Jean AITCHISON
Seeds of Speech

1 A natural curiosity:
How did language begin?

'Actually,' says Liz, 'what I *do* suffer from is curiosity. I want to know *what really happened.*'

'When?'

'At the beginning. When human nature began. At the beginning of human time. And I know I'll never know. But I can't stop looking. It's very frustrating. When occasionally it comes over me that I'll never know, I can't quite believe it. Surely, one day, I will find out?'

Margaret Drabble, *A natural curiosity*

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:

In the Land of the Bumbley Boo
You can buy Lemon pie at the Zoo;
They give away Foxes
In little Pink Boxes
And Bottles of Dandylion Stew.[1]

Nobody has ever encountered the bizarre delights of this fictional land. Yet we have no difficulty in understanding these lines written by the comic writer Spike Milligan. 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.[2] 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.[3] 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, a playground for cranks.

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'.[4] 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.[5]

Or consider the views of James Burnett Lord Monboddo, a Scottish lawyer, 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.[6]

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'.[7]

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.'[8]

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 repute among sober-minded philologists.[9]

Yet scholarly disapproval did not stop speculation. In 1977, one researcher counted twenty-three 'principal theories' of language origin.[10] Another 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.'[11]

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', noted a recent writer.[12]

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. A cynical view is that academic areas of interest swing in and out of fashion like clothes. But there is a more realistic, 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.'[13] 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.'[14]

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.'[15] In addition, classification of the sounds is difficult: 'Boundaries are blurred by intermediate or transitional acoustic forms'.[16] 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 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?'[17]

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.[18] But this is not the only similarity between birds and humans. There are several others.[19]

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.[20] 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'.[21] 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.[22]

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.[23] And considerable variation is found between the songs of different birds, more than between different languages.[24] 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.[25] 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.[26]

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,[27] 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.[28] 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.'[29] 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. Birds do not, for example, serenade the beauties of nature, as poets such as Christopher Marlowe sometimes assumed:

> By shallow Rivers, to whose falls,
> Melodious byrds sing Madrigalls.[30]

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, somewhat in the manner of Agatha Christie's fictional detective Hercule Poirot:

> Mrs. Gardener was wrestling with a jigsaw ... 'But about detecting, I would so like to know your methods ...'
>
> Hercule Poirot said 'It is a little like your puzzle, Madame. One assembles the pieces. It is like a mosaic – many colours and patterns – and every strange-shaped little piece must be fitted into its own place.'
>
> Poirot went on: 'And sometimes it is like that piece of your puzzle just now. One arranges very methodically the pieces of the puzzle – one sorts the colours – and then perhaps a piece of one colour that should fit in with – say, the fur rug, fits in instead in a black cat's tail.'[31]

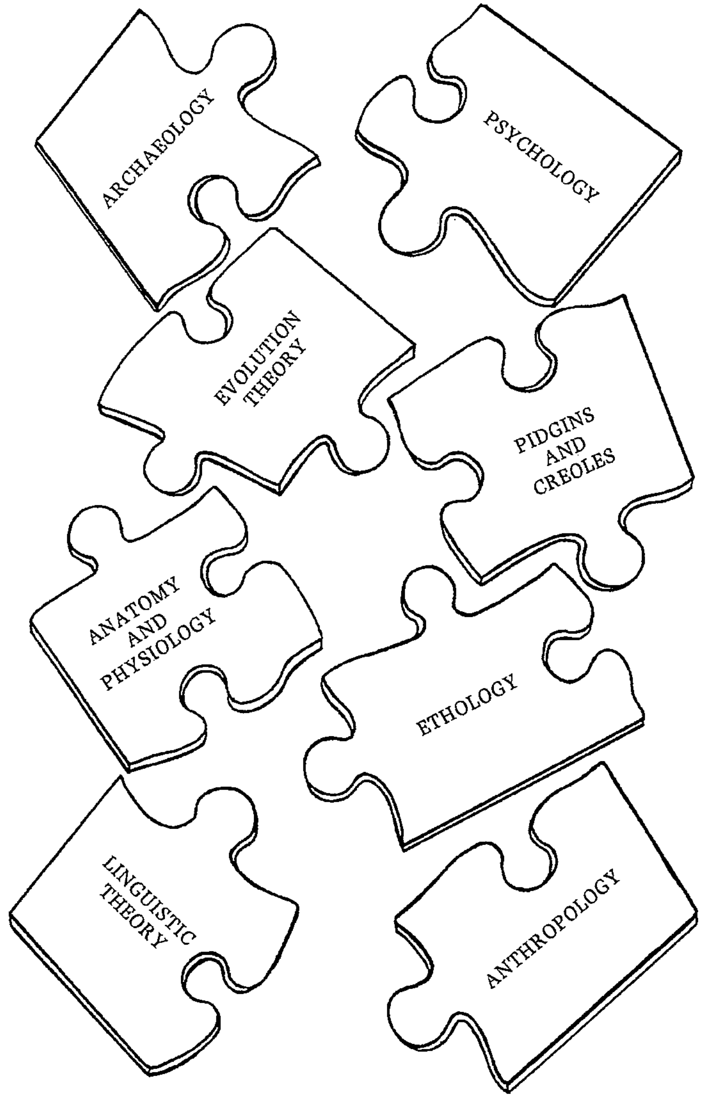

Figure 1.1 The pieces of the puzzle

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).

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.

The Greek historian Thucydides, writing in the fifth century BC, hoped that his words 'would be judged useful by those who want to understand clearly the events which happened in the past, and which, human nature being what it is, will at some time or other be repeated in the future in much the same way'.[32] This book is taking the reverse path over pidgins and creoles, in assuming that recent developments can provide information about what might have happened in the much earlier past.

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.[33] 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

An amoeba named Sam, and his brother
Were having a drink with each other
  In the midst of their quaffing,
  They split themselves laughing.
And each of them now is a mother.[34]

Did language evolve like an amoeba, as a simple outline which gradually became elaborated? Or was it a sprawling mish-mash which slowly neatened 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.[35]

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 agressor, nature dictates accents, cries, lamentations . . . ', Rousseau proposed, 'and that is why the first languages were singable and passionate before they became simple and methodical.'[36] 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.'[37]

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.[38] 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.[39] But the final route selected was not automatic. It may have taken generations to become firm, and was probable rather than inevitable.[40]

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.[41]

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.[42]

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.'[43]

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.

Summary

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.

2 A peculiar habit: What is language for?

> It is worth repeating at this point the theories that Ford had come up with, on his first encounter with human beings, to account for their peculiar habit of continually stating and restating the very, very obvious, as in 'It's a nice day', or 'You're very tall', or 'So this is it, we're going to die.'
>
> His first theory was that if humans didn't keep exercising their lips, their mouths probably seized up.
>
> After a few months of observation, he had come up with a second theory, which was this – 'If human beings don't keep exercising their lips, their brains start working.'
>
> Douglas Adams, *The restaurant at the end of the universe*

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'[1] 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'.[2]

But language does not necessarily involve the transfer of information, often it is just polite chatter, as satirized by Douglas Adams in the quotation at the top of the chapter.

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.[3]

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 Müller.[4] 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:[5]

(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).

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.

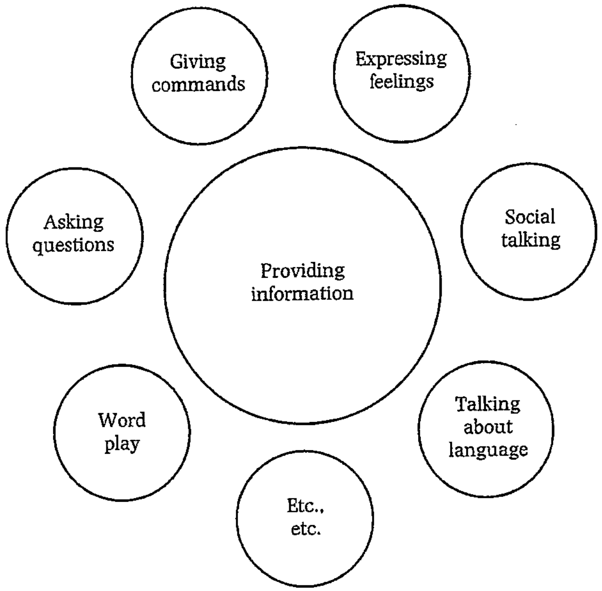

Figure 2.1 Traditional view of language functions

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.'[6] 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.[7]

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.[8]

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. Except swearing. There's no language for it. Ouch, ow, oof, gah. Jesus. Pain is its own language', says Martin Amis in his novel *London Fields*.[9] 'The paucity of language we have to describe emotional life can constrain our capacity to communicate the range and subtlety of our emotional responses', commented the journalist Susie Orbach.[10] And the poet Byron aptly expresses the failure of language to capture deep feelings when he talks of his pleasure in pathless woods and the lonely shore,[11] where he can:

> mingle with the Universe, and feel
> What I can ne'er express.

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

Matilda told such Dreadful Lies,
It made one Gasp and Stretch one's Eyes;
Her Aunt, who, from her Earliest Youth,
Had kept a Strict Regard for Truth,
Attempted to Believe Matilda;
The effort very nearly killed her.[12]

Officially, lying is often discouraged, as in Hilaire Belloc's *Cautionary tales for children*, where Matilda who told lies ends up burned to death.

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. Fanciful elaboration is also common: Pooh-Bah, a character in the light opera *The Mikado*, speaks of adding 'corroborative detail, intended to give artistic verisimilitude to an otherwise bald and unconvincing narrative'.[13] Lying is so common, a whole anthology of real-life lies was recently published.[14] And some fibbers even take pleasure in their skill, according to the English writer Rudyard Kipling in his poem 'The Lie'.

There is pleasure in the wet, wet clay,
When the artist's hand is potting it.
There is pleasure in the wet, wet lay,
When the poet's hand is blotting it...
But the pleasure felt in these is as chalk to Cheddar cheese
When it comes to a well-made Lie. –
To a quite unwreckable Lie,
To a most impeccable Lie!
To a water-tight, fire-proof, angle-iron, sunk-hinge, time-lock,
steel-faced Lie![15]

In short, 'the human race is greatly given to lying', as the journalist Katherine Whitehorn commented.[16] 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 one 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'.[17] 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 tabby cat cannot relay information about past happenings: 'It's a disgrace: that drunken lout threw a bowl of water over me yesterday', nor warn another of a future danger: 'Be careful, my dear, that snotty child likes pulling cats' tails.' 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 talking', 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 Malinowksi, 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'.[18] 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: 'Good morning', 'Hi there!', 'Hello again!', and there are standard topics of conversation. In Britain this is traditionally the weather, as the eighteenth-century lexicographer Samuel Johnson noted: 'When two Englishmen meet, their first talk is of the weather.'[19] In other cultures, it may be the health of relatives, as in the following exchange between a villager and a city-bred young man who has just returned to his home village in Karnataka, South India:

Young man: How are you?
Villager: By the grace of God, all are fine. My son is employed now. Many people have come to offer their daughters to him already. My daughter attained puberty recently. She is sent to her husband's place. If that Lord Venkateshwara of Tirupathi opens his eyes, I will be a grandfather soon.[20]

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, as in the following conversation:

Marge: Can I have one of the Tabs?
Do you want to split it?
Do you want to split a Tab?
Kate: Do you want to split MY Tab?
Vivian: No.
Marge: Kate, do you want to split my Tab?
Kate: No, I don't want to split your Tab.[21]

Meaningless words, or even misunderstood words can keep a conversation going, a point often satirized by Alan Bennett in his plays:

Les: He's had a stroke. What is a stroke?
Marjorie: Why?
Les: This old man had had one.
Marjorie: What old man?
Les: I'm telling you.
Marjorie: Les.
Les: What?
Marjorie: You're still not thinking about the army.
Les: No.

Marjorie: You've not been getting yourself vaccinated?
Les: No. I want to tell you about this couple. Listen to me about this couple. This husband and wife.
Marjorie: I'm not interested in husbands and wives.[22]

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: 'Every woman is infallibly to be gained by every sort of flattery, and every man by one sort or another', said the Earl of Chesterfield in a letter to his son (1752). A somewhat cynical heroine in Jane Austen's *Pride and prejudice* comments to a honey-tongued suitor: 'It is happy for you that you possess the talent of flattering with delicacy. May I ask whether these pleasing attentions proceed from the impulse of the moment, or are the result of previous study?'[23] Or consider the editor trying to fob off an investigative journalist in Michael Dobbs's novel *House of cards*: 'His mind was charging through his Thesaurus of flannel, words which were noncommittal but which left their audience with an appropriately warm feeling of encouragement. It was a well-thumbed volume.'[24]

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.[25]

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'[26] – an assertion supported by an extract from the official minutes of a meeting at the White House (1969): 'You can say that this Administration will have the first complete, far-reaching attack on the problem of hunger in history. Use all the rhetoric, as long as it doesn't cost money', American ex-president Richard Nixon is reported as saying.[27]

But it's not just flattery, advertising and political language which influence people. So can various other forms of language, as satirized by W. S. Gilbert in the light opera *Patience*:

> You must lie upon the daisies and discourse in novel phrases of
> your complicated state of mind,
> The meaning doesn't matter if it's only idle chatter of a
> transcendental kind.
> And everyone will say,
> As you walk your mystic way,
> If this young man expresses himself in terms too deep for me,
> Why what a very singularly deep young man this deep young
> man must be![28]

To take a more recent example, academic gobbledegook is used to impress in a science-fiction story: 'Olgarkov had originated the fashionable saying "Silence is an epiphenomenon of organisation". No-one knew what it meant, but it sounded good at parties.'[29]

An important role of language, then, is to influence others: 'Language is an efficient way to change another's behavior', notes one researcher. '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.'[30]

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).

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.

Summary

This chapter looked at the role of language. The uses of language are so numerous and complex in modern society, that its

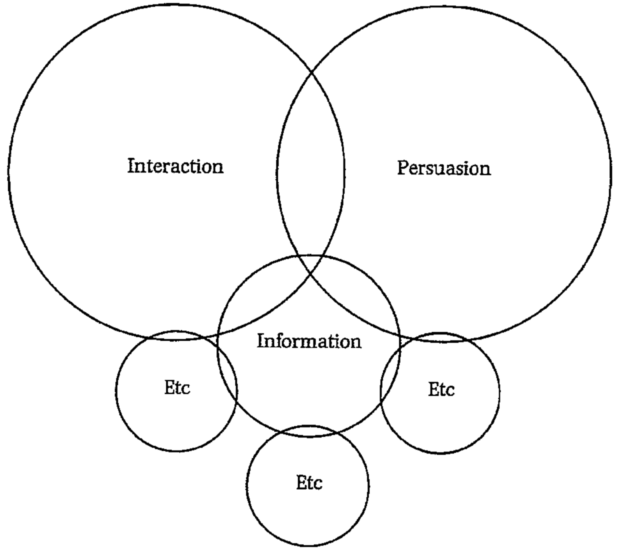

Figure 2.2 Realistic view of language functions

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?

3 The bother at Babel:
Why do languages differ so much?

I am not like a lady at the court of Versailles, who said: 'What a dreadful pity that the bother at the tower of Babel should have got language all mixed up; but for that, everyone would always have spoken French.'

Voltaire, letter to Catherine the Great (1767)

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.[1] 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'.[2]

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'[3]

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:

mutsl 'he is lying on his stomach'
pak'l 'he is lying on his back'
tṣaltš 'he is lying on his side'
qinl 'he is lying outstretched'
leql 'he is lying sprawled (probably intoxicated)'
kutṣl 'he is lying alone in a house (probably sick)'[4]

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.'[5]

Or going further afield, consider the Guugu Yimidhirr language, spoken in the north-eastern tip of Australia.[6] 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 Guugu 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.[7]

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, 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'.[8] 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.[9] A similar type of rule is used by the blue-footed booby, a seabird which inhabits the Galapagos islands.[10] 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 metre 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:

(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![11]

It's as if humans had to choose between 'Hallo', 'Goodbye', 'Please', 'Thankyou', '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.'[12] 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.[13]

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.'[14]

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 thoughtcrime 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.'[15]

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.[16]

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.[17] 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.[18] (See Fig. 3.1.)

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.[19] 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.[20]

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

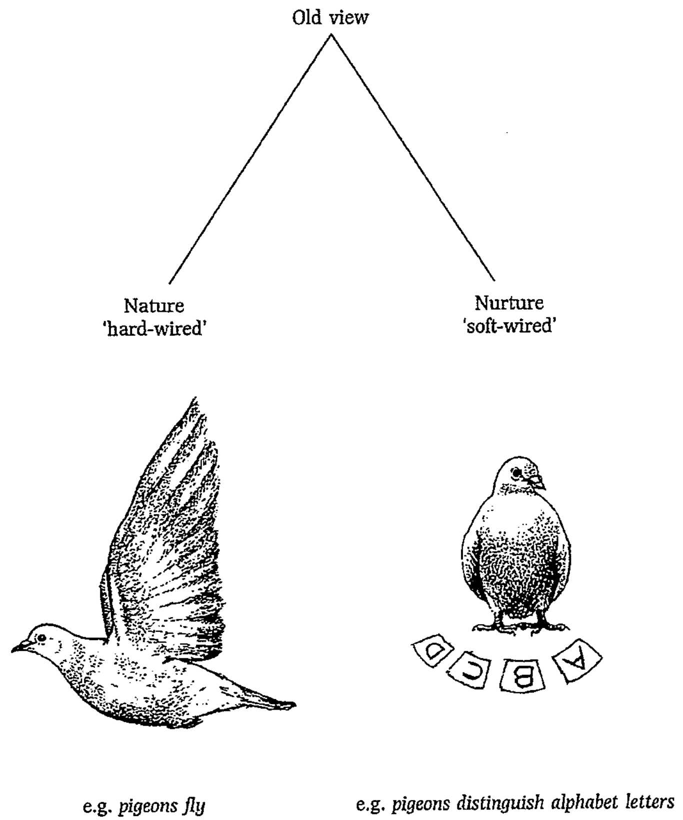

Figure 3.1 Old nature–nurture view

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.[21] 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.'[22]

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.

The hardworking nature of bees appealed to the eighteenth-century moralist who wrote the following verse for children:[23]

> How doth the little busy bee
> Improve each shining hour,
> And gather honey all the day
> From every opening flower!

But he failed to point out the oddest fact about bees, that they can recognize flowers in the first place. 'Every opening flower' covers a huge range, from roses to marigolds to foxgloves to heather, which look different and smell different. But bees cannot possibly have an inbuilt encyclopaedia listing all possible plants. So what happens?

Apparently, bees have some generalized inbuilt information about flowers, but they have to fill in the details themselves. Bees spontaneously land on small, brightly coloured objects that, like flower petals, have a high proportion of edges to unbroken areas, and which, like flower middles, have centres which absorb ultra-violet light, and so appear dark to bees. But not all such objects contain nectar and pollen. So additional learning is required.

A bee's ability to remember different colours, patterns, shapes and odours was tested by checking how reliably bees returned to particular artificial 'flowers'.[24] 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

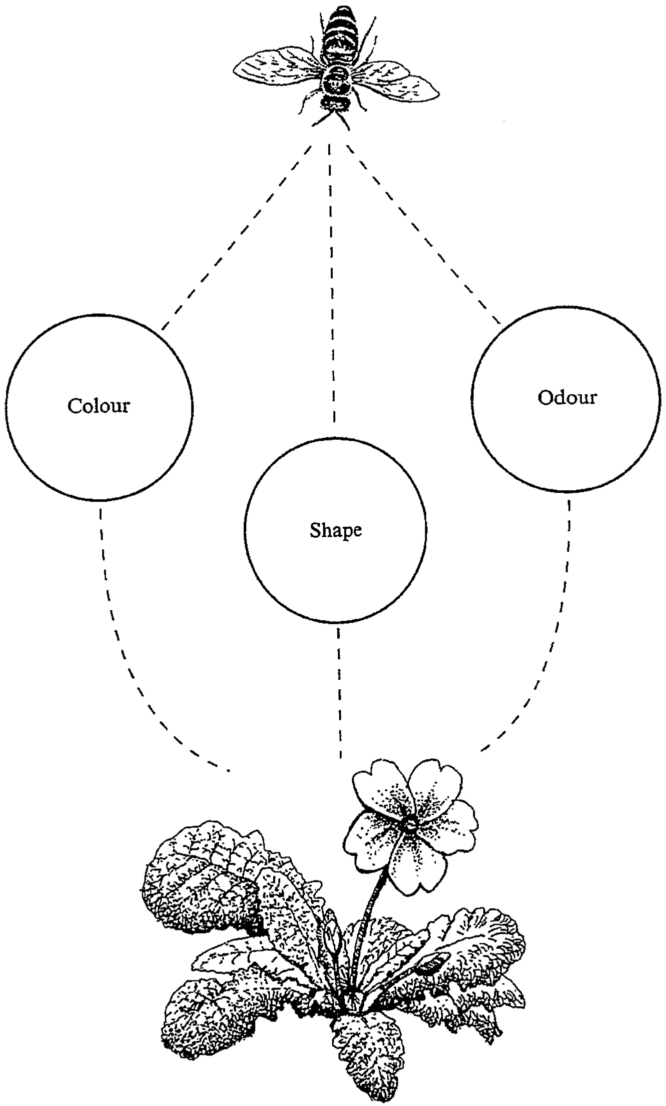

Figure 3.2 Innately guided behaviour

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).

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.[25]

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.'[26]

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 pioneeering 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.[27]

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.

Summary

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.

5 The family tree:
The evolutionary background

Some folks'll boast about their family trees,
And there's some trees they ought to lop;
But our family tree, believe me, goes right back,
You can see monkeys sitting on top!

R. P. Weston and Bert Lee, 'St. George and the Dragon'

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: 'Descended from the apes? My dear, we will hope it is not true. But if it is, let us pray that it may not become generally known' is a remark supposedly made by the wife of a canon of Worcester Cathedral.

A well-known novel, *Tarzan of the apes* (1912), promoted this fallacy in a stirring fictional account of Tarzan, a human brought up by apes, which implies that apes are part-way towards being real people:

> Many travellers have seen the drums of the great apes, but Tarzan . . . is, doubtless, the only human being who ever joined in the fierce, mad, intoxicating revel of the Dum-Dum. From this primitive function has arisen, unquestionably, all the forms and ceremonials of modern church and state, for through all the countless ages, back beyond the uttermost ramparts of a dawning humanity our fierce, hairy forebears danced out the rites of the Dum-Dum to the sound of their earthen drums, beneath the bright light of a tropical moon in the depth of a mighty jungle which stands unchanged.[1]

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.[2] 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).

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.[3]

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.[4] Additional findings from the area, including hip joints, are still being checked, assembled and argued over.[5]

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

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.'[6] About 1½ 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.'[7]

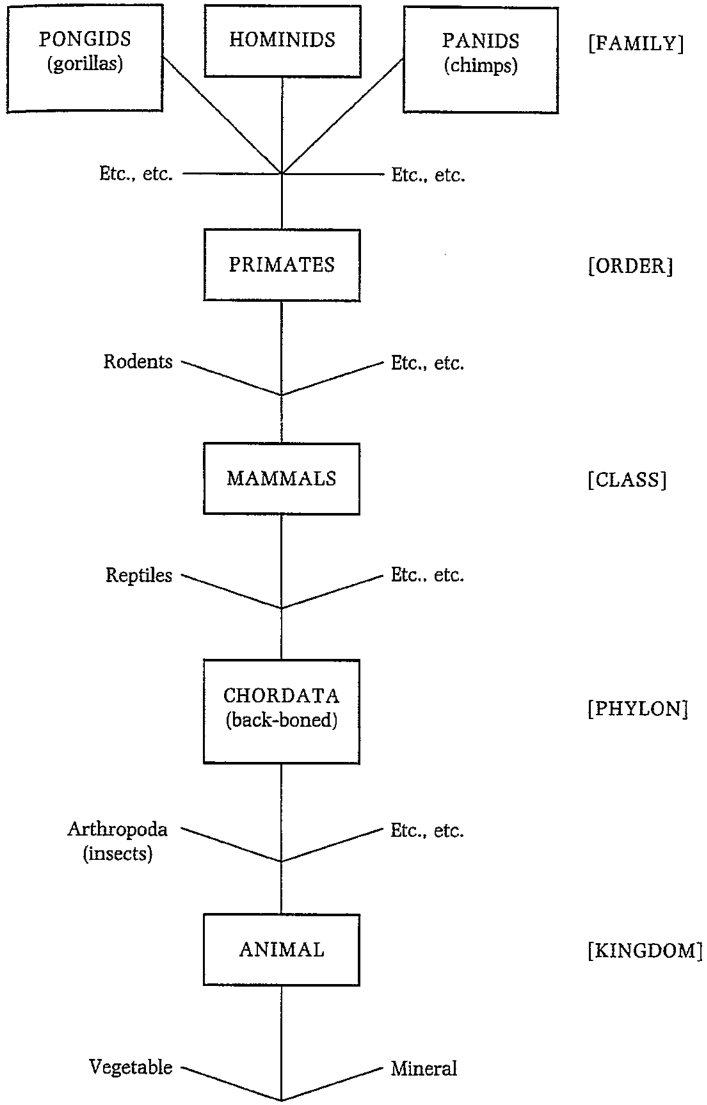

Figure 5.1 The primate bush

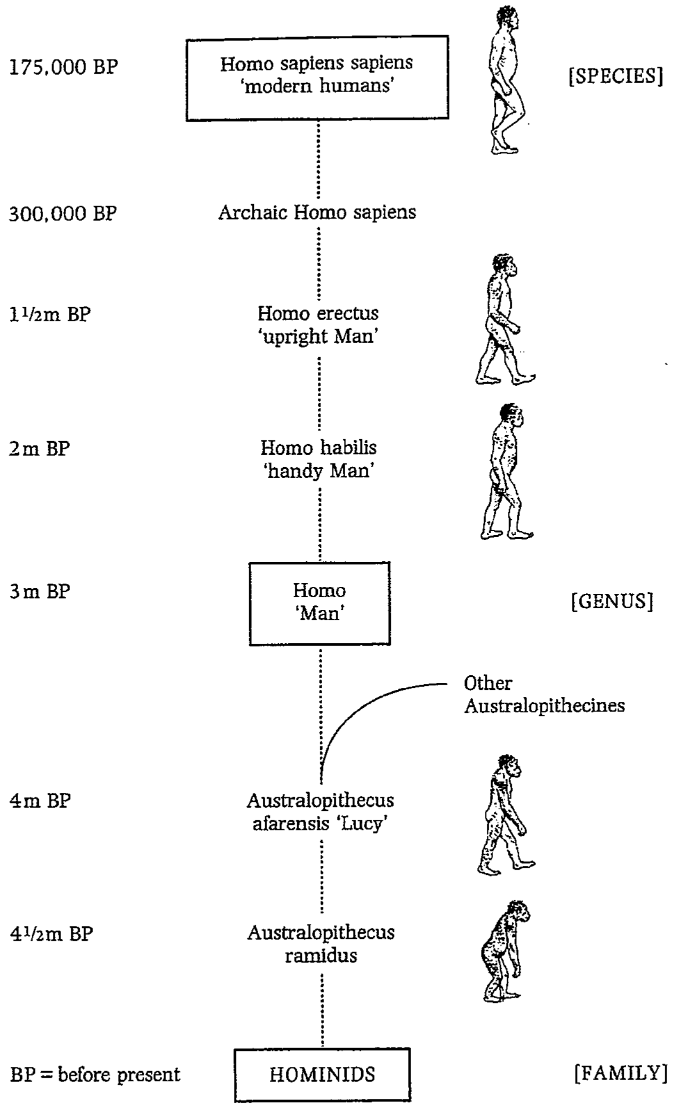

Figure 5.2 The genus *Homo*

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

The development of language was somewhere between 250,000 BP and 50,000 BP, with the average estimate being around 100,000 years ago,[8] 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 BP.[9] 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'[10] 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.[11] 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.[12]

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.'[13] 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.'[14]

This mystifying process has been argued about for decades.[15] 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.[16] 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.[17] 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 (see Fig. 5.3).

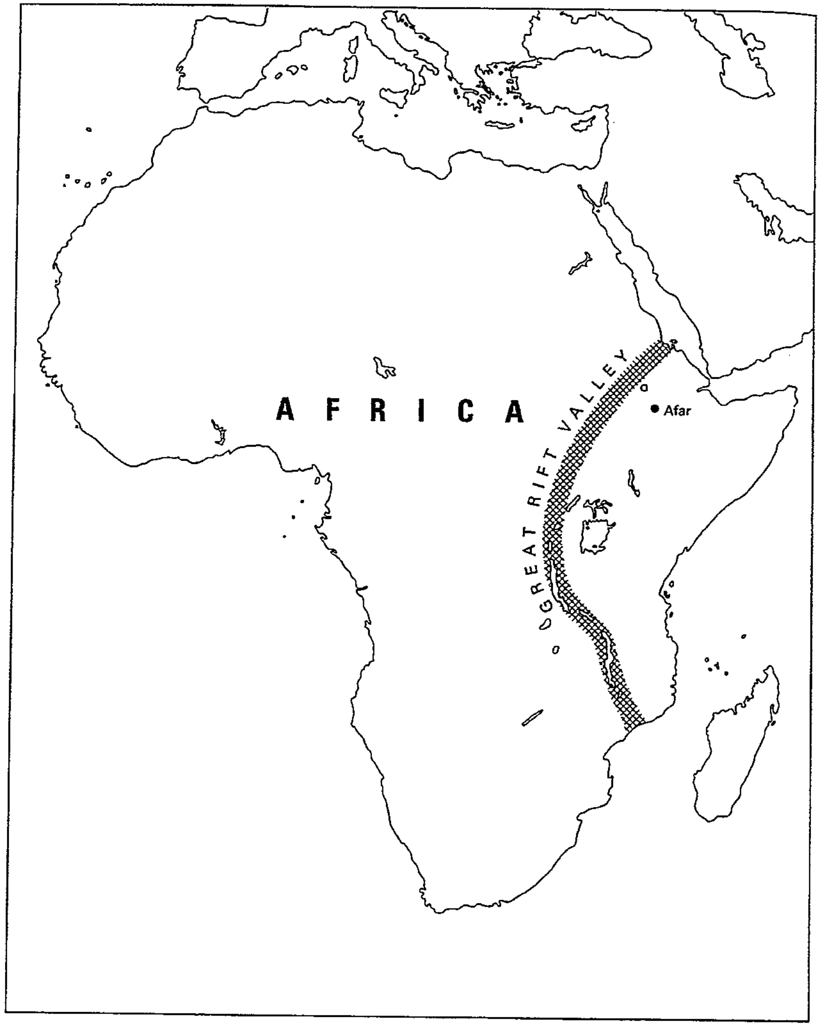

Figure 5.3 The Great Rift Valley

'As for humans, we are unquestionably a pure product of a certain aridity', it has been claimed.[18] 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.[19] 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

Fire burn and cauldron bubble: bubbling vats of human cells, recombinant DNA, surging and swelling, pulsing and heaving, multiplying by the million, the more the merrier; all the better, the more efficiently for biologists and computers to work upon the structure of the living cell, the blueprints of our lives, decoding the DNA which is our inheritance. A snip here, a section there, excise this, insert that, slice and shuffle, find a marker, see what happens.[20]

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 one count[21] – 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'.[22]

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.[23]

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.[24]

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.'[25]

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.[26]

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'.[27]

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.[28] 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-quick-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. 5.4).

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.[29]

Probably, a simplified type of language began to emerge at least as early as 250,000 BP.[30] Piece by piece, the foundations were slowly put in place. Somewhere between 100,000 and 75,000 BP 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

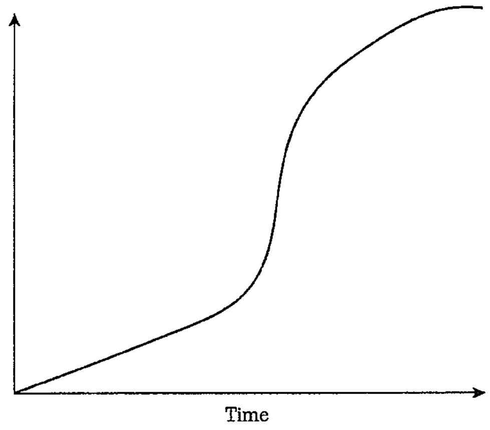

Figure 5.4 S-curve

50,000 BP 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!'[31] 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 puttered and flapped.'[32] 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'.[33] 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.[34]

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.[35] 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, which paid dividends:

> Two roads diverged in a wood, and I –
> I took the one less traveled by,
> And that has made all the difference.

This was a comment by the poet Robert Frost on his life,[36] but it applies equally to humankind and language.

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.

Summary

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.

7 Broken air:
Inherited ingredients

Soune is noght but eyre ybroken
And every spech that ys yspoken,
Lowde or pryvee, foule or faire,
In his substance ys but aire;
For as flaumbe ys but lyghted smoke,
Ryght too soune ys aire y-broke.

Geoffrey Chaucer, *The house of fame* (*c.*1375)

Chaucer, writing in the fourteenth century, was wrong to regard flame as lighted smoke, but right to regard speech as broken air.[1] But the broken air of speech is highly complex, and requires a range of physical structures for handling it. Speech is 'a thing of shreds and patches',[2] 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).

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 (voice-box) 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.[3]

This chapter will consider the various bits and pieces, starting

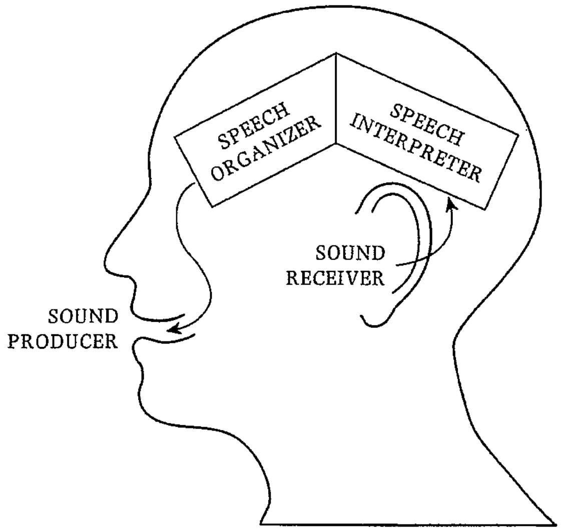

Figure 7.1 Basic ingredients for speech

with the probable oldest, those which appear to be most strongly shared with other primates.

Telling noise from signal

> The man I work with – Gunther – started to go deaf fairly recently. The doctors couldn't explain why but his hearing problems became so bad that he was obliged to be fitted with a hearing aid. He told me that, initially, he found the amplified sound in his head alarmingly hard to cope with. Everything came at him in a rush, he said, trying to explain the effect, sounds were suddenly unfamiliar and new. 'You see, Hope,' he said a little plaintively, 'the problem was that I couldn't tell what was irrelevant and what was important . . . I couldn't tell noise from signal.'[4]

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, as shown by the above extract from William Boyd's novel *Brazzaville beach*. Just as bullfrogs respond to bullfrogs,[5] and macaque monkeys tune in to other macaques,[6] human babies are able to recognize human voices with ease, twelve hours after birth, according to one report.[7] 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.[8] 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.[9]

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.'[10] 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.[11]

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.[12] Both children and monkeys were given pacifiers to suck, each of which was wired to a pre-set sound.[13] 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.[14]

The humans and monkeys may not have heard the sounds in exactly the same way.[15] 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.[16] 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.[17]

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.[18]

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.[19] These different abilities – voice recognition and understanding emotional effect – are apparently handled by different brain areas.[20]

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 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).[21]

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.[22]

The voice-box or 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.[23] 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.[24] 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.[25] Other researchers, however, dispute the link with bipedalism.[26] According to one theory, primates developed hand–eye co-ordination 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.[27] (See Fig. 7.2.)

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'.[28]

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.[29] But it's unclear whether the bone was located in the same position as in modern humans.

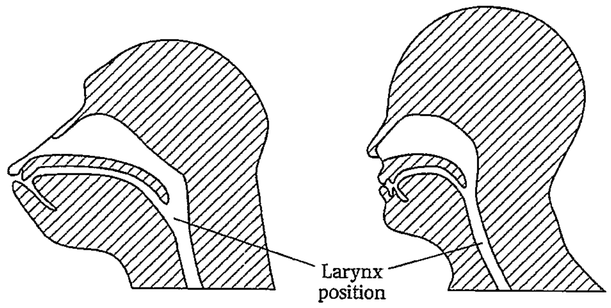

Figure 7.2 Chimp vs human vocal tract

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'.[30] Chimps also can produce vowel-like sounds, but not very distinct ones.[31]

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', the back of the roof of the mouth. Before this happened, nasalized sounds only would have

been possible, in which the air is expelled partially through the nose: these nasal sounds are more difficult to recognize than non-nasal ones.[32]

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.[33] 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. The result is somewhat like the sound sometimes used to imitate mouse squeaks, conventionally spelled 'ee-ee' or 'eek-eek'. It is counterbalanced by [u], a high back vowel, in which the tongue is pulled back, with the back part raised, as in the 'ooh!' of surprise or appreciation. The third of the trio, [a] is produced with the mouth fairly open, and the tongue low and fairly central, somewhat like the 'ah!' of realization or recognition. Relatively few words would have been easily distinguishable without these key vowels, and only humans can articulate them (see Fig. 7.3).

Before the key vowels were possible, clear words were unlikely, and the situation might have been similar to that described by

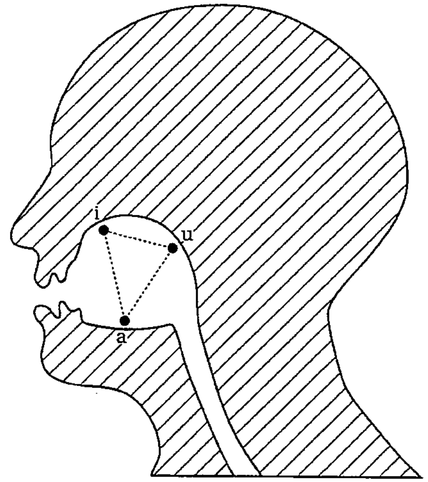

Figure 7.3 Vowel triangle

Edgar Rice Burroughs, in his fanciful novel *Tarzan of the apes* (1912): 'The language of the apes had so few words that they could talk but little of what they had seen in the cabin, having no words to accurately describe the strange people or their belongings.'[34]

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].[35] But only humans can produce [k] and [g], which even now are relatively unstable sounds in that they tend to change.[36]

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, it has been claimed.[37] 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.[38]

Finally, an overall control system is needed to co-ordinate it all: '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', it has been claimed.[39] The next section will therefore move on to the brain, where this co-ordination happens.

The proper brain

'Without the proper brain to run it... a new mouth was of no help.'[40] The new mouth, relocated larynx, and fairly old ears, needed to be co-ordinated by the most important component, a developed brain.

'Why does everybody call me bighead?' runs a popular song, and with reason. 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*.[41] (See Fig. 7.4.)

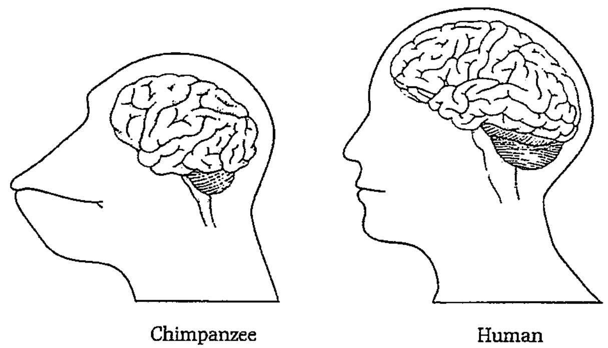

Figure 7.4 Chimp vs human brain

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.[42] Then brain size and language possibly increased together.[43] 'If humans weren't using and refining language I would like to know what they *were* doing with their autocatalytically increasing brains', comments one researcher.[44]

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:

Much I owe to the Lands that grew –
  More to the Lives that fed –
But most to Allah Who gave me two
  Separate sides to my head.

says the poet Rudyard Kipling in 'The two-sided man'.[45]

The left hemisphere controls movement in the right side of the body, and also language in most humans. The connection has been known for a long time. In the Bible, a psalm begs: 'If I will forget thee, Jerusalem, let my right hand die – let my tongue stick to the roof of my mouth.'[46] This is a reference to the right-sided paralysis and language impairment which is likely to afflict anyone who has a left hemisphere stroke – regarded in the Bible as a punishment for wrongdoing (see Fig. 7.5).

But exactly how language and handedness are linked is disputed.[47] 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.[48] 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.[49] 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'.[50]

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.[51]

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

'Is there any point to which you would wish to draw my attention?'
'To the curious incident of the dog in the night-time.'

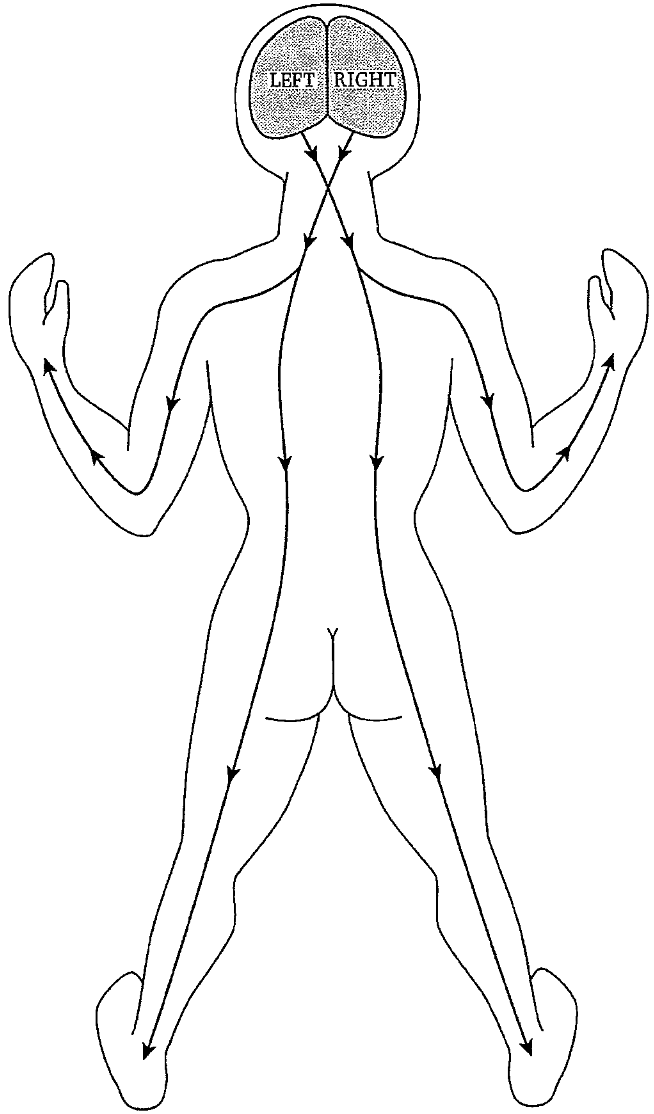

Figure 7.5 Handedness

'The dog did nothing in the night-time.'
'That was the curious incident,' remarked Sherlock Holmes.[52]

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.[53]

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.[54] 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'.[55]

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.[56]

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).

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.[57] First, an area which deals with the muscles controlling speech, mainly those of the mouth.

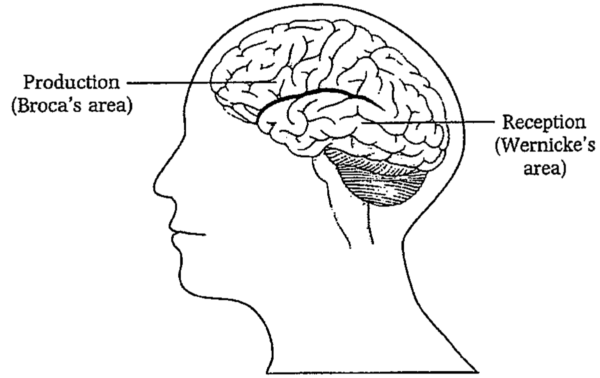

Figure 7.6 The human brain: production and reception areas

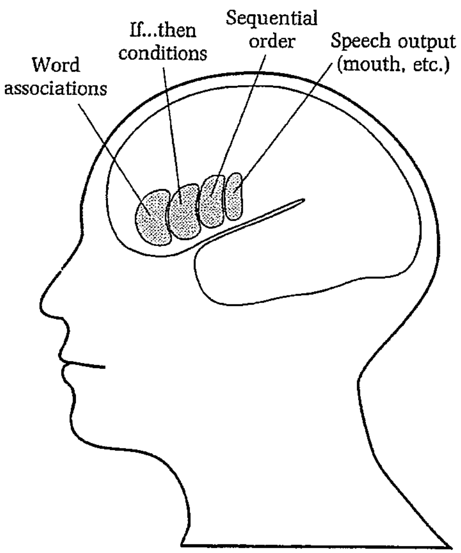

Figure 7.7 Divisions within Broca's area (from Deacon 1992)

Further forward is an area which controls sequential order, that is, the arrangment 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,[58] though humans have extended their use: 'Language functions have recruited cortical circuits that evolved for very different purposes in our primate ancestry.'[59] (See Fig. 7.7.)

But Broca's area needs to be backed up by contributions from other portions of the brain, including deeper sections.[60] 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: 'Nobody has more than the faintest idea how the brain works', comments one journalist, 'Our brainiest boffins speak almost boastfully about their ignorance... What

little they do know suggests that nerve cells secrete chemicals which zip from place to place like motorcycle couriers, dropping tiny electrical parcels as they arrive at their destinations.'[61] Co-ordination of it all may be the key to human language.

The human race may have been able to achieve this degree of co-ordination because of their extended childhood, known as 'neoteny' from the Greek 'young-stretch'. 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.[62] Second, helpless newborns must be kept near their mothers: '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.'[63]

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.

Summary

This chapter looked 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 (voice-box) 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.