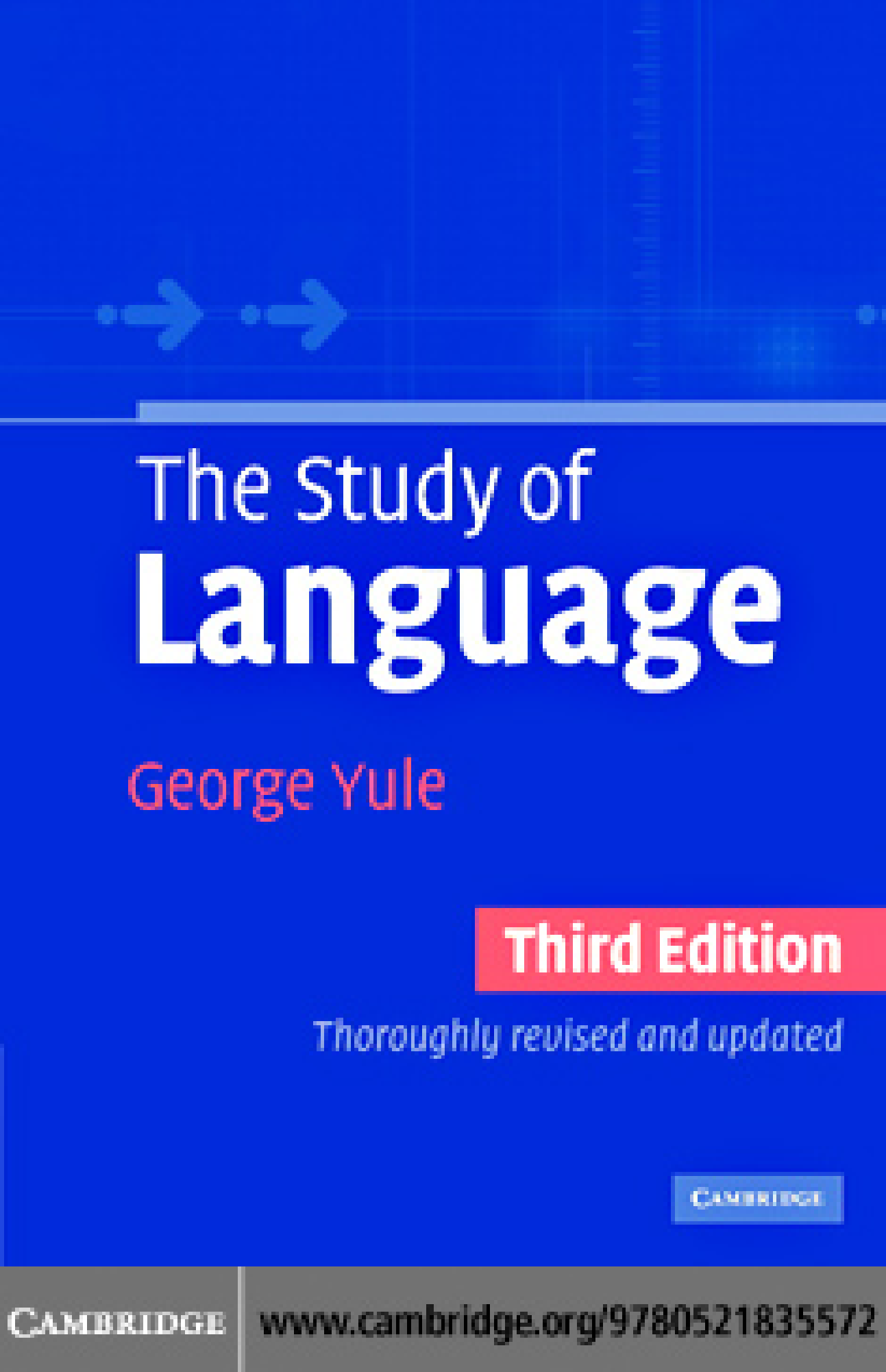
The Study of
Language
George Yule
Third Edition
Thoroughly revised and updated
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The Study of Language

Designed for beginners, this best-selling textbook provides a lively introduction to the study of language. Starting from the basics, it provides a solid foundation in all of the essential topics, and introduces the analysis of the key elements of language – sounds, words, structures and meanings. A wide range of fascinating questions are explored, such as how conversation works, how children learn language, why women and men speak differently, and how language varies between regions and social groups.

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Unrivalled in its popularity, *The Study of Language* is quite simply the best introduction to the field available today.

GEORGE YULE has taught Linguistics at the Universities of Edinburgh, Hawai'i, Louisiana State and Minnesota. He is the author of *Discourse Analysis* (with Gillian Brown, 1983), *Teaching the Spoken Language* (with Gillian Brown, 1983), *Pragmatics* (1996) and *Explaining English Grammar* (1998).

The Study of Language

THIRD EDITION

GEORGE YULE

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Preface

In preparing the third edition of this book, I have tried to present an updated survey of what is known about language and also of the methods used by linguists in arriving at that knowledge. There have been many interesting developments in the study of language over the past two decades, but it is still a fact that any individual speaker of a language has a more comprehensive 'unconscious' knowledge of how language works than any linguist has yet been able to describe. Consequently, as you read the following chapters, take a critical view of the effectiveness of the descriptions, the analyses and the generalizations by measuring them against your own intuitions about how your language works. By the end of the book, you should feel that you do know quite a lot about both the internal structure of language (its form) and the varied uses of language in human life (its function), and also that you are ready to ask more of the kinds of questions that professional linguists ask when they conduct their research.

To help you find out more about the issues covered in this book, each chapter ends with a set of Further Readings which will lead you to more detailed treatments than are possible in this introduction. Each chapter also has Study Questions, Research Tasks and Discussion Topics/Projects. The Study Questions are presented simply as a way for you to check that you have understood some of the main points or important terms introduced in that chapter. They should be answered without too much difficulty and an appendix of suggested answers is provided near the end of the book. The set of Research Tasks is designed to give you an opportunity to explore related concepts and types of analysis that go beyond the material presented in the chapter. To help you in these tasks, selected readings are provided on the book's website at http://www.cambridge.org/0521543207. The set of Discussion Topics/Projects provides an opportunity to consider some of the larger issues in the study of language, to think about some of the controversies that arise with certain topics and to try to focus your own opinions on different language-related issues.

The origins of this book can be traced to introductory courses on language taught at the University of Edinburgh, the University of Minnesota and Louisiana State University, and to the suggestions and criticisms of hundreds of students who forced me to present what I had to say in a way they could understand. An early version of the written material was developed for Independent Study students at the University of Minnesota. Later versions have had the benefit of expert advice from a lot of teachers working with diverse groups in different

situations. I am particularly indebted to Professor Hugh Buckingham, Louisiana State University, for sharing his expertise and enthusiasm over many years as a colleague and friend.

For help in creating the first and second editions, I would like to acknowledge my debt to Gill Brown, Keith Brown, Penny Carter, Feride Erkü, Diana Fritz, Kathleen Houlihan, Tom McArthur, Jim Miller, Rocky Miranda, Eric Nelson, Sandra Pinkerton, Rich Reardon, Gerald Sanders, Elaine Tarone and Michele Trufant.

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For my own introductory course, I remain indebted to Willie and Annie Yule, and, for my continuing enlightenment, to Maryann Overstreet.

1 The origins of language

Chewing, licking and sucking are extremely widespread mammalian activities, which, in terms of casual observation, have obvious similarities with speech.
MacNeilage (1998)

We don't usually think of speaking as similar to chewing, licking and sucking, but, like speaking, all of these actions involve movements of the mouth, tongue and lips in some kind of controlled way. So, perhaps this connection is not as improbable as it first sounds. It is an example of the type of observation that can lead to interesting speculations about the origins of spoken language. They remain, however, speculations, not facts. We simply don't know how language originated. We suspect that some type of spoken language developed between 100,000 and 50,000 years ago, well before written language (about 5,000 years ago). Yet, among the traces of earlier periods of life on earth, we never find any direct evidence or artifacts relating to the speech of our distant ancestors that might tell us how language was back in the early stages. Perhaps because of this absence of direct physical evidence, there has been no shortage of speculation about the origins of human speech. In this chapter, we will consider the merits of some of those speculations.

The divine source

In the biblical tradition, God created Adam and "whatsoever Adam called every living creature, that was the name thereof". Alternatively, following a Hindu tradition, language came from Sarasvati, wife of Brahma, creator of the universe. In most religions, there appears to be a divine source who provides humans with language. In an attempt to rediscover this original divine language, a few experiments have been carried out, with rather conflicting results. The basic hypothesis seems to have been that, if human infants were allowed to grow up without hearing any language around them, then they would spontaneously begin using the original God-given language.

An Egyptian pharaoh named Psammetichus tried the experiment with two newborn babies more than 2,500 years ago. After two years in the company of goats and a mute shepherd, the children were reported to have spontaneously uttered, not an Egyptian word, but something that was identified as the Phrygian word *bekos*, meaning 'bread'. The pharaoh concluded that Phrygian, an older

language spoken in a part of what is modern Turkey, must be the original language. That seems very unlikely. The children may not have picked up this 'word' from any human source, but as several commentators have pointed out, they must have heard what the goats were saying. (First remove the *-kos* ending, which was added in the Greek version of the story, then pronounce *be-* as you would the English word *bed* without *-d* at the end. Can you hear a goat?)

King James the Fourth of Scotland carried out a similar experiment around the year 1500 and the children were reported to have started speaking Hebrew. It is unfortunate that all other cases of children who have been discovered living in isolation, without coming into contact with human speech, tend not to confirm the results of these types of 'divine-source' experiments. Very young children living without access to human language in their early years grow up with no language at all. (We will consider the case of one such child later in chapter 13.) If human language did emanate from a divine source, we have no way of reconstructing that original language, especially given the events in a city called Babel, "because the Lord did there confound the language of all the earth", as described in the book of Genesis (11: 9).

The natural sound source

A quite different view of the beginnings of language is based on the concept of natural sounds. The suggestion is that primitive words could have been imitations of the natural sounds which early men and women heard around them. When an object flew by, making a CAW-CAW sound, the early human tried to imitate the sound and used it to refer to the thing associated with the sound. And when another flying creature made a COO-COO sound, that natural sound was adopted to refer to that kind of object. The fact that all modern languages have some words with pronunciations that seem to echo naturally occurring sounds could be used to support this theory. In English, in addition to *cuckoo*, we have *splash*, *bang*, *boom*, *rattle*, *buzz*, *hiss*, *screech*, and forms such as *bow-wow*. In fact, this type of view has been called the 'bow-wow' theory of language origin. While it is true that a number of words in any language are **onomatopoeic** (echoing natural sounds), it is hard to see how most of the soundless as well as abstract things in our world could have been referred to in a language that simply echoed natural sounds. We might also be rather skeptical about a view that seems to assume that a language is only a set of words used as 'names' for things.

It has also been suggested that the original sounds of language may have come from natural cries of emotion such as pain, anger and joy. By this route, presumably, *Ouch!* came to have its painful connotations. But *Ouch!* and other interjections such as *Ah!*, *Ooh!*, *Wow!* or *Yuck!*, are usually produced with sudden intakes of breath, which is the opposite of ordinary talk. We normally produce spoken language on exhaled breath. Basically, the expressive noises people make

in emotional reactions contain sounds that are not otherwise used in speech production and consequently would seem to be rather unlikely candidates as source sounds for language.

One other natural sound proposal has come to be known as the 'yo-he-ho' theory. The idea is that the sounds of a person involved in physical effort could be the source of our language, especially when that physical effort involved several people and had to be coordinated. So, a group of early humans might develop a set of grunts, groans and curses that were used when they were lifting and carrying large bits of trees or lifeless hairy mammoths. The appeal of this theory is that it places the development of human language in some social context. Human sounds, however they were produced, must have had some principled use within the social life of early human groups. This is an important idea that may relate to the uses of humanly produced sounds. It does not, however, answer our question regarding the origins of the sounds produced. Apes and other primates have grunts and social calls, but they do not seem to have developed the capacity for speech.

The physical adaptation source

Instead of looking at types of sounds as the source of human speech, we can look at the types of physical features humans possess, especially those that are distinct from other creatures, which may have been able to support speech production. We can start with the observation that, at some early stage, our ancestors made a very significant transition to an upright posture, with bi-pedal (on two feet) locomotion, and a revised role for the front limbs.

Some effects of this type of change can be seen in physical differences between the skull of a gorilla and that of a Neanderthal man from around 60,000 years ago. The reconstructed vocal tract of a Neanderthal suggests that some consonant-like sound distinctions would have been possible. We have to wait until about 35,000 years ago for features in reconstructions of fossilized skeletal structures that begin to resemble those of modern humans. In the study of evolutionary development, there are certain physical features, best thought of as partial adaptations, which appear to be relevant for speech. They are streamlined versions of features found in other primates. By themselves, such features would not necessarily lead to speech production, but they are good clues that a creature possessing such features probably has the capacity for speech.

Teeth, lips, mouth, larynx and pharynx

Human **teeth** are upright, not slanting outwards like those of apes, and they are roughly even in height. Such characteristics are not very useful for ripping or tearing food and seem better adapted for grinding and chewing. They are also very helpful in making sounds such as *f* or *v*. Human **lips** have much more

intricate muscle interlacing than is found in other primates and their resulting flexibility certainly helps in making sounds like *p* or *b*. The human **mouth** is relatively small compared to other primates, can be opened and closed rapidly, and contains a smaller, thicker and more muscular **tongue** which can be used to shape a wide variety of sounds inside the oral cavity. The overall effect of these small differences taken together is a face with more intricate muscle interlacing in the lips and mouth, capable of a wider range of shapes and a more rapid delivery of sounds produced through these different shapes.

The human **larynx** or 'voice box' (containing the vocal cords) differs significantly in position from the larynx of other primates such as monkeys. In the course of human physical development, the assumption of an upright posture moved the head more directly above the spinal column and the larynx dropped to a lower position. This created a longer cavity called the **pharynx**, above the vocal cords, which acts as a resonator for increased range and clarity of the sounds produced via the larynx. One unfortunate consequence of this development is that the lower position of the human larynx makes it much more possible for the human to choke on pieces of food. Monkeys may not be able to use their larynx to produce speech sounds, but they do not suffer from the problem of getting food stuck in their windpipe. In evolutionary terms, there must have been a big advantage in getting this extra vocal power (i.e. a larger range of sound distinctions) to outweigh the potential disadvantage from an increased risk of choking to death.

The human brain

In control of organizing all these more complex physical parts potentially available for sound production is the human **brain**, which is unusually large relative to human body size. The human brain is **lateralized**, that is, it has specialized functions in each of the two hemispheres. Those functions that control motor movements involved in things like speaking and object manipulation (making or using tools) are largely confined to the left hemisphere of the brain for most humans. It may be that there is an evolutionary connection between the language-using and tool-using abilities of humans and that both are involved in the development of the speaking brain. Most of the other approaches to the origins of speech have humans producing single noises to indicate objects in their environment. This activity may indeed have been a crucial stage in the development of language, but what it lacks is any structural organization. All languages, including sign language, require the organizing and combining of sounds or signs in specific arrangements. We seem to have developed a part of our brain that specializes in making these arrangements.

If we think in terms of the most basic process involved in tool-making, it is not enough to be able to grasp one rock (make one sound); the human must also

be able to bring another rock (other sounds) into proper contact with the first in order to develop a tool. In terms of language structure, the human may have first developed a naming ability by producing a specific and consistent noise (e.g. *bEEr*) for a specific object. The crucial additional step was to bring another specific noise (e.g. *gOOd*) into combination with the first to build a complex message (*bEEr gOOd*). Several thousand years of evolution later, humans have honed this message-building capacity to a point where, on Saturdays, watching a football game, they can drink a sustaining beverage and proclaim *This beer is good*. As far as we know, other primates are not doing this.

The genetic source

We can think of the human baby in its first few years as a living example of some of these physical changes taking place. At birth, the baby's brain is only a quarter of its eventual weight and the larynx is much higher in the throat, allowing babies, like chimpanzees, to breathe and drink at the same time. In a relatively short period of time, the larynx descends, the brain develops, the child assumes an upright posture and starts walking and talking.

This almost automatic set of developments and the complexity of the young child's language have led some scholars to look for something more powerful than small physical adaptations of the species over time as the source of language. Even children who are born deaf (and do not develop speech) become fluent sign language users, given appropriate circumstances, very early in life. This seems to indicate that human offspring are born with a special capacity for language. It is innate, no other creature seems to have it, and it isn't tied to a specific variety of language. Is it possible that this language capacity is genetically hard-wired in the newborn human?

As a solution to the puzzle of the origins of language, this **innateness hypothesis** would seem to point to something in human genetics, possibly a crucial mutation, as the source. This would not have been a gradual change, but something that happened rather quickly. We are not sure when this proposed genetic change might have taken place or how it might relate to the physical adaptations described earlier. However, as we consider this hypothesis, we find our speculations about the origins of language moving away from fossil evidence or the physical source of basic human sounds toward analogies with how computers work (e.g. being pre-programmed or hard-wired) and concepts taken from the study of genetics. The investigation of the origins of language then turns into a search for the special 'language gene' that only humans possess.

If we are indeed the only creatures with this special capacity for language, then will it be completely impossible for any other creature to produce or understand language? We'll try to answer that question in chapter 2.

Study questions

1 With which of the four types of 'sources' would you associate the quotation from MacNeilage at the beginning of the chapter?
2 What is the basic idea behind the 'bow-wow' theory of language origin?
3 Why are interjections such as *Ouch!* considered to be unlikely sources of human speech sounds?
4 What special features of human teeth make them useful in the production of speech sounds?
5 Where is the pharynx and how did it become an important part of human sound production?
6 Why do you think that young deaf children who become fluent in sign language would be cited in support of the innateness hypothesis?

Research tasks

A What is the connection between the Heimlich maneuver and the development of human speech?
B What exactly happened at Babel and why is it used in explanations of language origins?
C The idea that "ontogeny recapitulates phylogeny" was first proposed by Ernst Haeckel in 1866 and is still frequently used in discussions of language origins. Can you find a simpler or less technical way to express this idea?
D What is the connection between the innateness hypothesis, as described in this chapter, and the idea of a Universal Grammar?

Discussion topics/projects

I A connection is sometimes proposed between language, tool-using and right-handedness in the majority of humans. Is it possible that freedom to use the hands, after assuming an upright bipedal posture, resulted in certain skills that led to the development of language? Why did we assume an upright posture? What kind of changes must have taken place in our hands? (For background reading, see chapter 5 of Beaken, 1996.)

II In this chapter we didn't address the issue of whether language has developed as part of our general cognitive abilities or whether it has evolved as a separate component that can exist independently (and is unrelated to intelligence, for example). What kind of evidence do you think would be needed to resolve this question? (For background reading, see chapter 4 of Aitchison, 2000.)

Further reading

Two introductions to the study of language origins are Aitchison (2000) and Beaken (1996). The funny names (e.g. 'bow-wow' theory) for some of the

earlier ideas come from Jespersen (1922). On ‘natural cries’, see Salus (1969), on the connection between tool-use and language, see Gibson & Ingold (1993), on the innateness hypothesis, see Pinker (1994), and for arguments against it, see Sampson (1997). Haeckel’s ideas are explored in Gould (1977). Other interesting approaches to language origins are presented in Bickerton (1990), Corballis (1991), Deacon (1997), Dunbar (1996), Jablonski & Aiello (1998) and Lieberman (1991, 1998).

2 Animals and human language

One evening in the mid-1980s my wife and I were returning from an evening cruise around Boston Harbor and decided to take a waterfront stroll. We were passing in front of the Boston Aquarium when a gravelly voice yelled out, "Hey! Hey! Get outa there!" Thinking we had mistakenly wandered somewhere we were not allowed, we stopped and looked around for a security guard or some other official, but saw no one, and no warning signs. Again the voice boomed, "Hey! Hey you!" As we tracked the voice we found ourselves approaching a large, glass-fenced pool in front of the aquarium where four harbor seals were lounging on display. Incredulous, I traced the source of the command to a large seal reclining vertically in the water, with his head extended back and up, his mouth slightly open, rotating slowly. A seal was talking, not to me, but to the air, and incidentally to anyone within earshot who cared to listen.

Deacon (1997)

There are a lot of stories about creatures that can talk. We usually assume that they are fantasy or fiction or that they involve birds or animals simply imitating something they have heard humans say (as Deacon discovered was the case with the loud seal in Boston Aquarium). Yet we know that creatures are capable of communicating, certainly with other members of their own species. Is it possible that a creature could learn to communicate with humans using language? Or does human language have properties that make it so unique that it is quite unlike any other communication system and hence unlearnable by any other creature? To answer these questions, we will first consider some special properties of human language, then review a number of experiments in communication involving humans and animals.

Communicative and informative signals

We should first distinguish between specifically **communicative signals** and those which may be unintentionally **informative signals**. Someone listening to you may become informed about you through a number of signals that you have not intentionally sent. She may note that you have a cold (you sneezed), that you aren't at ease (you shifted around in your seat), that you are disorganized (non-matching socks) and that you are from some other part of the country (you

have a strange accent). However, when you use language to tell this person, *I'd like to apply for the vacant position of senior brain surgeon at the hospital*, you are normally considered to be intentionally communicating something. Similarly, the blackbird is not normally taken to be communicating anything by having black feathers, sitting on a branch and looking down at the ground, but is considered to be sending a communicative signal with the loud squawking produced when a cat appears on the scene. So, when we talk about distinctions between human language and animal communication, we are considering both in terms of their potential as a means of intentional communication.

Displacement

When your pet cat comes home and stands at your feet calling *meow*, you are likely to understand this message as relating to that immediate time and place. If you ask your cat where it has been and what it was up to, you'll probably get the same *meow* response. Animal communication seems to be designed exclusively for this moment, here and now. It cannot effectively be used to relate events that are far removed in time and place. When your dog says *GRRR*, it means *GRRR, right now*, because dogs don't seem to be capable of communicating *GRRR, last night, over in the park*. In contrast, human language users are normally capable of producing messages equivalent to *GRRR, last night, over in the park*, and then going on to say *In fact, I'll be going back tomorrow for some more*. Humans can refer to past and future time. This property of human language is called **displacement**. It allows language users to talk about things and events not present in the immediate environment. Indeed, displacement allows us to talk about things and places (e.g. angels, fairies, Santa Claus, Superman, heaven, hell) whose existence we cannot even be sure of. Animal communication is generally considered to lack this property.

It has been proposed that bee communication may have the property of displacement. For example, when a worker bee finds a source of nectar and returns to the beehive, it can perform a complex dance routine to communicate to the other bees the location of this nectar. Depending on the type of dance (round dance for nearby and tail-wagging dance, with variable tempo, for further away and how far), the other bees can work out where this newly discovered feast can be found. Doesn't this ability of the bee to indicate a location some distance away mean that bee communication has at least some degree of displacement as a feature? The crucial consideration involved, of course, is that of degree. Bee communication has displacement in an extremely limited form. Certainly, the bee can direct other bees to a food source. However, it must be the most recent food source. It cannot be *that delicious rose bush on the other side of town that we visited last weekend*, nor can it be, as far as we know, possible future nectar in bee heaven.

Arbitrariness

It is generally the case that there is no 'natural' connection between a linguistic form and its meaning. The connection is quite arbitrary. We can't just look at the Arabic word كلب and, from its shape, for example, determine that it has a natural and obvious meaning any more than we can with its English translation form *dog*. The linguistic form has no natural or 'iconic' relationship with that hairy four-legged barking object out in the world. This aspect of the relationship between linguistic signs and objects in the world is described as **arbitrariness**. Of course, you can play a game with words to make them appear to 'fit' the idea or activity they indicate, as shown in the words below from a child's game. However, this type of game only emphasizes the arbitrariness of the connection that normally exists between a word and its meaning.

There are some words in language with sounds that seem to 'echo' the sounds of objects or activities and hence seem to have a less arbitrary connection. English examples are *cuckoo*, *CRASH*, *slurp*, *squelch* or *whirr*. However, these onomatopoeic words are relatively rare in human language.

For the majority of animal signals, there does appear to be a clear connection between the conveyed message and the signal used to convey it. This impression we have of the non-arbitrariness of animal signaling may be closely connected to the fact that, for any animal, the set of signals used in communication is finite. That is, each variety of animal communication consists of a fixed and limited set of vocal or gestural forms. Many of these forms are only used in specific situations (e.g. establishing territory) and at particular times (e.g. during the mating season).

Productivity

Humans are continually creating new expressions and novel utterances by manipulating their linguistic resources to describe new objects and situations. This property is described as **productivity** (or 'creativity' or 'open-endedness') and it is linked to the fact that the potential number of utterances in any human language is infinite.

The communication systems of other creatures do not appear to have this type of flexibility. Cicadas have four signals to choose from and vervet monkeys have thirty-six vocal calls. Nor does it seem possible for creatures to produce new signals to communicate novel experiences or events. The worker bee, normally

able to communicate the location of a nectar source to other bees, will fail to do so if the location is really 'new'. In one experiment, a hive of bees was placed at the foot of a radio tower and a food source placed at the top. Ten bees were taken to the top, shown the food source, and sent off to tell the rest of the hive about their find. The message was conveyed via a bee dance and the whole gang buzzed off to get the free food. They flew around in all directions, but couldn't locate the food. (It's probably one way to make bees really mad.) The problem seems to be that bee communication has a fixed set of signals for communicating location and they all relate to horizontal distance. The bee cannot manipulate its communication system to create a 'new' message indicating vertical distance. According to Karl von Frisch, who conducted the experiment, "the bees have no word for *up* in their language" and they can't invent one.

This limiting feature of animal communication is described in terms of **fixed reference**. Each signal in the system is fixed as relating to a particular object or occasion. Among the vervet monkey's repertoire, there is one danger signal *CHUTTER*, which is used when a snake is around, and another *RRAUP*, used when an eagle is spotted nearby. These signals are fixed in terms of their reference and cannot be manipulated. What might count as evidence of productivity in the monkey's communication system would be an utterance of something like *CHUTT-RRAUP* when a flying creature that looked like a snake came by. Despite a lot of experiments involving snakes suddenly appearing in the air above them (among other unusual and terrifying experiences), the vervet monkeys didn't produce a new danger signal. The human, given similar circumstances, is quite capable of creating a 'new' signal, after initial surprise perhaps, by saying something never said before, as in *Hey! Watch out for that flying snake!*

Cultural transmission

While we may inherit physical features such as brown eyes and dark hair from our parents, we do not inherit their language. We acquire a language in a culture with other speakers and not from parental genes. An infant born to Korean parents in Korea, but adopted and brought up from birth by English speakers in the United States, will have physical characteristics inherited from his or her natural parents, but will inevitably speak English. A kitten, given comparable early experiences, will produce *meow* regardless.

This process whereby a language is passed on from one generation to the next is described as **cultural transmission**. It is clear that humans are born with some kind of predisposition to acquire language in a general sense. However, we are not born with the ability to produce utterances in a specific language such as English. We acquire our first language as children in a culture.

The general pattern in animal communication is that creatures are born with a set of specific signals that are produced instinctively. There is some evidence from studies of birds as they develop their songs that instinct has to combine with

learning (or exposure) in order for the right song to be produced. If those birds spend their first seven weeks without hearing other birds, they will instinctively produce songs or calls, but those songs will be abnormal in some way. Human infants, growing up in isolation, produce no 'instinctive' language. Cultural transmission of a specific language is crucial in the human acquisition process.

Duality

Human language is organized at two levels or layers simultaneously. This property is called **duality** (or 'double articulation'). In speech production, we have a physical level at which we can produce individual sounds, like *n*, *b* and *i*. As individual sounds, none of these discrete forms has any intrinsic meaning. In a particular combination such as *bin*, we have another level producing a meaning that is different from the meaning of the combination in *nib*. So, at one level, we have distinct sounds, and, at another level, we have distinct meanings. This duality of levels is, in fact, one of the most economical features of human language because, with a limited set of discrete sounds, we are capable of producing a very large number of sound combinations (e.g. words) which are distinct in meaning.

Among other creatures, each communicative signal appears to be a single fixed form that cannot be broken down into separate parts. Although your dog may be able to produce *woof* ('I'm happy to see you'), it does not seem to do so on the basis of a distinct level of production combining the separate elements of *w* + *oo* + *f*. If the dog was operating with the double level (i.e. duality), then we might expect to hear different combinations with different meanings, such as *oowf* ('I'm hungry') and *foow* ('I'm really bored').

Talking to animals

If these five properties of human language make it such a unique communication system, quite different from the communication systems of other creatures, then it would seem extremely unlikely that other creatures would be able to understand it. Some humans, however, do not behave as if this is the case. There is, after all, a lot of spoken language directed by humans to animals, apparently under the impression that the animal follows what is being said. Riders can say *Whoa* to horses and they stop (or so it seems), we can say *Heel* to dogs and they will follow at heel (well, sometimes), and a variety of circus animals go *Up*, *Down* and *Roll over* in response to spoken commands. Should we treat these examples as evidence that non-humans can understand human language? Probably not. The standard explanation is that the animal produces a particular behavior in response to a particular sound-stimulus or 'noise', but does not actually 'understand' what the words in the noise mean.

If it seems difficult to conceive of animals understanding human language, then it appears to be even less likely that an animal would be capable of producing

human language. After all, we do not generally observe animals of one species learning to produce the signals of another species. You could keep your horse in a field of cows for years, but it still won't say *Moo*. And, in some homes, a new baby and a puppy may arrive at the same time. Baby and puppy grow up in the same environment, hearing mostly the same things, but about two years later, the baby is making lots of human speech sounds and the puppy is not. But perhaps a puppy is a poor example. Wouldn't it be better to work with a closer relative such as a chimpanzee?

Chimpanzees and language

The idea of raising a chimp and a child together may seem like a nightmare, but this is basically what was done in an early attempt to teach a chimpanzee to use human language. In the 1930s, two scientists (Luella and Winthrop Kellogg) reported on their experience of raising an infant chimpanzee together with their baby son. The chimpanzee, called Gua, was reported to be able to understand about a hundred words, but did not 'say' any of them. In the 1940s, a chimpanzee named Viki was reared by another scientist couple (Catherine and Keith Hayes) in their own home, exactly as if she was a human child. These foster parents spent five years attempting to get Viki to 'say' English words by trying to shape her mouth as she produced sounds. Viki eventually managed to produce some words, rather poorly articulated versions of *mama*, *papa* and *cup*. In retrospect, this was a remarkable achievement since it has become clear that non-human primates do not actually have a physically structured vocal tract which is suitable for articulating the sounds used in speech. Apes and gorillas can, like chimpanzees, communicate with a wide range of vocal calls, but they just can't make human speech sounds.

Washoe

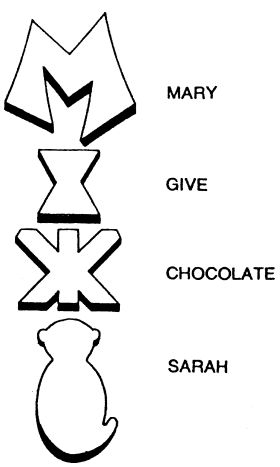
Recognizing that a chimpanzee was a poor candidate for spoken language learning, another scientist couple (Beatrix and Allen Gardner) set out to teach a female chimpanzee called Washoe to use a version of American Sign Language. As described later in chapter 16, this sign language has all the essential properties of human language and is learned by many congenitally deaf children as their natural first language.

From the beginning, the Gardners and their research assistants raised Washoe like a human child in a comfortable domestic environment. Sign language was always used when Washoe was around and she was encouraged to use signs, even her own incomplete 'baby-versions' of the signs used by adults. In a period of three and a half years, Washoe came to use signs for more than a hundred words, ranging from *airplane*, *baby* and *banana* through to *window*, *woman* and *you*. Even more impressive was Washoe's ability to take these forms and combine them to produce 'sentences' of the type *gimme tickle*, *more fruit* and

open food drink (to get someone to open the refrigerator). Some of the forms appear to have been inventions by Washoe, as in her novel sign for *bib* and in the combination *water bird* (referring to a swan), which would seem to indicate that her communication system had the potential for productivity. Washoe also demonstrated understanding of a much larger number of signs than she produced and was capable of holding rudimentary conversations, mainly in the form of question–answer sequences. A similar conversational ability with sign language was reported (by Francine Patterson) for a gorilla named Koko not long after.

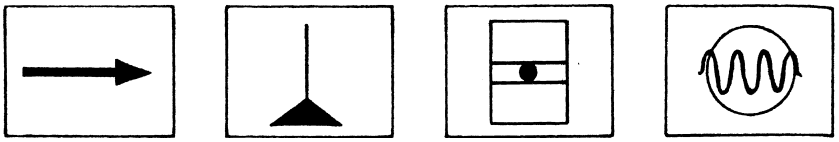
Sarah and Lana

At the same time as Washoe was learning sign language, another chimpanzee named Sarah was being taught (by Ann and David Premack) to use a set of plastic shapes for the purpose of communicating with humans. These plastic shapes represented 'words' that could be arranged in sequence to build 'sentences' (Sarah preferred a vertical order). The basic approach was quite different from that of the Gardners. Sarah was systematically trained to associate these shapes with objects or actions. She remained an animal in a cage, being trained with food rewards to manipulate a set of symbols. Once she had learned to use a large number of these plastic shapes, Sarah was capable of getting an apple by selecting the correct plastic shape (a blue triangle) from a large array. Notice that this symbol is arbitrary since it would be hard to argue for any 'natural' connection between an apple and a blue plastic triangle. Sarah was also capable of producing 'sentences' such as *Mary give chocolate Sarah* and had the impressive capacity to understand complex structures such as *If Sarah put red on green, Mary give Sarah chocolate*. Sarah got the chocolate.



A similar training technique with another artificial language was used (by Duane Rumbaugh) to train a chimpanzee called Lana. The language she learned

was called Yerkish and consisted of a set of symbols on a large keyboard linked to a computer. When Lana wanted some water, she had to press four symbols, in the correct sequence, to produce the message *please machine give water*.



Both Sarah and Lana demonstrated an ability to use what look like word symbols and basic structures in ways that superficially resemble the use of language. There is, however, a lot of skepticism regarding these apparent linguistic skills. It has been pointed out that when Lana used the symbol for 'please', she did not have to understand the meaning of the English word *please*. The symbol for 'please' on the computer keyboard might simply be the equivalent of a button on a vending machine and, so the argument goes, we could learn to operate vending machines without necessarily knowing language. This is only one of the many arguments that have been presented against the idea that the use of signs and symbols by these chimpanzees is similar to the use of language.

The controversy

On the basis of his work with another chimpanzee called Nim, the psychologist Herbert Terrace has argued that chimpanzees simply produce signs in response to the demands of people and tend to repeat signs those people use, yet they are treated (by naive researchers) as if they are taking part in a 'conversation'. As in many critical studies of animal learning, the chimpanzees' behavior is viewed as a type of conditioned response to cues provided (often unwittingly) by human trainers. Herbert's conclusion was that chimpanzees are clever creatures who learn to produce a certain type of behavior (signing or symbol selection) in order to get rewards and are essentially performing sophisticated 'tricks'.

In response, the Gardners argued that they were not animal trainers, nor were they inculcating and then eliciting conditioned responses from Washoe. In complex experiments, designed to eliminate any possible provision of cues by humans, they showed that in the absence of any human, Washoe could produce correct signs to identify objects in pictures. They also emphasize a major difference between the experiences of Washoe and Nim. While Nim was kept in a bare windowless cell as a research animal and had to deal with a series of research assistants who were often not fluent in American Sign Language, Washoe lived in a domestic environment with a lot of opportunity for imaginative play and interaction with fluent signers who were also using sign language with each other. They also report that a group of younger chimpanzees not only

learned sign language, but used it with each other and with Washoe, even when there were no humans present.

Kanzi

In a more recent study by Sue Savage-Rumbaugh, an interesting development relevant to this controversy came about almost by accident. While Savage-Rumbaugh was attempting to train a bonobo (a pygmy chimpanzee) called Matata how to use the symbols of Yerkish, Matata's adopted baby, Kanzi, was always with her. Although Matata did not do very well, her son Kanzi spontaneously started using the symbol system with great ease. He had learned not by being taught, but by being exposed to, and observing, a kind of language in use at a very early age. Kanzi eventually developed a large symbol vocabulary (over 250 forms). By the age of eight, he was reported to be able, through the association of symbols with spoken words, to demonstrate understanding of spoken English at a level comparable to a two-and-a-half-year-old human child. There was also evidence that he was using a consistently distinct set of 'gentle noises' as words to refer to things such as bananas, grapes and juice. He had also become capable of using his symbol system to ask to watch his favorite movies, *Quest for Fire* (about primitive humans) and *Greystoke* (about the Tarzan legend).

The barest rudiments of language

Important lessons have been learned from attempts to teach chimpanzees how to use forms of language. We have answered some questions. Were Washoe and Kanzi capable of taking part in interaction by using a symbol system chosen by humans and not chimpanzees? The answer is clearly "Yes". Did Washoe and Kanzi perform linguistically on a level comparable to a human child of the same age? The answer is just as clearly "No". In addition, one of the most important lessons for those who study the nature of language is the realization that, although we can describe some key properties of language, we clearly do not have a totally objective and non-controversial definition of what counts as 'using language'. We assume that when young human children make language-like noises we are witnessing language development, but when young chimpanzees produce language-like signs in interaction with humans, many scientists are very unwilling to classify this as language-use. Yet, the criteria we use in each case do not seem to be the same.

This problem remains, as does the controversy among different psychologists and linguists over the reported abilities of chimpanzees to use language. However, given the mass of evidence from these studies, we might suggest that the linguist Noam Chomsky (1972) should revise his claim that "acquisition

of even the barest rudiments of language is quite beyond the capacities of an otherwise intelligent ape". We may not have had reports on the chimpanzee view of linguistic theory, but on their obvious capacity to cope with "the barest rudiments of language" we certainly have.

Study questions

1 What kind of evidence is used to support the idea that language is culturally transmitted?
2 What is the difference between a communication system with productivity and one with fixed reference?
3 Which property of language enables people to talk about 'the future'?
4 How did the Gardners try to show that Washoe was not simply repeating signs made by interacting humans?
5 If Sarah could use a gray plastic shape to convey the meaning of the word *red*, which property does her 'language' seem to have?
6 What was considered to be the key element in Kanzi's language learning?

Research tasks

A What is meant by 'sound symbolism' and how does it relate to the property of arbitrariness?
B In studies of communication involving animals and humans, there is sometimes a reference to 'the Clever Hans phenomenon'. Who or what was Clever Hans, why was he/she/it famous and what exactly is the 'phenomenon'?
C What was the significance of the name given to the chimpanzee in the research conducted by the psychologist Herbert Terrace?
D What exactly are bonobos and why might they be better at language learning than chimpanzees?

Discussion topics/projects

I Listed below are six other properties (or 'design features') which are often discussed when human language is compared to other communication systems.

use of the **vocal-auditory channel** (language signals are sent using the vocal organs and received by the ears)

specialization (language signals do not serve any other type of purpose such as breathing or feeding)

non-directionality (language signals have no inherent direction and can be picked up by anyone within hearing, even unseen)

rapid fade (language signals are produced and disappear quickly)

reciprocity (any sender of a language signal can also be a receiver)

prevarication (language signals can be false or used to lie or deceive)

(i) Are these properties found in all forms of human communication via language?

(ii) Are these special properties of human language or can they be found in the communication systems of other creatures?

(For background reading, see chapter 17 of O'Grady *et al*., 2005.)

II The most persistent criticism of the chimpanzee language-learning projects is that the chimpanzees are simply making responses like trained animals for rewards and are consequently not using language to express anything. Read over the following reports and try to decide how the different behaviors of these chimpanzees (Dar, Washoe and Moja) should be characterized. Signs are represented by words in capital letters.

After her nap, Washoe signed OUT. I was hoping for Washoe to potty herself and did not comply. Then Washoe took my hands and put them together to make OUT and then signed OUT with her own hands to show me how.

Greg was hooting and making other sounds, to prevent Dar from falling asleep. Dar put his fist to Greg's lips and made kissing sounds. Greg asked WHAT WANT? and Dar replied QUIET, placing the sign on Greg's lips.

Moja signed DOG on Ron and me and looked at our faces, waiting for us to "woof". After several rounds I made a "meeow" instead. Moja signed DOG again, I repeated "meeow" again, and Moja slapped my leg harder. This went on. Finally I woofed and Moja leapt on me and hugged me.

Moja stares longingly at Dairy Queen as we drive by. Then for a minute or more signs NO ICE CREAM many times, by shaking her head while holding fist to mouth, index edge up.

(For background reading, see Rimpau *et al*., 1989, which is the source of these examples.)

Further reading

Introductory treatments of the properties of language and a discussion of other communication systems can be found in chapter 12 of Hudson (2000) or chapter 17 of O'Grady *et al*. (2005). Some of the original ideas regarding properties of language are in Hockett (1960). For different perspectives on the nature of communication, see Mellor (1990) or Rogers & Kaplan (2000). For more on vervet monkeys, see Cheney & Seyfarth (1990) and, on dancing bees, see von Frisch (1993). On human versus animal communication, see Aitchison (1998). Overviews of the research with chimpanzees are presented in Linden (1987) or Premack (1986), which are generally favorable, and Anderson (2004) or