions' (*apud* Sacks 1989/1991: 76).

As these linguistic pioneers realized, language possesses the property of *generativity* : the use of a finite number of elementary parts to produce a potentially infinite number of forms and sentences. Generativity may be a basic property of the human mind: 'The generative nature of language is probably parasitic on the generative nature of human cognition (Bloom 1994: 181).

But there is more to it than just endlessly rearranging words within the permissible patterns. More importantly, the rules can be repeatedly reapplied, so that any sentence can in principle go on for ever: 'I know you believe you understand what you think I said. But I am not sure you realize that what you heard is not what I meant.' This is a notice reputedly found on the wall of a civil servant's office. It is composed of two longish sentences, which have several sub-sentences embedded inside them. And many more subsentences could have been embedded. Sentences stop because people get thirsty, or run out of things to say, not because of any linguistic limit.

Language, incidentally, is not the only human ability which involves generativity, it is also found in mathematics. Some researchers suggest that generativity arose first in language, and then spread to other domains (e.g. Corballis 1992). Others, perhaps the majority, assume that the human ability to handle maths arose independently, but made use of some of the same basic capacities as did language (Wynn and Bloom 1992).

But the inexhaustibility of language, its generativity, will be the topic of this chapter.

### More than a yip-yop

Generativity in its true sense needs to be distinguished from simple repetition. A make-believe insect, a yip-yop, which randomly yipped and yopped all day would not qualify

as possessing generativity.

There is disagreement over whether any animals have a true generative communication system. Take the song of the chickadee, a North American songbird with grey-black plumage (Hailman and Ficken 1986). The songs of these birds contain four basic elements that may be strung together in an open-ended but rule-bound way. The four elements always occur in a particular order, although each element may be repeated any number of times, or may be omitted. Consequently the authors of the chickadee study claim this system qualifies as 'language'. Others (e.g. Corballis 1992) have argued that simple repetition must not be confused with true generativity.

Yet judging from the chickadee, generativity can occur at a very simple level and be indistinguishable from repetition. The mechanisms which underlie it are what matters. Human language makes use of a medley of devices.

An ordering ability is fairly basic, a skill particularly associated with the left hemisphere of the human brain (chapter 7):

The old frog swallowed a very large fly

The order shows that the frog swallowed a fly, not vice versa. Yet keeping to a basic order is not particularly difficult, and even pigeons can be trained to peck at patterns in a particular sequence.

Selective repetition is a step further:

The old old frog swallowed a very very large fly

but not

\*The old frog frog caught a very large fly fly

This is more difficult, because it requires an awareness that different types of item are involved. This is a major step towards realizing that language is 'structure-dependent'. Any sentence has an internal structure which has to be subconsciously understood. A division between nouns and verbs may be an early prerequisite (chapter 9), a milestone on the way to structure-dependence.

However, true structure-dependence requires more than this. A speaker must grasp that a group of words can structurally take the place of one: *old frogs*, *fat old frogs*, *large fat old frogs*, *the large fat old frogs who lived in the pond* might take the structural place of the simple word *frogs* (see Fig. 12.1).

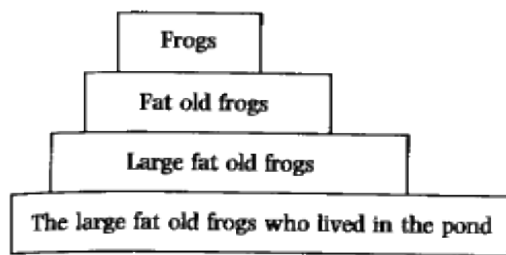


Figure 12.1 Hierarchical structure

In short, an awareness of hierarchical structure is necessary. It's possible that the replacement of a single item by an expanded group is part of a general cognitive awareness, which became applied to language (Cromer 1991). But until this had happened, a major power of language was missing.

Embryo adjectives may have aided this development. Take the Tok Pisin sentences (PRT is an untranslatable particle):

dok bilong yu i longlong, dok bilong mi i gutpela  
 dog of you PRT mad dog of me PRT good  
 Your dog is mad, my dog is good

Perhaps the adjective was reordered, and used to distinguish between similar nouns:

*longlong dok i ranawe, gutpela dok i stap long haus*  
 mad dog PRT run-away good dog PRT stay at house  
 'The mad dog ran away. the good dog stayed at home'

This example shows how one word might become extra-closely associated with another: the basis of hierarchical structure.

But even this does not explain generativity's most important property, the repeated reapplication of the same rule. Let us consider this phenomenon.

## Rerunning the same sentence

Language can rerun the same sentence structure again and again, by repeatedly reapplying the same rules, as in the 'simple plan' example (see above). This re-application is known as **recursion**.

This is the frog *which* swallowed the fly *which* settled on the water-lily which grew by the river *which* flowed through the fields *which* adjoined the village ...

The potentially endless sentence above illustrates a major type of recursion which is found in all languages. It involves relative clauses. Pidgins (and once again Tok Pisin) show how relative clauses might come into being.

Tok Pisin has a wide variety of possible relative clauses. Different structures compete, and different potential relative clause types predominate in different areas, in a true spaghetti junction situation (Mühlhäusler 1985; Aitchison 1992). But an increasingly common type of relative clause is one which starts with *we* , meaning originally 'where'.

Unlike English, Tok Pisin puts its question words at the end of sentences:

Yu go *we* ?  
You go where?  
'Where are you going?'

Longer sentences are easily made:

Mi go *we* yu go  
I go where you go  
'I go where you go'

From here, it is a very short step to ambiguous structures which signal the beginning of true relative clauses:[1]

mi drenim aut wara *we* mi boilim pitpit longen  
I drain out water where I boil pitpit in-it  
'I drain out the water in which (where) I boiled the pitpit (a vegetable)

ol i go long wanpela ples *we* i gat bikpela tais longen  
They PRT go to a place where PRT got big swamp in-it  
'They went to a place which had got (where there was) a big swami in it'

As a next stage, the meaning 'where' has been forgotten, and only the meaning 'which' remains:

pikinini *we* papamama lukautim yet...  
child which parents look-after still ...  
'A child which its parents still look after ...'

Ol i no laikim pater *we* i pulim longpela lotu  
They PRT not like priests who PRT drag-out long worship  
'They do not like priests who drag out the church service

Sista *we* wok  
Sister who work  
'The nurse on duty'

This type of relative clause, therefore, has exploited a word *where* which already exists, and adapted it to mean 'which' via ambiguous structures Its use as a general-purpose relativizer was possibly reinforced by *we* from English *when* :

Taim *we* mi bin sik nogut tru...  
time when I was sick no-good truly  
'The time when I was very ill...'

It was also probably reinforced by the speech of occasional visitors from the nearby Solomon Islands or from Vanuatu. Solomon Islands Pijin and Bislama (spoken on Vanuatu) are pidgins which have long used *we* as a relativizer:

waetman *we* i lukaot long stoa long Liro  
whiteman where PRT look-out for store at Liro  
'The European who looks after the store at Liro' (Bislama, 1923; data from Crowley 1990)

In addition, relative clauses may have been influenced by local Melanesian languages: some sentence patterns look superficially like English relative clauses, even though the basic structure is rather different (Keesing 1988).

Two major facts about language are revealed by relative clauses beginning with *we* in Tok Pisin: first, reanalysis is not a trivial happening, which affects only single words. It influences whole structures, and allows sentences (potentially) to go on for ever. It is a major tool of generativity. Second, humans are enormously good at pulling together input from numerous sources: the more the merrier, as it were. One source reinforces another cumulatively.

But relative clause construction is not the only type of recursion, as will be discussed below.

## Say say

Lapun i tok olsem 'pukpuk i longlong'  
Old-man PRT speak thus crocodile PRT mad  
'The old man said "The crocodile is mad"'

This Tok Pisin sentence suggests another way in which simple sentences can be linked together into one longer structure. *Olsem* is easily reanalyzed as a word introducing indirect speech:

Lapun i tok *olsem* pukpuk i longlong  
old-man PRT speak thus crocodile PRT mad  
'The old man said that the crocodile was mad'

At first, the construction was used with the word *tok* (talk). Then it was extended to other verbs:

Na yupela i no *save olsem* em i matmat?

And you PRT not know that it PRT cemetery  
'Did you not know that it was a cemetery? (Woolford 1979b: 118)

Sometimes, *olsem* is reduced to *se* :

Em i tok *se* em i laik bilong ol meri yet long maritim waitskin  
He PRT say that it PRT desire of PLURAL women still to-marry white-person  
'He said that women still wanted to marry a white man' (Mühlhäusler 1985: 414)

This Tok Pisin *se* is parallel to another word *se* found in Bislama with the same meaning, but with a different origin (Crowley 1989). Bislama *se* is probably primarily from an original English word *say* :

Joseph i giaman long mi *se* hem i stap wok  
Joseph PRT lie to me that he PRT is work  
'Joseph lied to me that he has a job'

It was supported by the existence of French *c'est* (it is), since it occurs in parallel constructions:

Bislama:

Taem *se* watu

Time is money

French:

Le temps *c'est* de l'argent

In a number of cases, the *say* and *c'est* origins have coalesced, so a Bislama sentence may appear to have been influenced by both:

Wanem mi stap talem *se* mi no finisim work blong mi yet  
What I keep say that/it's I no finish work of me yet  
'What I am saying is that I haven't finished my work yet'

The *se* constructions show, first, that complex sentences emerge naturally in languages, especially in connection with certain kinds of verb, in this case verbs of saying, extended to verbs of thinking and knowing. Second, they show that new constructions often 'take off' when one source supports another, which may happen by chance.

## New words

*Wantok* is the name of a Tok Pisin newspaper, from *wan* 'one' plus *tok* 'talk'. The word *wantok* means a 'fellow countryman', 'someone who speaks the same language'. Similarly, *wanbel* comes from *wan* 'one' and *bel* 'stomach', and it means a 'twin', and *wanlek* from *wan* and *lek* 'leg', meaning a one-legged person.

These examples show that as soon as a language has a supply of basic lexical items, it can use them for explosive expansion. Some examples of Tok Pisin vocabulary were given in chapter 1 . But the list is almost endless.[2] Tok Pisin *skru* , for example, is a 'screw' or 'joint'. It gives rise to:

skru bilong lek  
(joint of leg)  
'knee'  
skru bilong fut  
(joint of foot)  
'ankle'  
skru bilong han  
(joint of arm)  
'elbow'  
skru bilong pinga  
(joint of finger)  
'knuckle'

Or take the word *skin* meaning 'outer covering'. This gives:

skin bilong kiau  
(skin of egg)  
'eggshell'  
skin bilong kokonas  
(skin of coconut)  
'coconut husk'  
skin bilong diwai  
(skin of tree)  
'bark of tree'  
skin bilong trausel  
(skin of turtle)  
'turtle shell'

Plants and animals also get named, often by describing them much as we talk about *bluebells* or *goldfish* . In Bislama, *redfis* 'red fish' is a red snapper, *blufis* 'blue fish' is a parrotfish, *bigbel* 'big stomach' is a pufferfish, and *longmaot* 'long mouth' is a barracuda. Some of these coinages may date back a century or more (Crowley 1992a).

These examples of words and sentences show that language, once it gets going, can easily build and rebuild itself out of its existing resources. It is like a well which constantly replenishes itself: the more is taken out, the more is available for use.

But at some point, language spread out across the world. How this happened will be the topic of the next chapter .

## Notes

[1] The examples are taken from Mühlhäusler 1985 and Aitchison 1992.

[2] Examples are taken from Mihalic 1971, Mühlhäusler 1979, Crowley 1992a.



## 13. The widening circle: Moving outwards

Worldwide diffusion followed the origin of language. Language is recognizably language, wherever it has travelled, much to the astonishment of some nineteenth-century travellers: 'The grammar is precise and somewhat complicated...', noted one writer, on encountering the language of the Miskitu Indians in South America, 'it seems strange to find among an uncultivated and uncivilized race rules of grammar as precise and well known as are used by the most cultivated nations of Europe. The Indian who has no literature, no written or defined rules, uses the grammar of his language with uniformity and without confusion. How is this to be explained?' (Bell 1899:309).

But the widening circle of language raises two important questions: first, can the early routes of human language diffusion be plotted? Second, can any actual words or syntax be reconstructed for these prehistoric times? These issues will be the topic of this chapter.

### Out of Africa

Modern humans are all descended from a fairly small stock of ancestors, who came from Africa ([chapter 5](#)). Humans walked out of Africa and into Asia, starting perhaps around 75,000 years ago-though the exact date is disputed.[\[1\]](#) Tribe after tribe filtered outwards and onwards. These new sophisticated humans with their advanced language skills eventually took over the world. The migrants probably came in small groups, one after another. Greater linguistic divergence set in as they moved in different directions (see Fig. 13.1).

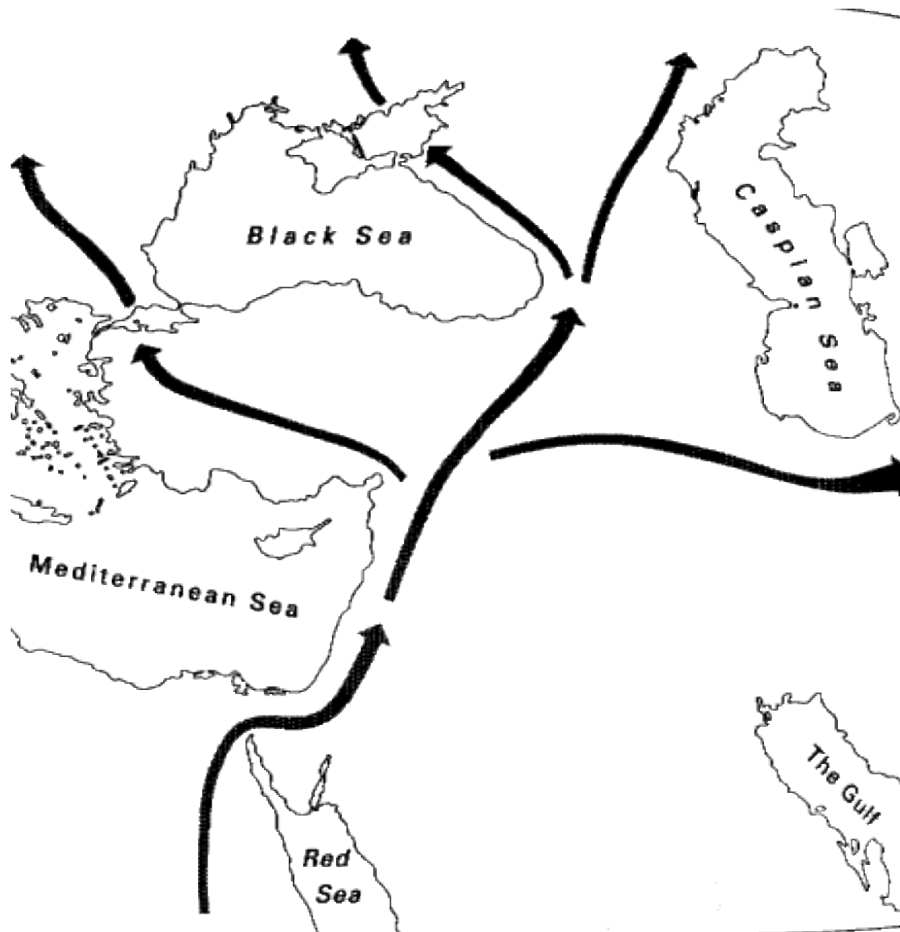


Figure 13.1 Africa to Middle East and onwards

The Middle East and particularly Lebanon provided a staging post, judging from the archaeological evidence. Both the skeletons and the tool technology suggest fully modern humans lived there from at least 50,000 BC (Mellars 1993). From there, the newcomers moved in various directions.

To the west, a culture of remarkable uniformity and considerable sophistication spread across Europe. According to Mellars (1993), remnants of it have been found in east and southeast Europe dating from around 45,000 BC, Spain around 40,000 BC, and southwest France around 35,000 BC. This archaeologist also comments (*ibid.* 2,7):

Arguably the most striking feature ...is the wide range of different aspects of behaviour which seem to have been affected. The changes range, apparently, into all spheres of culture: the technology of tool production, various forms of symbolic expression, food procurement patterns, demography, social organization and (almost certainly) into the more fundamental realms of communication and the related 'cognitive' structures of the human groups ... Indeed, the entire spectrum of ... behaviour and culture has a remarkably 'modern' feel (in anthropological terms) which would be hard to visualize without the kind of structures and subtleties of communication which only relatively advanced forms of language could provide.

Technically, this change occurred between the Middle Palaeolithic and the Upper Palaeolithic periods, and is associated with a culture often referred to as 'Aurignacian', named after the contents of a cave found at Aurignac in the Pyrenees.

The new humans did not kill off the existing populations. Peaceful coexistence with some 'acculturation' between them is the most likely scenario (Mellars 1993). The term 'Neandertal' or 'Neanderthal' is often used to refer to the pre-human population of Europe with whom the new humans interacted. Yet the Neandertals are themselves the subject of controversy. The name was given to a fossil skeleton found in 1857 in Germany. The bones are generally assumed to be around 120,000 years old. But nowadays there is considerable discussion as to whether the Neandertals were a previous population, separate cousins, cousins who intermarried, or even modern humans. The main problem is that the original remains were dug up before excavation and dating techniques had been refined.[\[2\]](#)

Other humans moved eastwards from the Middle East, and then Southwards to Austronesia, probably in small groups. 50,000 BC is the earliest date proposed for their arrival. The diversity of the mitochondrial DNA ([chapter 5](#)) found in Papua New Guinea is paralleled by the diversity of the languages. This may be explained by successive small waves of immigrants, who had spent some time in Asia before moving on to their final destination. No direct link exists between genes and language: the missing link is geographical location. People who are related genetically tend to live together and consequently speak the same language.

Some humans eventually arrived in America, though when this happened is disputed, as will be explained below.

## Into America

Everyone agrees on two things: first, that America was the last of the continents to be populated by humans, and second, on the route the newcomers took (see Fig. 13.2).

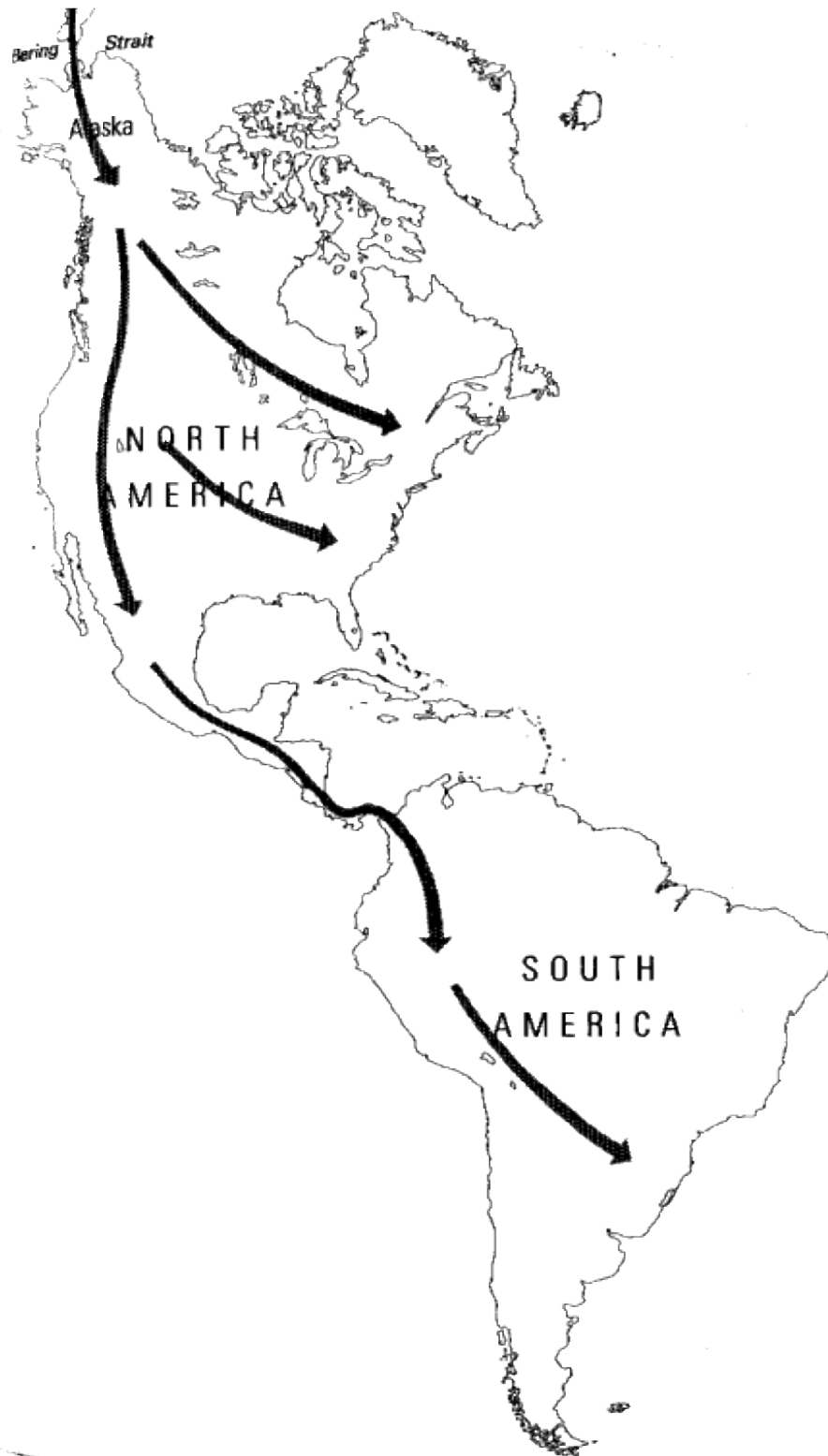


Figure 13.2 Into America

Adventurous easterners crossed from northeastern Siberia into northwestern Alaska. They went on foot via Beringia or by boat via the Bering Strait. Given the conditions in the Arctic, multiple entries of smallish groups are more likely than one massive cohort. The migrants may originally have spoken dialects of the same language, or perhaps related languages.

Northeastern Eurasia therefore 'provided seedstock for the languages of the New World. The subsequent differentiation of this seedstock has given rise to the unusually high degree of diversity, both genetic and typological, for languages in the New World' (Nichols 1990: 476).

But controversy surrounds the date of arrival, with proposed dates ranging from 35,000 BC to 12,000 BC.[\[3\]](#) The archaeological evidence suggests a date at least as early as 30,000 BC (Fortescue 1995).

The diversity of languages found in the Americas points to an early arrival date, according to some recent work by Johanna Nichols, from the University of California at Berkeley (Nichols 1990). Late-date supporters 'are in the wrong ballpark, given what can be determined about rates of diversification and migration in high-latitude areas like northeastern Siberia' (Nichols 1990: 476), which is the only way the immigrants could have come, she points out.

According to Nichols's calculation, a stock or major language grouping normally lasts at least 5,000 years, and just under 2 daughter languages are likely to survive from it. Approximately 140 Amerind (American-Indian) stocks now exist, so 5,000 years ago there were half that number or 70 stocks, 10,000 years ago only 35, and so on. It would take 35,000 years to reach a figure of under 2 stocks. The New World must therefore have been settled at least 20,000 and maybe even 40,000 years ago, she concludes (Nichols 1990).

The spread of language around the globe can therefore be mapped, at least in outline. But this leads to a highly contentious question. Can we do the reverse? That is, can we start with known languages and from them surmise what some of these early languages were like? This will be the topic of the next section.

## Reaching backwards

For centuries, scholars have pursued language backwards. Methods of doing this vary. Three of them may be useful for finding out about early language, judging from the claims of their proponents. Comparing relatives (i.e. languages which are descended from a common 'parent') is the oldest and most reliable method, but it cannot go back very far: 10,000 years is usually considered its maximum useful range. Comparing areas (i.e. comparing similar constructions across geographical space) is a newer method which may potentially lead back 30,000 years or more. Comparing word resemblances is a highly controversial new method: according to its advocates, it leads back to the origin of language. The pros and cons of these methods will be discussed below.[\[4\]](#) (See Fig. 13.3 )



Figure 13.3 Reconstructing the past

## Comparing relatives

The 'comparing relatives' method was developed in the nineteenth century, and is known as **comparative historical linguistics**.

Words from languages known to be 'daughters' of the same 'parent' are inspected, with a view to finding systematic links between them. Compare, for example, some Samoan and Hawaiian words:

Samoan	Hawaiian
<i>ufi</i> 'yam'	<i>uhi</i> 'yam'
<i>afi</i> 'fire'	<i>ahi</i> 'fire'
<i>faa</i> 'four'	<i>haa</i> 'four'

Samoan *f* repeatedly matches Hawaiian *h*. This is unlikely to be chance. Then a possible earlier common stage can be reconstructed.

Comparative historical reconstruction involves a step-by-step process of deduction. Above all, three guidelines are followed. First, the majority verdict: any route taken by most languages is assumed to be the most likely. Second, phonetic probability: the researcher takes into consideration which sounds are likely to change into which others. Third, language patterns: the reconstructions should be consistent with a plausible linguistic pattern.[\[5\]](#)

In the Polynesian example above (Crowley 1992b), the Proto-Polynesian words can be reconstructed as *\*ufi* 'yam', *\*afi* 'fire' and *\*faa* 'four' mainly because [f] often turns into [h], but the reverse does not normally happen; though for reliable conclusions, evidence must be drawn from many more words, and also other related Polynesian languages.

Distorting features are eliminated as far as possible. Recurring child-language words, such as *papa*, *mama* ([chapter 8](#)), are treated with caution, and so are onomatopoeic words, such as those representing the crowing of roosters, which tends to be represented by [k]-sounds all over the world, from Dutch *kukelelu* to Japanese *okekokkoo*. Items which could have been borrowed from a near neighbour are discounted, such as English *mutton* from French *mouton* 'sheep'. Isolated resemblances are ignored, as when the English word *bad* resembles a Persian word with the same meaning.

This method works best with languages which split when their speakers migrated in

different directions, as in Polynesia. It can lead back thousands of years, and it has proved especially useful in reconstructing Proto-Indo-European, the language stock to which English belongs, which is presumed to have been spoken around 3,000BC. But, as already mentioned, 10,000 years is usually considered its maximum useful range.

A few optimists have tried to build up a picture of a 'superlanguage', linking several existing language stocks. The first attempt started in the 1960s when two Soviet scholars, Vladislav M. Illych-Svitych and Aaron B. Dolgopolsky, proposed a hypothetical super-ancestor language which they called **Nostratic**, from the Latin word for 'our' (language). It covers Indo-European, the Dravidian languages of India, the Kartvelian languages of the southern Caucasus, the Uralic family including Finnish and Hungarian, Altaic, covering Turkish and Mongolian, and Afro-Asiatic, which includes Arabic, Berber and others (see Fig. 13 4).[\[6\]](#)

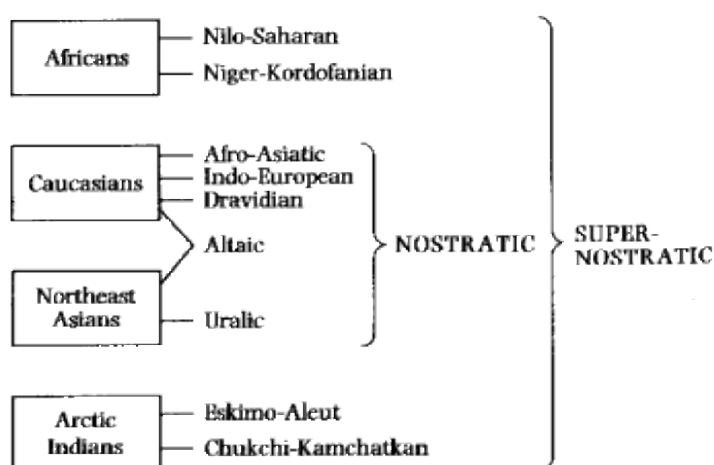


Figure 13.4 Proposed Nostratic groups

Some investigators have proposed an even wider super-grouping, sometimes labelled Super-Nostratic, which adds in extra language stocks such as Eskimo-Aleut from America, Chukchi-Kamchatkan from Siberia, and Niger-Kordofanian and Nilo-Saharan from Africa (Kaiser and Shevoroshkin 1988: 309-10).

Distant links between languages must exist, given that human language sprang from a single source. But at remote time-depths, relationships are hard to establish. One clue that these links may be on the right track is DNA sampling ([chapter 5](#)). Some argue that the 'gene trees' correlate well with language stocks[\[7\]](#), even though genes have no intrinsic connection with languages, as explained earlier (p. 164).

Cavalli-Sforza (1991), a researcher who has spent years matching gene distribution with Nostratic languages, claims that 'The distribution of genes corresponds surprisingly well with that of languages' (p. 76). But not everyone agrees with this assessment (3.g. Nei and Roychoudhury 1993).

However, hunches about Nostratic may not be the only way to roll back knowledge about

language. Other possible methods (mentioned above) will be discussed below.

## Comparing areas

A new 'comparing areas' method may lead back more than 30,000 years. Its aim is to find 'principles governing the distribution of structural features among the world's languages' (Nichols 1992:2). It seeks out stable and independent linguistic characteristics which might have spread over large areas.

Borrowing via contact is the key to this new approach. Features which are taken over from another language seep in slowly. New words are easily incorporated, but other constructions take time to Spread from language to language, and, if found, guarantee a long period of close acquaintance. A bilingual population is usually required for these to take hold, at least on the border between languages.[\[8\]](#)

The new 'comparing areas' method has been developed primarily by Johanna Nichols, who calls it **population typology**. She treats it as a population science, that is, a linguistic counterpart to population biology and population genetics, which analyse variation within and between populations of organisms and use the results to describe evolution' (Nichols 1992:2). This wide-ranging geographical approach therefore complements existing attempts to find links between languages.

Population typology is not entirely new, in that linguistic areas, have long been recognized, cases where a linguistic feature has spread across unrelated but geographically adjacent languages.[\[9\]](#) Many Indian languages, for example, have retroflex sounds, in which the tongue is curled back against the roof of the mouth, This must have developed via contact, since retroflexion has spread across different language families.

Population typology is innovative in that no serious study has ever before attempted to plot and quantify shared characteristics on a long-term time-scale over large sections of the globe. Nichols has sampled a worldwide range of languages, on a number of linguistic features which are independent of one another.

The inclusive/exclusive opposition was one feature examined. Some languages, such as Guugu Yimidhirr in Australia, and Tok Pisin in Papua New Guinea, distinguish between two types of *we*, 'inclusive' when *we* includes the other people in the conversation, and 'exclusive' when it does not, as in the Tok Pisin sentences below:

Asde *yumi* lukim bikpela snek (*we* inclusive)  
'Yesterday we (you and I) saw a big snake'

Asde *mipela* lukim bikpela snek (*we* exclusive)  
'Yesterday we (I and some other people) saw a big snake'



The percentage of languages having this opposition increases dramatically towards the east, judging from a representative sample. It occurs in a mere 10% of European and Caucasian languages (one out of ten languages examined), in 56% of South and South East Asian ones (five out of nine), but in a massive 89% of the Australian languages (seventeen out of nineteen) (Nichols 1992: 124).

Plurality neutralization on nouns was another feature scrutinized. That is, cases where the noun did not carry any marker overtly showing it to be plural: plurality was marked primarily on the verb, as in a largish number of North American languages, such as Central Pomo, spoken in California (Mithun 1988):

yoohtow caac' waada  
south-from person go-SINGULAR  
'There s a person coming from the south'

yoohtow caac' hlaada  
south-from person go-PLURAL  
'There are people coming from the south'

Once again, this feature showed an eastwards increase. For this purpose, America is regarded as being eastern, since it was populated from the east, via the Bering Strait (p. 164).

An eastward increase was found in a further distinction, between alienable and inalienable possession, that is, things possessed that could be separated from one's person, such as 'my horse', and things that cannot as in 'my foot'.

In summary, for a number of independent language characteristics, there was a superficially puzzling increase: the further east the language, the more likely the feature was to occur, across a range of different language stocks.

A possible explanation runs as follows. In historical times, colonization movements have been primarily from west to east. Therefore if these features were recent ones, one would expect them to be highest in the west, and lowest in the east. If they were old ones, one would expect them to be gradually disappearing as western influence took hold, and so be lowest in the west, and highest in the east, as is the case. In short, the features which show an eastwards increase may be very old, and may reflect early population movements.

The peopling of the world may have happened in three stages, according to Nichols. First, the origin of humans and human language happened in Africa. Then came 'the stage of expansion', in which humans colonized areas within Europe, inner Asia, Australia and America. She dates this to between 60,000 and 30.000 years BC. The third stage followed on, and involved the rise of complex societies and large-scale economies. There was probably a reduction in linguistic diversity, and the spread of a few lineages

across the known world.

Some of the features which increase towards the east may represent the 'stage of expansion', she believes. If she is correct, then she has provided glimpses of language at a time-depth far greater than had previously been thought possible. She comments: 'Thus our closest perspective on human language comes from the Pacific and the New World, areas relatively unaffected by the vast spreads in the Old World. The population profile of statistical propensities and diversity of these regions can justifiably be regarded as primordial, and the populations that most clearly show that profile ... are our best models of human language' (Nichols 1992:281).

All languages are equal, in that all languages can express anything they want to express, and all possess similar basic characteristics ([chapter 14](#)), so there is no suggestion that these old features are in any sense 'primitive': they merely represent a different way of expressing things from the way most of us are used to.

Nichols has proposed an interesting new method of exploring the past. Inevitably, her claims are controversial, and they have not yet been fully assessed. Hopefully, future research will show whether or not she is right.

## Comparing resemblances

The monosyllable *tik* meaning finger is 100,000 years old, according to one optimistic hypothesis, so are the words *tsuma* 'hair', *kuan* 'dog' and *bur* 'ashes, dust' (Ruhlen 1994). The conclusions were reached by a 'lucky dip' approach: trawling through dictionaries, and coming across superficial resemblances between words in far-flung languages. A hypothetical *bur* 'ashes, dust', for example, is claimed to have links with Classical Hebrew *bar* 'field, open space', a word *bur* 'dirty, muddy, dark' from Khalka, a Mongolian language, and a word *pra* 'ashes' in Cayapo, an Amerindian language, to take a sample of the quoted 'evidence'. Most linguists treat these claims with scepticism.

Problems abound with this 'lucky dip' approach, sometimes known as 'the method of mass comparison'.[\[10\]](#) Chance resemblances are easy to find among different languages if only vague likenesses among shortish words are selected. Such words pulled out from a wide time range, across multiple centuries, provide an even greater likelihood of chance similarities.

More importantly, sounds change radically over the centuries. Words which existed so long ago are unlikely to have survived in anything like their original state. Quite a lot is now known about which sounds tend to be stable over time, and which unstable. At the beginning of a word, *m-* is fairly stable, and so is *n-*, but most others change hugely over the course of a thousand or so years. To return to *tik*, neither [t] nor [k] are particularly stable sounds, so doubts are raised by the very fact that some modern words similar to *tik* are quoted as relations, as Turkish *tek* 'only', *tek* 'fingernail' from Boven Mbian in

Southwest New Guinea, and Greenlandic *tik(-iq)* 'index finger' (Ruhlen 1994:322). For comparison, consider some more traditional etymologies: the English word *tick* 'a kind of mite' has as its possible nearest relatives German *zicke*, and Irish *dega* 'stag-beetle'. while our own word *finger* is usually associated with an old word for 'five', which around 3,000 years ago was probably something like *\*penkwe* or *\*kwenkwe*.

Taboo is a further problem: words for body-parts sometimes involve prohibitions both in primitive societies and in our own. This makes it even harder to be sure of past forms.

To summarize, the 'lucky dip' approach does not make any attempt to eliminate accidental correspondences, nor does it control for phonetic probability or taboo. These basic problems are aggravated by factors inherent in reconstructions of earlier forms of any language: meanings tend to be reduced to fairly simple, straightforward items, with a limited number of phonetic shapes. In these circumstances, chance similarities are likely to play a worryingly high role, and this 'mass comparison' method is unlikely to stand the test of time.

However, the diversity of language, both old and new, leads to another question. Is it possible to identify a 'hard core', a universal base found in every language? This will be the topic of the [next chapter](#).

## Notes

[1] Various figures have been proposed between 100,000 and 50,000-75,000 is average.

[2] Johanson and Edey 1981/1990: 24. On the discovery of a 'Neandertal' hyoid bone, see [chapter 7](#).

[3] 35,000 is the date in Nichols (1990), earlier than most. Greenberg (1987) proposes a much later date, and is now thought by many to be mistaken.

[4] A number of other, well-established methods of reconstructing the past also exist, but they take us back at most only a few thousand years. For these methods, see Aitchison 1991, Crowley 1992b, Fox 1995.

[5] For further details see Aitchison 1991, Crowley 1992b, Fox 1995.

[6] For a summary, see Ross 1991:75; see also Ruhlen 1992, Kaiser and Shevoroshkin 1988.

[7] Cavalli-Sforza 1991; Cavalli-Sforza, Piazza, Menozzi and Mountain 1988; Cavalli-Sforza, Minch and Mountain 1992; Cavalli-Sforza, Menozzi and Piazza 1993.

[8] For a summary of borrowing, see Aitchison 1991; for a more extensive survey, see Thomason and Kaufman 1988.

[28] For an outline account, and further references, see Aitchison 1991.

[33] See Salmons 1992, who lists a number of problems.

## 14. The hidden core: The hunt for universals

'100% of the people in this carriage have heads. Therefore this is a good place to advertise hats' ran an ad on the London underground. Similarly, maybe language universals can be detected, a set of basic language characteristics, equivalent to human heads, or the unchanging features of the beach in the quotation above. This is a recurring hope among language researchers.

Any human can learn any language, so something must link all languages together, even though some have been geographically separated from others for at least 50,000 years. But 'language universals' in the sense of 'features which occur in all languages' are extraordinarily elusive. Over fifty years ago, the American linguist Leonard Bloomfield commented: 'Features which we think ought to be universal may be absent from the very next language that becomes accessible' (Bloomfield 1933: 20), and similar comments are still being made: 'It is dangerous to speculate about what must be in language, and all too often what appears to be an "obvious" fact about language turns out to be merely a feature of English and familiar (usually European) languages' (Palmer 1994: 22).

The term 'universal' sounds simple enough, but 'features found in all languages' is not the only possible interpretation. Sometimes, it refers to a universal repertoire, in the sense of 'features which are *available* to all languages', of which any single language will select only a proportion (Chomsky 1965). For example, the 'universal' stock of speech sounds is presumably finite, given the range of sounds which can be produced by the human vocal organs. But each language will contain only a subset of these. The universal store includes noises which are odd to English ears, such as the 'clicks' of Xhosa, a South African Bantu language, which sound to English ears somewhat like 'kissy-kiss' noises, the 'gee-up' encouragement made to horses, and the 'tut-tut' of disapproval.

Just occasionally, the word 'universal' is used in an even wider sense, to mean 'apparently true facts about languages'. Décsy (1988:60) claims to have gathered together 586 'universals', which include statements such as '14% of the languages of the world have long consonants', and 'verbs for snoring contain an *r* in many languages'.[\[1\]](#)

But if the term 'universal' is restricted to its narrowest and most obvious sense, that of characteristics shared by all languages, then hardly any can be found. This chapter will consider this problem.

### The rarity of absolute universals

Relatively few features are common to all languages. Bolinger (1968:18) quoted a presumed six, but critics disputed even some of these, commenting: 'Even though universals in the strictest sense of the word may exist, some of the most likely candidates

for strict universality can turn out to be disappointing (Mallinson and Blake 1981: 9).

Of course, it's easy to think up fairly broad 'design features' for languages, if characteristics shared widely with some other animals are included. The linguist Charles Hockett first tried to do this in the 1950s, though his list changed over the years.[\[2\]](#) Hockett's list included, for example, 'interchangeability', meaning that all humans could both send and receive messages.

But, often, features shared with many other animals are too broad to be truly illuminating. Consider the claim that all human languages use outgoing air from the lungs. This is true. It is the main airstream mechanism in all languages, but it is not necessarily the *only* one. Sometimes outgoing air comes from a source higher than the lungs. Hausa, for example, the main language of Northern Nigeria, has ejective sounds, produced by expelling a pocket of air trapped between the tongue and the glottis. Some languages also use indrawn air. For example, Sindhi, spoken in India and Pakistan, has implosive sounds, in which air trapped between the tongue and glottis is pulled inwards. And Xhosa clicks suck back air from within the mouth. No language uses the whole range of possibilities, though Uduk, spoken in southern Sudan, has implosives and ejectives as well as the more usual pulmonic egressive sounds-those produced with outgoing breath from the lungs.

A possible list of 'narrow' absolute universals (features found in all languages) runs as follows.

All languages:

1. have consonants and vowels.
2. combine sounds into larger units.
3. have nouns-words for people and objects.
4. have verbs-words for actions.
5. can combine words.
6. can say who did what to who.
7. can negate utterances.
8. can ask questions.
9. involve structure-dependence ([chapter 12](#)).
10. involve recursion ([chapter 12](#))

But even these few could be criticized as misleading. For a start, language can be transferred to sign language, which would eliminate the first two.

If spoken language only is considered, then these ten proposed universals are still problematic. For example, some have queried the claim that all languages distinguish nouns and verbs. The noun-verb distinction may be blurred in Nootka, an American-Indian language, spoken in the northwestern USA (Swadesh 1939). At first sight, Nootka places verbs first in the sentence, followed by a tense ending, and nouns second, often

followed by the definite marker (examples from Schachter 1985: 11).

mamuk-ma quʔas-ʔi  
work-PRES man-the  
'The man is working'

But consider the following, where the order is reversed and the endings also are switched over:

quʔas-ma mamuk-ʔi  
man-PRES work-the  
'The worker is a man'

Sentences such as these have led to claims that Nootka does not have a verb-noun division.

Nootka shows that some languages work in weird ways, by English standards. But Nootka may not be as astonishing as was first thought. In many languages the same word stem can be both a verb and a noun. Consider the English sentences:

Everybody *must* work  
*Work* is a *must* for everybody

In the first sentence, the words *must* and *work* are both verbs, in the second they are nouns. When a verb is used as a noun, the secondary use is often restricted, as shown with *must*. So in English, you can say 'Work is a *must*', but not '\*Work is *the must*' or '\*Work is *this must*' (with an asterisk marking an ill-formed sentence). The Nootka examples are apparently similar, in that the words are not freely interchangeable (Schachter 1985).

Another possible interpretation of the Nootka data is that the word order has been shifted around for emphasis. In this case, *-ma* is not a true present tense, but a clitic, a word which attaches itself to another word, here to the first word, even though it may not 'belong' to it in any strong sense (Anderson 1985a).

In short, Nootka nouns ARE distinguishable from verbs, though the distinction is not as clearcut as in English, and Nootka specialists still discuss it: 'While diligent search reveals some characteristics distinguishing these classes, the difference is anything but obvious' (Anderson 1985a: 155). It's a bit like finding some flowers which apparently don't have petals; but on closer inspection, they often do, though petals quite unlike those associated with roses or daisies.[\[3\]](#)

The case of Lisu, spoken in Burma, is perhaps odder. Supposedly, it cannot state clearly who did what to who. Li and Thompson (1976:472) claimed that, in this language, 'even the grammatical relations Agent and Patient cannot be identified'. Take the sentence:

làma nya ánà kyù-a  
Tigers TOPIC dogs bite

This could mean either 'Tigers bite dogs' or 'Dogs bite tigers.' The only marker is *nya* which highlights the topic of conversation. So the sentence could be: 'It is tigers that bite dogs' or 'It is tigers that dogs bite'. This is fairly weird, by the standards of most languages.

But Lisu is not quite as peculiar as it seems at first sight. First, many of the ambiguous sentences are clear from the context. Second, and more importantly, a particle *lae* marks the patient in some sentences. So the overall conclusion is that Lisu sometimes marks the difference between agent and patient, but does not do so obligatorily, as do some languages. Furthermore, it's not spectacularly odd to have sentences where the person who did the action is unclear, as in English 'The shooting of the policemen horrified everybody.' Did the policemen shoot, or were they shot? It's impossible to say for sure.

The Nootka and Lisu examples show that neither of these languages is quite as weird as was once thought. But neither of them maintains clearcut boundaries for distinctions which English regards as essential. They show how difficult it is to sort out absolute universals for language even at a basic level, especially as linguists disagree as to how to tackle the problem.

## Buried treasure

Just as the pirates searching for buried treasure in Robert Louis Stevenson's novel *Treasure Island* cannot agree on where to dig, so linguists argue, often bitterly, about the best way to proceed when they hunt for the linguistic treasure of language universals among the world's 5,000 or so tongues.

Traditionally, there are two main methods, which can be called shallow scraping and deep delving.<sup>[4]</sup> Shallow scrapers zap around the world collecting specimens from numerous languages, and then compare them to see what they have in common. Joseph Greenberg is often regarded as the 'father' of the shallow scrapers, whose pioneering work on universals in the 1960s 'set the ball 'rolling'.<sup>[5]</sup> Deep delvers, on the other hand, look in depth at the behavior of one particular language. They then check this against other languages, to see if they have identified common properties. Noam Chomsky and his followers represent the deep delving approach (e.g. Chomsky 1980, Coopmans 1984).

Both methods have good and bad points. The advantage of shallow scraping is that it considers a large sample. The method may be useful in the early stages of research, since it gives some idea of the range of data which needs to be accounted for. It takes the inductive approach to knowledge, in which theories are formulated by seeking patterns in a wide array of data.



But shallow scraping contains inherent problems. First, some theory must subconsciously have been formed in order to decide what data to collect, not least about what constitutes a language. Second, patterns are often difficult to detect in disparate arrays of data. In this situation, there is a subconscious temptation to look at only a portion of the evidence, and impose patterns which are not really there.

A third problem with the surface-scraping approach is that the observations are often fairly superficial, because there is not time to look at each language in detail. For example, little can be done with an observation such as 'All languages have the sound [t]', unless it is fitted into a wider framework, such as how many *t*-sounds there are in a language, and which sounds they contrast with: Hindi, for example, has four contrasting types of *t*, compared with English which has only one (and even this one is pronounced in different ways depending on where it comes in a word).

Deep delving represents the deductive approach to knowledge, in which a hypothesis is formulated, and then tested against new evidence. If the hypothesis is disproved, then an amended theory is formulated, and so on.

To take an imaginary non-linguistic example, suppose Yok, a man from Mars, found a dead goldfish up an apple tree. He might first guess that it flew there to eat apples and died from overeating. But he might later discover that goldfish cannot flit through the air, so would reformulate the hypothesis: something took it there. Then he would guess what: maybe a cat, or a large bird, and so on. This is the standard way to proceed. As a linguistic example, a preliminary hypothesis might be: all English sentences must contain a noun phrase followed by a verb phrase. Then the researcher might find: *Sing!* or *Up jumped the swagman*. The hypothesis would have to be amended or abandoned.

Deep delvers can formulate detailed hypotheses about a particular language, and how its different parts interact. The guesses can then be tested against other languages. But the method also has problems. Its proponents tend to overemphasize the importance of any language they have studied in depth, and so fail to propose hypotheses which might occur to them if they had looked at data from a wider range of languages.

Deep delving also encourages speculation, the postulation of wild ideas which cannot be disproved. Chomsky has suggested that linguists seeking for principles of language are like physicists trying to understand the thermonuclear reactions hidden in the sun's interior (Chomsky 1980). They have to make elaborate guesses about how the sun's heat is converted into light. In some circumstances, as perhaps with the sun, it may be impossible to put forward truly testable hypotheses, but it's important to try.

An untestable hypothesis might be proposed if it was the only suggestion which fitted in with the rest of an otherwise tested theory. If Felix the cat was seen with a goldfish in its mouth, and was also known to be good tree-climber, then a hypothesis that Felix took the goldfish up the tree is highly plausible, if untestable.

But there's always a danger of circularity, especially if more than one researcher is involved. Suppose Yok's friend Yak saw apples floating in a fishpond: her hypothesis is that goldfish eat apples. Yok's original hypothesis was that goldfish climb trees. Yak quotes Yok to back up her proposal, and Yok quotes Yak, and the goldfish-apple myth enters Martian folklore for ever (cf. Gross 1979:966).

To summarize so far, shallow scraping is important particularly in the early stages of research, in order to explore the data which must be accounted for. Deep delving is a standard method once researchers understand some of the basic questions which need to be asked, though it must take care not to get into a state of closed-circuit functioning.

But whichever method is used, the task is still a mammoth one. The next section will discuss some ways in which a hunt for universals can be made more manageable.

## Snark-hunting?

The search for language universals sometimes resembles the hunt for the mythical Snark in Lewis Carroll's poem, in that the searchers do not know the shape of the entity they are pursuing.

A possible step forward is to divide universals into different types. For example, at one time the American linguist Noam Chomsky suggested universals might be either substantive, the substance out of which language is made, or formal, the way in which language is arranged (Chomsky 1965). In outline, this is a good idea, and works in some non-linguistic situations: the beaks of all birds are made out of the same substance, but they differ quite dramatically in form: the beak of a toucan is quite different in shape from that of a parrot or duck. But in language, the division ran into problems. Nobody could agree on whether a statement such as 'All languages have nouns and verbs' was a claim about substance or form, for example.

Two further dimensions have provided a more useful approach. Universals can be looked at via degree of firmness, on the one hand, and degree of independence on the other (see Fig. 14.1, p. 185).

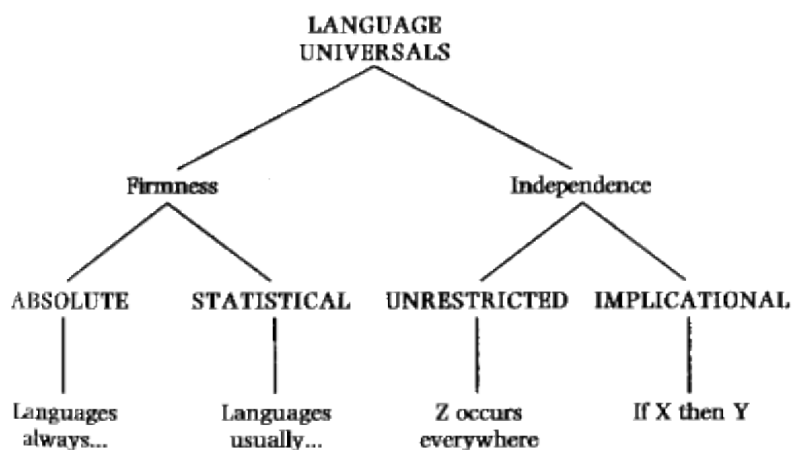


Figure 14.1 Types of universal

On the firmness dimension, a distinction can be drawn between absolute universals, those true of all languages, which are disappointingly few, and statistical universals, those applicable to most languages.

Statistical universals are features which are overwhelmingly likely to be found in a language, but may occasionally be absent. The 'unmarked' situation, the normal, basic one, can then be contrasted with the 'marked' situation, the unusual, exceptional one. For example, nasals usually involve vibration of the vocal folds. So-called voiceless nasals, without vocal fold vibration, are rare. They occur in a handful of languages only, as in Klamath, a Californian American-Indian language. In one sample of around 300 languages, only 10 were definitely found to have voiceless [m], compared with 296 which definitely had voiced [m]. This 296 included the 10 which had voiceless [m]: no languages had only voiceless [m] (Maddieson 1984).

Statistical universals are useful for dealing with languages which appear to 'go mad'. A comforting myth exists that any language somehow balances itself out: a complicated set of vowels is balanced by simple consonants, or vice versa. Or complex word endings compensate for simple syntax, and so on. Sometimes this appears to happen, but not always. Some languages just appear to be 'way out'.

Consider the ratio of consonants to vowels. In the 300-language sample mentioned above, the total number of consonants varied between 6 and 95 with a mean of 22.8. The total number of vowels varied between 3 and 46 with a mean of 8.7 (Maddieson 1984). But as a general tendency, the greater the number of consonants, the greater the number of vowels: 'The tendency for vowel inventories to increase in, step with increases in consonant inventories is the opposite of the prediction made by a compensation theory' (Maddieson 1984: 17). Another possibility considered was that languages with contrastive stress and several tones might require fewer different sounds. But again this was not borne out: 'The overall tendency appears once again to be more that complexity of different kinds goes hand in hand, rather than for complexity of one sort to be balanced by simplicity elsewhere' (Maddieson 1984: 21). And the same was true of the

relationship between number of sounds and syllable structure, that is, large inventories did not result in simple syllables. In short, these investigations suggested 'that complexity of various kinds occurs together in languages, and that languages really do differ in their phonological complexity' (Maddieson 1984: 23).

To take another example, languages streamline their aspectual systems, judging from Tok Pisin ([chapter 11](#)). But Central Pomo, an American-Indian language spoken some 100 miles north of San Francisco, has an intricate mesh of fine distinctions. Among its numerous aspectual forms are an imperfective, for unfinished actions, as in 'the ground is drying up'; a habitual imperfective, as in 'children would pack those little fish around in their pockets and eat them like popcorn'; a continuative, as in 'she kept grabbing on to it'; and a frequentative, as in 'Do you go away a lot?' And some of these could be combined further, as in 'I used to talk to him all the time', which involves imperfective, habitual and frequentative. All of these are expressed primarily by combining the consonants [d] and [w] with various vowels, in a system which has around 30 consonants to choose from (Mithun 1995). For example:

Wá·ymin-wa ma ?é·y-yo-hduwa-dan ?  
often-QUESTION you away-go-FREQUENTATIVE  
'Do you go away a lot?' (example from Mithun 1995)

This frequentative is composed of several different aspectual suffixes, and can be split into *yo-h-du-w-ad-an*. In such cases, statistical universals seem essential.

But the independence dimension may be ever more important. Universals can be subdivided into unrestricted universals, encapsulate independent facts, such as 'All languages have vowels', and implicational universals, which have an *if-then* connection: 'If a language has X, then it will also have Y', as 'If a language has voiceless nasals, then it will also have voiced nasals': voiced nasals can exist without voiceless ones, but not vice versa (as explained above).

Implicational universals can reveal important restrictions on languages, as many researchers now realize (e.g. Chomsky 1986). A search for restrictions and constraints (things that languages DON'T do) may be the most useful way of tackling the universals problem. This will be the topic of the [next chapter](#).

## Notes

[1] See also Aitchison 1988 for review of Décsy 1988.

[2] For a discussion of design features, see Aitchison 1989a. See Hockett and Altmann 1968 for one of the later versions.

[3] Schachter 1985 notes that Tagalog, in the Philippines, has some similarities to the Nootka case.

[4] The terms 'shallow scraping' and 'deep delving' are my own. Aitchison 1986 and Aitchison 1989b, though the controversy is one of long standing. The two approaches are well explained, though not labelled, in Comrie 1989.

[5] E.g. Greenberg 1963/1966. Greenberg's tradition has been carried on by others, e.g. Comrie 1989.

## 15. Ruling the rules

The permitted patterns or rules of all languages constantly change, and new words are continually coming into use. Yet language never collapses: the rules do not spiral out of control. Each new generation of children can cope with learning their language. And, with a bit of effort, all humans can learn any other human language, though they are baffled when faced with the communication systems of other species.

It's an odd situation when it's impossible to find more than a few broad language universals. Some principles must rule the rules. Language has 'hidden secrets', reins which keep it in check, and linguists are who try to find out what they are. Let us consider the matter further.

### Prohibitions vs preferences

Language must have strong constraints, bounds which restrain it. It's easy to think up some things which languages don't do. No language works by simply reversing its words to mean the opposite. That is, *Boris is tired* would not in any language have a word reversal as its negative, *\*Tired is Boris*, to mean 'Boris is not tired.' But it's less easy to explain why this is so.

Broadly speaking, constraints are of two types, filters and preferences. Filters close off certain possibilities absolutely. Such prohibitions are true constraints. Preferences, on the other hand, provide channels which are easy to flow along. They turn attention away from some non-preferred, though possible, routes. Such pseudoconstraints are often difficult to separate from prohibitions.

Some filters are due to physical limitations: no speech sound can be made by placing a tongue-tip on one's ear, the human tongue is just not long enough. Preferences also may reflect physical make-up. The sound [f] is normally made by placing the upper teeth on the lower lip. But a similar sound can be made by placing the lower teeth on the upper lip. Because the top jaw normally protrudes beyond the lower jaw, the first is an easier and quicker method of producing *f*, and is the one found in all known languages. But occasionally someone with a minor defect, perhaps no top teeth, selects the second way, showing that the standard *f*-route is a preference, rather than a prohibition.

Or take hearing. Humans can perceive only a limited range of sounds. The make-up of their ears prevents them from hearing some high squeaks of bats, or some of the low notes found in whale songs. These are therefore filtered out as possible human speech sounds. To take a preference, no human language has eight different types of *l*, or six different types of *r*, even though physically these would not be impossible to produce. But it would probably be too difficult for humans to pronounce them fast and distinguish

them easily. The record, incidentally, is held by Irish, which is reported to have six types of *l* and four types of *r* (Maddieson 1984), though the vast majority of languages have one *l* and one *r*.

In some areas, prohibitions and preferences merge into one another, as in memory restrictions. Humans have a fairly small working memory span-memory for things they do not wish to store permanently: most people can remember a phone number for a few moments, long enough to dial the number after looking it up in the phone book. In line with short-term memory limitations, humans plan and produce speech in smallish chunks. The approximate span is revealed above all by errors: items within a planned span sometimes get confused, as in 'He threw the window through the clock' for 'He threw the clock through the window'. But it's difficult to set an absolute limit.[\[1\]](#)

Ideally, constraints which reflect general human abilities should be separated from those due to special linguistic mechanisms. But in the animal world, constraints due to purpose-built structures cannot always be separated from those caused by more general factors.

Consider the hexagonal shape of the honeycomb cells made by bees. This is the only area of bee-life in which hexagons occur, and one might therefore suppose that bees have an innate knowledge of hexagons, specifically inbuilt to enable them to store their honey in this way, and in no other. But hexagons are the inevitable result of bees pushing with their hemispheric heads from a variety of directions, it turns out (Bates 1984). So even unique structures may not be genetically purpose-built.

Possible rediscovery presents a similar problem. All through the ages, humans have probably run away from lions. An innate fear of lions might constrain their actions, and force them down one route rather than another. But it's more likely that they have looked at the teeth and claws and decided that a wrestling match would be too great a risk. To take another example, bows and arrows occur widely around the world. But this does not make them 'innate hunting structures': they represent a recurring thoughtful response to the problem of killing prey that runs faster than humans.[\[2\]](#)

As these examples show, constraints overlap with universals: if humans are prevented from going down alternative paths, they may be inevitably pushed in one particular direction, resulting in an apparent universal.

To summarize, universals and constraints overlap: they are opposite sides of the same coin. Language contains two types of constraints: filters (real constraints) and preferences (pseudoconstraints). And these may work on at least two levels: that of general human abilities, and that of language.

At one time, linguists tried to find absolute, independent constraints. But they proved frustratingly elusive. As time went by, constraining links turned out to be more illuminating, as will be discussed below.

## No smoke without fire

'Where smoke, there fire' is a proverb which goes back around 2,000 years, when it's found in the old Indian language Sanskrit (Carr 1986). Similar constraining links (if X, then Y) occur within language ([chapter 14](#)), and their importance is enormous in reining in the multiple possibilities of language.

Finding them is a challenge. The evidence has to be treated with care, because superficial correspondences may mislead. To take a trivial example: human eyes and legs come in pairs. But eye structure is not necessarily based on leg structure, or vice versa.

Correlations need to be treated with equal caution. The geographical distribution of bowel cancer in the world correlates broadly with the ownership of telephones. But a significant link between this disease and buying a phone is unlikely. Similarly, growth in children's height normally correlates with language acquisition, but height and language are not directly connected. Two problems therefore exist: first, finding genuine links, second, explaining them.

The study of implicational universals in language dates from the work of the Czech linguist Roman Jakobson over fifty years ago. He suggested, for example: 'The first consonantal opposition [In child language] is that of nasal and oral stop (e.g., *mama-papa*), which is followed by the opposition of labials and dentals (e.g., *papa-tata* and *mama-nana*). These two oppositions form the minimal consonant system of the languages of the world. These are the only oppositions that cannot be lacking anywhere' (Jakobson 1941). Following his ideas, considerable work has been done on sound-structure implications, over which he was partially right, and partially wrong.[\[3\]](#)

Word-order implications have attracted attention in the last quarter-century, inspired by the work of the American linguist Joseph Greenberg in the 1960s. He proposed a number of links, such as 'with overwhelmingly greater than chance frequency, languages with normal SOV [= subject-object-verb] order are postpositional'.[\[4\]](#)

Most such links are statistical, rather than absolute ([chapter 14](#)). This is shown recently by Dryer (1992), which has been adjusted for geographical distribution and genetic relationship. 70 verb-before-object (VO) languages had prepositions, while only 12 had postpositions. In contrast, 107 object-before-verb (OV) languages had postpositions while 7 had prepositions. Adpositions therefore follow the pattern of verbs: an order of preposition-noun correlates with VO (verb-before-object), and noun-postposition with OV (object-before-verb):

	VO	OV
Prepositions	70	7
Postpositions	12	107



On closer examination, parallel patterns between different word classes occur more extensively, with the 'head' of the phrase (the most important word structurally) tending to be placed in a similar position in different types of phrases:

Peter was        *furious* with his brother  
Geraldine was *out* of the room  
Alex was        *thinking* about his mother

This tendency has been labelled the **principle of cross-category harmony**: 'The more the word order co-occurrence sets of languages depart from this "ideal" harmonic ordering, the fewer exemplifying languages there are' (Hawkins 1983:134). It has been widely recognized as valid[\[5\]](#), even though identifying the head of a phrase is sometimes problematic.[\[6\]](#)

Other parallels between different types of phrase have been proposed. For example, some languages may primarily add markers to heads, others to their dependents, it has been suggested (Nichols 1986; Vincent 1993). Maltese *bin Alla* 'son of God' marks the head: the word 'son' has been altered from *iben* to *bin* to show the meaning 'son-of'. But English behaves differently: it marks the dependent, as in *son of-God*, or *God's son*, though not everyone agrees that this is a significant distinction.[\[7\]](#)

Noam Chomsky has put forward perhaps the best-known of recent implicational theories.[\[8\]](#) Children, he suggests, have an inbuilt knowledge of some basic language principles. But in addition, they are instinctively aware of some key 'either/or' options. They need to find out which their own language selects. When they discover this, they metaphorically set a switch. Such switch-setting automatically brings in further ramifications, and the whole system clicks into place.

It's as if children were car-drivers who knew in advance that you could drive either on the right, or on the left, of the road. But they have to solve the left or right problem for themselves. Once they decide, extra information follows automatically: which side of the car to have the driver's seat, which way to drive round roundabouts (traffic circles), and so on.

Chomsky speaks of this process as 'setting parameters'. A parameter is a fixed property which can vary in particular ways. For example, temperature is a parameter of the atmosphere. The atmosphere must have a temperature, but this alters, going both up and down, which in turn affects day-to-day decisions, such as whether to wear warm clothes, install central heating, and so on (see Fig. 15.1).

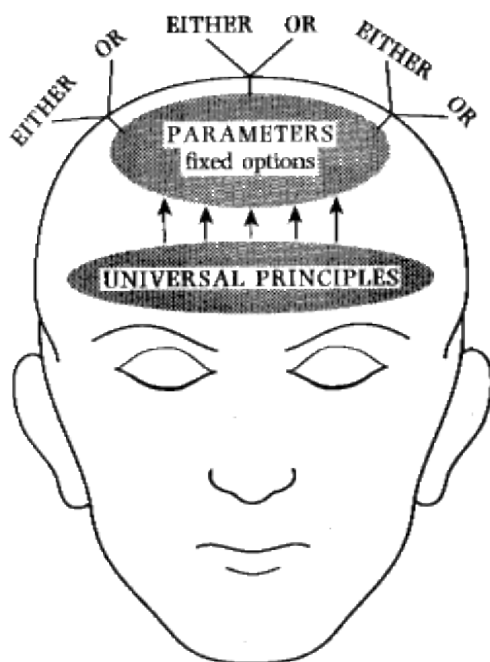


Figure 15.1 Switch-setting

Possible linguistic parameters have been much discussed: head-dependent ordering (outlined above) is one, and another overlapping parameter is 'branching direction', that is whether languages attach phrases to the left or right of major lexical items (Dryer 1992). In addition, predictable differences may exist between 'pro-drop' languages, such as Italian, which allow speakers to drop pronouns at the beginning of sentences (as in: *sono italiano* '[I] am Italian) and languages such as English, where the pronoun must normally be included: *I am English*, rather than *\*am English* (Rizzi 1986; Hyams 1986). These discussions will undoubtedly continue for some years.

Parameter setting is important because as Chomsky notes: 'Change in a single parameter may have complex effects, with proliferating consequences' (Chomsky 1981:6). More importantly, perhaps: 'A few changes in parameters yield typologically different languages' (Chomsky 1986: 152).

But switch-setting in an either/or fashion is only one type of link which might exist within language, as will be discussed below.

## Two's company, three's a crowd

If you have fingers, then you will have arms, if you have arms then you will have shoulders ... This type of chain-link occurs quite often in language.

An implicational chain is found in the category of number, which deals with the quantity of people or things involved. Number can be shown on nouns, pronouns, adjectives and verbs-either on some or on all of them. In full languages, the possible number categories are:

singular (one)  
plural (more than one)  
dual (two)  
trial/paucal (three or several)

This whole range is found in Manam, spoken on a small island off Papua New Guinea.

But the marking of number is not random: if a language has trial or paucal, then it will normally also have a dual; if it has a dual, then it will have a plural; if it has a plural, then it will have a singular; and all languages have singulars. This implicational order can be written as:

singular < plural < dual < trial/paucal [\[9\]](#)

This scale is statistical, rather than absolute, and is sometimes reflected in the way a language marks its plurals. In Kharia, for example, spoken in north-east India, the extra markedness (unusualness) of the dual is shown by adding an extra ending onto the plural:

biloi-ki      'cats'  
biloi-ki-yar 'two cats' (Croft 1990:99)

But there are other, more complex chains in language. Let us go on to consider one of these.

## Who did what to who

A 'pecking order' exists among the different roles of noun phrases within a sentence, resulting in a chain known as the 'grammatical relations hierarchy' (GRH). Complications arise because different languages have different types of chain.

In one variant of this hierarchy, the person or thing initiating the action of the verb is basic and unmarked, while the object of the verb's action is marked, as in Latin:

*Caesar puella-m* adiuvit  
Caesar girl helped  
'Caesar helped the girl'

*Puella Caesar-em* adiuvit  
girl Caesar helped  
'The girl helped Caesar'

Next on this hierarchy is the indirect object. This subject < object < indirect object hierarchy shows up in various languages, for example Hungarian:

subject < object < indirect object  
ember 'man' ember-t ember-nek (Croft 1990: 10)

The hierarchy is completed with 'oblique cases, which refers to relations other than subject, object and indirect object, as in 'Paul arrived *with Felicity*'. This version of the grammatical relations hierarchy (GRH) therefore runs (see Fig. 15.2):

subject < object < indirect object < oblique  
Figure 15.2 Grammatical relations hierarchy. subject-object version

The hierarchy was identified primarily by inspecting various languages, and ranking the markers attached to the noun. But it also shows up in other ways, most notably in relative clauses, which in English often begin with a WH-word (word beginning with *wh-*, such as *who*, *which*).

The WH-word or phrase in English may be subject (S), object (O), indirect object (IO) or oblique case (OBL) in its clause.

The cat *which* ate the cream ran away (S)  
The cook looked for the cream *which* the cat had eaten (O)  
The cook wrote to the man *to whom* the cat belonged (IO)  
The old man locked the room *in which* the cat slept (OBL)

But languages which do not have this wide set of relative clauses mostly follow the sliding scale of the GRH for what they allow, in a so-called 'noun phrase accessibility hierarchy':

If a language has OBL relative clauses, then it will also have IO, O, and S ones.  
If a language has IO relative clauses, then it will also have O and S ones.  
If a language has O relative clauses, then it will also have S ones (Comrie 1989).

Some exceptions to this can be found, but it works in the majority languages which use the S < O < IO < OBL version of the GRH.

But a rather different version of the GRH is also found widely. Consider Dyirbal, an Australian language from north Queensland:

yabu banaganyu  
mother returned  
'mother returned'  
  
puma yabu- gu buran  
father mother-ERG saw  
'mother saw father' (Dixon 1994: 10)

In this so-called ergative system, a marker is attached only when someone does

something which involves someone else. Another Australian example of this phenomenon was given earlier, from the Gungu Yimidhirr language ([chapter 3](#)), though similar ones can be found elsewhere in the world, as in Avar, a Caucasian language:

*ins:u-c:a cu bec:uleb bugo*

father-ERG horse praising is

'Father is praising the horse' (Harris and Campbell 1995: 189)

In these languages, the basic (unmarked) form is the absolutive, which covers both the subject of an intransitive verb (a verb without an object), and the object of a transitive verb (a verb with an object).

In the ergative type of language, the hierarchy runs (see Fig. 15.3):

absolutive < ergative < indirect object < oblique

Figure 15.3 Grammatical relations hierarchy, ergative version

The situation is not quite as simple as described here, because many languages mix the hierarchies, having one type of GRH for full nouns and another for pronouns. [\[10\]](#)

Overall, the GRH shows both the importance of finding implicational links within languages, and the difficulty of doing this.

## Multiple chains

Chains and hierarchies of various types run throughout language. Grammaticalization chains are another example, which work in the historical dimension (chapters 9-12): Yesterday's discourse is today's syntax; today's syntax will be tomorrow's morphology, This is as valid in all 'full' modern languages. as it is in pidgins and creoles (e.g. Heine 1992).

Strictly linguistic hierarchies are not the only ones. Others overlap with general cognitive abilities. Eleven basic colour terms exist (white, black, red, green, yellow, blue, brown, purple, pink, orange, grey) and their foci are similar in all languages, according to a claim made by Berlin and Kay (1969). They argued for an implicational hierarchy: if a language has two basic colour terms, these will be black and white; if three, red will be added; if five, green and yellow will be included and so on. These claims have been progressively modified, and are still under review (e.g. Kay and McDaniel 1978, Kay, Berlin and Merrifield 1991, Davidoff 1991). However, controversy still rages as to whether this colour hierarchy truly exists. And, if it does, whether it is based on the human perceptual apparatus, or on the colours found in the physical world, which are in any case filtered through the human eye and brain.

Chains and hierarchies are a major factor in keeping language in check: they help to stop it flying apart in multiple different directions. But their cause is only partially

understood, as will be discussed below.

## The search for explanations

The various constraints on language must not only be described, they need to be explained. Partially, the answer is clear: language has to be produced and comprehended fairly fast. So some seemingly strange facets of language have a user-and-use or 'processing' explanation: human languages are partly the way they are because of how languages are used. Three explanations of this type will be considered below.

First, look at a slightly odd sentence:

Penelope handed over *the pizza with anchovy, crab and salmon filling* to Fred

Nothing is basically wrong with it. but an alternative order is more readily comprehended:

Penelope handed over to Fred *the pizza with anchovy. crab and salmon filling*

For a long time, it has been known that speakers often move long noun phrases to the end of a sentence, a process known as 'heavy NP shift'. Ease of processing is a possible reason. Sentences may be organized in accordance with a principle of 'early immediate constituents', that is, shortish chunks of speech which are easily recognized as complete constituents or components of the sentence are placed before those which are not so readily identified (Hawkins 1994).

Second, think about words. Extra attachments can be added either by prefixes, added to the front of a word, or by suffixes, added to the end. Swahili, for example, uses prefixes for its nouns *w-imbo* 'song', *ny-imbo* 'songs', whereas English uses suffixes: *song. song-s*. Overall, languages have a suffixing preference: more languages use suffixes than prefixes. According to one count, no object-before-verb (OV) language has only prefixes, but 62%, have only suffixes, and 38%, have both prefixes and suffixes. Only 10%, of verb-before-object (VO) languages have only prefixes, while 17% have only suffixes' and 73% have both:[\[11\]](#)

	OV	VO
Only prefixes	--	10
Only suffixes	62	17
Suffixes & prefixes	38	73

This is a massive vote in favour of suffixes, perhaps because word recognition mostly takes place from the beginning of the word, and prefixes delay early recognition (Marslen-Wilson 1989), even though some languages, such as Swahili and Welsh, handle word recognition perfectly well in spite of regularly altering word beginnings.

Thirdly, consider language sounds. Vowel systems tend to be similar across languages, in that they all include a minimum three-vowel system [i], [u], [a] ([chapter 7](#)), which is then expanded in predictable ways. It has possibly evolved so as to arrive at a compromise between perception and production: in the sound system as a whole, sufficient perceptual differences have emerged at acceptable articulatory costs (Lindblom, MacNeilage and Studdert-Kennedy 1984).

But there's a puzzle. Function often seems irrelevant, or at least invisible. In some cases, languages have structures which seem even to hinder processing. Take the sentence: 'Who did Penelope say Peter decided to ask to pick up the wine?' in which the word *who* has been moved away from the verb *asked* ('Peter asked who ...??'). Even native speakers have to think carefully about who is doing what to who.

As Chomsky comments: 'Language design as such appears in many respects "dysfunctional", yielding properties that are not well adapted to the functions language is called upon to perform'.[\[12\]](#)

This apparently puzzling problem will be discussed in the [next chapter](#).

## Notes

[1] On working memory and language, see Cathercole and Baddeley 1993; on memory in general, see Baddeley 1990.

[2] D. Everett (3 June 1995) on the electronic bulletin board *Linguist*.

[3] Maddieson 1984 provides an up-to-date list of sound-structure implications.

[4] Greenberg 1963/1966: 79; on adpositions (prepositions and postpositions), see chapter 10.

[5] For example, it is a tenet of 'X-bar syntax' within transformational generative grammar; for an outline account see Radford 1988.

[6] On the 'head' problem, see Corbett, Fraser and McGlashen 1993.

[7] Dryer 1992 disputes the usefulness of the head- and dependent-marking distinction within linguistic typology.

[8] E.g. Chomsky 1986, for a readable version.

[9] Some people put implicational arrows the other way round, but this direction is followed in Croft 1990.

[10] Dixon 1994. See Keenan 1976, Dixon 1989 on subject object identification problems.

[11] Hall 1992: 42; Hawkins and Gilligan 1985, 1988; Hawkins and Cutler 1988; Bybee, Pagliuca and Perkins 1990.

[12] Chomsky 1991: 448. The form vs function dilemma has a massive literature. See Comrie 1984, Hawkins 1988a, Hurford 1990 for overviews.



## 16. Unweaving the rainbow: Separating the strands

Language has some similarities to the rainbow. Both can be partially separated from their surroundings: the rainbow from the clouds, and language from a general ability to think ([chapter 4](#)). And both language and the rainbow appear to be made out of various strands. To a poet, chopping it all up might seem like pointless pedantry. But for linguists concerned with language, this is a necessity, even if the result is unromantic.

Just as a rainbow has different though overlapping colours, so language has developed semi-independent modules within itself. Modular systems tend to be more stable than those which function as wholes ([chapter 4](#)). If one part is damaged, the whole system does not collapse.

But unweaving a rainbow may be easier than chopping up language. Two views exist about the splitting, as to whether the result is 'God's truth' or 'hocus-pocus'.<sup>[1]</sup> 'The God's-truth assumption is that language has a structure that is just there, waiting for the analyst to work it out; uncertainty about the facts bears witness to insufficient observation or defective procedure or both' (Joos 1957:80). The hocus pocus view is that linguists are imposing their own structure onto language: their divisions are somewhat like the latitude and longitude grids laid over the world by atlases: useful aids when referring to the world, but artificial ones.

Both sides are partially right: a few language components may be separable, but others are so inextricably entwined that any divisions are bound to be inexact. The hard core of a component may be easier to identify than the boundary, as with a rainbow, where pointing to the centre of a colour band is easier than finding where the band stops.

But a more basic problem is the double nature of language. It is a system which has to be used. But it also has to be stored and remembered. Overall, it is a compromise between both these requirements (see Fig. 16.1).

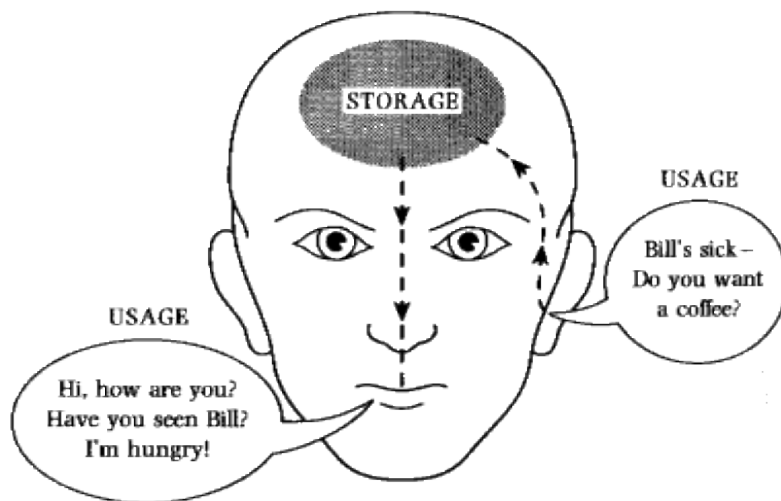


Figure 16.1 Usage vs storage

This chapter will look first at the various strands which make up the stored part of language, and will discuss to what extent they are separable from one another. Then it will consider how they interact in usage.

## The strands of language

Language has three basic components, according to most analysts: syntax (word organization), phonology (sound patterns) and semantics (meaning). Morphology (within-word make-up) is usually regarded as a subdivision of syntax. The lexicon (dictionary of words) is attached to all of these (see Fig. 16.2).

PHONOLOGY sound patterns	SYNTAX word organization	SEMANTICS word meaning
LEXICON dictionary		

Figure 16.2 Language sub-divisions

In general the separability of any language component is directly dependent on lack of conscious awareness. The more easily speakers are consciously able to access a strand, the less it can be treated as self-contained. In consequence, phonology is mostly an autonomous system, but semantics is a mixed system, with speakers partially aware and partially unaware of meaning relationships. Take *chase* and *pursue*, words often regarded as synonyms. Few English speakers consciously realize that you *chase* a runaway horse, or a bus, or some other concrete object, often an undesirable one. You *pursue* a hobby or course of action, or similar abstract goal (Aitchison and Lewis, in press). But speakers can easily be made aware of this, when it is explained.

But syntax is a puzzle. Many people regard it as the core of language, since it is the

component which links together the sounds and meaning. It is less accessible to consciousness than semantics, but more so than phonology. So a crucial question is whether it can be regarded as an autonomous system, like phonology, or a mixed system, like semantics. The matter is disputed.

In the following pages, the detachability of phonology will be illustrated. Then the syntax problem will be discussed.

## Detached sounds

Key ... oh what do you call them ... oh yeah ... you put ... you put ... with your ... with your ... oh ... with your ... when you ... when someone's stole something ... and ... what do you call them ... necklace? no I just don't know the word (Constable, Stackhouse and Wells 1994: 1).

Michael is not an old man, he's a seven-year-old child who can't remember the word *handcuffs*. He knows full well what handcuffs are for, and mentions that they are used 'when someone's stole something'. But he has enormous difficulty remembering the form of words. Sometimes, he manages to get near the word, as in *elilunt* or *efilunt*, for 'elephant', *telilision*, *tevilision*, for 'television'. This is a clear case of someone who has a damaged linguistic component the sound system is partially defective. It has also become detached from the rest of language.

The detachment of sounds from word meaning and syntax is well documented. Elderly people increasingly find that word-forms elude them, even though they may know full well what they want to say. This disability is sometimes extreme in cases of Alzheimer's disease. Take Mary, a 58-year-old patient who was shown a picture of a woman looking out of the window, and allowing a sink to overflow, while a boy reaching for some cookies is about to fall off a stool:

To me it looks absolutely ridiculous, but still ... The boy is, while she's looking at the - she must have been looking out of the window. I think -and while, during that time, the um boy was taking down the cookie jar and she, the girl, was hand - expecting to get one - and, but the um stool was going to fall, and he was going to tall very quickly and all this (pointing to the water) was going to make it all wet everywhere (Funnell and Hodges 1991: 174).

Mary appears unable to access the words *sink*, *tap* (*faucet*), *water*, which would have made her description comprehensible. She could repeat words correctly, showing that she had not lost her grasp of English sounds, but she could not remember the form of words. When tested on pictures, she was able to comprehend most of the pictures she failed to name. Initially, then: 'The naming disorder appears therefore to be one of impaired access from semantic descriptions to the phonological lexicon' (Funnell and Hodges 1991: 176).

At a later stage, Mary became progressively more confused, and she was unable to distinguish between similar items, such as a hammer and an axe (Funnell 1992). But in the early stages of her disease, she showed the independence of word-forms from word meaning.

Phonology is therefore largely detachable, as a variety of studies have shown. It is a relatively independent system, whose patterning is mostly outside human conscious awareness.[\[2\]](#)

## The nut-tree question

Many people are aware of bits and pieces of syntax, usually because they have been taught fragments at school: they can often distinguish between nouns and verbs, and have a list of beliefs about what is right and what is wrong. These are often quite odd, several of them dating back to artificial rules imposed by eighteenth-century grammarians, and further promulgated by nineteenth-century etiquette books, which interleaved them with general prohibitions about behaviour. But apart from these trivia, many sentences are opaque in structure to the average person, though perfectly comprehensible, as, say: 'The fact that Sebastian's singing in the bath annoys Joanna does not mean that she intends to leave him'. The crucial question, however, is whether syntax always emerges automatically, like the sound structure, or whether it has to be thought through, like the meaning.

The answer is a mixed one. Mostly, syntax is autonomous. But not inevitably. Consider the following children's rhyme:

I had a little nut-tree,  
*Nothing would it bear*  
But a silver nutmeg  
And a golden pear.

In its second line, this rhyme exemplifies a common rule of English. if you bring a negative towards the front for emphasis, then you need to carry out a further switch, so that the negative is always followed by an auxiliary verb such as *would*, *will*, *do*. That is, you could say:

It would bear nothing

but not:

\**Nothing it would bear*

which must be changed to:

Nothing *would it bear*

The switch-over (inversion) is found in sentences such as:

Never *have I* seen such behaviour  
Nowhere *could the cat* be found  
On no account *may Percy* leave the building

You couldn't say:

\*Never *I have* seen such behaviour  
\*Nowhere *the cat could* be found  
\*At no time *Percy may* leave the building

This, then, seems like an independent, purely formal rule, which can be applied without conscious thought. But notice the following:

For no money *would Priscilla* dance naked (she wouldn't)  
For no money *Priscilla would* dance naked (she would)

Both of these sentences are quite all right, but they have different meanings. As George Lakoff, the linguist who spotted the difference between these constructions, noted: 'This is not a "finer characterization" of a syntactic condition; it is evidence against the claim that syntax is autonomous' (Lakoff 1991: 58). In short, syntactic rules cannot be applied mindlessly, meaning has to be taken into consideration at all times. The rules of language cannot be treated as a completely independent system, even though in many ways the link-up with the world has become quite indirect.

Let us now consider a further claim sometimes made about syntax, that the morphological component within it can be detached.

## One wug, two wugs

'This is a wug', said the researcher, showing a birdlike creature. 'So these are ... ?' she asked, showing two of them. The woman being tested 'looked totally confused and laughed nervously and responded, "How should I know?" ' After some prompting she said 'These are wug' (Gopnik and Crago 1991: 19).

Putting endings onto nonsense words is a task which normal children find easy (Berko 1958). Yet the adult above found it enormously difficult, even though she was not an infant, nor was she ill. She is one of an extended family, of whom about half cannot easily cope with providing plurals for words. To *zat* she responded, 'These are zacko'. When asked about *sas* 'she smiled broadly, ... and responded *sasez* ... She then added *ez* to all the rest of the items: *zoop* goes to *zoopez*, *tob* to *tobez*, and *zash* goes to *zashes*' (Gopnik and Crago 1991: 19). Another family member 'corrected' 'The boy eats three cookie' to 'The boy eat four cookie'.

Verb endings provide equal problems for these family members. One given the sentence 'Every day he walked eight miles. Yesterday he\_\_?' responded: 'had a rest'. After being prompted to use the word *walk*, the subject replied *walks*. Yet all of the subjects were able to produce past tenses some of the time, but often inconsistently, as in:

She *remembered* when she *hurts* herself the other day

Then we *went* canoeing really fast and then I *fall* in three times (Gopnik 1994: 123)

Perhaps these family members just cannot think fast enough when they talk, is an immediate response. Yet their written language also contained errors of this type. An eleven-year-old girl wrote in her diary, on different occasions:

Carol *is cry* in church

I *walking* down the road (Gopnik and Crago 1991: 41)

But it's not just word endings. The afflicted individuals, who could be either male or female, have other problems. They prefer to repeat nouns, rather than use pronouns:

The lady's pointing at the bird and the man is watching her. The man is climbing the tree looking at the birds in their nest. The lady is crying because the man what fall off the tree and the bird frowd away. The neighbors phone the ambulance because the man fall off the tree. The ambulance come along and put the man into the ambulance to the hospital, and he's got a broken leg in the hospital (Gopnik and Crago 1991: 43).

This description of a set of pictures contrasted strongly with that of a family member with normal speech who said: 'He climbs up the tree and the branch breaks ... So he falls on the ground and he breaks his leg. So she runs indoors to call an ambulance ... The ambulance comes. They get in the van and he's in the hospital'.

Speaking is difficult for those affected: 'They find using language very stressful and tiring. They report that they often plan what they are going to say and, when possible, avoid situations in which they must speak' (Gopnik and Crago 1991: 46). Yet they could perfectly well follow commands such as: 'Here are three crayons. Drop the yellow one on the floor, give me the blue one, and pick up the red one' (Gopnik and Crago 1991: 19).

Controversially, a defective gene was originally proposed as the cause of the problem: 'It is not unreasonable to entertain an interim hypothesis that a single dominant gene controls for those mechanisms that result in a child's ability to construct the paradigms that constitute morphology' (Gopnik and Crago 1991: 47); though this explanation is now thought to be oversimple, especially as the difficulty covers more than morphology.

Language uses more than one type of skill: first, an ability to store items, to recall them, and place them one after the other. The impaired family members can do this. Second, an ability to adjust the form of these items as they are spoken. This, it seems, is difficult for the family members with defective speech: they just cannot 'get the hang of it'.

In brief, these impaired speakers can memorize whole lexical items, but they cannot perform normal 'on-line' manipulations. They learned past-tense forms one at a time, and only in response to specific corrections. For example, one diary entry referred to the previous weekend's activities:

On Saturday I watch TV and I watch plastic man and I watch football (Gopnik 1994: 128)

The teacher inserted *-ed* after each occurrence of *watch*. The subject got *watched* right the next time he used it, but he did not mark the past tense on other verbs:

On Saturday ... I wash myself and I get dress and I eat my breakfast and I watched TV all day ...

Families with this defect therefore show that language is a complex interaction between static components and processing needs.[\[3\]](#) As an analogy, it's as if the family members with the disorder have a full bone-structure for the leg, but they just cannot flex the knee-joint fully.

## Beyond the rainbow

The analogy of language as a rainbow may be too simple. It is more like a whole body. The human body can be discussed in terms of fixed organs: heart, lungs, liver and so on. But it can also be described in terms of the functional systems which utilize these organs: circulation, breathing, digestion:[\[4\]](#) 'These two systems are in a many-many relation with each other. One particular type of cell tissue can be involved in carrying out two or more functions, and each function draws on several types of anatomical structure (Newmeyer 1991:22). Furthermore, these systems have evolved in tandem. Function strongly influences structure, yet at some point the structure becomes a semi-independent entity.

Much the same structure-function interaction appears to have happened in language, even though there are no 'language organs, as such: language circuits would be a better term (chapter [4](#), chapter [7](#)). Yet arguments arise because those investigating language disagree about which facet is the most important.

Traditionally, linguists work on stable basics. They regard language as a complex system, formed out of numerous interacting subsystems (e.g. Chomsky 1986). These are themselves simple, yet affect one another in important but predictable ways. In general, linguists pay attention to the relatively unchanging basics, the components which are available for use, and how they interact in principle.

They are less concerned with how these are actually used. To follow up the body imagery, linguists might describe the heart or liver in some depth, and the blood vessels which join them, but would be less likely to track a litre of blood pumping round the



body.

Psychologists, on the other hand, are more concerned with the moving aspects of language, the way in which people learn it and process it in day-to-day usage. Humans have a powerful ability to 'mop up' information, whether they are children acquiring language or adults exposed to new words. As language is used, multiple concurrent connections are activated. These links and how they are formed have been a major concern recently, so much so that 'connectionism', the overall name given to this type of study, has received massive attention.[\[5\]](#) But there has been less interest in the way such links might be integrated into an overall system, and how the system might develop its own independence. To return to the blood analogy, psychologists would be intrigued by how a litre of blood spread itself round the body, but the structure of the heart might not interest them so much.

Linguists and psychologists therefore traditionally look into different aspects of the same system, even though this is something of an oversimplification: an increasing number of 'functional linguists' try to understand language by looking at usage, as many discussions in this book have shown (e.g. Hopper and Thompson 1984).[\[6\]](#)

But even 'shaking them all up in a bag' oversimplifies what might be happening. It leaves out of account speakers' own interaction with the system, which works in two opposing ways: on the one hand, speakers become aware of parts of language which they had not thought about before. On the other hand, they become better at handling chunks of language automatically, without thinking about it: 'Development thus seems to involve two opposite processes: on the one hand, the progressive access to knowledge previously embedded in procedures and, on the other hand, the progressive modularization of parts of the system' (Karmiloff-Smith 1991: 186).

Language is therefore a highly complex system, which both 'works under its own steam', and also responds to immediate needs. The more complex a system, the more likely it is to have evolved into a relatively stable state as far as its overall design goes. Parts of the system may alter, but there is sufficient leeway within it for language to rebalance any changes without collapsing. As the linguist Roman Jakobson said over fifty years ago: 'A sense of equilibrium and a simultaneous tendency towards breaking it, are indispensable properties of language as an entity' (Jakobson 1949).

## Notes

[1] This distinction supposedly originated with Householder, but it became widely known via Joos 1957.

[2] See Lindblom, MacNeilage and Studdert-Kennedy (1984) for a discussion of the evolution of sound patterning, Anderson (1985b) for an outline of twentieth-century approaches to phonology, Goldsmith (1995) for recent phonological theory.



[3] Gopnik and Crago 1991 and Gopnik 1994 provide useful accounts of the disorder; Matthews 1994 contains a wide-ranging set of working papers on the topic; Vargha-Khadem, Watkins, Alcock, Fletcher and Passingham 1995 suggest that the deficit may go beyond language.

[4] Newmeyer 1991 proposes this analogy.

[5] For an outline, see Bechtel and Abrahamsen 1991, Morelli and Brown 1992; on its application to child language acquisition, see Plunkett 1995.

[6] The linguistic structure-function debate is discussed in relation to language evolution in Newmeyer 1992.

## 17 The endless stair: Past and future

Evolution is sometimes claimed to be the most powerful idea that has ever arisen on earth. And Charles Darwin initiated an intellectual revolution with his theory of natural selection, which aimed at explaining how evolution works. Darwin himself apparently believed that everything was getting better and better: 'Natural selection is daily and hourly scrutinizing, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good' (Darwin 1859).

Yet this is impossible: there are inevitable trade-offs. Animals with arms can't have wings. Humans have a streamlined throat, good for sound production, but this streamlining makes them liable to choke. People who are naturally protected against malaria are vulnerable to a blood disease, sickle-cell anaemia, and so on.

But trade-offs cannot always be found: marsupials produce more embryonic babies than they can nourish. Mother wolf-spiders carry a hundred or so babies around on their backs for about six months, during which time the young do not eat or grow. Humans have long hair on top of their heads, and relatively little anywhere else.[\[1\]](#)

Some oddities can be explained because unwanted remnants fade away very slowly. The human appendix no longer has a function, but has not yet disappeared. But other oddities remain a puzzle. In a complex organism, there are conflicting messages. It is impossible to see 'function' as governing all. The overall requirements of a semi-stable system may override a quick response to a short-term need, as happens with language.

And organisms can proceed only along grooves which fit in with their existing predispositions. These tracks are one-way paths, with an inbuilt directionality. This is true of human language, both now; and in its early days. But where, if anywhere, is language going? This question can be considered first, by summarizing the findings of earlier chapters, and then by asking if any new developments might affect human language in the future.

### A brief summary

Part 1, 'Puzzles', considered some of language's puzzling features. Chapter [1](#) pointed out that human language is bizarre, in that it has more in common with birdsong than with the communication systems of other primates. Chapter [2](#) examined the role of language, and noted that it was particularly good at social roles: influencing others and maintaining friendly relations. Chapter [3](#) queried why languages differed so much: it explained that language is a category of innately guided behaviour, in which the framework is provided by nature, but the details are filled in by learning. This allows a range of variation. Chapter [4](#) discussed cases in which language had been apparently separated from general

cognitive abilities, and concluded that language was largely an independent system.

Part 2, 'Origin', explored how language probably originated. Chapter [5](#) outlined the 'East Side story', which suggests that humans separated from apes when they were stranded on the east side of Africa, after the Great Rift Valley split the terrain. Humans were forced to live on their wits in a harsh landscape, and began to develop language. Chapter [6](#) examined the prerequisites for language, which are shared with our ape cousins: first, friendly involvement with others and a predisposition for grooming; second, an aptitude for tactical deception, or lying, which depends on 'a theory of mind', an ability to understand the intentions of others. Chapter [7](#) considered the basic requirements for speech many of which are present in other primates. Sound-receiving mechanisms are shared with apes, though sound-producing ones differ, perhaps because of our upright posture, which in the long run enabled humans to produce a range of finely tuned sounds. Human brains allowed our ancestors to suppress automatic vocalizations, and to coordinate multiple strands of language in an efficient way. Chapter [8](#) noted that ontogeny, the development of the individual, only sometimes correlates with phylogeny, the development of the species. Two ways in which these coincided were the lowering of the larynx, and the development of the 'naming insight', an understanding of the power of naming.

Part 3, 'Evolution', examined how language might have evolved. Chapter [9](#) looked at ways in which words could have been combined. At first, many sequences were possibly repetitive and inconsistent. But, gradually, strong preferences may have become rules. These preferences were based on pre-linguistic 'mind-sets'. Chapter [10](#) looked at how language expanded, and showed how it makes use of the human body and its location in space for extending word meanings. The evolution of different parts of speech occurred probably via reanalysis: adjectives and prepositions both grew out of reinterpretation of nouns and verbs. Chapter [11](#) considered attachments to verbs. Multiple options possibly arose, then these were slowly narrowed down to a fairly typical tense, mood and aspect system. Chapter [12](#) examined generativity, the use of finite resources to produce an infinite variety of sentences. Such structures arose from reanalysis of existing structures.

Part 4, 'Diffusion', considered the spread of language around the world, and discussed why languages have not become unlearnably different from one another. Chapter [13](#) outlined the route taken as humans moved out of Africa, and considered the possibility of reconstructing glimpses of language as it might have been more than 30,000 years ago. Chapter [14](#) examined the difficulties and frustrations of hunting for language universals. Chapter [15](#) pointed out that looking for constraints, things that languages don't do, might be more enlightening. Implicational links, it noted, are important for keeping language in check. Such links are partially due to processing needs, but partly also to the overall structure of the system. Chapter [16](#) outlined the components within the language system, and emphasized that these interacted with usage of the system in a complex way.

## Maxims of language evolution

Language evolution can be largely summarized in four key maxims, which apply also to language change today:[\[2\]](#)

1. Nothing comes out of nothing
2. Multiple births are the norm
3. Changes are unidirectional
4. More of the same

First, 'Nothing comes out of nothing.' Just about all innovations are reanalyses of existing constructions, or borrowings. In the earliest stages, the first words probably came out of 'natural' sounds: lip-smacks, pant hoots, or grunts as the vocal chords open after effortful action. Some of these sounds became conventional, with an agreed meaning. But the 'nothing out of nothing' maxim may account for the slow take-off at the beginning of language; perhaps allied with the need for the 'naming insight'. As more words became established and combined, more could be reanalyzed.

Second, 'Multiple births are the norm'. Language branches out in numerous new directions, then slowly neatens itself up. In the early stages, language was probably very messy, with repeated words, and little sign of rules. Various human preferences tended to make certain orders probable, but many more possible. Then as now proliferation was followed by slow smoothing-out, alongside further proliferation.

Third, 'Changes are unidirectional'. Just as rivers do not flow backwards, so language changes move in predictable directions. Language moves down time in a current of its own making. It has a drift ... The linguistic drift has direction', in words of Sapir (1921). He may have been struggling to express the insight that certain changes are possible and likely, and others apparently impossible and unlikely.[\[3\]](#)

Fourth, 'More of the same'. Each language tends to repeat and extend its own patterns. This is broadly known as analogy, sometimes defined as 'reasoning from parallel cases'. It causes both levelling (the smoothing-out of differences), and extension (expanding an existing pattern by bringing in new similar examples).

## Flexibility and leaps

The maxims of language evolution demonstrate two crucial aspects of human minds, their flexibility and their tendency to jump to conclusions.

Human concepts have fuzzy edges, rather than hard boundaries. Humans repeatedly look for resemblances, and they allow latitude in what they regard as 'similar'. They require rough matches only. Such underspecification is an important property of language.[\[4\]](#)

Using this fuzziness, humans place sounds and words into flexible categories. They also

extract new patterns out of old material: in short, they can restructure.

The restructuring often takes place in leaps: a few pieces of evidence are combined, and a jump is made: 'Logical deduction is not our strong suit ... What we are good at is jumping to conclusions: taking two or three bits of evidence and extracting a pattern or rule that makes us feel we've got that problem in the bag and can go on to the next one' (Barber and Peters 1992:344).

These abilities were built into language. Language spent a long time getting established. It finally took off and expanded quite fast, then gradually emerged into a fairly stable system, at least in its overall design. No 'language organ' exists, but specialized brain circuits have evolved, which were at first adaptations of neural structures found also in primates. These are inherited by any child born today, though exposure to language is required for the circuits to be fully activated.

The system has grown up piecemeal, so that any human language is a complex mosaic: 'Our language can be seen as an ancient city', said the philosopher Wittgenstein, 'a maze of little streets and squares, of old and new houses, and of houses with additions from various periods; and this surrounded by a multitude of new boroughs with straight regular streets and uniform houses' (Wittgenstein 1958:8).

This piecemeal development raises a question about language and thought: how did they interact as language emerged? A philosopher, Neil Tennant, has expressed it well:

There could be staccato talk without thought.

There had to be thought before structured talk.

Once established, structured talk could be mastered with less thought.

Once mastered, structured talk makes for more thought (Tennant 1984:102).

But eventually, language took off on its own route. In its modern state, the various components of language are semi-independent, each with its own particular organization, and its own 'rules'. Rules conveniently short-cut our dealings with the details of the world, thereby saving our energy for other matters' (Barber and Peters 1992:344). But a long-term tension exists between language structure (the system) and language processing (its day-to-day usage).

But one critical question needs to be asked about language today: are languages and speakers 'equal'?

## The equality question

The equality question is really two questions: first, are all languages equal? Second, are all humans equal in their ability to speak them?

All languages are equal, as far as we can tell, in that any language can express everything

it needs to express.

Of course, languages differ in the number of vocabulary distinctions they draw, as shown by the numerous words for sitting, standing and lying found in Mam (chapter [3](#)), though the commonly heard claim that Eskimos have numerous words for 'snow' has been much exaggerated. Eskimos and British skiers possibly equal one another in the types of snow they can name, as explained in Pullum (1991). And languages also show considerable structural diversity (chapters [3](#), [15](#)).

Such observations lead to another commonly asked question: whether language differences can affect thought in any deep way.

'Human beings ... are very much at the mercy of the particular language which has become the medium of expression for their society ... The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached', as Edward Sapir (1929) claimed.

As Sapir pointed out, humans tend to think along the grooves of their own language, and the mental mind-set imposed by one language can lead to misunderstandings in others. Yet linguistically aware speakers can detect problems, and mismatches can be pointed out. In an evolutionary perspective, misunderstandings between languages are relatively unimportant, in that they can be put right. No language differences have been identified which could not potentially be understood by any speaker of any language. Problems remain because speakers have never been made aware of the divergences, not because they are incapable of grasping them (Aitchison 1995b).

Moving on to the second type of equality, all humans are equal in that any normal human can learn any language as a first language. Children may find some aspects of their own language easier to grasp than others, in that they seem to have certain expectations about language which are not always immediately met (Slobin 1985), much as bees have expectations about flowers which need to be honed by experience (chapter [3](#)). The occasional claim that some languages are more 'difficult' than others is thought to be a mirage: languages just seem complicated to learners who try to acquire a second language which is structurally different from their own.

But not all people can handle language equally well, even leaving aside anyone brain-damaged. One half of the human race, the female half, may be 'better' at language than males. Women perform better than men on a wide range of verbal skills, though men outperform women at spatial tasks (Kimura 1992, Halpern 1992). This difference is apparently due to hormonal differences which affect the embryo, though the details are disputed. One long-standing view is that men's brains are more 'lateralized', with abilities more firmly located in one hemisphere than the other, though recent studies have not all supported the lateralization claim.[\[5\]](#) A controversial evolutionary interpretation is that early human hunter-gatherers may have taken on different roles. Perhaps men were responsible for hunting large game, which may have required long-distance travel and an

ability to find their way about. Women gathered food near the home, looked after children, and talked to them and to each other (Kimura 1992). But this is speculation.

## The future

A long line of humans have become dissatisfied with language, and assumed that it is on the decline.[\[6\]](#) The seventeenth-century pedagogue John Amos Comenius, for example, proposed to institute a new universal language, which would be 'a universal antidote to confusion of thought ... For the men of earlier ages, the authors of that language which has been handed down to us, were not so accurate in their investigation of things as to remark all their peculiar qualities and differentiae, and so to express them in exact and appropriate terms.'[\[7\]](#) Yet language adjusts itself to its requirements, far better than any invented system, above all because of its flexibility.

The grumblers complain for various reasons. Some have not realized that the artificial prescriptions they were taught in their youth are irrelevant (chapter [16](#)). Others wonder whether human developments can wreck language. Occasionally telephones are blamed, or newspapers, or television, or more recently the Internet.

Above all, the media are a convenient target for people's discontent, But the media hardly ever initiate a change, though they may spread the use of a new word, such as *wimp* 'feeble male' (Aitchison 1994a). They may also appear to sanction a change: 'It must be all right to say *damn*, I heard it on the radio'. Overall, the media can only push language further along paths it is already travelling. The Internet is unlikely to influence language any more than the telephone conversations in this medium develop their own conventions. This does not alter a normal person's speech any more than learning to write a business letter affects them.

Yet while 'language worriers' agitate about minutiae within their own language, global language patterns are changing radically.

## Language death

'The coming century will see either the death or the doorn of 90% of mankind's languages', according to Krauss (1992).[\[8\]](#)

This gloomy forecast was reached as follows: 6,000 was assumed to be 'not an unreasonable round estimate' for living languages in the last decade of the twentieth century.[\[9\]](#) Of these half will perish, based on a calculation of 'moribund' languages, those no longer learned as a first language by the new generation of speakers. A further 2,400 will come near extinction, on the assumption that any language with fewer than 100,000 speakers is in the unsafe zone. This leaves 600, or 10% of the current total, in the safe category.



The concern for language loss unusual. More people nowadays worry about endangered species in the biological world, where figures of loss are much lower: according to Krauss (1992), the total number of threatened mammals has been estimated at 10%, and birds at 5%.

A relatively few languages therefore may remain. These will spread across the world. Once diffused, they are likely to split into separate languages, much as Latin split into French, Spanish, Italian and so on. Already, some varieties of English, for example, differ quite widely from one another (Burchfield 1994).

But the structural variety found will inevitably be reduced. Arguably, the massive disappearance of so many languages represents 'irretrievable loss of diverse and interesting intellectual wealth, the priceless products of human mental industry' (Hale 1994: 6).

## Notes

[1] Wesson 1991 lists these examples.

[2] Cf. A. C. Harris and Campbell 1995, who try to reduce syntactic change to three broad principles, which partially overlap with these; on language change in general, see Aitchison 1991.

[3] The meaning of Sapir's cryptic comment has been much discussed.

[4] See Aitchison 1994c for a discussion of fuzziness and prototypes in relation to word meaning.

[5] For a useful survey of lateralization, see Springer and Deutsch 1993.

[6] On this, see Aitchison 1991.

[7] Comenius, *Via lucis*, in Slaughter 1982: 114.

[8] Krauss 1992 is part of Hale, Craig, England, LaVerne, Krauss, Watahomigie and Yamamoto 1992, which is a more extensive exploration of dying languages.

[9] Krauss 1992: 5. Around 5,000 was an estimate quoted in [chapter 3](#).



# References

[\[A\]](#) | [\[B\]](#) | [\[C\]](#) | [\[D\]](#) | [\[E\]](#) | [\[F\]](#) | [\[G\]](#) | [\[H\]](#) | [\[J\]](#) | [\[K\]](#) | [\[L\]](#) | [\[M\]](#) | [\[N\]](#) | [\[O\]](#) | [\[P\]](#) | [\[R\]](#) | [\[S\]](#) | [\[T\]](#) | [\[V\]](#) | [\[W\]](#) | [\[Y\]](#)

Aiello, L. C. & Dean, C. (1990). *An introduction to human evolutionary anatomy*. London: Academic Press.

Aiello, L. C. & Wheeler, P. (1995). The expensive-tissue hypothesis: the brain and the digestive system in human and primate evolution. (With comment). *Current Anthropology*, 36, 199-221.

Aitchison, J. (1983). On roots of language. *Language and Communication*, 3, 83-97.

\_\_\_ (1986). Review of John Hawkins, *Word order universals*. *Lingua*, 70, 191-7.

\_\_\_ (1988). Review of G. Décsy, *A select catalogue of language universals*. *General Linguistics*, 28, 227-8.

\_\_\_ (1989a). *The articulate mammal: An introduction to psycholinguistics* (3rd edn). London: Routledge.

\_\_\_ (1989b). Hidden treasure: the search for language universals. In J. Montangero & A. Tryphon (eds.), *Language and cognition* (vol. x). Geneva: Fondation Archives Jean Piaget.

\_\_\_ (1989c). Spaghetti junctions and recurrent routes: some preferred pathways in language evolution. *Lingua*, 77, 151-71.

\_\_\_ (1991). *Language change: Progress or decay?* (2nd edn). Cambridge University Press.

\_\_\_ (1992). Relative clauses in Tok Pisin: is there a natural pathway? In M. Gerritsen & D. Stein (eds.), *Internal and external factors in linguistic change*. Berlin: Mouton de Gruyter.

\_\_\_ (1994a). *Language joyriding*. Inaugural lecture at Oxford University. Oxford University Press.

\_\_\_ (1994b). Pidgins, creoles and change. In R. E. Asher (ed.), *The encyclopaedia of language and linguistics*. (vol. VI, pp. 3181-6). Oxford and Aberdeen: Pergamon Press and Aberdeen University Press.

\_\_\_ (1994c). *Words in the mind: An introduction to the mental lexicon* (2nd edn). Oxford: Blackwell.

\_\_\_ (1995a). Chimps, children and creoles: the need for caution. In S. Puppel (ed.), *The*

*biology of language*. Amsterdam and Philadelphia: John Benjamins.

\_\_\_\_ (1995b). Free or ensnared? The hidden nets of language. In E. Barker (ed.), *LSE on freedom*. London: LSE Books.

\_\_\_\_ (1995c). Tadpoles, cuckoos and multiple births: language contact and models of change. In J. Fisiak (ed.), *Linguistic change under contact conditions*. (Proceedings of international conference on language contact and linguistic change, Rydzyna, Poland, 1991). Berlin: Mouton de Gruyter.

Aitchison, J. & Lewis, D. (in press). The mental word-web: forging the links. Swedish Academy.

Anderson, S. R. (1985a). Inflectional morphology. In Shopen (1985c).

\_\_\_\_ (1985b). *Phonology in the twentieth century*. University of Chicago Press.

Ardrey, R. (1970/1972). *The social contract*. London: Fontana.

Arends, J. (1986). Genesis and development of the equative copula in Sranan. In P. Muysken & N. Smith (eds.), *Substrata versus universals in creole genesis*. Amsterdam and Philadelphia: John Benjamins.

Arends, J., Muysken, P. & Smith, N. (1995). *Pidgins and creoles: An introduction*. Amsterdam: John Benjamins.

Armstrong, D. F., Stokoe, W. C. & Wilcox, S. E. (1995) *Gesture and the nature of language*. Cambridge University Press.

Arnold, D., Atkinson, M., Durand, J., Grover, C. & Sadler, L. (1989). *Essays on grammatical theory and universal grammar*. Oxford: Clarendon Press.

Baddeley, A. (1990). *Human memory: Theory and practice*. Hove and London: Lawrence Erlbaum.

Baker, P. (1995). Australian and Melanesian Pidgin English and the *fellows* in between (Ms.).

Bar-Adon, A. & Leopold, W. F. (eds.) (1962/1971). *Child language: A book of readings*. Englewood Cliffs, NJ: Prentice-Hall.

Barber, E. J. W. & Peters, A. M. W. (1992). Ontogeny and phylogeny: what child language and archaeology have to say to each other. In Hawkins & Gell-Mann (1992).

Baron-Cohen, S. (1990). Autism: a specific cognitive disorder of 'mind-blindness'. *International Review of Psychiatry*, 2, 81-90.

(1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT

Press.

Baron-Cohen, S., Leslie, A. M. & Frith, U. (1985). Does the autistic child have a 'theory of mind'? *Cognition*, 21, 37-46.

Baron-Cohen, S., Ring, H., Moriarty, J., Schmitz, B., Costa, D. & Ell, P. (1994). Recognition of mental state terms: clinical findings in children with autism and a functional neuroimaging study of normal adults. *British Journal of Psychiatry*, 165, 640-9.

Barrett, M. (1995). Early lexical development. In P. Fletcher & B. MacWhinney (eds.), *The handbook of child language*. Oxford: Blackwell.

Bates, E. (1984). Bioprograms and the innateness hypothesis. *Behavioral and Brain Sciences*, 7, 188-90.

Bauer, L. (1983). *English word-formation*. Cambridge University Press.

Bechtel, W. & Abrahamsen, A. (1991). *Connectionism and the mind: An introduction to parallel processing networks*. Oxford: Blackwell.

Bell, C. N. (1899). *Tangweera: Life and adventures among gentle savages*. London: Arnold.

Bellugi, U., Bihrie, A. & Corina, D. (1991). Linguistic and spatial development: dissociations between cognitive domains. In Krasnegor, Rumbaugh, Schiefelbusch & Studdert-Kennedy (1991).

Berko, J. (1958). The child's learning of English morphology. *Word*, 14, 150-77. (Also in Bar-Adon and Leopold 1971)

Berlin, B. & Kay, P. (1969). *Basic color terms: Their universality and evolution*. Berkeley: University of California Press.

Bickerton, D. (1981). *The roots of language*. Ann Arbor: Karoma.

\_\_\_\_ (1984). The language bioprogram hypothesis. *Behavioral and Brain Sciences*, 7, 173-221. (Includes peer commentary.)

\_\_\_\_ (1990). *Language and species*. University of Chicago Press.

\_\_\_\_ (1991). On the supposed 'gradualness' of creole development. *Journal of Pidgin and Creole Languages*, 6, 25-8.

Binnick, R. L. (1991). *Time and the verb: A guide to tense and aspect*. Oxford University Press.

Blake, B. J. (1988). Review of Tomlin (1986). *Journal of Linguistics*, 24, 213-17.

- Bloom, P. (1994). Generativity within language and other cognitive domains. *Cognition*, 51, 177-89.
- Bloomfield, L. (1933). *Language*. New York: Holt, Rinehart, Winston.
- Bock, J. K., Loebell, H. & Morey, R. (1992). From conceptual roles to structural relations: bridging the syntactic cleft. *Psychological Review*, 99, 150-71.
- Bolinger, D. L. (1968). *Aspects of language*. New York: Harcourt, Brace and World.
- Braine, M. D. S. (1992). What sort of innate structure is needed to 'bootstrap' into syntax? *Cognition*, 45, 77-100.
- Burchfield, R. (1994). *The Cambridge history of the English language* (vol. V: *English in Britain and overseas*). Cambridge University Press.
- Burzio, L. (1986). *Italian syntax*. Dordrecht: Reidel.
- Butterworth, B., Comrie, B. & Dahl, O. (eds.) (1984). *Linguistics 21. Explanations for language universals*. The Hague: Mouton.
- Bybee, J. L., Pagliuca, W. & Perkins, R. D. (1990). On the asymmetries in the affixation of grammatical material. In W. Croft, K. Denning & S. Kemmer (eds.), *Studies in typology and diachrony*. Amsterdam and Philadelphia: John Benjamins.
- Bybee, J. L., Perkins, R. D. & Pagliuca, W. (1994). *The evolution of grammar: Tense, aspect and modality in the languages of the world*. University of Chicago Press.
- Byrne, B. & Davidson, E. (1985). On putting the horse before the cart: exploring conceptual bases of word order via acquisition of a miniature artificial language. *Journal of Memory and Language*, 24, 277-389.
- Byrne, R. W. (1994a). The ape legacy: the evolution of Machiavellian intelligence and interactive planning. In E. Goody (ed.), *Social intelligence and interaction*. Cambridge University Press.
- \_\_\_\_ (1994b). The evolution of intelligence. In P. J. B. Slater & T. R. Halliday (eds.), *Behaviour and evolution*. Cambridge University Press.
- Byrne, R. W. & Whiten, A. (1988). Towards the next generation in data quality: a new survey of primate tactical deception. *Behavioral and Brain Sciences*, 11, 267-71.
- \_\_\_\_ (1992). Cognitive evolution in primates: evidence from tactical deception. *Man*, 27, 609-27.
- Canger, U. (1986). What the eye sees. In M. S. Flier & S. Karlinsky (eds.), *Language, literature and linguistics: In honor of Francis J. Whitfield on his seventieth birthday*

March 25, 1986. Berkeley, CA: Berkeley Slavic Specialities.

Cann, R. L., Stoneking, M. & Wilson, A. C. (1987). Mitochondrial DNA and human evolution. *Nature*, 325, 31-6.

Carey, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.

Carey, S. & Gelman, R. (eds.) (1991). *The epigenesis of mind: Essays on biology and cognition*. Hillsdale, NJ: Lawrence Erlbaum.

Carr, M. W. (ed.) (1986). *A selection of Telegu proverbs*. New Delhi: Asian Educational Series.

Carter, A. L. (1979). Prespeech meaning relations: an outline of one infant's sensorimotor morpheme development. In P. Fletcher & M. Garman (eds.), *Language acquisition: Studies in first language development*. Cambridge University Press.

Catania, A. C. (1990). What good is five percent of a language competence? *Behavioral and Brain Sciences*, 13, 729-31. (Open peer commentary on Pinker & Bloom (1990))

Cavalli-Sforza, L. L. (1991). Genes, people and languages. *Scientific American*, 265(5), 72-8.

Cavalli-Sforza, L. L., Menozzi, P. & Piazza, A. (1993). Demic expansions and human evolution. *Science*, 259, 639-46.

Cavalli-Sforza, L. L., Minch, E. & Mountain, J. (1992). Coevolution of genes and languages revisited. *Proceedings of the National Academy of Science USA*, 89, 5620-4.

Cavalli-Sforza, L. L., Piazza, A., Menozzi, P. & Mountain, J. (1988). Reconstruction of human evolution: bringing together genetic, archaeological and linguistic data. *Proceedings of the National Academy of Science USA*, 85, 6002-6.

Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.

\_\_\_ (1972). *Language and mind* (enlarged edn). New York: Harcourt Brace Jovanovich.

\_\_\_ (1979). *Language and responsibility*. Sussex: The Harvester Press.

\_\_\_ (1980). *Rules and representations*. Oxford: Basil Blackwell.

\_\_\_ (1981). *Lectures on government and binding*. Dordrecht: Foris.

\_\_\_ (1986). *Knowledge of language: Its nature, origin and use*. New York: Praeger.

\_\_\_ (1991). Some notes on economy of derivation and representation. In R. Freidin (ed.), *Principles and parameters in comparative grammar*. Cambridge, MA: MIT Press.

Comrie, B. (1976). *Aspect*. Cambridge University Press.

\_\_\_ (1984). Form and function in explaining language universals. In Butterworth, Comrie & Dahl (1984).

\_\_\_ (1985). *Tense*. Cambridge University Press.

\_\_\_ (1989). *Language universals and linguistic typology: Syntax and morphology* (2nd edn). Oxford: Blackwell.

Condillac, E. B. de (1798/1947). Essai sur l'origine des connaissances humaines, ouvrage où l'on réduit à un seul principe tout ce qui concerne l'entendement. In *Oeuvres philosophiques de Condillac*. Paris: Georges Leroy.

Constable, A., Stackhouse, J. & Wells, B. (1994). The case of the missing handcuffs: phonological processing and word finding difficulties in a boy with specific language impairment. *Work in Progress: The National Hospital's College of Speech Sciences*, 4, 1-27.

Cooper, W. E. & Ross, J. R. (1975). World order. In R. E. Grossman, L. J. San & T. J. Vance (eds.), *Papers from the parasession on functionalism*. Chicago Linguistic Society.

Coopmans, P. (1984). Surface word order typology and universal grammar. *Language*, 60, 55-69.

Coppens, Y. (1994). East Side story: the origin of humankind. *Scientific American*, 270(5), 62-79.

Corballis, M. C. (1991). *The lopsided ape: Evolution of the generative mind*. Oxford University Press.

\_\_\_ (1992). On the evolution of language and generativity. *Cognition*, 44, 197-226.

Corbett, G. G., Fraser, N. M. & McGlashen, S. (eds.) (1993). *Heads in grammatical theory*. Cambridge University Press.

Cosmides, L. (1993). The evolution of reasoning. (Paper presented at conference on Evolution and the human sciences. LSE, London, June 1993.)

Cosmides, L. & Tooby, J. (1994). Beyond intuition and instinct blindness: toward an evolutionarily rigorous cognitive science. *Cognition*, 50, 41-77.

Croft, W. (1990). *Typology and universals*. Cambridge University Press.

Cromer, R. F. (1991). *Language and thought in normal and handicapped children*. Oxford: Blackwell.

Cronin, H. (1991). *The ant and the peacock*. Cambridge University Press.

Crowley, T. (1989). *Say, c'est* and subordinate constructions in Melanesian Pidgin. *Journal of Pidgin and Creole Languages*, 4, 185-210.

\_\_\_\_ (1990a). *Beach-la-mar to Bislama: The emergence of a national language in Vanuatu*. Oxford: Clarendon Press.

\_\_\_\_ (1990b). Serial verbs and prepositions in Bislama. In J. W. M. Verhaar (ed.), *Melanesian Pidgin and Tok Pisin*. Amsterdam: John Benjamins.

\_\_\_\_ (1991). Genesis of a preposition system in Bislama. In R. Harlow (ed.). *Western Austronesian and contact languages* (Papers from the 5<sup>th</sup> International Conference on Austronesian Linguistics). Auckland: Linguistic Society of New Zealand.

\_\_\_\_ (1992a). Derivational morphology and structural complexity in nineteenth century Melanesian Pidgin. *Te Reo*, 35, 3-18.

\_\_\_\_ (1992b). *An introduction to historical linguistics* (2nd edn). Oxford University Press.

Curtiss, S. R. (1977). *Genie: A psycholinguistic study of a modern-day 'wild child'*. New York: Academic Press.

\_\_\_\_ (1988). Abnormal language acquisition and the modularity of language. In F. Newmeyer (ed.), *Linguistics: The Cambridge survey* (vol. II). Cambridge University Press.

Cushing, S. (1994). *Fatal words: Communication clashes and aircraft crashes*. University of Chicago Press.

Darwin, C. (1859/1964). *On the origin of species*. Cambridge, MA: Harvard University Press.

\_\_\_\_ (1871). *The descent of man and selection in relation to sex* (vols. I-II). London: John Murray.

Davidoff, J. (1991). *Cognition through colour*. Cambridge, MA: MIT Press.

Dawkins, R. (1986/1988). *The blind watchmaker*. Harmondsworth: Penguin.

\_\_\_\_ (1995). *River out of Eden*. London: Weidenfeld and Nicolson.

Deacon, T. W. (1988). Human brain evolution: 1. Evolution of language circuits. In H. J. Jerison & I. Jerison (eds.), *Intelligence and evolutionary biology* Berlin: Springer.

\_\_\_\_ (1992). Brain-language coevolution. In Hawkins & Gell-Mann (1992)

Decsy, G. (1988). *A select catalogue of language universals*. Bloomington, IN: Eurolingua.

- Dennett, D. (1995). *Darwin's dangerous idea*. London: Allen Lane.
- Dever, R. B. (1974). Discussion summary: non-speech communication. In R. L. Schiefelbusch & L. L. Lloyd (eds.), *Language perspectives: Acquisition, retardation and intervention*. Baltimore: University Park Press.
- De Villiers, J. G. & de Villiers, P. A. (1978). *Language acquisition*. Cambridge, MA: Harvard University Press.
- Diamond, A. S. (1959). *The history and origin of language*. London: Methuen.
- Dixon, R. M. W. (1982). *'Where have all the adjectives gone? and other essays in semantics and syntax*. Berlin: Mouton.
- \_\_\_\_ (1989). Subject and object in universal grammar. In Arnold, Atkinson, Durand, Grover & Sadler (1989).
- \_\_\_\_ (1994). *Ergativity*. Cambridge University Press.
- Donald, M. (1991). *Origins of the modern mind: Three stages in the evolution of culture and cognition*. Cambridge, MA: MIT Press.
- (1993). Origins of the modern mind. *Behavioral and Brain Sciences*, 16, 737-91. (Includes peer commentary.)
- Dryer, M. S. (1992). The Greenbergian word order correlations. *Language*, 68, 81-138.
- Du Bois, J. W. (1987). The discourse basis of ergativity. *Language*, 63, 805-55.
- Du Brul, E. L. (1977). Origin of the speech apparatus and its reconstruction in fossils. *Brain and Language*, 4, 365-81.
- Dunbar, R. I. M. (1993). Co-evolution of neocortex size, group size and language in humane. *Behavioral and Brain Sciences*, 16, 681-735, (Includes peer commentary.)
- Dutton, T. (1973). *Conversational New Guinea Pidgin*. *Pacific Linguistics: D-12*. Canberra: Australian National University.
- Dutton, T. & Dicks, T. (1985). *A new course in Tok-Pisin*. *Pacific Linguistics Series: D-67*. Canberra: Australian National University.
- Eimas, P. D. (1985). The perception of speech in early infancy. *Scientific American*, 252(1), 34-40.
- Eimas, P. D., Siqueland, E., Jusczyk, P. & Vigorito, J. (1971). Speech perception in infants. *Science*, 171, 303-6.
- Eldredge, N. & Gould, S. J. (1972). Punctuated equilibria: an alternative to phyletic



gradualism. In T. J. M. Schopf (ed.), *Models in palaeobiology*. San Francisco, CA: Cooper & Co.

\_\_\_\_ Punctuated equilibrium prevails. *Nature*, 332, 211-12.

Etcoff, N. L. (1989). Asymmetries in recognition of emotion. In F. Boller & J. Grafman (eds.), *Handbook of neuropsychology* (vol. III). New York: Elsevier Science Publishers.

Falk, D. (1989). Commentary. *Current Anthropology*, 30, 141-42.

\_\_\_\_ (1991). 3.5 million years of hominid brain evolution. *Seminars in the Neurosciences*, 3, 409-16.

Fano, G. (1962/1992). *The origins and nature of language*. Bloomington: Indiana University Press. (Trans. Susan Petrilli. Originally *Origini e natura del linguaggio* (1962 & 1973))

Fernald, A. (1992). Meaningful melodies in mothers' speech to infants. In H. Papousek, U. Jürgens & M. Papousek (eds.), *Nonverbal vocal communication: Comparative and developmental approaches*. Cambridge University Press.

Fodor, J. A. (1983). *The modularity of mind*. Cambridge, MA: MIT Press.

\_\_\_\_ (1985). The modularity of mind. *Behavioral and Brain Sciences*, 8, 1-42. (Summary of Fodor, J. A. (1983). *The modularity of mind*. Includes peer commentary.)

\_\_\_\_ (1990). *A theory of content and other essays*. Cambridge, MA: MIT Press.

Fortescue, M. (1995). Eskimo-Aleut and Chukotko-Kamchatkan pronouns and verbal inflection: skeletal Proto-Siberian. Ms., Department of Eskimology, University of Copenhagen.

Fox, A. (1995). *Linguistic reconstruction: An introduction to theory and method*. Oxford University Press.

Frith, U. (1993). Autism. *Scientific American*, 268(6), 78-84.

Funnell, E. (1992). Progressive loss of semantic memory in a case of Alzheimer's disease. *Proceedings of the Royal Society of London*, B243, 287-91.

Funnell, E. & Hodges, J. R. (1991). Progressive loss of access to spoken word forms in a case of Alzheimer's disease. *Proceedings of the Royal Society of London*, B 243, 173-9.

Gallistel, C. R., Brown, A. L., Carey, S., Gelman, R. & Keil, F. C. (1991). Lessons from animal learning for the study of cognitive development. In Carey & Gelman (1991).

Gardner, R. A. & Gardner, B. T. (1969). Teaching sign language to a chimpanzee. *Science*, 165, 664-72.

- Garfield, J. L. (ed.). (1987). *Modularity in knowledge representation and natural-language understanding*. Cambridge, MA: MIT Press.
- Gathercole, S. E. & Baddeley, A. D. (1993). *Working memory and language*. Hove, Sussex: Lawrence Erlbaum.
- Gazzaniga, M. S. (1992). *Nature's mind: The biological roots of thinking, emotions, sexuality, language and intelligence*. New York: Harper Collins.
- Gibbs, R. W. (1994). *The poetics of mind: Figurative thought, language and understanding*. Cambridge University Press.
- Gibson, K. R. (1994). Continuity theories of human language origins versus the Lieberman model. *Language and Communication*, 14, 97-114.
- Givón, T. (1979). *On understanding grammar*. New York: Academic Press.
- \_\_\_\_ (1982). Tense-aspect-modality: the creole proto-type and beyond. In P. J. Hopper (ed.), *Tense-aspect: Between semantics and pragmatics* Amsterdam and Philadelphia: John Benjamins.
- Glezer, I. I. & Kinzey, W. G. (1993). Do gossip and lack of grooming make us human? *Behavioral and Brain Sciences*, 16, 704-5.
- Goldsmith, J. A. (1995). *The handbook of phonological theory*. Oxford: Blackwell.
- Goodall, J. (1986). *The chimpanzees of Gombe: Patterns of behavior*. Cambridge, MA: Harvard University Press.
- Goodman, M. (1985). Review of Bickerton (1981). *International Journal of American Linguistics*, 51, 109-13.
- Gopnik, M. (1994). Impairments of tense in a familial language disorder. *Journal of Neurolinguistics*, 8, 109-33.
- Gopnik, M. & Crago, M. B. (1991). Familial aggregation of a developmental language disorder. *Cognition*, 39, 1-50.
- Gould, S. J. (1977). *Ontogeny and phylogeny*. Cambridge, MA: Harvard University Press.
- \_\_\_\_ (1983/1984). *Hen's teeth and horse's toes*. Harmondsworth: Penguin.
- \_\_\_\_ (1989/1991). *Wonderful rife: The Burgess Shale and the nature of history*. London: Penguin.
- \_\_\_\_ (1993/1994). *Eight little piggies*. London: Penguin.

- Gould, S. J. & Eldredge, N. (1977). Punctuated equilibria: the tempo and mode of evolution reconsidered. *Palaeobiology*, 6, 383-96.
- Gould, S. J. & Lewontin, R. C. (1979). The spandrels of San Marco and the Panglossian paradigm. A critique of the adaptionist programme. *Proceedings of the Royal Society of London*, 205, 281-8.
- Gould, S. J. & Marler, P. (1987). Learning by instinct. *Scientific American*, 256(1), 62-73.
- Grant, P. R. (1986). *Ecology and evolution of Darwin's finches*. Princeton University Press.
- \_\_\_\_ (1991). Natural selection and Darwin's finches. *Scientific American*, 263(4), 60-5.
- Greenberg, J. (1963/1966). Some universals of language with particular reference to the order of meaningful elements. In J. Greenberg (ed.), *Universals of language* (2nd edn). Cambridge, MA: MIT Press.
- \_\_\_\_ (1987). *Language in the Americas*. Stanford University Press.
- Greenfield, P. M. & Savage-Rumbaugh, E. S. (1990). Grammatical combination in *Pan paniscus*: processes of learning and invention in the evolution and development of languages. In S. Taylor Parker & K. R. Gibson (eds.), *'Language' and intelligence in monkeys and apes*. Cambridge University Press.
- Griffiths, P. (1986). Early vocabulary. In P. Fletcher & M. Garman (eds.), *Language acquisition: Studies in first language development* (2nd edn). Cambridge University Press.
- Grimm, J. (1851). Über den Ursprung der Sprache. In L. Speidel (ed.), *Aus den kleineren Schriften von Jacob Grimm*. Berlin, 1911.
- Gross, M. (1979). On the failure of generativ grammar. *Language*, 55, 859-85.
- Haeckel, E. (1866). *Generelle Morphologie der Organismen* (vols. I & II). Berlin: George Rymer.
- \_\_\_\_ (1874). *Anthropogenie*. Leipzig: W. Engelmann.
- Hailman, J. P. & Ficken, M. S. (1986). Combinatorial animal communication with computable syntax: chick-a-dee calling qualifies as 'language' by structural linguistics. *Animal Behaviour*, 34, 1899-1901.
- Hale, K. (1994). Resisting language loss: the human value of local languages. Ms., Massachusetts Institute of Technology.
- Hale, K., Craig, C., England, N., LaVerne, J., Krauss, M., Watahomigie, L. &

- Yamamoto, A. (1992). Endangered languages. *Language*, 68, 1-42.
- Hall, C. J. (1992). *Morphology and mind: A unified approach to explanation in linguistics*. London: Routledge.
- Hall-Craggs, J. (1969). The aesthetic content of bird song. In R. A. Hinde (ed.), *Bird vocalizations: Their relations to current problems in biology and psychology*. Cambridge University Press.
- Halliday, M. A. K. (1978). *Language as social semiotic: The social interpretation of language and meaning*. London: Edward Arnold.
- Halpern, D. F. (1992). *Sex differences in cognitive abilities*. New York: Erlbaum.
- Handel, S. (1989). *Listening: An introduction to the perception of auditory events*. Cambridge, MA: MIT Press.
- Harnad, S. R. (1987). *Categorical perception: The groundwork of cognition*. Cambridge University Press.
- Harnad, S. R., Horst, D., Steklis, D. & Lancaster, J. (eds.). (1976). *Origins and evolution of language and speech*. Annals of the New York Academy of Science: 280. New York Academy of Science.
- Harris, A. C. & Campbell, L. (1995). *Historical syntax in cross-linguistic perspective*. Cambridge University Press.
- Harris, R. (1990). On 'folk' and 'scientific' linguistic beliefs. In S. L. Tsohatsidis (ed.), *Meanings and prototypes: Studies in linguistic categorization*. London: Routledge.
- Haviland, J. B. (1979). How to talk to your brother-in-law in Guugu Yimidhirr. In T. Shopen (ed.), *Languages and their speakers*. Cambridge, MA: Winthrop.
- Hawkins, J. A. (1983). *Word order universals*. New York: Academic Press.
- \_\_\_\_ (1988a). Explaining language universals. In Hawkins (1988b).
- \_\_\_\_ (ed.) (1988b). *Explaining language universals*. Oxford: Blackwell.
- \_\_\_\_ (1994). *A performance theory of order and constituency*. Cambridge University Press.
- Hawkins, J. A. & Cutler, A. (1988). Psycholinguistic factors in morphological asymmetry. In Hawkins (1988b).
- Hawkins, J. A. & Gell-Mann, M. (eds.) (1992). *The evolution of human languages*. Santa Fé Studies in the Science of Complexity: 11. Reading, MA.

- Hawkins, J. A. & Gilligan, G. (1985). The suffixing preference: a processing explanation. *Linguistics*, 23, 723-58.
- \_\_\_\_ (1988). Prefixing and suffixing universals in relation to basic word order. *Lingua*, 74, 219-59.
- Heine, B. (1992). Grammaticalization chains. *Studies in Language*, 16, 335-68.
- Heine, B., Claudi, U. & Hünemeyer, F. (1991). *Grammaticalization: A conceptual framework*. University of Chicago Press.
- Herder, J. G. (1891/1966). On the origin of language. In J. H. Moran & A. Gode (eds.), *On the origin of language* (essays by Rousseau and Herder, translated, with afterwords, by John H. Moran and Alexander Gode). Chicago and London: University of Chicago Press.
- Hewes, G. W. (1977). Language origin theories. In D. M. Rumbaugh (ed.), *Language learning by a chimpanzee: The Lana project*. New York: Academic Press.
- Hinton, L., Nichols, J. & Ohala, J. J. (1994a). Introduction: sound-symbolic processes. In Hinton, Nichols & Ohala (1994b).
- \_\_\_\_ (eds.) (1994b). *Sound symbolism*. Cambridge University Press.
- Hockett, C. F. & Altmann, S. (1968). A note on design features. In T. Sebeok (ed.), *Animal communication: Techniques of study and results of research*. Bloomington: Indiana University Press.
- Hockett, C. F. & Ascher, R. (1964). The human revolution. *Current Anthropology*, 3, 135-47.
- Holloway, R. L. (1976). Paleoneurological evidence for language origins. In Harnad, Horst, Steklis & Lancaster (1976).
- Holm, J. A. (1988). *Pidgins and creoles* (vol. I). Cambridge University Press.
- Holmes, J. A. (1992). *An introduction to sociolinguistics*. London: Longman.
- Hopper, P. J. (ed.) (1982). *Tense-aspect*. Amsterdam and Philadelphia: John Benjamins.
- Hopper, P. J. & Thompson, S. A. (1984). The discourse basis for lexical categories in universal grammar. *Language*, 60, 703-52.
- Hopper, P. J. & Traugott, E. C. (1993). *Grammaticalization*. Cambridge University Press.
- Houghton, P. (1993). Neanderthal supralaryngeal vocal tract. *American Journal of Physical Anthropology*, 90, 139-46.

Humboldt, W. von (1836/1988). *On language: The diversity of human language structure and its influence on the mental development of mankind*. Cambridge University Press.

Hume, D. (1739/1978). *A treatise of human nature* (2nd edn, ed. P. H. Nidditch). Oxford: Clarendon Press.

Hurford, J. (1990). Nativist and functional explanations in language acquisition. In I. M. Roca (ed.), *Logical issues in language acquisition*. Dordrecht: Foris.

\_\_\_\_ (1991). The evolution of the critical period for language acquisition. *Cognition*, 40, 159-202.

Hyams, N. (1986). *Language acquisition and the theory of parameters*. Dordrecht: Reidel.

Hyland, M. E. (1993). Size of human groups during the Paleolithic and the evolutionary significance of increased group size. *Behavioral and Brain Sciences*, 16, 709-10.

Jackendoff, R. (1983). *Semantics and cognition*. Cambridge, MA: MIT Press.

\_\_\_\_ (1993/1994). *Patterns in the mind: Language and human nature*. New York: Basic Books.

Jakobson, R. (1941/1968). *Child language, aphasia and phonological universals*. The Hague: Mouton.

\_\_\_\_ (1949/1978). Principles of historical phonology. In P. Baldi & R. N. Werth (eds.), *Readings in historical phonology*. Philadelphia: Pennsylvania State University Press.

\_\_\_\_ (1962/1971). Why 'mama' and 'papa'? In Bar-Adon and Leopold (1962/1971).

Jespersen, O. (1922). *Language, its nature, development and origin*. London: Allen and Unwin.

Johanson, D. C. & Edey, M. A. (1981/1990). *Lucy: The beginnings of mankind*. London: Penguin.

Johnson, M. (1987). *The body in the mind: The bodily basis of meaning, imagination and reason*. University of Chicago Press.

Joos, M. (1957). *Readings in linguistics 1: The development of descriptive linguistics in America 1925-56*. University of Chicago Press.

Jürgens, U. (1992a). Introduction and review. In Papousek, Jürgens & Papousek (1992).

\_\_\_\_ (1992b). On the neurobiology of vocal communication. In Papousek, Jürgens & Papousek (1992).

- Kaiser, M. & Shevoroshkin, V. (1988). Nostratic. *Annual Review of Archaeology*, 17, 309-29.
- Karmiloff-Smith, A. (1991). Beyond modularity: innate constraints and developmental change. In S. Carey & R. Gelman (eds.), *The epigenesis of mind: Essays on biology and cognition*. Hillsdale, NJ: Lawrence Erlbaum.
- Kay, P., Berlin, B. & Merrifield, W. R. (1991). Biocultural implications of systems of color naming. *Journal of Linguistic Anthropology*, 1, 12-25.
- Kay, P. & McDaniel, C. K. (1978). The linguistic significance of the meanings of basic color terms. *Language*, 54, 610-46.
- Keenan, E. L. (1976). Towards a universal definition of 'subject'. In C. Li (ed.), *Subject and topic*. New York: Academic Press.
- Keesing, R. (1988). *Melanesian Pidgin and the Oceanic substrate*. Stanford University Press.
- Keil, F. C. (1989). *Concepts, kinds and cognitive development*. Cambridge, MA: MIT Press.
- Kimura, D. (1976). The neurological basis of language qua gestures. In H. Whitaker & H. A. Whitaker (eds.), *Current trends in neurolinguistics*. New York: Academic Press.
- \_\_\_\_ (1979). Neuromotor mechanisms in the evolution of human communication. In H. D. Steklis & M. J. Raleigh (eds.), *Neurobiology of social communication in primates*. New York: Academic Press.
- \_\_\_\_ (1992). Sex differences in the brain. *Scientific American*, 267(3), 80-7.
- Krasnegor, N. A., Rumbaugh, D. M., Schiefelbusch, R. L. & Studdert-Kennedy, M. (eds.) (1991). *Biological and behavioral determinants of language development*. Hillsdale, NJ: Lawrence Erlbaum.
- Krauss, M. (1992). The world's languages in crisis. *Language*, 68, 4-10.
- Kuhl, P. T. (1987). The special-mechanisms debate in speech research: categorization tests on animals and infants. In S. Harnad (ed.), *Categorical perception: The groundwork of cognition*. Cambridge University Press.
- Lakoff, G. (1991). Cognitive versus generative linguistics: how commitments influence results. *Language and Communication*, 11, 53-62.
- Lakoff, G. & Johnson, M. (1980). *Metaphors we live by*. Chicago University Press.
- Lakoff, G. & Turner, M. (1989). *More than cool reason: A field guide to poetic*

*metaphor*. Chicago University Press.

Landau, B. & Jackendoff, R. (1993). 'What' and 'where' in spatial language and spatial cognition. *Behavioral and Brain Sciences*, 16, 217-65. (Includes peer commentary.)

Lane, H. (ed.) (1984). *The deaf experience: Classics in language and education*. Cambridge, MA: Harvard University Press. (Trans. Franklin Philip)

Laver, J. (1994). *Principles of phonetics*. Cambridge University Press.

Leakey, R. (1994). *The origins of humankind*. London: Weidenfeld and Nicolson.

Lecours, A. R. & Joanette, Y. (1980). Linguistic and other aspects of paroxysmal aphasia. *Brain and Language*, 10, 1-23.

Lenneberg, E. H. (ed.) (1967). *Biological foundations of language*. New York: Wiley.

Lerdahl, F. & Jackendoff, R. (1983). *A generative theory of tonal music*. Cambridge, MA: MIT Press.

Lester, B. M. & Boukydis, C. F. (1992). No language but a cry. In Papousek, Jürgens & Papousek (1992).

Lewin, R. (1993). *The origin of modern humane*. New York: Scientific American Library.

Li, C. N. & Thompson, S. A. (1976). Subject and topic: a new typology of language. In C. N. Li (ed.), *Subject and topic*. New York: Academic Press.

Lieberman, A. M., Harris, K. S., Hoffman, H. S. & Griffith, B. C. (1957). The discrimination of speech sounds within and across phoneme boundaries. *Journal of Experimental Psychology*, 54, 358-68.

Lieberman, P. (1984). *The biology and evolution of language*. Cambridge, MA: Harvard University Press.

\_\_\_\_ (1991). *Uniquely human: The evolution of speech, thought and selfless behavior*. Cambridge, MA: Harvard University Press.

\_\_\_\_ (1992). On the evolution of human language. In Hawkins & Gell-Mann (1992).

Liem, K. F. (1988). Form and function of lungs: the evolution of air breathing mechanisms. *American Zoologist*, 28, 739-59.

Lindblom, B., MacNeilage, P. F. & Studdert-Kennedy, M. (1984). Self-organizing processes and the explanation of phonological universals. In Butterworth, Comrie & Dahl (1984).



- Locke, J. (1690/1975). *An essay concerning human understanding* (ed. P. H. Nidditch). Oxford: Clarendon Press.
- Locke, J. L. (1993). *The child's path to spoken language*. Cambridge, MA: Harvard University Press.
- \_\_\_\_ (1995). Development of the capacity for spoken language. In P. Pletcher & B. MacWhinney (eds.), *The handbook of child language*. Oxford: Blackwell.
- Lorenz, K. (1950/1977). *Man meets dog* (Trans. Marjorie Kerr Wilson). London: Methuen. (Originally published as *So kam der Mensch auf den Hund*, Wien: Borotha-Schoeler. This translation first published 1954.)
- Lyons, J. (1977). *Semantics* (vol. II). Cambridge University Press.
- \_\_\_\_ (1988). Origins of language. In A. C. Fabian (ed.), *Origins*. Cambridge University Press.
- \_\_\_\_ (1989). Semantic ascent. In Arnold et al. (1989).
- Mackay, A. L. (ed.). (1991). *A dictionary of scientific quotations*. Bristol: IOP Publishing.
- MacNeilage, P. F. (1991). The 'postural origins' theory of primate neurobiological asymmetries. In Krasnegor et al. (1991).
- MacNeilage, P. F., Studdert-Kennedy, M. G. & Lindblom, B. (1987). Primate handedness reconsidered. *Behavioral and Brain Sciences*, 10, 247-303.
- Maddieson, I. (1984). *Patterns of sounds*. Cambridge University Press.
- Malinowski, B. (1935). *The language and magic of gardening*. London: Allen & Unwin.
- Mallinson, G. & Blake, B. J. (1981). *Language typology*. Amsterdam: North Holland.
- Marantz, A. (1982). Re reduplication. *Linguistic Inquiry*, 13, 483-545.
- Maratsos, M. (1992). Constraints, modules, and domain specificity: an introduction. In M. R. Gunnar & M. Maratsos (eds.), *Modularity and constraints in language and cognition*. The Minnesota Symposia on Child Psychology: 25. Hillsdale, NJ: Lawrence Erlbaum.
- Marler, P. (1976). Social organization, communication and graded signals: the chimpanzee and the gorilla. In P. P. G. Bateson & R. A. Hinde (eds.), *Growing points in ethology*. Cambridge University Press.
- \_\_\_\_ (1991a). Differences in behavioural development in closely related species: birdsong. In P. Bateson (ed.), *The development and integration of behaviour*. Cambridge

University Press.

\_\_\_\_ (1991b). The instinct to learn. In Carey & Gelman (1991).

Marler, P., Evans, C. S. & Hauser, M. D. (1992). Animal signals: motivational, referential or both? In Papousek, Jürgens & Papousek (1992).

Marshall, J. C. (1987). Review of Savage-Rumbaugh (1986). *Nature*, 325, 310.

Marslen-Wilson, W. D. (1989). Access and integration: projecting sound on to meaning. In W. D. Marslen-Wilson (ed.), *Lexical representation and process*. Cambridge, MA: MIT Press.

Matthews, J. (ed.). (1994). *Linguistic aspects of familial language impairment*. McGill Working Papers in Linguistics: 10. Montreal: McGill University.

Mayr, E. (1991/1993). *One long argument: Charles Darwin and the genesis of modern evolutionary thought*. London: Penguin.

McDonald, J. L., Bock, J. K. & Kelly, M. H. (1993). Word and world order: semantic, phonological and metrical determinants of serial position. *Cognitive Psychology*, 25, 188-230.

McShane, J. (1980). *Learning to talk*. Cambridge University Press.

Medin, D. L., Ahn, W.-K., Bettger, J., Florian, J., Goldstone, R., Lassaline, M., Markman, A., Rubinstein, J. & Wisniewski, E. (1990). Safe takeoffs - soft landings. *Cognitive Science*, 14, 169-78.

Mehler, J., Jusczyk, P., Lambertz, G., Halsted, N., Bertoncini, J. & Amiel-Tison, C. (1988). A precursor of language acquisition in young infants. *Cognition*, 29, 143-78.

Meillet, A. (1912/1948). *Linguistique historique et linguistique générale*. Paris: Champion.

Mellars, P. (1993). Archaeology and modern human origins in Europe. *Proceedings of the British Academy*, 82, 1-35.

Merton, D. V., Morris, R. B. & Atkinson, I. A. E. (1984). Lek behavior in a parrot-the kakapo strigops-habroptilus of New Zealand. *Ibis*, 126, 277.

Mihalic, F. (1971). *The Jacaranda dictionary and grammar of Melanesian pidgin*. Milton, Queensland, Australia: The Jacaranda Press.

Miller, G. A. & Fellbaum, C. (1991). Semantic networks of English. *Cognition*, 41, 197-229.

Miller, J. & Jusczyk, P. W. (1990). Seeking the neurobiological basis of speech

perception. In P. D. Eimas & A. M. Galaburda (eds.), *Neurobiology of cognition*. Cambridge, MA: MIT Press. (Originally published 1989 in *Cognition* 33, 111-37)

Milroy, J. & Milroy, L. (1991). *Authority in language: Investigating language prescription and standardization* (2nd edn). London: Routledge.

Mithun, M. (1984). The evolution of noun incorporation. *Language*, 60, 847-94.

\_\_\_\_ (1988). Lexical categories and the evolution of number marking. In M. Hammond & M. Noonan (eds.), *Theoretical morphology: Approaches to modern linguistics*. New York: Academic Press.

\_\_\_\_ (1992). Is basic word order universal? In D. L. Payne (ed.), *Pragmatics of word order flexibility*. Amsterdam: John Benjamins.

\_\_\_\_ (1995). The legacy of recycled aspect. Paper presented at the International Congress of Historical Linguistics, University of Manchester, August 1995.

Mithun, M. & Chafe, W. I. (1979). Recapturing the Mohawk language. In T. Shopen (ed.), *Languages and their status*. Cambridge, MA: Winthrop.

Molfese, D. L. & Morse, P. A. (1991). Developmental changes in nonhuman primate patterns of brain lateralization for the perception of speech cues: neuroelectrical correlates. In Krasnegor et al. (1991).

Morelli, R. & Brown, M. (1992). Computational models of cognition. In R. Morelli, W. M. Brown, D. Anselmi, K. Haberlandt & D. Lloyd (eds.), *Minds, brains and computers*. Norwood, NJ: Ablex.

Morris, D. (1967). *The naked ape*. London: Jonathan Cape.

Mühlhäusler, P. (1979). *Growth and structure of the lexicon of New Guinea Pidgin*. Pacific Linguistics: C-52. Canberra: Australian National University.

\_\_\_\_ (1985). Syntax of Tok Pisin. In S. A. Wurm & P. Mühlhäusler (eds.), *Handbook of Tok Pisin (New Guinea Pidgin)* Pacific Linguistics: C-70. Canberra: Australian National University.

\_\_\_\_ (1986). *Pidgin and creole linguistics*. Oxford: Basil Blackwell.

Muysken, P. (1981). Creole tense/mood/aspect systems: the unmarked case? In P. Muysken (ed.), *Generative studies on creole languages*. Dordrecht: Foris.

Nei, M. & Roychoudhury, A. K. (1993). Evolutionary relationships of human populations on a global scale. *Molecular Biology and Evolution*, 10, 927-43.

Nerlich, B. (1990). *Change in language: Whitney, Bréal and Wegener*. London: Routledge.

- Newmeyer, F. J. (1991). Functional explanations in linguistics and the origins of language. *Language and Communication*, 11, 3-28.
- \_\_\_\_ (1992). Iconicity and generative grammar. *Language*, 68, 756-96.
- Newport, E. (1990). Maturational constraints on language learning. *Cognitive Science*, 14, 11-28.
- \_\_\_\_ (1991). Contrasting conceptions of the critical period for language. In Carey & Gelman (1991).
- Nichols, J. (1986). Head-marking and dependent-marking grammar. *Language*, 62, 56-119.
- \_\_\_\_ (1990). Linguistic diversity and the first settlement of the New World. *Language*, 66, 475-521.
- \_\_\_\_ (1992). *Linguistic diversity in space and time*. University of Chicago Press.
- Noonan, M. (1988). Review of Tomlin (1986). *Language*, 64, 196-7.
- Nottebohm, F. (1975). A zoologist's view of some language phenomena with particular emphasis on vocal learning. In E. H. Lenneberg & E. Lenneberg (eds.), *Foundations of language development* (vol. I). New York: Academic Press.
- Ortony, A. (ed.) (1993). *Metaphor and thought* (2nd edn). Cambridge University Press.
- Orwell, G. (1946/1962). Politics and the English language. In G. Orwell, *Inside the whale and other essays*. Harmondsworth: Penguin.
- Owren, M. J., Seyfarth, R. M. & Hopp, S. L. (1992). Categorical verbal signaling in nonhuman primates. In Papousek, Jürgens & Papousek (1992).
- Palmer, F. (1994). *Grammatical roles and relations*. Cambridge University Press.
- Papousek, H., Jürgens, U. & Papousek, M. (eds.). (1992). *Nonverbal vocal communication: Comparative and developmental approaches*. Cambridge University Press.
- Passingham, R. E. (1982). *The human primate*. San Francisco, CA: Freeman.
- Payne, D. L. (1992a). Introduction. In Payne (1992b).
- (ed.). (1992b). *Pragmatics of word order flexibility*. Amsterdam: John Benjamins.
- Petersen, M. R. (1982). The perception of species-specific vocalization in primates: a conceptual framework. In Snowdon, Brown & Petersen (1982).

- Petitto, L. A. & Marentette, P. F. (1991). Babbling in the manual mode: evidence for the ontogeny of language. *Science*, 251, 1493-6.
- Piatelli-Palmarini, M. (1989). Evolution, selection and cognition: from 'learning' to parameter setting in biology and in the study of language. *Cognition*, 31, 1-44.
- Pinker, S. (1994). *The language instinct: The new science of language and mind*. London: Allen Lane.
- Pinker, S. & Bloom, P. (1990). Natural language and natural selection. *Behavioral and Brain Sciences*, 13, 707-84. (Includes peer commentary.)
- Ploog, D. W. (1992). The evolution of vocal communication. In Papousek, Jürgens & Papousek (1992).
- Plunkett, K. (1995). Connectionist approaches to language acquisition. In P. Fletcher & B. MacWhinney (eds.), *The handbook of child language*. Cambridge University Press.
- Posner, M. I. & Raichle, M. E. (1994). *Images of mind*. New York: Scientific American Library.
- Pullum, G. K. (1991). *The great Eskimo vocabulary hoax and other irreverent essays on the study of language*. University of Chicago Press.
- Radford, A. (1988). *Transformational grammar: A First course*. Cambridge University Press.
- Raj, K. S. (1990). Application of Grice's maxims in Kannada: a note. *CIEFL Occasional Papers in Linguistics*, 2, 92-9.
- Rapoport, J. (1990). *The boy who couldn't stop washing: The experience and treatment of obsessive-compulsive disorder*. London: Fontana/Collins.
- Rhodes, R. (1994). Aural images. In Hinton, Nichols & Ohala (1994b).
- Ridley, M. (1993). *Evolution*. Oxford: Blackwell Scientific.
- Rizzi, L. (1986). Null objects in Italian and the theory of *pro*. *Linguistic Inquiry*, 17, 501-57.
- Robins, R. H. (1952). Noun and verb in universal grammar. *Language*, 28, 289-98.
- Romaine, S. (1988). *Pidgin and creole languages*. London: Longman.
- Rosner, B. S. (1995). Musical intervals, scales of pitch, and vowel phonetics. Ms., Phonetics Laboratory, University of Oxford.
- Ross, P. E. (1991). Hard words. *Scientific American*, 264(4), 70-9.

- Rousseau, J. J. (1852/1966). On the origin of languages. In J. H. Moran & A. Gode (Eds.), *On the origin of language* (essays by Rousseau and Herder, translated, with afterwords, by John H. Moran and Alexander Gode). Chicago and London: University of Chicago Press.
- Ruhlen, M. (1987). *A guide to the world's languages* (vol. I: *Classification*). Stanford University Press.
- \_\_\_\_ (1992). An overview of genetic classification. In Hawkins & Gell-Mann (1992).
- \_\_\_\_ (1994). *On the origin of languages: Studies in linguistic taxonomy*. Stanford University Press.
- Rymer, R. (1993). *Genie: Escape from a silent childhood*. London: Michael Joseph.
- Sacks, O. (1989/1991). *Seeing voices*. London: Picador. (First published by University of California Press, Berkeley)
- \_\_\_\_ (1995). *An anthropologist on Mars*. London: Picador.
- Salmons, J. (1992). A look at the data for a global etymology: \*tik 'finger'. In G. W. Davis & G. K. Iverson (eds.), *Explanation in historical linguistics*. Amsterdam and Philadelphia: John Benjamins.
- Sapir, E. (1921). *Language*. New York: Harcourt, Brace and World.
- \_\_\_\_ (1929/1949). *Selected writings in language, culture and personality* (ed. D. G. Mandelbaum). Berkeley: University of California Press.
- Savage-Rumbaugh, E. S. & Lewin, R. (1994). *Kanzi: The ape at the brink of the human mind*. New York: Doubleday.
- Savage-Rumbaugh, E. S., Murphy, J., Sevcik, R. A., Brakke, K. E., Williams, S. L. & Rumbaugh, D. M. (1993). *Language comprehension in ape and child*. (With commentary by Elizabeth Bates and a reply by E. Sue Savage-Rumbaugh.) Monographs of the Society for Research in Child Development: 58.
- Schachter, P. (1985). Parts-of-speech systems. In T. Shopen (1985a).
- Scherer, K. R. (1992). Vocal affect expression as symptom, symbol and appeal. In Papousek, Jürgens & Papousek (1992).
- Sebeok, T. A. (1965). Animal communication. *Science*, 147, 1006-14.
- Seyfarth, R. M. & Cheney, D. L. (1986). Vocal development in vervet monkeys. *Animal Behaviour*, 34, 1640-58.
- Seyfarth, R. M., Cheney, D. L. & Marler, P. (1980a). Monkey responses to three different

alarm calls: evidence for predator classification and semantic communication. *Science*, 210, 801-3.

\_\_\_\_ (1980b). Vervet monkey alarm calls: semantic communication in a free-ranging primate. *Animal Behavior*, 28, 1070-94.

Shallice, T. (1984). More functionally isolable subsystems, but fewer modules. *Cognition*, 17, 243-52.

\_\_\_\_ (1988). *From neuropsychology to mental structure*. Cambridge University Press.

Shettleworth, S. J. (1975). Reinforcement and the organisation of behavior in golden hamsters: hunger, environment and food reinforcement. *Journal of Experimental Psychology: Animal Behavior Processes*, 1, 56-87.

Shopen, T. (ed.). (1985a, b, c). *Language typology and syntactic description* (vol. I: *Clause structure*, vol. II: *Complex constructions*, vol. III: *Grammatical categories and the lexicon*). Cambridge University Press.

Simon, J. (1981). *Paradigms lost*. London: Chatto & Windus.

Singler, J. V. (ed.) (1990). *Pidgin and creole tense-mood-aspect systems*. Amsterdam: John Benjamins.

Slaughter, M. M. (1982). *Universal languages and scientific taxonomy in the seventeenth century*. Cambridge University Press.

Slobin, D. I. (1985). Crosslinguistic evidence for the language-making capacity. In D. I. Slobin (ed.), *The crosslinguistic study of language acquisition*. Hillsdale, NJ: Lawrence Erlbaum.

Small, M. F. (1994). Ay up, a chimp wi' an accent. *New Scientist* (4 June), 33-7.

Smith, N. V. & Tsimpili, I. A. (1991). Linguistic modularity? A case study of a 'Savant' linguist. *Lingua*, 84, 315-51.

\_\_\_\_ (1995). *The mind of a savant: Language learning and modularity*. Oxford: Blackwell.

Snowden, C. T., Brown, C. H. & Petersen, M. R. (eds.) (1982). *Primate communication*. Cambridge University Press.

Spock, B. (1968). *Baby and child care revised*. New York: Pocket Books.

Springer, S. P. & Deutsch, G. (1993). *Left brain, right brain* (4th edn). New York: W. H. Freeman.

Studdert-Kennedy, M. (1991). Language development from an evolutionary perspective.

In Krasnegor et al. (1991).

Sussman, H. M. (1989). Neural coding of relational invariance in speech: human language analogs to the barn owl. *Psychological Review*, 96, 631-42.

Sutton, D. (1979). Mechanisms underlying learned vocal control in primates. In H. D. Steklis & M. J. Raleigh (eds.), *Neurobiology of social control in primates: An evolutionary perspective*. New York: Academic Press.

Swadesh, M. (1939). Nootka internal syntax. *International Journal of American Linguistics*, 9, 77-102.

Sweetser, E. E. (1990). *From etymology to pragmatics: Metaphorical and cultural aspects of semantic structure*. Cambridge University Press.

Symmes, D. & Biben, M. (1992). Vocal development in nonhuman primates. In Papousek, Jürgens & Papousek (1992).

Tannen, D. (1989). *Talking voices: Repetition, dialogue and imagery in conversational discourse*. Cambridge University Press.

Tennant, N. (1984). Intentionality and the evolution of language. In C. Hookeray (ed.), *Minds, machines and evolution*. Cambridge University Press.

Terrace, H. S. (1979). *Nim*. New York: Knopf.

Thelen, E. (1991). Motor aspects of emergent speech: a dynamic approach. In Krasnegor et al. (1991).

Thomason, S. G. & Kaufman, T. (1988). *Language contact, creolization and genetic linguistics*. Berkeley: University of California Press.

Thorne, A. G. & Wolpoff, M. H. (1992). The multiregional evolution of humans. *Scientific American*, 266(4), 28-33.

Todd, P. & Aitchison, J. (1980). Learning language the hard way. *First Language*, 1, 122-40.

Tomlin, R. S. (1986). *Basic word order: Functional principles*. London: Croom Helm.

Traugott, E. C. & Heine, B. (1991). *Approaches to grammaticalization* (vol. 1). Amsterdam: John Benjamins.

van Cleve, J. V. (ed.) (1987). *Gallaudet encyclopaedia of deaf people and deafness*. New York: McGraw Hill.

Vargha-Khadem, P., Watkins, K., Alcock, K., Fletcher, P. & Passingham, R. (1995). Praxic and nonverbal cognitive deficits in a large family with a genetically transmitted



speech and language disorder. *Proceedings of the National Academy of Science USA*, 92, 930-3.

Vincent, N. (1993). Head- versus dependent-marking: the case of the clause. In G. G. Corbett, N. M. Fraser & S. McGlashan (eds.), *Heads in grammatical theory*. Cambridge University Press.

Wallman, J. (1992). *Aping language*. Cambridge University Press.

Wang, W. S. Y. (1982). *Explorations in language evolution. Osmania Papers in Linguistics*: 8 (Supplement). Hyderabad: Osmania University Department of Linguistics.

Wavell, S. (1995). The almighty muddle from 4m years BC. *Sunday Times*, 20 August 1995.

Weiner, J. (1994). *The beak of the finch*. London: Cape.

Weizenbaum, J. (1976/1984). *Computer power and human reason*. London: Pelican. (First published by Freeman, New York)

Wells, G. A. (1987). *The origin of language: Aspects of the discussion from Condillac to Wundt*. La Salle, IL: Open Court.

Wesson, W. (1991). *Beyond natural selection*. Cambridge, MA: MIT Press.

White, R. (1985). Thoughts on social relationships and language in hominid evolution. *Journal of Social and Personal Relationships*, 2, 95-115.

White, T. D., Suwa, G. & Asfaw, B. (1994). *Australopithecus ramidus*, a new species of early hominid from Aramis, Ethiopia. *Nature*, 371, 306-12.

Whitney, W. D. (1893). *Oriental and linguistic studies* (vol. I). New York: Charles Scribner's Sons.

Whorf, B. L. (1956). *Language, thought and reality: Selected writings of Benjamin Lee Whorf* (ed. J. B. Carroll). Cambridge, MA: MIT Press.

Wilson, A. C. & Cann, R. L. (1992). The recent African genesis of humane. *Scientific American*, 266(4), 22-7.

Wind, J. (1983). Primate evolution and the emergence of speech. In E. de Grolier, A. Lock, C. R. Peters & J. Wind (eds.), *Glossogenetics: The origin and evolution of language*. Chur: Harwood.

Wittgenstein, L. (1958). *Philosophical investigations* (2nd edn, trans. G. E. M. Anscombe). Oxford: Blackwell.

Woolford, E. (1979). The developing complementizer system in Tok Pisin. In K. C. Hill

(ed.), *The genesis of language*. Ann Arbor: Karoma.

Wurm, S. A. & Mühlhäusler, P. (eds.) (1985). *Handbook of Tok Pisin (New Guinea Pidgin)*. Pacific Linguistics: C-70. Canberra: Australian National University.

Wynn, K. & Bloom, P. (1992). The origins of psychological axioms of arithmetic and geometry. *Language and Mind*, 7, 409-16.

Yaguello, M. (1984/1991). *Lunatic lovers of language: Imaginary languages and their inventors*. London: Athlone. (Originally *Les fous du langage: des langues imaginaires et de leurs inventeurs*. Paris: Editions du Seuil.

Yamada, J. L. (1990). *Laura: A case for the modularity of language*. Cambridge, MA: MIT Press.