common language is the pidgin — the language has then become a creole.

Once it has become a creole, the system tends to develop rapidly. Speech is speeded up, the syntax becomes more complex, and extra vocabulary items are created. Fairly soon, if it continues to develop, a creole is likely to be indistinguishable from a 'full' language.

In some circumstances, however, a creole can be devoured by its parent. If a creole is spoken in an area where the base language is also used, then there may be social pressure on the creole speakers to speak the base, which often has more prestige. Therefore, little by little, the creole becomes **decreolized**, as words and constructions from the base language replace the creole ones.

The study of pidgins and creoles has grown rapidly, because their implications and interest spread far beyond sociolinguistics. They are valuable for the insights they provide into language change, and some people have claimed that they shed light on language universals – that they present language in a stripped down and basic state. This claim is controversial, but the interest it has aroused has increased the attention given to the topic. Only time will tell whether such grandiose claims are justified.

However, language universals are more commonly associated with the study of language and mind. This is the topic of the next chapter.

Questions

1 What problems arise in an attempt to define the notion of a 'language'?
2 Distinguish between **dialect** and **accent**.
3 Which socio-economic class is likely to show the greatest phonological variation within its speech, and why?
4 In what ways might women's speech differ from men's?
5 What is **language planning**, and how might it be carried out effectively?
6 What is a **pidgin**, and how may it be distinguished from a **creole**?

11 language and mind

This chapter looks at psycholinguistics, and outlines three core areas: how humans acquire language, how they comprehend speech, and how they produce it. It also looks briefly at speech disorders, and where language might be located in the brain.

Psycholinguistics is often defined as the study of language and the mind. It explores what goes on in the human mind as an individual acquires, comprehends, produces and stores language. Such a study covers an enormous range of topics, and no two psycholinguists agree on exactly the ground which it covers. One reason for this disagreement is that psycholinguistics overlaps with a somewhat wider study, sometimes called the **psychology of communication**, which looks at language alongside other human methods of communication, such as the use of gesture and facial expressions.

This chapter outlines some of the work going on in three 'core' psycholinguistic topics:

How humans acquire language.
How humans comprehend speech.
How humans produce speech.

It also discusses how the study of language and mind overlaps with that of language and the brain.

Psycholinguistic evidence

The mind cannot be directly observed, so psycholinguists have to devise ways of finding out how it works. They get their evidence from two main sources: observation of spontaneous utterances, on the one hand, and psycholinguistic experiments, on the other.

Spontaneous utterances which deviate from the norm in some way are the most informative. We can learn considerably more from a child's mistake such as *foots* instead of 'feet', or someone who said *geranium* instead of 'hydrangea', than we can from a perfect flow of speech.

However, ordinary speech is somewhat messy, in that there are dozens of different factors which have to be taken into account when utterances are analyzed. Psycholinguists therefore devise experiments in which the number of variable factors can be controlled, and the results can be accurately measured. They might, for example, set subjects a 'lexical decision task', in which they time how long it takes a person to recognize a word as being a word, or reject a nonsense sequence such as *vleesidence* as a non-word.

But this type of methodology presents a problem, sometimes called the 'experimental paradox'. The more carefully an experiment is devised so as to limit variables, the more subjects are put into an unnatural situation, in which they are likely to behave oddly. On the other hand, the more one allows a situation to be like 'real-life', the less one is able to sort out the various interacting factors.

Ideally, major topics should be tackled both by observing spontaneous speech and by devising experiments. And when the results coincide, this is a sign that progress is being made.

Acquiring language

The so-called 'innateness question' has been a burning issue over the last half century. Exactly how much language is pre-programmed within the human mind? Do humans have a genetically imprinted 'Universal Grammar', as Chomsky suggests? Or were the rudiments of language invented by a clever cave-man and handed down from generation to generation? No detailed solution has yet been found to these questions. But by examining them, we are slowly acquiring a greater understanding of the nature of human language.

One point in particular has become clearer: language has all the hallmarks of **maturationally controlled behaviour**. It used to be thought that animal behaviour could be divided into two types: that which was inborn and natural (for example, dogs naturally bark), and that which was learned and unnatural (dogs may be taught to beg). It turns out, however, that this division is by no means clearcut and may be misleading. Many types of behaviour develop 'naturally' at a certain age, provided that the surrounding environment is adequate. Such behaviour is maturationally controlled, and sexual activity is a typical example. Arguments as to whether it is inborn or learnt are futile. Both nature and nurture are important. Innate potentialities lay down the framework, and within this framework, there is wide variation depending on the environment. When individuals reach a crucial point in their maturation, they are biologically in a state of readiness for learning the behaviour. They would not learn it at this time without a biological trigger and, conversely, the biological trigger could not be activated if there was nobody around from whom they could learn the behaviour.

Human infants pay attention to language from birth. They produce recognizable words at around 12–15 months, and start

putting words together at around 18 months. The urge for language to emerge at this time is very strong, and only very extraordinary circumstances will suppress it – as in the case of Genie, a Californian teenager who from the age of 20 months had been confined to one small room, and had been physically punished by her father if she made any sounds. Naturally, she was without speech when she was found.

But all normal children, and some abnormal ones, will begin to speak if they hear language going on around them. Take Laura, a severely retarded girl who produced fluent and richly structured speech, as:

He was saying that I lost my battery-powered watch that I loved.

She was not just parrotting sentences she had heard, because she made some grammatical errors, as:

Three tickets were gave out by a police last year.

This linguistic fluency contrasted strongly with her inability to handle other everyday matters: she did not even know her age!

The content–process controversy

The realization that language is maturationally controlled means that most psycholinguists now agree that human beings are innately programmed to speak. But they cannot agree on exactly *what* is innate. In particular, they cannot decide to what extent (if any) language ability is separate from other cognitive abilities.

All researchers agree that there is extraordinary similarity in the speech development of English-speaking children. Children who could not possibly be acquainted go through similar stages in their development, and also make similar mistakes. The implications of this coincidence are hotly disputed. On the one hand, there are those who consider that this uniformity of speech development indicates that children innately *contain* a blueprint for language: this view represents a so-called **content** approach. Extreme supporters of this view suggest that children may have a universal framework imprinted on their brains.

On the other hand, there are those who support a **process** approach, and argue that children could not possibly contain specific language universals. Instead, they are innately geared to *processing* linguistic data, for which they utilize a puzzle-solving ability which is closely related to other cognitive skills.

A further group of people point to the social nature of language, and the role of parents. Children, they argue, are social beings who have a great need to interact with those around them. Furthermore, all over the world, child-carers tend to talk about the same sort of things, chatting mainly about food, clothes and other objects in the immediate environment. **Motherese** or **caregiver language** has fairly similar characteristics almost everywhere: the caregivers slow down their rate of speech, and speak in slow, well-formed utterances, with quite a lot of repetition. People who stress these social aspects of language claim that there is no need to search for complex innate mechanisms: social interaction with caring caregivers is sufficient to cause language to develop.

This latter view is turning out to be something of an exaggeration. The fact that parents make it easier for children to learn language does not explain why they are so quick to acquire it: intelligent chimps exposed to intensive sign language rarely get beyond 200 words and two-word sentences. Furthermore, language seems to be due to something more than a desire to communicate. There is at least one strange child on record who acquired fluent language, but did not use it to communicate. He spoke only monologues to himself, and refused to interact with others.

The whole controversy is far from solved. But increasingly, language is thought to be **innately guided behaviour** (Chapter 2). Humans are naturally 'tuned in' to language. They instinctively pick out speech sounds, and know how to build them into linguistic grammars.

The rule-governed nature of child language

In spite of the numerous controversies surrounding child language, psycholinguists are at least in agreement on one major point. Children are not simply imitating what they hear going on around them as if they were parrots. The learning processes involved are far more complex. From the moment they begin to talk, children seem to be aware that language is **rule-governed**, and they are engaged in an active search for the rules which underlie the language to which they are exposed. Child language is never at any time a haphazard conglomeration of random

words, or a sub-standard version of adult speech. Instead, every child at every stage possesses a grammar with rules of its own even though the system will be simpler than that of an adult. For example, when children first use negatives, they normally use a simple rule: 'Put *no* or *not* in front of the sentence.' This results in consistent negative sentences which the child could not possibly have heard from an adult:

No play that.
No Fraser drink all tea.

This rule is generally superseded by another which says: 'Insert the negative after the first NP.' This also produces a consistent set of sentences which the child is unlikely to have heard from an adult:

Doggie no bite.
That no mummy.

A rather more obvious example of the rule-governed nature of child language are forms such as *mans*, *foots*, *gooses*, which children produce frequently. Such plurals occur even when a child understands and responds correctly to the adult forms *men*, *feet*, *geese*. This is clear proof that children's own rules of grammar are more important to them than mere imitation.

Children do not, however, formulate a new rule overnight, and suddenly replace the old one with this new one. Instead, there is considerable fluctuation between the old and the new. The new construction appears at first in a limited number of places. A child might first use the word *what* in a phrase with a single verb:

What mummy doing?
What daddy doing?
What Billy doing?

then only gradually extend it to other verbs, as in:

What kitty eating?
What mummy sewing?

This process is somewhat like the way in which an alteration creeps from word to word in language change (Chapter 13).

Attention to the ways in which children move from one rule to another has shown that language acquisition is not as uniform as was once thought. Different children use different strategies for acquiring speech. For example, some seem to concentrate on the overall rhythm, and slot in words with the same general sound pattern, whereas others prefer to deal with more abstract slots. Of particular interest is work which looks at how children cope with different languages. This enables researchers to see if children have any universal expectations about how language behaves, or whether they wait and see what their own particular language offers.

Some recent work has tried to simulate on a computer how children learn past tenses, with some success. First the computer, like children, learned irregular past tenses correctly, such as *caught*, *went*. Then, as children do, it overregularized them, and produced forms such as *catched*, *goed*. Eventually, like children, it successfully handled the past tenses of almost all the verbs fed into it. But two opposite conclusions have been drawn from this: either language is straightforward, if it can be handled by a well-programmed computer. Or, word endings are a small, and not very difficult part of language. Time will tell if computers can be programmed to acquire more complex aspects of language.

Learning the meaning of words

Children have to learn not only the syntax and sounds of their language, but also the meaning of words. This turns out to be more complicated than some people suppose. For a start, it probably takes some time for children to discover that words can refer to separate things. At first, they probably think that a word such as *milk* refers to a whole generalized ritual, something uttered as a mug is placed in front of them. Later, they discover that words have meanings which can be applied to individual objects and actions.

At first, children may be able to use words only in a particular context. One child agreed that *snow* was white, but refused to accept that a piece of paper was also white. This tendency to **undergeneralize** usually passes unnoticed. But it is probably commoner than **overgeneralization**, which attracts much more attention.

People often remark on children's overgeneralizations. Youngsters may call any type of small thing a *crumb*: a crumb, a small beetle, or a speck of dirt, or they may apply the word *moon* to any kind of light. An idea popular in the 19th century was that children see the world through a mental fog. They are able only to grasp broad outlines, which they then narrow down.

But this turns out to be an oversimplification, because children's overgeneralizations are often quite specific, and quite odd. One child referred to a shiny green leaf as a moon! A possible explanation is that she was working from a prototype (Chapter 8) which was unlike the adult's prototype. This child had apparently taken a picture of a shiny yellow crescent moon as a prototypical moon, and re-applied the word *moon* to anything which had the approximate shape of the original, as well as one of its other characteristics. The leaf was vaguely crescent shaped, and also shiny. This interesting idea is currently being explored by researchers.

Doing it by hand

The urge to communicate is strong in humans, and those who cannot hear can be taught sign language. Sign language is a full language in every way, but it is important for children to start acquiring it young. Deaf children with deaf parents start signing earlier, and quickly become more proficient than deaf children with hearing parents.

In Nicaragua, a community of deaf youngsters has invented its own sign language. At first, the youngsters learned a general hotch-potch of different signs from others around. But by around 20 years later, they had developed these signs into a full language. These Nicaraguan signers show how strong the urge is for language to emerge, and how quickly young humans can devise a language system: all they need is a few signs to get them going, and a group of people who interact using them.

Recognizing words

Understanding speech is not the simple matter it appears to be at first sight. Most people assume that comprehension involves being a passive recipient of someone else's message. Hearers, it is often supposed, behave like secretaries taking down a mental dictation. They mentally record the message, then read it back to themselves.

This assumption turns out to be quite wrong. For a start, it is physically impossible to recognize each separate sound, speech is just too fast. Understanding language is an *active*, not a passive process. Hearers jump to conclusions on the basis of partial information. This has been demonstrated in various experiments. For example, listeners were asked to interpret the following sentences, in which the first sound of the final word was indistinct.

Paint the fence and the ?ate.
Check the calendar and the ?ate.
Here's the fishing gear and the ?ate.

The subjects claimed to hear *gate* in the first sentence, *date* in the second, and *bait* in the third.

Since recognizing words involves quite a lot of guesswork, how do speakers make the guesses? Suppose someone had heard 'She saw a do–'. Would the hearer check through the possible candidates one after the other, *dog*, *doll*, *don*, *dock*, and so on (**serial processing**)? Or would all the possibilities be considered subconsciously at the same time (**parallel processing**)?

The human mind, it appears, prefers the second method, that of parallel processing, so much so that even unlikely possibilities are probably considered subconsciously. A recent **interactive activation** theory suggests that the mind is an enormously powerful network in which any word which at all resembles the one heard is automatically activated, and that each of these triggers its own neighbours, so that activation gradually spreads like ripples on a pond. Words that seem particularly appropriate get more and more excited, and those which are irrelevant gradually fade away. Eventually, one candidate wins out over the others.

Understanding syntax

We now know quite a lot about word recognition. But it is still unclear how separate words are woven together into the overall pattern.

To some extent, the process is similar to word recognition, in that people look for outline clues, and then actively reconstruct the probable message from them. In linguistic terminology, hearers utilize **perceptual strategies**. They jump to conclusions on the basis of outline clues by imposing what they expect to hear onto the stream of sounds. For example, consider the sentence:

The boy kicked the ball threw it back.

Most people who hear this sentence feel that there is something wrong with it, that there is a word left out somewhere, and that it would preferably be:

The boy who kicked the ball threw it back.
The boy kicked the ball, then threw it back.

However, they realize that it is in fact perfectly well-formed when shown a similar sentence:

The boy thrown the ball kicked it back. (The boy to whom the ball was thrown kicked it back.)

The problem arose because when interpreting sentences, people tend to impose a subject-verb-object sequence on them. It is hard to counteract this tendency, and accounts for a number of **garden-path** sentences, situations in which hearers are initially led 'up the garden path' in their interpretation, before realizing they have made a mistake, as in:

Anyone who cooks ducks out of the washing-up. (Anyone who cooks tries to avoid or ducks out of the washing-up.)

In other cases, however, people's interpretation varies depending on the lexical items. In:

Clever girls and boys go to university,

people usually assume that *clever* refers both to girls and boys. But in:

Small dogs and cats do not need much exercise,

small is usually taken to refer to the dogs alone.

The relationship between lexical items, the syntax, and the overall context therefore is still under discussion. A further problem is that of **gaps**, situations in which a word has been brought to the front of the sentence, and left a 'gap' after the verb, as in:

Which wombat did Bill put in the cage?

Do hearers mentally store *which wombat* until they find the place in the sentence which it slots into (in this case, after the verb *put*)? Or what happens? This matter is still hotly disputed.

Speech production

Speech production involves at least two types of process. On the one hand, words have to be selected. On the other, they have to be integrated into the syntax.

Slips of the tongue – cases in which the speaker accidentally says something such as *par cark* instead of 'car park' – provide useful clues to these processes, and so do pauses: they can tell us where a speaker stops to think – though it is difficult to separate out pauses caused by searching for lexical items, and pauses due to syntactic planning.

There are two main kinds of slips: on the one hand, there are **selection errors**, cases in which a speaker has picked out the wrong item, as in:

*Please hand me the **tin-opener*** (nut-crackers).

*Your seat's in the third **component*** (compartment).

On the other hand, there are **assemblage errors**, cases in which a correct choice has been made, but the utterance has been wrongly assembled:

Dinner** is being served at **wine (Wine is being served at dinner).

A poppy of my caper (A copy of my paper).

At first sight, such slips may seem haphazard and confused. On closer inspection, they show certain regularities, so much so that some people have talked about tongue slip 'laws' – though this is something of an exaggeration. We are dealing with recurring probabilities, rather than any real kind of 'law'.

Selection errors usually involve lexical items, so they can tell us which words are closely associated in the mind. For example, people tend to say *knives* for 'forks', *oranges* for 'lemons', *left* for 'right', suggesting that words on the same general level of detail are tightly linked, especially if they are thought of as a pair. Similar sounding words which get confused tend to have similar beginnings and endings, and a similar rhythm, as in *antidote* for 'anecdote', *confusion* for 'conclusion'.

These observations were possibly first made by the two Harvard psychologists who devised a now famous 'tip of the tongue' experiment. The experimenters assembled a number of students, and read them out definitions of relatively uncommon words. For example, 'A navigational instrument used in measuring angular distances, especially the altitude of sun, moon and stars at sea'. Some of the students were unable to write down the word *sextant* immediately. The word was on the tip of their tongue, but they could not quite remember it. Those in a 'tip of the tongue state' were asked to fill in a questionnaire about their mental search. They found that they could provide quite a lot of information about the elusive word. They could often say how many syllables it had, what the first letter was, and sometimes,

how it ended. They could think up similar-meaning words such as *astrolabe*, *compass*, and also similar-sounding words such as *secant*, *sexton*, *sextet*. This suggests that adults store and select words partly on the basis of rhythm, partly by remembering how they begin and end.

A considerable number of selection errors tend to be similar both in sound and meaning, as in *component* for 'compartment', *geraniums* for 'hydrangeas'. This suggests that an interactive activation theory, of the type proposed for speech recognition, may also be relevant in speech production. The mind activates all similar words, and those that have two kinds of similarity, both meaning and sound, get more highly activated than the others, and so are more likely to pop up in error.

Whereas selection errors tell us how individual words are stored and selected, assemblage errors indicate how whole sequences are organized ready for production. For example, mistakes nearly always take place within a single 'tone-group' – a short stretch of speech spoken with a single intonation contour. This suggests that the tone group is the unit of planning. And within the tone group, items with similar stress are often transposed, as in:

A gas of tank (a tank of gas).

Furthermore, when sounds are switched, initial sounds change place with other initials, and final with final, and so on, as in:

Reap of hubbish (heap of rubbish).
Hass or grash (hash or grass).

All this suggests that speech is organized in accordance with a rhythmic principle – that a tone group is divided into smaller units (usually called feet), which are based (in English) on stress. Feet are divided into syllables, which are in turn possibly controlled by a biological 'beat' which regulates the speed of utterance. The interaction between these rhythmically based tone groups and syntactic constructions is a topic which still needs to be carefully examined.

Slips of the tongue are part of *normal* speech. Everybody makes them. But they overlap with the stranger and more extreme errors found in people suffering from speech disorders.

Speech disorders

'Lovely rabbit' said a woman who had had a stroke, when shown a picture of an apple. By chance, she had been talking about rhubarb previously, and so had somehow blended the words *apple* and *rhubarb* into *rabbit*. She was suffering from **aphasia**, the general word for serious speech disorders, which literally means 'without speech'. In fact, such speakers usually have some speech, but speech of a rather odd kind. It's important to distinguish them from those who simply have a problem in 'spitting out' what they want to say, such as stutterers.

Aphasic patients are difficult to classify, because damage to the brain is hardly ever neat and tidy. The tissues may swell, some areas are likely to be starved of blood and oxygen, and the brain often tries to compensate in unpredictable ways. So every patient's symptoms are slightly different – though almost all of them have problems in finding words, a problem known as **anomia**, literally 'without naming ability'.

But it is sometimes possible to classify disorders into broad types. On the one hand, there are people who have huge difficulty in stringing words together into sentences. They speak effortfully, typically in three or four word bursts, using nouns above all. There are hardly any endings on words, and the 'little words', such as *a*, *the*, *on*, *to*, are likely to be missing. One patient, when asked if he went home from hospital at weekends, replied: 'Why, yes ... Thursday, er, er, er, no, er, Friday... Barbara wife ... and, oh, car ... drive ...'. **Agrammatism** is the technical name for this man's condition, because his speech appears to be without grammar – though he can mostly understand other people quite well, and answer appropriately.

In contrast, others suffer from **fluent aphasia**. As the name suggests, these patients speak fluently, though they tend not to make sense. They also produce strange made-up words, and often have severe problems comprehending what is said to them. One patient, when asked why he was in hospital, produced a stream of meaningless gibberish: 'I can't mention the tarripoi ... I impose a lot, while, on the other hand, you know what I mean, I have to run around, look it over, trebbin, and all that sort of stuff.'

These two broad varieties of disorder are not the only ones, but they are possibly the commonest, with agrammatism being more frequently found than fluent aphasia. From them (and other sources), linguists try to draw conclusions about how humans organize language. For example, fluent aphasics suggest that speech production and speech comprehension might be to a large extent separate, since one can exist without the other.

The study of aphasia, technically **aphasiology**, represents the borderline between the mind and the brain. Psycholinguistics 'proper' tries to map out what is happening in the mind, independently of how language is organized in the brain. Just as one could study the bus routes in London, without knowing anything about the physical nature of buses, so one could find out quite a lot about how language works without worrying about the neurons which allow this to happen. But as knowledge about the brain improves, psycholinguistics increasingly incorporates knowledge about the brain, technically **neurolinguistics**. And a question which has been discussed for well over a century is whether particular types of language disorder can be correlated with damage to particular areas within the brain.

Language and the brain

The human brain is roughly organized like a peach, in that there is a large outer layer (the **cerebrum**) surrounding an inner kernel (the **brainstem**), which keeps people alive. The outer layer is extensively folded, and is the source of all intentional thought and movement. After death, it is grey, as reflected in the phrase: 'Use your grey matter' for 'Think!', and is divided into two halves, the **cerebral hemispheres**. The left hemisphere controls the right side of the body, and the right hemisphere the left: so if someone is paralyzed down the right side of their body after a stroke, the stroke affected the left side of their brain.

The hemispheres look roughly similar, but this is an illusion. One of them, usually the left, is the more powerful **dominant** hemisphere. This is not only because it controls the right side of the body – and the majority of humans are right-handed – but also because it normally controls language. Approximately 90 per cent of the human race are born with their brain 'wired' for language in the left hemisphere. Humans who do not have language in their left hemisphere are often, though not inevitably, left-handers. This much is fairly uncontroversial.

But disputes begin when attempts are made to locate language precisely within the left hemisphere. Once again, the outline is clearer than the details. Those who have problems with speech production, such as agrammatic aphasics, mostly have injuries towards the front of the brain, while those who have problems with comprehension, such as fluent aphasics, have injuries towards the back.

These disputes began in the 19th century, when Paul Broca, a French surgeon, pinpointed an area in front of, and slightly above, the left ear. According to him, postmortems showed that this area had been destroyed in the brain of two patients who could produce hardly any speech. Even today, damage to the general region known as **Broca's area** is statistically likely to cause severe speech problems – so much so that agrammatic speech is still sometimes known as **Broca's aphasia** (Figure 11.1).

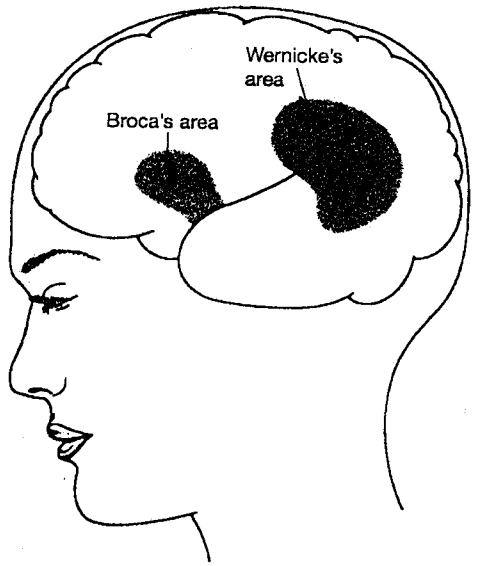

figure 11.1

Some years after Broca's claims, Karl Wernicke, a German neurologist, noted that several patients who talked fluent nonsense had severe damage towards the back of the brain, in an area under and surrounding the left ear. This became known as **Wernicke's area**, and fluent aphasics are sometimes said to be suffering from **Wernicke's aphasia** (Figure 11.1).

But brain areas cannot be as accurately located as the heart or liver. So over the years, patients have been found who can speak perfectly well, even though Broca's region has been damaged, as well as people who cannot speak when Broca's area is apparently intact. Some neurolinguists argue that speech is therefore located slightly differently in each person, while others claim that connections within the brain matter more than specific areas.