Chapter 1

What is language?

This book is an introduction to the study of human language across the planet. It is concerned with the immense variety among the languages of the world, as well as the common traits that cut across the differences. The book presents a number of analytic tools for comparing and contrasting different languages, and for seeing any one particular language in a larger linguistic perspective.

The book attempts to avoid eurocentrism, the excessive focus on European languages often found in introductions to linguistics. Although, for ease of presentation, examples are often drawn from English, a large variety of languages from all continents are drawn into the discussion whenever this helps to broaden our perspective.

This global focus is reflected in the choice of topics. Apart from a chapter introducing the four traditional branches of linguistics (semantics, syntax, morphology and phonology), this book is primarily interested in the following seemingly simple questions:

1. How and why do languages resemble each other?

2. How and why do languages differ from each other?

These questions are dealt with, from different angles, in the chapters on language universals, linguistic typology, language families and language contact. The chapter on language variation moves the focus from inter-language to intra-language comparison. Finally, the chapter on writing discusses similarities and differences in the ways in which various cultures have used a visual medium to represent and augment the auditory signals of speech.

The book is primarily concerned with natural languages that function as full-fledged mother tongues for larger or smaller groups of people. It is less concerned with the clearly artificial and highly restricted languages of, for instance, mathematics, formal logic or computer programming. The line of division is not always clear. While the word one belongs to English, the number 1 belongs to mathematics; and while the words if and then belong to English, the logical operator if-then belongs to formal logic and computer programming.

At the heart of our concern lies the spoken language. All natural languages are spoken, while to this day many of them have no written form. Unlike most textbooks in linguistics, however, this book will also devote a whole chapter to writing, which may be seen as an extension of speech. On the other hand, it will have little to say about forms of language that are based on gestures rather than speech, such as body language or the sign languages of the deaf.
Like most modern studies of linguistics, this book is descriptive rather than prescriptive. It is not within the scope of the book to judge which of the following sentences is the more correct:

A. I can’t get no satisfaction.
B. I can’t get any satisfaction.

It is within the scope of the book, however, to describe the fact that different speakers of English will form different judgements regarding the acceptability of these sentences under different circumstances.

In addition to descriptions, the book will also seek explanations. Why do languages across the world have certain traits in common, such as the tendency for the subject to precede the object? Why are certain features systematically linked to each other, so that, for instance, languages where the verb precedes the object tend to have prepositions, while languages where the verb follows the object tend to have postpositions? In such cases, we shall try to consider alternative explanations without theoretical prejudice.

1.1 What is language?

Human beings can communicate with each other. We are able to exchange knowledge, beliefs, opinions, wishes, threats, commands, thanks, promises, declarations, feelings – only our imagination sets limits. We can laugh to express amusement, happiness, or disrespect, we can smile to express amusement, pleasure, approval, or bitter feelings, we can shriek to express anger, excitement, or fear, we can clench our fists to express determination, anger or a threat, we can raise our eyebrows to express surprise or disapproval, and so on, but our system of communication before anything else is language. In this book we shall tell you a lot about language, but as a first step towards a definition we can say that it is a system of communication based upon words and the combination of words into sentences.

Communication by means of language may be referred to as linguistic communication, the other ways mentioned above – laughing, smiling, shrieking, and so on – are types of non-linguistic communication.

Most or all non-human species can exchange information, but none of them are known to have a system of communication with a complexity that in any way is comparable to language. Primarily, they communicate with non-linguistic means resembling our smiling, laughing, yelling, clenching of fists, and raising of eyebrows. Chimpanzees, gorillas, and orangutangs can exchange different kinds of information by emitting different kinds of shrieks, composing their faces in numerous ways, and moving their hands or arms in different gestures, but they do not have words and sentences. By moving in certain patterns, bees are apparently able to tell their fellow workers where to find honey, but apparently not very much else. Birds sing different songs, whose main functions are to defend their territory or to attract a mate.

Language – as defined above – is an exclusively human property. Among the characteristics that make a relatively clear distinction between linguistic and non-linguistic communication meaningful, two are particularly important: double articulation and syntax.
1.1.1 Double articulation

Languages consist of tens of thousands of signs, which are combinations of form and meaning. Form in spoken languages is a sequence of sounds, in written languages for example a sequence of letters (depending upon what kind of writing system we are talking about) and in the sign languages of the deaf a certain combination of gestures. Here, we shall concentrate on spoken languages, and one example of a sign is the English word *sit*, which has the form */sIt*/. Speakers of English associate a certain meaning with this form: ‘to assume a position of rest in which the weight is largely supported by the buttocks’. The form and the meaning together constitute a sign, as shown in FIGURE 1. You can read more about signs in chapter 2.

<table>
<thead>
<tr>
<th>SIGN</th>
<th>FORM</th>
<th>MEANING</th>
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<tr>
<td></td>
<td><em>/sIt</em>/</td>
<td>‘to assume a position of rest in which the weight is largely supported by the buttocks’</td>
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Languages have tens of thousands of signs, and the term **double articulation** refers to the fact that the formal sides of these signs are built from a relatively small repertoire – usually between 10 and 100 – of meaningless sounds.

In English, the number of sounds is around 50 – almost equally divided between consonants and vowels – varying somewhat between dialects and between different ways of analyzing the English phonological system. There is no connection between the meaning and any of the sounds. If the */I*/ of */sIt*/ is replaced by */U*/ we get */sUt*/, spelt soot, which has the meaning ‘a black powdery form of carbon produced when coal, wood, or oil is burned, which rises up in fine particles with the flames and smoke’. This meaning is totally unrelated to the meaning ‘to assume a position of rest in which the weight is largely supported by the buttocks’, despite the fact that the units */sIt*/ and */sUt*/ both start with */s*/ and end with */t*/ and have a vowel in between, and the difference in meaning is in no way connected to the phonetic difference between the vowels */I*/ and */U*/. If */t*/ in */sIt*/ is replaced by */k*/ we get the sound sequence */sIk*/ spelt sick, which is used to express another completely unrelated meaning: ‘affected by an illness’.

In a “language” without double articulation, the formal sides of all signs would be constituted by individual sounds, and the number of different sounds would be equal to the number of signs. One example would be a system of communication where the formal side of each sign is a specific cry. A human being would probably be able to distinguish several hundreds of cries, but such a system would not only be poor, but also uneconomical, and extremely vulnerable to noise.

1.1.2 Syntax

The principle of double articulation has enabled human beings to create languages with an impressively large number of signs, but the inventory of signs in a language is by necessity finite. Since the number of sounds in a language usually is between 10 and 100, we could not have hundreds of thousands of different signs unless we allowed them to be extremely long, and there is anyway an upper limit to the number
of signs that a human being is able to remember. It would not be very practical for a language to have separate signs for meanings like ‘man killed lion’ and ‘lion killed man’. The total number of isolated signs in a human language is generally limited to roughly 10 000–20 000, and with this number of signs we cannot talk about an infinite number of meanings – unless we combine them.

The ingenious invention that enabled human beings to talk about everything they can imagine, is syntax. Syntax is used to put together signs expressing relatively simple meanings into sign combinations expressing more complex meanings. To express a meaning like ‘man killed lion’, we combine signs meaning ‘man’, ‘kill’, ‘past’, and ‘lion’, and we combine the same signs in a different way to express the meaning ‘lion killed man’. The English sign sequences man kill-ed lion and lion kill-ed man are sentences, and the number of sentences in a language is infinite. Take any sentence in a language, and it is always possible to make it longer: man killed lion ⇒ the man killed the lion ⇒ the woman said that the man killed the lion ⇒ the old woman said that the young man killed the lion ⇒ the old woman said that the young man killed the lion that ate the antelope ⇒ the girl believed that the old woman said that the young man killed the lion that ate the antelope – and so on infinitely.

Syntax is a mechanism that enables human beings to utter or understand an infinite number of sentences constructed from a finite number of building blocks. Without syntax, we would not be able to express other meanings than those associated with isolated signs, and the number of different meanings we would be able to express would be equal to the number of signs in the “language”.

1.2 The origin of language

Biologists refer to the modern human as homo sapiens, Latin for ‘wise man’, but the possession of language is such an important part of the definition of the modern human that homo loquens ‘talking man’ would be an equally appropriate name.

Since humans are the only creatures on Earth that possess language, this system of communication must by necessity be younger than the split between the human lineage and that of our closest modern non-human relative, the chimpanzee. This split is generally assumed to have taken place 5 to 7 million years ago. The oldest creatures in the human lineage are called hominids, while the first individuals belonging to our own genus, Homo, appeared about 1.9 million years ago. Few researchers – if any at all – believe language to be close to 2 million years old, but before we discuss in more detail the upper limit or the maximum age of language, let us take a closer look at the lower limit or the minimum age of language.

1.2.1 The minimum age of language

We shall discuss the minimum age of language on the basis of writing, historical reconstruction, oral tradition, and archeology.

7.2.1.1 Writing

In many parts of the world – France, India, Zimbabwe, and elsewhere – cave drawings and bone carvings have been discovered that were made during the archeological period referred to as the Upper Paleolithic in Europe and Asia and the
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Middle Stone Age in Africa. Roughly, this period lasted from 35 000 until 10 000 BP (= before present). Some researchers interpret these drawings and carvings as the earliest precursors of writing. The relevance to us of such claims is that writing depends upon language, since it can be defined in the following way:

**Writing** is a set of visible or tactile signs used to represent units of language in a systematic way.

On the basis of this definition, writing is much younger. It is tempting – and quite reasonable – to propose that those ancient drawings and carvings cannot have been made by humans without language, but they do not constitute direct evidence of language. Writing in the strict sense started around 5 300 BP in Mesopotamia with the cuneiform writing system, and the first language ever written was Sumerian. About 300 years later, the hieroglyphic writing system appeared in Egypt. In China, writing started not more than 1 000 years later, around 4 000 BP. In the Americas, the oldest writing system is that of the Maya civilization, and the oldest documents have been dated to 2 200–2 100 BP. However, most languages in the world were not written down until the 19th and the 20th century.

It is almost an understatement that language must have existed for a considerable time before humans started to write, so that nobody would question the claim that language is much more than 5 300 years old. Still, it is important to remember that we do not have any documentation of language from an earlier date.

### 7.2.1.2 Historical Reconstruction

Today, about 6 900 languages are spoken throughout the world – more than 2 000 languages in Africa, 1 000 in the Americas, more than 2 250 in Asia, about 220 in Europe, and more than 1 300 in Australia and the Pacific. These languages can be grouped into more than 90 language families. A language family is defined in the following way:

**A language family** is a group of languages with a common origin.

The common origin is postulated to have been a single language, referred to as a proto-language, that was spoken at a certain time in the past. Through the ages that proto-language broke up into dialects. As time went by, these dialects become increasingly more different from each other, ending up as different languages, primarily due to geographical distance. These languages developed dialectal differences, and the whole cycle was repeated, many times.

The major language families in the world are Afro-Asiatic (353 languages spoken in Africa and Asia), Austronesian (1 246 languages spoken in Asia and Oceania), Indo-European (430 languages spoken in Asia and Europe, and in European settlements in other parts of the world), Niger-Congo (1 495 languages spoken in Africa), Sino-Tibetan (399 languages spoken in Asia), and Trans-New Guinea (561 languages spoken in New Guinea and adjacent islands).

Linguists have developed quite reliable methods to reconstruct proto-languages – for example, Proto-Indo-European – spoken before writing was introduced. The reason why we can call the methods reliable is that in several cases reconstructions have been supported by written texts discovered after the reconstructions were made.
We cannot exclude the possibility – in fact, it is highly plausible – that the proto-languages of the ninety-odd language families in the world were themselves languages in even older language families, but the methods of historical language reconstruction have their limits. After a certain period of time, languages change so much that a possible common origin simply cannot be detected. While archeologists can date the age of artefacts on the basis of the constant decay of radioactive atoms, languages do not change at a constant rate at all times and at all places, but most linguists do not think that it is possible to reconstruct proto-languages that were spoken more than approximately 10 000 BP. This does not, mean, however, that language origins should not be traced much further into the past.

7.2.1.3 Oral Tradition

When writing was invented, texts could be stored and information could be transmitted across generations, centuries, and millennia, to a much larger extent than before. But crossgenerational communication did not start with writing. Interesting pieces of information have been «handed down» to us through oral tradition.

Some fascinating examples of information from a distant past that have survived through oral tradition is mentioned by the linguist R. M. W. Dixon in his book about the Australian language Dyirbal, *The Dyirbal Language of North Queensland*. On p. 29, Dixon writes that «beneath the veneer of fantasy, some [Dyirbal] myths may provide accurate histories of events in the distant past of the people», and this is just one example:

Further evidence is contained in the myth of Giʔugar, a legendary man who came from the south, visiting each mountain, lake and island and giving it a name. The storyteller remarked that in Giʔugar’s day it was possible to walk across to the islands (Palm Island, Hinchinbrook Island, and so on). In fact geographers believe that sea level was sufficiently low for it to have been possible to walk to all islands in the Coral Sea at the end of the last ice age, eight to ten thousand years ago.

This may be some of the oldest direct evidence in the world of the existence of language. The fact that it was possible to walk across to those islands could not have been «handed down» from one generation to another for at least 10 000 years without language.

7.2.1.4 Archeology

In Africa, the first archeological remains of *anatomically* modern humans, *Homo sapiens*, have been dated to 130 000 years BP, and the development of *behaviorally* modern humans was apparently completed 60 000–40 000 years ago.

As we shall come back to below, language could not develop until our ancestors had acquired certain anatomical features, while, on the other hand, certain behavioral features are difficult to imagine in a society without language. Necessary anatomical features are what we call *articulatory organs* – that is, among other things, a mouth, and and throat of a certain shape – a *minimum brain size*, while art is an important behavioral feature.
Many scholars therefore believe that language emerged not earlier than the completed development of anatomically modern humans, 120 000–100 000 BP, and not later than the completed development of behaviorally modern humans, 60 000–40 000 BP.

While modern humans have existed in Africa for 130 000 years, it was only after the development of the behaviorally modern humans that they spread to other parts of the world. Fossil and archeological evidence indicate that they reached Australia 50 000 BP, West Asia 47 000 BP, New Guinea 45 000 BP, Europe 40 000 BP, East Asia 39 000 BP, the Americas considerably later, but at least 14 500 BP. Western parts of Oceania were settled by modern humans approximately 30 000 BP, while eastern parts were settled within the last 3 500 years.

We do not know whether language has arisen several times (polygenesis) or only once (monogenesis) in the prehistory of man. Monogenesis implies that all languages in the world are related to each other, in an ancient family of languages, all of which have descended from a proto-language that some linguists call Proto-World. To the extent that this question is being discussed, linguists can be divided into two groups, those that defend monogenesis and those – probably the overwhelming majority – that regards themselves as «agnostics».

Whatever the right answer, it is highly probable that those modern humans that left Africa 50 000–40 000 years BP had language. In this perspective, we’re all Africans speaking African languages!

### 7.2.1.5 The Neanderthals

But we have nothing resembling hard evidence that precludes the existence of language before the period before the anatomical and behavioral development of modern humans was completed in the period 130 000–40 000 years BP. The Neanderthals, who lived in Europe and Western Asia from around 250 000 years BP until 28 000 years BP, might well have had some kind of language. The Neanderthals are regarded as descendants of Homo heidelbergensis, that first appeared – as descendants of Homo erectus (1.9 million to 27 000 years BP) – in Africa about 1 million years BP. There were Neanderthals in Europe until 12 000 years after modern humans had settled there, and they may simply have been absorbed by the modern humans, and Europeans may count Neanderthals among their ancestors. As stated by John Gribbin and Jeremy Cherfas write in The First Chimpanzee. In Search of Human Origins (p. 86):

> Neanderthal people were certainly intelligent – they used tools, they painted pictures in caves, built shelters and even buried their dead with ritual, judging by the evidence of a flower-bedecked grave found in Iraq.

In the preceding paragraphs we have presented some hopefully «informed guesses» about the age of human language as we know it, but we hesitate to write anything about how it all started, despite the fact that many «theories» have been presented through the ages.

Much has also been written about the question whether the ancestors or close relatives of modern man, like Homo erectus and Homo neanderthalensis, had any kind of language.
1.2.2 The maximum age of language

After our discussion of the minimum age of language, we may conclude that we have not found any hard evidence that language is more than 10 000 years old, but few scholars would doubt that it is considerably older, and at least 40 000–50 000 years old. Now we shall take a different perspective and ask about the maximum possible age of language.

While the discussion about the minimum age is primarily governed by cultural phenomena, that is, *inter alia* writing, language reconstruction, oral tradition, and art, the discussion about the maximum age will primarily be dominated by anatomy.

We do not know how large and complex a brain has to be to make language possible. May be chimpanzee’s brain is too small for language, but whether the brain obtained the necessary size in *Homo erectus*, *Homo heidelbergensis*, *Homo neanderthalensis*, or not until *Homo sapiens*, will at our present state of knowledge be nothing but conjecture. Claims have often been made since the 19th century to the effect that modern humans have a «language center» in their brain, and we shall come back to this in section 1.3.

Psychologists have tried to teach chimpanzees human language. After some unsuccessful attempts 40–50 years ago to teach them spoken language, some chimpanzees have been taught parts of *American Sign Language*, the language used by deaf people in the United States. The reasons why chimpanzees did not manage to learn to speak are probably quite numerous. They may not have sufficiently developed articulatory organs; they may lack the ability to perceive and later to articulate sounds in a particular sequence; they may lack a sufficiently developed brain in a more general sense; or all of this may be true. When the chimpanzees were allowed to use their eyes, hands and arms instead of the ears and mouths, they were more successful. Linguists have been arguing ever since how much they learnt, and we shall get involved in that discussion. Instead, we shall take a look at research around the following question: Did the Neanderthals have an anatomy that enabled them to speak?

7.2.2.1 More about the Neanderthals

Several attempts have been made to reconstruct the vocal tract of *Homo neanderthalensis*, that is, tongue, mouth cavity, pharynx (throat), and larynx. On the basis of some early reconstructions – which have been heavily criticized as wrong – it was first concluded that a human vocal did not fit into the skull of a Neanderthals, who therefore had to be unable to speak. Among other things, it was believed that modern humans have a significantly lowered larynx (of which the Adam's apple is a part), which was believed to be a necessary prerequisite for speech. This allegedly lowered larynx was even regarded as a human evolutionary adaption to language. Later it has been shown that the lowered larynx is found in adult males only, and not in children and adult females – who nevertheless have the same ability to speak. The lowered larynx seems to be an evolutionary specialization of males after puberty, and its main function is to give the males a darker voice that frightens potential attackers and competitors.
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The American linguist Philip Lieberman, who has played a central role in the research on the Neanderthal vocal tract, writes in his 1998 book *Eve spoke. Human language and human evolution* (p. 8):

Neanderthals clearly possessed language and speech, but their speech capabilities were intermediate between those of still earlier hominids and those of modern humans. Neanderthal speech would immediately have been perceived as being different from that of our [modern human] ancestors.

Let us conclude this discussion with the conjecture that language may have developed gradually, and that Neanderthals had some kind of language, but that their language did not reach the stage of development of the language that came into existence in modern humans approximately 130 000–40 000 years ago.

### 1.3 Instinct vs. invention

It is a fact that in our time, 28 000 years after the disappearance of the Neanderthals, the modern human is the only species on Earth possessing language. Clearly, we are the only species with sufficient anatomical prerequisites for language learning, but linguists disagree about our degree of anatomical specialization for language.

Some linguists claim that the reason why humans are the only possessors of language is that we have an innate language capacity. Others claim that the reason is our general cognitive capacities, which surpass those of all other species.

#### 1.3.1 Exaptation

The particular shape of the vocal tract, that is, its fitness for articulating language sounds, is probably due to what in evolutionary biology is called exaptation: a large change in function is accomplished with little change in structure, or, expressed in a different way, old tools are used for new purposes.

It has not been possible to find anatomical changes in the vocal tract that can only be understood as evolutionary adaptions to language. The vocal tract most probably acquired its present shape for reasons that are irrelevant for language, like adaption to a different diet and walking upright, but this new shape turned out to be an almost perfect tool for talking.

#### 1.3.2 A language instinct?

The matter of controversy is whether the development of the brain is comparable to the development of the vocal tract, or whether this development can only be understood as a biological adaption to language use. In 2002, the American linguists Stephen R. Anderson and David Lightfoot published the book *The Language Organ. Linguistics as Cognitive Physiology*, where they defend the latter view, which they formulate in the following way (p. 216):

Our ability to speak and understand a natural language results from – and is made possible by – a richly structured and biologically determined capacity specific both
to our species and to this domain. […] the language faculty is a part of human
biology, tied up with the architecture of the human brain, and distinct in part from
other cognitive faculties.

This alleged «richly structured and biologically determined capacity» for language is
referred to as an innate language faculty, a language instinct, or a language organ,
an «organ» that is compared to other organs like the visual system, which inter alia
includes the eyes, the optic nerves, and the visual cortex, and which without any
doubt is the result of a long biological evolution.

The main advocate for the view that human beings has this capacity is the well-
known American linguist Noam Chomsky, who has presented several arguments in
favor of an innate language faculty, and we shall take a look at three of them, as an
illustration of Chomsky’s argumentation:

1. Speed of acquisition
2. Poverty of data
3. Language universals

We shall take a look at each argument. Some of the criticism presented is taken from
the book The ‘Language Instinct’ Debate, which the British linguist Geoffrey

### 7.3.2.1 Speed of Acquisition

Chomsky has claimed that language is acquired in «a remarkably short period», and
that the speed would not be possible if the human did not have an innate language
faculty.

Critics have pointed out that in order to assess this argument, we need to know
what it means to acquire language in a remarkably short period, and that this
information has never supplied by the «nativists».

### 7.3.2.2 Poverty of Data

Chomsky has claimed that «the language each person acquires is a rich and complex
construction hopelessly underdetermined by the fragmentary evidence available», that
is, the grammar acquired by children is much more complex than one should expect
on the basis of the language data the children is exposed to from people around them.

Geoffrey Sampson points out that «Chomsky originally made statement about
the child’s data being quantitatively poor years before anyone had done serious
research on the nature of the speech addressed to children», and that later research has
not supported Chomsky’s statement.

### 7.3.2.3 Language Universals

All languages in the world are claimed to resemble each other in a remarkable way
from a structural point of view. Notice that we are talking about the grammatical
structure of sentences, and for example not about words, since there is no particularly
striking resemblance between the word meaning ‘book’ in English (book), French (livre), Arabic (kitāb), and Chinese (shū). Chomsky says that languages resemble each other in structural features that are not necessary properties of a language, and that these universal structural properties must be explained on the basis of innate knowledge.

In Geoffrey Sampson’s view, the number of language universals is not that impressive, and not large enough to justify the postulation of an innate language faculty.

Sampson also expresses agreement with the American linguist Martin Joos, who wrote in 1957 that «languages […] differ from each other without limit and in unpredictable ways.»

### 1.3.3 Was language invented by humans?

According to an alternative view, language is primarily a cultural phenomenon and not a biological one, and explanations of the structure of language should be sought in language functions and general aspects of human cognition. In this perspective, language is **invented** by human beings, and through exaptation different parts of the human body have acquired a linguistic function, primarily in addition to other and primary functions that still survive.

Theories about an innate language faculty cannot be defended before serious attempts have been made to account for more or less universal properties of language in this general cognitive perspective.

### 1.4 Language and thought

Most people see language as a vehicle for the expression of thoughts that are already there independently of the words and grammatical structures that express them, as seems to be implied in Saussure's model of the speech situation. But it has also been claimed that language contributes to the shaping of thought, and that different languages do so in different ways. This idea is often referred to as the **Sapir-Whorf hypothesis** (or just Whorfianism), after the linguists Edward Sapir and Benjamin Lee Whorf.

There are two versions of this hypothesis. The stronger version, called **linguistic determinism**, asserts that thought is completely determined by language, while the weaker version, called **linguistic relativity**, asserts instead that ways of thinking tend to be partly shaped by language. Linguistic determinism would leave little room for creative thinking that transcends the limitations of language, and this view has been largely discredited. Linguistic relativity is a much more plausible idea.

In a later chapter, we shall discuss such perspectives in relation to the typology of motion verbs (see 3.?.?). In the following, we shall look at a number of studies that seem to support the idea of linguistic relativity.

### 1.4.1 Memory and problem-solving

A number of psychological studies indicate that linguistic labels do make a difference for thinking, especially for memorizing and problem-solving.
In one experiment, two groups of persons were shown several meaningless shapes (see examples below). In one group, the shapes were given random names, in the other group, the shapes were not given names at all. It turned out that the group for whom the shapes had been given names were more prone to remember the names afterwards.

![Shapes](image)

CAT  SCREEN  RABBIT  DOG

In another experiment, two groups of persons were shown the same figures, but with different names. For instance, the figure ○—○ was presented as **eyeglasses** in one group and **barbells** in another group. When asked to reproduce the figures afterwards, the eyeglass group tended to distort the figure towards ○⎯○, while the barbell group tended to distort it towards ○—○.

In yet another experiment, two groups of persons were placed in front of a table with a candle, a box of tacks, and matches. They were asked to fasten the candle to the wall and make it burn without dripping. In order to solve the problem, they needed to realize that they could use the box not just as a container for the tacks, but also as a container for the candle, to be fixed to the wall. Both groups were shown a figure that illustrated the problem, but in one case each object was given a name (**box, tacks, candle and matches**, as illustrated below), while in the other case no names were given. The name group solved the problem after an average of 0.61 minute, while the no-name group needed an average of 8.82 minutes.
These and other experiments indicate that providing a name to an object does influence our ability to remember the object and to solve problems involving the object, as well as our tendency to distort our memory of it. The problem is to determine the consequences of this for natural languages, which are infinitely more complex than the experimental situations just described.

1.4.2 Colour perception

In contrast to English, the Mexican Indian language Tarahumara does not have one term for ‘green’ and one for ‘blue’, but instead has a single term, *siyóname*, that covers both. In other words, where English has two concepts, ‘green’ and ‘blue’, Tarahumara has only one. How does this difference affect the perception of colours among speakers of the two languages?

In one experiment, speakers of both languages were presented with three colour chips at a time. Each time, all three chips, say, A, B and C, were of different shades of colour on the scale from green to blue, with chip B being somewhere in between chips A and C:
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The subjects were asked to determine whether the distance in colour between chips A and B was greater than the distance between chips B and C or the other way around. It turned out that when the borderline between English *green* and *blue* went between chips B and C, the English speakers tended strongly to feel that the distance between chips B and C was greater than that between chips A and B, even when the actual distance between chips A and B, as measured independently, was greater. Speakers of Tarahumara did not make a similar systematic distortion.

The proposed explanation for this is that English speakers solve a difficult problem (that of determining distances between colours) by resorting to a “name strategy”. If chip A and B are both called *green*, while chip C is called *blue*, the name strategy prompts the English speaker to decide that chip C is more different from chip B than chip A is, even when the opposite is in fact the case. This strategy is not available to Tarahumara speakers, since their vocabulary does not distinguish between ‘green’ and ‘blue’.

In a second experiment, English speakers were presented with the same triads of colour chips, but in a way that only enabled them to see two chips at a time, either A and B or B and C. When they were shown chips A and B, the experimenter said: "You can see that this chip (points to A) is greener than this chip (points to B)." Everybody agreed. And when they were shown chips B and C, the experimenter said: "You can see that this chip (points to C) is bluer than this chip (points to B)." Again everybody agreed. Thus, all subjects were prompted to use both the terms *green* and *blue* to refer to chip B. When they were subsequently asked to judge the relative distance between A and B as opposed to B and C, the systematic distortion found in the first experiment had disappeared. The proposed explanation is that the name strategy was no longer available, since they had already referred to chip B by both terms. This suggests that the use of the name strategy was indeed the correct explanation for the systematic distortion in the first experiment.

To sum up, whether or not a language distinguishes between ‘green’ and ‘blue’ does seem to influence the perception of these colours. To some extent, language influences the way we perceive the world.

1.4.3 Why are East Asians so good at maths?

Children from East Asian countries have been generally shown to perform better at mathematics tests than children from Western countries. Many explanations have been proposed, including parental emphasis, pedagogical techniques and cultural differences. One suggested explanation is the different way numerals are constructed in the languages of the two areas.

In general, numerals in Chinese, Japanese and Korean are more systematically transparent than numerals in English and other European languages. This is especially true of numbers between 11 and 99, as shown in the following table, where East Asian numerals are directly translated into English for ease of comparison, and Japanese pronunciations are given as one East Asian example:

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1 In some respects, the Japanese system is more complex than both the English and the Chinese ones, since virtually every numeral has at least two different pronunciations, one indigenous and one borrowed from Chinese. With the exception of 4 and 7, the borrowed pronunciation is the preferred one.
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For numbers between 1 and 10, there is no such difference, and the same is basically true of numbers from 100 upwards.

Is the systematic transparency of East Asian numerals one of the reasons why they perform so well in mathematics tests? Maybe. In one experiment, Japanese and American first-grade children were given a set of blocks to represent numbers. White blocks represented units, while purple blocks represented tens, so that one purple block was equivalent to ten white blocks. The children were asked to read a number on a card and then to use the blocks to show that number. On first trial, American children tended to use only the white blocks (representing units), while Japanese children tended to use a combination of white and purple blocks, indicating that they had a better grasp of the decimal number system. Only on second trial did the American children begin to use the purple blocks as well. In other experiments, Chinese and Korean first-graders have been shown to perform more or less like their Japanese peers.

Significantly, the range of numbers between 11 and 99 showed the greatest differences between East Asian and American kids. In other tests, Chinese children have been shown to be better at counting between 11 and 99 than English-speaking children, but no better at counting between 1 and 10 or beyond 99. This suggests that the systematic transparency of East Asian numerals between 11 and 99 is indeed one of the factors influencing mathematics performance. East Asian numerals clearly stimulate children to think in tens, while the less transparent European system contains less of a stimulus to go beyond the amassment of single units.

1.4.4 Form perception

In the American Indian language Navaho, the form of a verb for handling an object varies with the form or shape of the object. For instance, if one asks somebody to hand over an object, the form of the verb will vary according to whether the object is long and flexible like a piece of string, long and rigid like a stick, or flat and flexible.
like paper or cloth. In general, Navaho-speaking children use these verb forms correctly as early as the age of three. Thus, the grammar of Navaho classifies objects according to form or shape in a way that English grammar does not.

In an experiment, Navaho children from the same reservation and living under similar circumstances were divided into two groups according to whether English or Navaho was their dominant language. Both groups were given pairs of objects where each object differed from the other in two respects, such as colour and size, colour and shape/form, or size and shape/form. For instance, one of the pairs consisted of a yellow stick and a piece of blue rope of comparable size, differing from each other in both colour and shape/form:

Then they were given a third object, which differed from each of the two others in only one respect, such as a piece of yellow rope, which differed from the yellow stick in shape/form and from the piece of blue rope in colour:

The children were asked which of the original objects went best with the new one. Children that grouped the piece of yellow rope with the yellow stick were noted as classifying objects on the basis of colour, while children that grouped the piece of yellow rope with the piece of blue rope were noted as classifying objects on the basis of shape/form.

As predicted, Navaho-speaking children tended more strongly to classify objects on the basis of shape/form than English-speaking children. In both groups, classification based on shape/form increased with age, but later and less marked in children speaking English than in children speaking Navaho. These results seem to confirm the linguistic relativity hypothesis.

When, however, the same experiment was performed on English-speaking white middle-class children in Boston, their performance was more similar to the Navaho-speaking children than to the English-speaking children from the reservation. Their preference for shape/form-based classification was slightly weaker in the earliest age group, but later was actually stronger than that of the Navaho-speaking children. The proposed explanation is that other non-linguistic factors associated with social class overrule the effect of language. This explanation seems to be confirmed by a later experiment with English-speaking schoolchildren in lower-class Harlem, whose performance was very close to the English-speaking children in the Navaho reservation.

1.4.5 Objects vs. substances

In English, there is a clear distinction between count nouns and mass nouns. Count nouns, such as horse, share the following characteristics:

- they have a singular and a plural form (horse vs. horses)
- they may occur with words such as many or few (many/few horses)
- they may occur with numerals (two horses)
- they may occur with the indefinite article (a horse)
In contrast, mass nouns, such as smoke, share the following characteristics:

- they do not have a plural form (*smokes)
- they occur with much or little rather than many or few (much/little smoke)
- they do not occur with numbers (*two smokes)
- they do not occur with the indefinite article (*a smoke)

Count nouns refer to objects, while mass nouns refer to substances. An object is a sharply delineated entity, and if it is divided into smaller pieces, these pieces are no longer instances of the same object (a horse cut in two does not give two horses). A substance is not sharply delineated, and if it is divided into smaller pieces, these pieces are instances of the same substance (smoke remains smoke even if divided in two). This distinction plays a central role in the grammar of English, as it does in Swahili and many other languages of the world.

In Japanese, the distinction between count nouns and mass nouns is grammatically unimportant, for the following reasons:

- there is no distinction between singular and plural forms of nouns
- there is no distinction between many/few and much/little
- no full nouns may occur with numerals alone
- there is no indefinite article

All Japanese nouns resemble English mass nouns in requiring a classifier (also known as a measure word) to intervene between a numeral and the noun itself. Just as English has two clouds of smoke, so Japanese has what may be literally rendered as two pieces of horse:

\[
\text{uma-ga}^3 \text{ ni-hiki} \\
\text{horse-SUBJ two-CLASS} \\
\text{'two horses'}
\]

Thus, the distinction between count nouns and mass nouns is not a central part of Japanese grammar. The same is true of the Mexican Indian language Yucatec and a number of other languages across the world.

How does this grammatical difference between English and Japanese affect the way speakers of these languages perceive the world around them? In one experiment, speakers of Japanese and English were given entities of three different kinds: complex objects, simple objects and substances. Complex objects had complex shapes and distinct functions, such as a lemon juicer:

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2 The correspondence between the count/mass noun distinction and the distinction between objects and substances is only approximate. In English, for instance, cloud is a count noun, although dividing a cloud in two does produce two clouds, and furniture is a mass noun, although cutting a piece of furniture in two does not produce two pieces of furniture. Note that many words have both count noun and mass noun usages, such as the mass noun oil (denoting the substance) vs. the count noun oil (pl. oils, denoting a type of oil).

3 The particle -ga marks nominative case and must be replaced by -wo if the phrase occurs as object, -wa if the phrase occurs as topic etc.
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Simple objects were made of a solid substance such as clay and were formed into very simple shapes such as the shape of a kidney:

Substances were non-solid stuff such as sand, but were arranged into characteristic shapes, such as an elongated S-shape:

Complex objects were the most prototypical objects, since they clearly could not serve their function if broken up into pieces. Simple objects were an in-between case, with seemingly accidental shapes which did not *prima facie* indicate particular functions that might be lost if the objects were broken into pieces. In some respects, the simple objects were quite close to substances, especially since the substances used were also formed into characteristic shapes.

The participants were presented with an entity (such as a lemon juicer, a kidney-shaped clay object or an S-shaped line of sand), which was given a novel name, such as *dax*. Then they were asked to compare this entity with two other entities, one that had the same shape, but different material, and one that had the same material, but different shape: "Look at this dax! Can you find the tray that also has the dax on it?" Thus, they were forced to classify the object on the basis of either shape (indicating that they saw the dax as an object) or material (indicating that they saw the dax as a substance).

As might be expected, both groups tended to classify a complex object on the basis of shape, while a substance was much more often classified on the basis of material (especially by the Japanese). The main difference lay in the way they treated the in-between group of simple objects. For English speakers, the tendency to classify simple objects on the basis of shape was almost (though not quite) as strong as for complex objects. For Japanese speakers, simple objects were just as often classified on the basis of material as shape, indicating that they were in fact perceived as an in-between case.

The sharp distinction between count nouns and mass nouns in English seems to have prompted English speakers to make a more unequivocal distinction between objects (including simple objects) and substances. The Japanese speakers, on the other hand, seemed to treat the distinction as a gradient one, where complex objects like a lemon juicer were the most typical objects and substances like sand the most typical
substances, while simple objects like the kidney-shaped object made of clay were treated like in-between cases.

Similar results have been found when contrasting English with other languages without a clear-cut distinction between count nouns and mass nouns, such as the Mexican Indian language Yucatec.

1.4.6 Counterfactual reasoning

English, like many other languages, makes a distinction between open and counterfactual conditionals:

**Open conditional**
If the doctor has arrived, we can talk to him.

**Counterfactual conditional**
If the doctor had arrived, we could have talked to him.

The *if* clause of an open conditional may be true or false (the doctor may or may not have arrived), while the *if* clause of a counterfactual conditional is implied to be false (the doctor has not arrived). In English, this distinction is marked by the form of the verb.

In Chinese, the distinction between open and counterfactual conditionals is usually left unmarked, and both of the above sentences may be translated as:

Rúguō yǐshēng dào le, wǒmen jiù kěyǐ gēn tā tán.
if          doctor  arrive PERF we        then can  with he talk

This sentence may be used both when the speaker does not know whether the doctor has arrived (open conditional) and when the speaker knows that the doctor has not arrived (counterfactual conditional).

Does this linguistic difference make it more difficult for speakers of Chinese to make consistent hypotheses counter to fact? Does it influence their ability to produce abstract reasoning? Is this linguistic feature, along with other traits that point in the same direction, part of the reason why modern scientific thought developed in Europe rather than in China?

In one study, speakers of English and speakers of Chinese were asked to read a text about the 18th century German philosopher Bier. The text stated explicitly that Bier could not read Chinese, but it went on to discuss at some length what would have happened if he had been able to do so. For instance, the text says that he would have been able to bring to focus the interrelationships between natural phenomena (as in Chinese philosophy), instead of only viewing such phenomena as distinct individual entities (as in Western philosophy). After reading the story, the subjects were asked to judge which among a number of statements about Bier were true. One of the statements was: "He led Western philosophy to pay attention to the mutual interrelationships among natural phenomena." Subjects who understood the counterfactual logic of the text would know that this was not implied to be true, but only represented an abstract hypothesis of what would have happened had Bier known Chinese.
While virtually all speakers of English responded correctly to the test, only about half of the Chinese speakers did.\(^4\) It seemed that they had more difficulty understanding the counterfactual logic of the text.

In a similar study, speakers of English and Chinese were given the following question in their own language:

If all circles were large and this small triangle \(\triangle\) were a circle, would it be large?

While 83 percent of the English speakers answered yes, only 25 percent of the Chinese speakers did. Although a small triangle is clearly not a large circle, the English-speaking subjects were more willing to enter into the counterfactual mode of reasoning than speakers of Chinese, even when the result is absurd.

It seems likely that the lack of a distinction between open and counterfactual conditionals in the Chinese language is at least part of the reason why speakers of this language seem less prone to think counterfactually than speakers of English.

It has been suggested that a similar contrast exists in the realm of reification of properties and actions. English has standard ways of deriving abstract nouns from adjectives and verbs:

- hard \(\rightarrow\) hardness
- important \(\rightarrow\) importance
- accept \(\rightarrow\) acceptance
- generalize \(\rightarrow\) generalization

Such devices are found in Chinese as well, but their use is much more restricted and often associated with a westernized style. As in the case of counterfactuals, Chinese seem less prone to use an abstract way of speaking—and possibly also less prone to use abstract ways of thinking.

The attempt to explain the rise of science in the West on the basis of linguistic peculiarities of European languages remains highly speculative, to say the least. It is possible, however, that English in its present form is more conducive to abstract, theoretical modes of thinking than Chinese is.

1.4.7 How does language influence thought?

Experimental situations are far removed from the complexities of real life, and it is difficult to know how to interpret the results of the studies above. In some cases, it is uncertain whether it is language that influences thought, thought that influences language, or some other factor that influences both language and thought. On the whole, however, the studies do provide support for linguistic relativity. Language does seem to have a certain influence on thought.

How does this influence take place? In other words, which aspects of thought are influenced by language, and which aspects of language may influence thought?

The psychological studies referred to in 1.4.1 indicate that providing a linguistic label to an object reinforces (and sometimes distorts) our memory of that

\(^4\) This applies to the responses to version 3 of the text. The Chinese translations of versions 1 and 2 are less felicitous and produced much worse results for the Chinese speakers.
object. They also suggest that linguistic labels help us in problem-solving involving the labelled objects.

The linguistic studies referred to in 1.4.2 to 1.4.6 indicate that linguistic categories influence at least three different levels of thought:

1. **Perception**, as when the "name strategy" is used in forming judgements about the relative distance between colours.

2. **Classification**, as when the shape/form categories of the Navaho verb system prompt Navaho-speaking children to classify objects on the basis of shape/form, or when the distinction between count nouns and mass nouns in English prompt English speakers of all ages to distinguish sharply between objects and substances.


In chapter 3 of this book, we will return to another type of linguistic relativism, where the properties of motion verbs in different languages influences the way speakers of these languages describe (and, presumably, perceive) the same sequence of events.

In many of the studies discussed, the crucial factor is how languages conceptualize the world differently, either through their grammar (as when the distinction between open and counterfactual conditionals is clearly expressed in the grammar of English, but not Chinese) or through their vocabulary (as when blue and green shades of colour are referred to by two words in English and one word in Tarahumara). Such differences are not insurmountable. If needed, speakers of Chinese may express the counterfactuality distinction (for instance, by adding a sentence like *The doctor hasn't arrived* in front of the conditional sentence), and speakers of Tarahumara may express more or less the same colour distinctions as English (for instance, by referring to the blue-green colour of the sky, as opposed to the blue-green colour of grass). But they can hardly do so without foregrounding distinctions that an English speaker may take for granted, as part of the backgrounded information. The way from backgrounded information to habitual thinking is not so far. Speakers of English are prompted by their language to think habitually in terms of the distinction between open and counterfactual conditionals, and in terms of the distinction between blue and green, in a way that speakers of Chinese and Tarahumara, respectively, are not.

Conceptualization is not always an advantage. English numerals like *twelve* and *twenty* more clearly represent individual concepts than Japanese numerals like *ten-two* (jū-ni) and *two-ten* (ni-jū). But this is exactly the reason why the Japanese numerals are so transparent. The decimal number system is more strongly built into the form of Japanese numerals, and this may be one of the reasons why Japanese children perform so well in mathematics tests.

Language is, of course, not the only factor influencing habitual thinking. We saw that while Navaho-speaking children were prompted by their language to classify objects on the basis of shape/form, English-speaking middle-class children in Boston did the same, although they were not prompted by their language to do so. Language does seem to have a certain effect on the way we think, but the effect may often be overruled by other factors.