

1 The great automatic grammatizator

Need anything be innate?

He reached up and pulled a switch on the panel. Immediately the room was filled with a loud humming noise, and a crackling of electric sparks . . . sheets of quarto paper began sliding out from a slot to the right of the control panel . . . They grabbed the sheets and began to read. The first one they picked up started as follows: 'Aifkjmbsoegweztpplnvo qudskigt, fuhpekanvbertyuiolkjhgfdsazxcvbnm, peruitrehdjkgmvnb, wmsuy' They looked at the others. The style was roughly similar in all of them. Mr Bohlen began to shout. The younger man tried to calm him down.

'It's all right, sir, Really it is. We've got a connection wrong somewhere, that's all. You must remember, Mr Bohlen, there's over a million feet of wiring in this room.'

'It'll never work,' Mr Bohlen said.

Roald Dahl, *The Great Automatic Grammatizator*

Every normal human being can talk. So the average person tends to think that there is little or nothing mysterious about language. As the linguist Noam Chomsky has pointed out:

We lose sight of the need for explanation when phenomena are too familiar and 'obvious'. We tend too easily to assume that explanations must be transparent and close to the surface . . . As native speakers, we have a vast amount of data available to us. For just this reason it is easy to fall into the trap of believing that there is nothing to be explained. Nothing could be further from the truth . . .

(Chomsky 1972a: 25–6)

But the mysterious nature of human language becomes more apparent when one realizes that no one has yet managed to simulate the language

ability of a human being. Computers can play chess, sort bank statements, and even talk about limited topics such as cubes, squares and cones. But we are far from producing a 'great automatic grammarizer' which could unaided hold conversations on any topic. Why is this? Perhaps we should think about language more carefully.

Nature or nurture?

When people start thinking about language, the first question which often occurs to them is this: is language *natural* to humans? – in the same way that grunting is natural to pigs, and barking comes naturally to dogs. Or is it just something we happen to have *learned*? – in the same way that dogs may learn to beg, or elephants may learn to waltz, or humans may learn to play the guitar.

Clearly, in one sense, children 'learn' whatever language they are exposed to, be it Chinese, Nootka or English. So no one would deny that 'learning' is very important. But the crucial question is whether children are born with 'blank sheets' in their head as far as language is concerned – or whether humans are 'programmed' with an outline knowledge of the structure of languages in general.

This question of whether language is partly due to *nature* or wholly due to learning or *nurture* is often referred to as the *nature–nurture* controversy, and has been discussed for centuries. For example, it was the topic of one of Plato's dialogues, the *Cratylus*. Controversies which have been going on for literally ages tend to behave in a characteristic fashion. They lie dormant for a while, then break out fiercely. This particular issue resurfaced in linguistics in 1959 when the linguist Noam Chomsky wrote a devastating and witty review of *Verbal Behavior*, a book by the Harvard psychologist B.F. Skinner (Skinner 1957; Chomsky 1959). This book claimed to 'explain' language as a set of habits gradually built up over the years. According to Skinner, no complicated innate or mental mechanisms are needed. All that is necessary is the systematic observation of the events in the external world which prompt the speaker to utter sounds.

Skinner's claim to understand language was based on his work with rats and pigeons. He had proved that, given time, rats and pigeons could be trained to perform an amazing variety of seemingly complex tasks, provided two basic principles were followed. First, the tasks must be broken down into a number of carefully graduated steps. Second, the animals must be repeatedly rewarded.

In a typical experiment, a rat was put in a box containing a bar. If it pressed the bar, it was rewarded with a pellet of food. Nothing

forced it to press the bar. The first time it possibly did so accidentally. When the rat found that food arrived, it pressed the bar again. Eventually it learned that if it was hungry, it could obtain food by pressing the bar. Then the task was made more difficult. The rat only got rewarded if it pressed the bar while a light was flashing. At first the rat was puzzled. Eventually it learned the trick. Then the task was made more difficult again. This time the rat only received food if it pressed the bar a certain number of times. After initial confusion, it learned to do this also. And so on, and so on.

This type of 'trial-and-error' learning was called *operant conditioning* by Skinner, which can be translated as 'training by means of voluntary responses' (the word 'operant' means a voluntary response rather than an automatic one). Skinner suggested that it is by means of this mechanism that the vast majority of human learning takes place, including language learning:

The basic processes and relations which give verbal behaviour its special characteristics are now fairly well understood. Much of the experimental work responsible for this advance has been carried out on other species, but the results have proved to be surprisingly free of species restrictions. Recent work has shown that the methods can be extended to human behaviour without serious modification. (Skinner 1957: 3)

All one needed to do in order to understand language, he said, was to identify the 'controlling variables', which would enable us to predict specific utterances. For example, in the same way as it was possible to say that a rat's bar-pressing behaviour was partly 'under the control' of a flashing light, so a feeling of hunger might 'control' or predict a human utterance such as 'Please pass the bread and butter.' Or the presence of a beautiful painting might call forth the exclamation, 'Oh how beautiful.' Or a bad smell might cause one to exclaim 'Oh what a terrible smell.' A French notice, such as '*Ne touchez pas*', might result in one saying, 'That means "Don't touch".' And if a child said 'Hickory dickory dock', you are likely to continue 'The mouse ran up the clock.' In theory, Skinner saw no difficulty in linking up any particular set of words which a human might wish to produce with an identifiable external happening.

In practice, the matter is far from simple, as Chomsky pointed out. Chomsky made two major criticisms of Skinner's work. First, the behaviour of rats in boxes is irrelevant to human language. Second, Skinner fundamentally misunderstood the nature of language.

The irrelevance of rats

Chomsky pointed out that the simple and well-defined sequence of events observed in the boxes of rats is just not applicable to language. And the terminology used in the rat experiments cannot be re-applied to human language without becoming hopelessly vague.

For example, how do you know that someone is likely to say 'Oh what a beautiful picture' when looking at a beautiful painting? They might say instead, 'It clashes with the wallpaper', 'It's hanging too low', 'It's hideous.' Skinner would say that instead of the utterance being 'controlled' by the beauty of the picture, it was 'controlled' by its clash with the wallpaper, its hanging too low, its hideousness. But this reduces the idea of 'control' to being meaningless, because you have to wait until you hear the utterance before you know what controlled it. This is quite unlike the predictable behaviour of rats which could be relied upon to respond to certain stimuli such as a flashing light with a fixed response.

Another problem was that the rats were repeatedly rewarded. It is quite clear that children do not receive pellets of food when they make a correct utterance. However, the idea of reward or *reinforcement* (since it reinforces the behaviour that is being learned) can in humans be naturally extended to approval or disapproval. One might suppose that a parent smiles and says 'Yes dear, that's right' when a child makes a correct utterance. Even if this were so, what happens to this idea of approval when there is nobody around, since children are frequently observed to talk to themselves? Skinner suggested that in these cases children automatically 'reinforce' *themselves* because they know they are producing sounds which they have heard in the speech of others. Similarly, Skinner assumed that someone like a poet who is uttering words aloud in an empty room will be 'reinforced' by the knowledge that others will be influenced by the poetry in the future. So reinforcement seems a very woolly notion, since an actual reward need not exist, it need only be imagined or hoped for. Such a notion is certainly not comparable to the food pellets given to rats when they make a correct response.

Studies by Roger Brown and his associates provided even more problems for Skinner's notion of reinforcement. After observing mother-child interactions they pointed out that parents tend to approve statements which are *true* rather than those which are grammatically correct. So a boy who said 'Teddy sock on' and showed his mother a teddy bear wearing a sock would probably meet with approval. But if the child said the grammatically correct utterance 'Look, Teddy is

wearing a sock', and showed his mother a bear *without* a sock, he would meet with disapproval. In other words, if approval and disapproval worked in the way Skinner suggested, you would expect children to grow up telling the truth, but speaking ungrammatically. In fact the opposite seems to happen (Brown *et al.* 1968).

Another example of a problem which crops up in trying to match rat and human behaviour is that of defining the notion of *response strength*. When a rat has learned to respond to a particular external happening, the extent to which it has learned the lesson can be measured in terms of the speed, force and frequency of the bar-pressing. Skinner suggested that similar measures of response strength might be found in some human responses. For example, a person who was shown a prized work of art might, much to the gratification of the owner, instantly exclaim 'Beautiful!' in a loud voice. Chomsky pointed out:

It does not appear totally obvious that in this case the way to impress the owner is to shriek 'Beautiful' in a loud, high-pitched voice, repeatedly, and with no delay (high response strength). It may be equally effective to look at the picture silently (long delay), and then to murmur 'Beautiful' in a soft low-pitched voice (by definition, very low response strength).

(Chomsky 1959: 35)

Chomsky used these and similar arguments to show the irrelevance of Skinner's experiments to the problem of understanding language. Perhaps 'irrelevance' is too strong a word, since there are areas of language where habit forming works. For example, some people invariably say 'Damn' if they drop a raw egg, or 'Good night' when they are going to bed, or 'London transport gets worse every day' when standing at a bus-stop. And there is one sad character in a Beatles' song who only ever says 'Good morning':

I've got nothing to say but it's OK

Good morning, good morning, good morning.

But apart from trivial exceptions such as these, language is infinitely more complex and less predictable than Skinner's theory would suggest.

Of course, just because Skinner's ideas were over-simple does not automatically mean that Chomsky's ideas were right. Maybe both Skinner's and Chomsky's views are outdated. Now, in the twenty-first century, we know a lot more about language and its special qualities, partly because Chomsky in particular inspired so many to

take language seriously as a key to understanding the human mind, and to work on it further.

The nature of language

What is there about language that makes it so special? There are a large number of human activities such as learning to drive or learning to knit which seem to be learnt in the same way as bar pressing by rats. Why not language also?

Chomsky pointed out some of the special properties of language in his review of Skinner's book, where he suggested that Skinner was not in a position to talk about the causation of verbal behaviour, since he knew little about the character of such behaviour:

There is little point in speculating about the process of acquisition without a much better understanding of what is acquired.

(Chomsky 1959: 55)

Chomsky has since discussed the nature of language in a number of places (e.g. Chomsky 1972a, 1986, 1995b 2000, 2002). One point which he stressed is that language makes use of *structure-dependent operations*. By this he means that the composition and production of utterances is not merely a question of stringing together sequences of words. Every sentence has an inaudible internal structure which must be understood by the hearer.

In order to see more clearly what is meant by a *structure-dependent* operation, it is useful to look at *structure-independent* operations.

Suppose a Martian had landed on earth, and was trying to learn English. She might hear the sentence:

AUNT JEMIMA HAS DROPPED HER FALSE TEETH DOWN THE DRAIN

as well as the related question:

HAS AUNT JEMIMA DROPPED HER FALSE TEETH DOWN THE DRAIN?

If she was an intelligent Martian, she would immediately start trying to guess the rules for the formation of questions in English. Her first guess might be that English has a rule which says, 'In order to form a question, scan the sentence for the word *has* and bring it to the front.' Superficially, this strategy might occasionally work. For example, a sentence such as:

PETRONELLA HAS HURT HERSELF

would quite correctly become:

HAS PETRONELLA HURT HERSELF?

But it is clearly a wrong strategy, because it would also mean that the Martian would turn a statement such as:

THE MAN WHO HAS RUN AWAY SHOUTING WAS ATTACKED BY A
WASP

Into:

*HAS THE MAN WHO RUN AWAY SHOUTING WAS ATTACKED BY A
WASP?

which is not English. (An asterisk denotes an impossible sentence.)

Looking at the Aunt Jemima sentence again, the Martian might make a second guess, 'In order to form a question, bring the third word to the front.' Once again, this might superficially appear to work because a sentence such as:

THE ALLIGATOR HAS ESCAPED

would correctly become:

HAS THE ALLIGATOR ESCAPED?

But it is obviously accidental that this type of rule gets the right result, because it also produces a number of non-sentences:

SLUGS ARE SLIMY

would become:

*SLIMY SLUGS ARE?

And:

MARY HAS SWALLOWED A SAFETY PIN

turns into:

*SWALLOWED MARY HAS A SAFETY PIN?

The Martian went wrong in her guesses because she was trying out structure-independent operations – manoeuvres which relied solely on mechanical counting or simple recognition procedures without looking at the *internal* structure of the sentences concerned. In order to grasp the principles of question formation, the Martian must first realize that:

AUNT JEMIMA, THE MAN WHO HAS RUN AWAY SHOUTING, SLUGS,
MARY

each behaves as a unit of structure. The number of words within each unit is irrelevant, so no amount of counting will produce the right result for question formation. In these sentences (though not in all English sentences) the solution is to take the word which follows the first unit and bring it to the front:

AUNT JEMIMA	HAS	DROPPED HER FALSE TEETH DOWN THE DRAIN
THE MAN WHO HAS RUN AWAY SHOUTING	WAS	ATTACKED BY A WASP
SLUGS	ARE	SLIMY
MARY	HAS	SWALLOWED A SAFETY PIN

This may seem an obvious solution to people who already know English – but it is not at all clear *why* language should behave in this way. As Chomsky pointed out:

The result is . . . surprising from a certain point of view. Notice that the structure-dependent operation has no advantages from the point of view of communicative efficiency or ‘simplicity’. If we were, let us say, designing a language for formal manipulations by a computer, we would certainly prefer structure-independent operations. These are far simpler to carry out, since it is only necessary to scan the words of the sentence, paying no attention to the structures which they enter, structures that are not marked physically in the sentence at all.

(Chomsky 1972b: 30)

Yet, amazingly, all children learning language seem to know automatically that language involves structure-dependent operations. On

the face of it, one might expect them to go through a prolonged phase of testing out Martian-like solutions – but they do not. This leads Chomsky to suggest that humans may have an innate knowledge of this phenomenon:

Given such facts, it is natural to postulate that the idea of ‘structure-dependent operations’ is part of the innate schematism applied by the mind to the data of experience.

(Chomsky 1972b: 30)

This knowledge, he argued (somewhat controversially), ‘is part of the child’s biological endowment, part of the structure of the language faculty’ (Chomsky 1988: 45).

The structure-dependent nature of the operations used in language is all the more remarkable because there are often no overt clues to the structure. Experiments carried out by psycholinguists have made it clear that listeners do not have to rely on auditory clues for interpreting the main structural divisions. For example, Garrett *et al.* (1966) constructed two sentences which each contained the words:

GEORGE DROVE FURIOUSLY TO THE STATION:

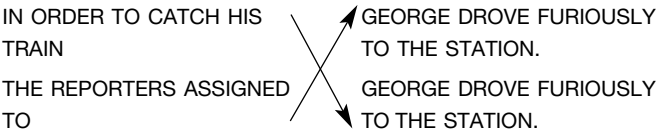
- 1 IN ORDER TO CATCH HIS TRAIN GEORGE DROVE FURIOUSLY TO THE STATION.
- 2 THE REPORTERS ASSIGNED TO GEORGE DROVE FURIOUSLY TO THE STATION.

In the first sentence, it is GEORGE who is driving furiously. In the second, it is the REPORTERS. In order to understand the sentence, the listener must (mentally) put the structural break in the correct place:

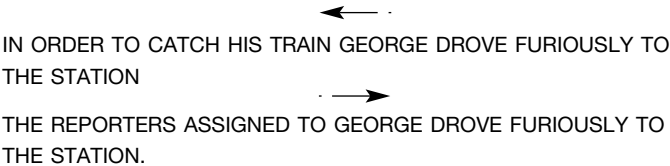
IN ORDER TO CATCH HIS TRAIN	GEORGE DROVE FURIOUSLY TO THE STATION.
THE REPORTERS ASSIGNED TO GEORGE	DROVE FURIOUSLY TO THE STATION.

Just to check that the listeners were *not* using auditory clues, the experimenters recorded both these sentences on to tapes. Then they cut the words GEORGE DROVE FURIOUSLY TO THE STATION off each tape, and spliced them to the *other* sentence:

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They then played the newly spliced tapes to students – but into one ear only. In the other ear the students heard a click, which was placed in the middle of a word, for example, GEORGE. The students were then asked whereabouts in the sentence the click had occurred. The interesting result was that in their reports students tended to move the location of the click in the direction of the structural break:



This indicates clearly that listeners impose a structure on what they hear for which there is often *no* physical evidence.

Another point made by Chomsky (1959) and others is that simple slot-filling operations are inadequate as explanations of language. It has sometimes been suggested that anyone learning language allocates to each sentence a number of ‘slots’ and then fits units of structure into each hole, for example:

1	2	3
BEES	LOVE	HONEY
I	WANT	MY TEA
MY BROTHER	HAS HIT	ME

No one would deny the existence of such substitutions and their value in language learning. But the problem is that there is a lot more going on besides, which cannot be accounted for by the ‘slot’ idea: ‘It is evident that more is involved in sentence structure than insertion of lexical items in grammatical frames’ (Chomsky 1959: 54). For example, look at the following sentences:

PERFORMING FLEAS	CAN BE	AMUSING
PLAYING TIDDLYWINKS	CAN BE	AMUSING

As soon as we try to find other words to fit into the slot occupied by *can be*, we run into problems. *Are* fits in with the first sentence but not the second, whereas *is* fits in with the second but not the first:

PERFORMING FLEAS	ARE	AMUSING
*PERFORMING FLEAS	IS	AMUSING
*PLAYING TIDDLYWINKS	ARE	AMUSING
PLAYING TIDDLYWINKS	IS	AMUSING

If slot-filling was the sole principle on which language worked, one would not expect this result. In fact, slot-filling makes it quite impossible to explain how the listener knows, in the sentences where the centre slot is filled by *can be*, that it is the fleas who are performing, but that it is not the tiddlywinks who are playing. But examples of ‘constructional homonymity’ (as Chomsky calls such superficially similar utterances) are by no means rare.

Even more inexplicable from a slot-filling point of view are sentences which can be interpreted in two different ways:

CLEANING LADIES CAN BE DELIGHTFUL:

- 1 LADIES WHO CLEAN CAN BE DELIGHTFUL.
- 2 TO CLEAN LADIES CAN BE DELIGHTFUL.

THE MISSIONARY WAS READY TO EAT:

- 1 THE MISSIONARY WAS ABOUT TO EAT.
- 2 THE MISSIONARY WAS ABOUT TO BE EATEN.

Sentences such as these indicate that merely filling a grammatical frame may be only part of what is happening when we speak. Such examples led Chomsky in the 1960s to suggest that language might be organized on two levels: a *surface* level, in which words are in the place where they actually occur, and a *deep* level, in which words are located in their ‘proper’ place in the slot structure.

Chomsky’s arguments that a ‘deeper’ level of syntax underlay the surface level were interesting, but not necessarily right. Other explanations are possible, as he himself later stressed (Chomsky 1995b). The important point is that the differing interpretations of the ambiguous sentences described above can *not* be explained by means of the bar-pressing antics of rats, nor by means of simple slot-filling operations. Some more complex procedure is involved.

So far, then, language can be said to be structure-dependent – and the types of structure-dependent operations involved seem to be complex.

Creativity is another fundamental aspect of language which is stressed repeatedly by Chomsky. By this, he seems to mean two things. First, and primarily he means the fact that humans have the ability to understand and produce novel utterances. Even quite strange sentences, which are unlikely to have been uttered before, cause no problems for speakers and hearers:

THE ELEPHANT DRANK SEVENTEEN BOTTLES OF SHAMPOO, THEN
SKIPPED DRUNKENLY ROUND THE ROOM.

THE AARDVARK CLEANED ITS TEETH WITH A PURPLE
TOOTHBRUSH.

This means that it is quite impossible to assume that a person gradually accumulates strings of utterances throughout their life and stores them ready for use on an appropriate occasion. And as well as producing new grammatical sequences, anyone who has mastered a language is automatically able to discard deviant utterances which they may never have met before. Sequences such as:

*HE WILL HAD BEEN SINGING

or:

*GIRAFFE UNDER IN WALKS GORILLA THE

will be rejected instantaneously by any normal speaker of English.

Chomsky also used ‘creativity’ in a second, subsidiary sense to mean that utterances are not controlled by external happenings. The appearance of a daffodil does not force humans to shriek ‘Daffodil’. They can say whatever they like: ‘What a lovely colour’, ‘It’s spring, I must remember to clean my car’, or ‘Why do flowers always give me hay fever?’

Most humans are so used to these properties of language that they no longer seem odd – but they have not yet been fully explained. Chomsky spoke of ‘this still mysterious ability’ when referring to the creative nature of human speech:

Having mastered a language, one is able to understand an indefinite number of expressions that are new to one’s experience, that bear

no simple physical resemblance and are in no simple way analogous to the expressions that constitute one's linguistic experience; and one is able with greater or less facility to produce such expressions on an appropriate occasion, despite their novelty and independently of detachable stimulus configurations, and to be understood by others who share this still mysterious ability. The normal use of language is, in this sense, a creative activity. This creative aspect of normal language is one fundamental factor that distinguishes human language from any known system of animal communication.
(Chomsky 1972a: 100)

Chomsky stressed that the creative aspect of language is *normal*. Humans produce novel utterances all the time, and anybody who does not is likely to be brain damaged:

It is important to bear in mind that the creation of linguistic expressions that are novel but appropriate is the normal mode of language use. If some individual were to restrict himself largely to a definite set of linguistic patterns, to a set of habitual responses to stimulus configurations . . . we would regard him as mentally defective, as being less human than animal. He would immediately be set apart from normal humans by his inability to understand normal discourse, or to take part in it in the normal way – the normal way being innovative, free from control by external stimuli, and appropriate to a new and ever-changing situation.
(Chomsky 1972a: 100)

It becomes clear that there is much more to language than merely stringing together words. In order to speak, a human possesses a highly complex internalized set of instructions or 'rules' which enables him or her to utter any of the permissible sequences of English – though they are unlikely to have any conscious knowledge of these 'rules'. The rules are both complex and stringent, as Mr Knipe discovered (a character in *The Great Automatic Grammatizator* by Roald Dahl):

Then suddenly he was struck by a powerful but simple little truth, and it was this: that English grammar is governed by rules that are almost mathematical in their strictness! . . . Therefore, it stands to reason that an engine built along the lines of the electric computer could be adjusted to arrange words in their right order according to the rules of grammar . . . There was no stopping Knipe now. He went to work immediately. After fifteen days of

continuous labour, Knipe had finished building his 'Great Automatic Grammarizer'.

But Mr Knipe is a character in a science-fiction story. As already noted, in real life no linguist, no computer expert has yet managed to build an 'automatic grammarizer' – a device which will account for all and only the permissible sequences of English.

Yet children do it all the time: in a remarkably short period, they acquire a complex set of internalized rules. And children have considerably less data to work from than the linguists who have failed to produce 'automatic grammarizers'. They are often restricted to hearing their parents and relatives talking – and, according to Chomsky, this speech is likely to be full of unfinished sentences, mistakes and slips of the tongue. We must therefore 'explain how we know so much, given that the evidence available to us is so sparse' (Chomsky 1986: xxvii). Furthermore, according to him, the acquisition of one's native language seems to be largely independent of intelligence. The language ability of dim children is not noticeably inferior to that of bright children – yet in most other areas of human activity – such as roller-skating or playing the piano – the gap between different children is enormous.

Although Chomsky is now generally thought to exaggerate the rapidity of acquisition, the substandard nature of the data, and the uniformity of ability, the great mystery remains: how do children construct 'automatic grammarizers' for themselves?

At the moment, the issue is still argued about. Two (main) possibilities exist:

Possibility 1 Human infants 'know' in advance what languages are like. This is the possibility preferred by Chomsky:

Given the richness and complexity of the system of grammar for a human language and the uniformity of its acquisition on the basis of limited and often degenerate evidence, there can be little doubt that highly restrictive universal principles must exist determining the general framework of each human language and perhaps much of its specific structure as well.

(Chomsky 1980: 232)

Possibility 2 No special advance knowledge is needed, because children are highly efficient puzzle-solvers in all areas of human behaviour. Language is just one type of puzzle which their high level of general

intelligence enables them to solve fast and well. In the words of the linguist Geoffrey Sampson:

Individual humans inherit no ‘knowledge of language’ . . . they succeed in mastering the language spoken in their environment only by applying the same general intelligence which they use to grapple with all the other diverse and unpredictable problems that come their way.

(Sampson 1980: 178)

It may not be necessary to choose between these possibilities. As this book will suggest, the answer may well lie somewhere between these two extremes. In this controversy, it is important to keep an open mind, and not be swayed by the fashion of the moment. In the 1960s, it was fashionable to follow Chomsky. In the 1970s it was equally fashionable to hold the view of his opponents. Both views were found in the 1990s, and are still found in the twenty-first century.

Chomsky’s claim that children are pre-programmed to speak requires serious attention. As the nineteenth-century American philosopher C.S. Peirce pointed out: ‘If men had not come . . . with special aptitudes for guessing right, it may well be doubted whether . . . the greatest mind would have attained the amount of knowledge which is actually possessed by the lowest idiot’ (Peirce 1932: 476). And as the psychologist Steven Pinker noted in his book *The Language Instinct*:

Some kinds of bats home in on flying insects using Doppler sonar. Some kinds of migratory birds navigate thousands of miles by calibrating the positions of the constellations against the time of day and year. In nature’s talent show we are simply a species of primate with our own act, a knack for communicating information about who did what to whom by modulating the sounds we make when we exhale.

(Pinker 1994: 19)

Chomsky’s belief that humans are genetically imprinted with knowledge about language is often referred to as ‘the innateness hypothesis’. Unfortunately, the word ‘innate’ has given rise to a considerable amount of confusion. Misunderstandings have arisen in two ways. First, to call Chomsky an ‘innatist’ wrongly implies that those who disagree with him are ‘non-innatists’. Yet his opponents have never asserted that *nothing* is innate. All human skills, even apparently unnatural ones, make use of innate predispositions. For example, driving a car is an

'unnatural' acquired skill, yet it makes use of innate propensities, such as the ability to see, and to co-ordinate arm and leg movements. The issue under discussion is whether an inbuilt language acquisition skill exists independently of other innate inabilities. The point is expressed well by two philosophers:

It is beyond dispute that some innate equipment figures in the acquisition of language (otherwise the baby's rattle would learn language as well as the baby, since they have comparable linguistic environments). The only question at issue is whether this innate structure has significant components that subserve the development of no other faculty than language.

(Osherson and Wasow 1976: 208)

Chomsky claims that the mind is 'constituted of "mental organs" just as specialized and differentiated as those of the body' (1979: 83), and that 'Language is a system . . . easy to isolate among the various mental faculties' (1979: 46). This is the claim which we are trying to evaluate.

The second misunderstanding involves a mistaken belief by some people that 'innate' means 'ready-made for use'. By innate, Chomsky simply means 'genetically programmed'. He does not literally think that children are born with language in their heads ready to be spoken. He merely claims that a 'blueprint' is there, which is brought into use when the child reaches a certain point in her general development. With the help of this blueprint, she analyses the language she hears around her more readily than she would if she were totally unprepared for the strange gabbling sounds which emerge from human mouths.

Or perhaps a better metaphor would be that of a seed, which contains within itself the intrinsic ability to become a dahlia or rose, provided it is planted and tended. Chomsky argues that 'language grows in the mind/brain' (Chomsky 1988: 55). He explains the situation by quoting the eighteenth-century thinker James Harris: 'The growth of knowledge . . . [rather resembles] . . . the growth of Fruit; however external causes may in some degree cooperate, it is the internal vigour, and virtue of the tree, that must ripen the juices to their maturity' (Chomsky 1986: 2).

In this book, the suggestion that language is a special, pre-programmed activity will be explored further. As Chomsky noted (1979: 84):

No one finds it outlandish to ask the question: what genetic information accounts for the growth of arms instead of wings?

Why should it be shocking to raise similar questions with regard to the brain and mental facilities?

Or, as a more recent researcher pointed out (Anderson 2004: 307):

Language as we know it is a uniquely human capacity, determined by our biological nature, just as the ability to detect prey on the basis of radiated heat is a biological property of (some) snakes.

But we will also be looking at the alternative viewpoint, that humans are intelligent animals, endowed with talented analytic abilities, which enable them to sort out the puzzle of language via their general intelligence.

In the next few chapters, the evidence in favour of each of these viewpoints will be assessed. The next chapter will look at the ability – or non-ability – of animals to communicate with one another in language-like ways.