

INTRODUCTION: ARBITRARINESS IN LANGUAGE

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It is generally recognized that the words of a language and the pieces that make up these words (all of which are discussed in some detail in later files) represent a connection between a group of sounds, which give the word or word-piece its form, and a meaning. For example, the word for the inner core of a peach is represented in English by the sounds we spell as *p*, *i* and *t*, occurring in that order to give the form *pit*. The combination of a form and a meaning connected in this way gives what may be called a linguistic sign.

An important fact about linguistic signs is that, in the typical instance in a language, the connection between form and meaning is arbitrary. The term 'arbitrary' here refers to the fact that the meaning is not in any way predictable from the form, nor is the form dictated by the meaning. The opposite of arbitrariness in this sense is nonarbitrariness, and the most extreme examples of nonarbitrary form-meaning connections are said to be iconic. Iconic forms are directly representational of their meanings (for example, a "No Smoking" sign that has a large red X through a cigarette). Moreover, the connection in such cases is not a matter of logic or reason, nor is it derivable from laws of nature.

Thus, the fact that the inner core of a peach may be called a *stone* or even a *seed* as well as a *pit* points to arbitrariness in the above example, for if the connection between the form and the meaning here were nonarbitrary (because the form determined the meaning, or vice versa), there should only be one possible form to express this meaning. Also, there is nothing intrinsic in the combination of the sounds represented by *p*, *i* and *t* that suggests the meaning 'inner core of a peach', for the same sounds combined in a different order have an entirely different meaning in the word spelled *tip*.

Arbitrariness in language is shown by other considerations. For instance, it is usually the case cross-linguistically that words with the same meaning have different forms in different languages and that similar forms express different meanings. Thus, what is *water* in English is *eau* in French, *Wasser* in German, *shui* in Mandarin Chinese, and so on. And the same form (pronounced like the English name *Lee*) means 'bed' in French (spelled *lit*), marks a question in Russian, and means 'meadow' or 'side sheltered from the wind' in English (spelled *lea* and *lee* respectively), as well as being an English proper name. If there were an inherent, nonarbitrary connection between form and meaning in all languages, with the meaning being determined by the form, then such cross-linguistic differences should not occur.

Similarly, the pronunciation of particular words can change over time (see File 92 on sound change). For instance, from a variety of evidence, including their spelling, we know that words such as *wrong*, *knight*, and *gnaw* must have had an initial *w*, *k*, and *g* respectively at some point in the history of English, and have thus undergone a change in their pronunciation, i.e., in their form. If we hold to the view that the form-meaning connection is determined and nonarbitrary, and if we further suppose that the original pronunciations of these words reflected this inherent and nonarbitrary relationship between form and meaning, then how can we maintain this inherent connection when the pronunciation changes without any accompanying changes in meaning? The relationship between the form and meaning of a word, therefore, has to be arbitrary in order to allow for inevitable changes it may undergo.

It is clear, therefore, that arbitrariness is the norm in language, at least as far as the basic relationship between the form of a word and its meaning is concerned. At the same time, though, it turns out that there are many nonarbitrary aspects to language. Again, to focus just on

vocabulary and the form-meaning connection (though nonarbitrariness can be found in other domains of language), notice that a small portion of the vocabulary of all languages consists of items whose forms are largely determined by their meanings. Most notable and obvious are the so-called onomatopoeitic (or onomatopoeic) words, i.e., words that are imitative of natural sounds or have meanings that are associated with such sounds of nature.

Examples of onomatopoeitic words in English include noise-words such as *bow-wow* for the noise a dog makes, *moo* for a cow's noise, *splat* for the sound of a rotten tomato hitting a wall, *swish* or *swoosh* for the sound of a basketball dropping cleanly through the hoop, *cockadoodle-doo* for the noise a rooster makes, and so on. Further examples include derivatives of noise-words, such as *cuckoo*, a bird name derived from the noise the bird makes, *babble*, a verb for the making of inarticulate noises derived from the perception of what such noises sound like, *burble*, a verb for the making of a rushing noise by running water derived from the sound itself, and so on. In all of these words, the match-up between the form of the word and the meaning of the word is very close: the meaning is very strongly suggested by the sound of the word itself.

Even in such onomatopoeitic words, however, an argument for arbitrariness is to be found. While the form is largely determined by the meaning, the form is not an exact copy of the natural noise; roosters, for instance, do not actually say *cockadoodle-doo*—English speakers have just arbitrarily conventionalized this noise in that form. Moreover, when different languages imitate the same sound, they have to make use of their own linguistic resources. Different languages admit different sound combinations, so even the same natural sound may end up with a different form in different languages, though each of the forms is somewhat imitative. For example, a rooster says *cockadoodle-doo* in English but *kukuku* in Mandarin Chinese; even though (presumably) roosters sound the same in China as in America. If there were an inherent and determined connection between the meaning and the form of even onomatopoeitic words, we would expect the same meaning to be represented by the same sounds in different languages. Thus, the strongest evidence for nonarbitrariness, namely the existence of onomatopoeitic words, is not quite so strong after all; in fact, comparison of such words in different languages can be used to argue for a degree of arbitrariness in linguistic signs. To make this point more clearly, we give below eleven natural sounds that are represented by onomatopoeitic words in eight languages. The similarity among them is expected, due both to the nature of the words and to possibility of borrowing between geographically neighboring languages; still, the variation is also great.

Crosslinguistic Examples of Onomatopoeia

Sound	English	German	French	Spanish	Hebrew	Arabic	Mandarin	Japanese
1. Dog barking	[hawhaw]	[vawvaw]—[wahwah]	[wawwaw]	[hawhaw]	[ḥawḥaw]	[ḥawḥaw] (baby talk)	[wāwḡwāw]	[wāwā]
2. Rooster crowing	[kaka- dud[du]	[kikoRiko]	[kokoRiko]	[kikōRiko] or [kokokoko]	[kikoRiku]	[kikiki]	[kuku]	[kokokokko]
3. Cat meowing	[miau]	[miau]	[miau]	[miau]	[miau]	[mawmaw]	[meaw] (baby talk)	[miau]
4. Cow lowing	[mæ:]	[mu]	[mø:]	[mu]	[mu]	[ḥu]	[mo]	[momo:]
5. Sheep bleating	[ba:]	[ba:]	[be:]	[be:]	[mæ:mæ:]	[ma:]	[mæme]	[me:me:]
6. Bird chirping	[twit- twit]	[pip]	[kwikwi]	[pippip]	[twitw twitw]	[zəgzəg]	[titi]	[titi]

7. Bomb exploding	[bʌm]	bʌm]	[bʌRʌm] or [vʌRʌm]	[bʌm]	[bʌm]	[bʌm]	[bʌm]	[bʌm]
8. Sound of laughing	[haha]	[haha]	[haha]	[xaxa]	[haha]	[qahqah]	[haha]	[haha]
9. Sound of sneezing	[aʃn]	[haʃi]	[aʃʌm]	[aʃn] or [aʃi]	[apʃi]	[ʃats]	[haʃʌ:]	[hakiʃʌ]
10. Sound of something juicy hitting a hard surface	[spɪʒɪt]	[pɪʒ]	[ʒɪk]	—	[ʒɪk]	[ʒɪk]	[pɪʒ]	[gʌʃɪt]
11. Sound of a clock	[tʌkʌk]	[tʌkʌk]	[tʌkʌk]	[tʌkʌk]	[tʌkʌk]	[tʌkʌk]	[tʌkʌk]	[tʌkʌkʌk]

*Buffalo cow

In what may perhaps be considered a special sub-case of onomatopoeia, it is often found that certain sounds occur in words not by virtue of being directly imitative of some sound but rather by simply being evocative of a particular meaning; that is, these words more abstractly suggest some physical characteristics by the way they sound. This phenomenon is known as **sound symbolism**. For instance, in many languages, words for 'small' and small objects or words which have smallness as part of their meaning often contain a vowel which is pronounced with the tongue high in the front part of the mouth (see File 22), which we will represent by the symbol [i]. This occurs in English *teeny* 'extra-small', *petite* and *wee* 'small', and dialectal *leetle* for 'little', in Greek *mikros* 'small', in Spanish diminutive nouns (i.e., those with the meaning 'little X') such as *perrito* 'little dog' where *-ito* is a suffix indicating 'little', and so on. Such universal sound symbolism—with [i] suggesting 'smallness'—seems to be motivated by several factors: first, the high, front vowel [i] uses a very small space in the front of the mouth, and second, [i] is a high-pitched vowel and thus more like the high-pitched sounds given off by small objects. Thus the use of [i] in 'small' words gives a situation where an aspect of the form—the occurrence of [i]—is determined by an aspect of the meaning—'smallness'—and where the form to a certain extent has an inherent connection with the meaning, even though not directly imitative in any way. We may thus characterize the appearance of [i] in such words as somewhat iconic—the "small" vowel [i] is an icon for the meaning 'small(ness)'.

In addition to such universal sound symbolism, there are also cases of language-particular sound symbolism, in which some sound or sequence of sounds can come to be associated in a suggestive way with some abstract and vague but often sensory-based meaning. For example, in English, words beginning with *fl-*, such as *fly*, *flee*, *flow*, *flimsy*, *flicker*, and *fluid*, are often suggestive of lightness and quickness. Also, there are many words in English that begin with *gl-* and refer to brightness (such as *gleam*, *glisten*, *glow*, *glint*, *glitter*, and *glimmer*), as well as a group of words signifying a violent or sudden action that all end in *-ash* (such as *bash*, *dash*, *crash*, and *flash*). In all such groups, an identifiable aspect of the form relates in a nonarbitrary way to the meaning.

Even in such cases, however, arbitrary aspects are again identifiable. Thus there are words which have the appropriate sequences of sounds but do not fit into the group semantically, such as *glove* and *glue* with respect to the *gl-* group, or *rash* and *cash* with respect to the *-ash* group. There are also words with appropriate meanings that do not fit in formally, such as *shine* or *hit*; note too that the English word *small* does not contain the "small" vowel [i], but instead a relatively "open" or "large" vowel (think about what a dentist or doctor might tell you to say in order to get your mouth open wide, and compare that to the vowel of *small*). Also, from a cross-linguistic

perspective, it turns out that other languages do not (necessarily) have the same clustering of words with similar meanings and a similar form. For example, the Greek words for 'fly', 'flee', 'flow' and 'fluid' are *petó*, *févyo*, *tréko*, and *tyró* respectively, showing that the *fl*- sound symbol is an English-particular fact and so cannot be a matter of a necessary and inherent connection between form and meaning.

All in all, these examples show that nonarbitrariness and iconicity have at best a somewhat marginal place in language. At the same time, though, it cannot be denied that they do play a role in language and moreover that speakers are aware of their potential effects. Poets often manipulate onomatopoeia and sound symbolism in order to achieve the right phonic impression in their poetry; for example, Alfred Tennyson in his poem *The Princess* utilized nasal consonants to mimic the noise made by the bees he refers to:

The moan of doves in immemorial elms

And murmuring of innumerable bees (VII.206-7)

Similarly, the successful creation of new words often plays on sound symbolic effects; for instance, the recently coined word *glitzy* meaning (roughly) 'flashily and gaudily extravagant' fits in well with the group of English words discussed above with initial *gl*-. It seems, therefore, that even though arbitrariness is the norm in language and is an important distinguishing characteristic separating human language from other forms of communication (see File 10), an awareness of nonarbitrary aspects of language is part of the linguistic competence of all native speakers and thus is worthy of study by linguists.

EXERCISES

1. In what ways do compound words such as *blackboard* or *outfox* show a degree of nonarbitrariness in their form-meaning connection? Will this be true for all compound words? Now think about the color of objects we call *blackboards*. In what ways are the meanings of compound words still arbitrary?

2. In Chinese, expressions for moving from one city to another by way of yet another city must take the form 'from X pass-through Y to Z', and cannot be expressed as 'from X to Z pass-through Y'; this is illustrated in the examples below (* indicates that a sentence is unacceptable).

a. *ta cong San Francisco jinguo Chicago dao New York*
he from pass-through to
'He went from San Francisco through Chicago to New York'

b. **ta cong San Francisco dao New York jinguo Chicago*
he from to pass-through

How would you characterize the form-meaning relationship exhibited by these Chinese expressions?

3. Onomatopoeic words often show a resistance to change in their pronunciation over time; for example, in earlier stages of English the word *cuckoo* had roughly the same pronunciation as now, and failed to undergo a regular change in the pronunciation of vowels that would have made it sound roughly like *cowcow*; similarly, the word *babble* has had *b* sounds in it for over 2,000 years and did not undergo the sound shift that is characteristic of all the Germanic languages (see File 102) by which original *b* came to be pronounced as *p*. Can you suggest a reason for this resistance to change on the part of these (and similar) words?

4. One piece of evidence for sound symbolism is the often quite consistent responses that speakers of a language give to the judgment of the relative meanings of pairs of nonsense words, where the only clue to work from is the sound (i.e., the form) of the words. For example, speakers of English typically judge the nonsense word *feeg* to refer to something smaller than the nonsense word *foag*. Try the following experiment out on a friend and then compare your friend's responses with your own and compare your results with those of others in your class:

Pronounce the words below according to regular English spelling, and decide for each pair of words which member of the pair could refer to something *heavy* and which to something *light* (you might want to ask if given a pair *x* and *y*, it is possible to say that "an *x* is a heavier *y*" or vice-versa).

- | | |
|----------------|------------------|
| a. lat - loat | e. fleen - feen |
| b. foon - feen | f. seeg - sleeeg |
| c. mobe - meeb | g. poas - poat |
| d. toos - tace | h. toos - tood |

--- The scope of linguistics ---

Linguistics covers a wide range of topics and its boundaries are difficult to define.

A diagram in the shape of a wheel gives a rough impression of the range covered (Figure 1).

In the centre is **phonetics**, the study of human speech sounds. A

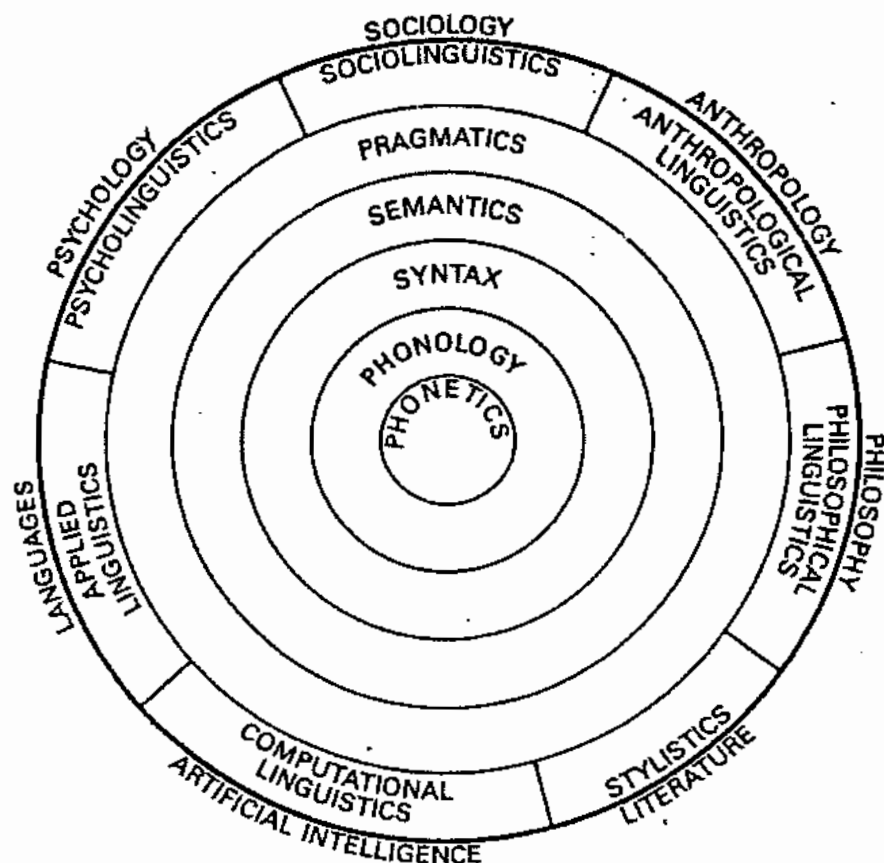


Fig. 1

--- Arbitrariness ---

There is often a strong recognizable link between the actual signal and the message an animal wishes to convey. An animal who wishes to warn off an opponent may simulate an attacking attitude. A cat, for example, will arch its back, spit and appear ready to pounce.

In human language, the reverse is true. In the great majority of cases, there is no link whatsoever between the signal and the message. The symbols used are **arbitrary**. There is no intrinsic connection, for example, between the word *elephant* and the animal it symbolizes. Nor is the phrase 'These bananas are bad' intrinsically connected with food. Onomatopoeic words such as *quack-quack* and *bang* are exceptions – but there are relatively few of these compared with the total number of words.

Use of sound signals

When animals communicate with one another, they may do so by a variety of means. Crabs, for example, communicate by waving their claws at one another, and bees have a complicated series of 'dances' which signify the whereabouts of a source of nectar.

But such methods are not as widespread as the use of sounds, which are employed by humans, grasshoppers, birds, dolphins, cows, monkeys, and many other species. So our use of sound is in no way unique. Sound signals have several advantages. They can be used in the dark, and at some distance, they allow a wide variety of messages to be sent, and they leave the body free for other activities.

Humans probably acquired their sound signalling system at a fairly late stage in their evolution. This seems likely because all the organs used in speech have some more basic function. The lungs are primarily used for breathing. Teeth, lips and tongue are primarily for eating. The vocal cords (thin strips of membrane deep in the throat) were used primarily for closing off the lungs in order to make the rib cage rigid for actions requiring a great effort. When people lift something heavy, they automatically hold their breath. This is caused by the closing of the vocal cords. The grunt when the heavy object is dropped is caused by the air being expelled as the vocal cords open. Millions of years ago we possibly needed a rigid rib cage for swinging in the trees – but humans still need this mechanism today for such actions as weightlifting, defecation and childbirth.

Duality

Animals who use vocal signals have a stock of basic sounds which vary according to species. A cow has under ten, a chicken has around twenty, and a fox over thirty. Dolphins have between twenty and thirty, and so do gorillas and chimpanzees. Most animals can use each basic sound only once. That is, the number of messages an animal can send is restricted to the number of basic sounds, or occasionally the basic sounds plus a few simple combinations.

Human language works rather differently. Each language has a stock of sound units or **phonemes** which are similar in number to the basic sounds possessed by animals; the average number is between thirty and forty. But each phoneme is normally meaningless in isolation. It becomes meaningful only when it is combined with other phonemes. That is, sounds such as *f, g, d, o*, mean nothing separately. They normally take on meaning only when they are combined together in various ways, as in *fog, dog, god*.

This organization of language into two layers – a layer of sounds which combine into a second layer of larger units – is known as **duality or double articulation**. A communication system with duality is considerably more flexible than one without it, because a far greater number of messages can be sent.

At one time, it was thought that duality was a characteristic unique to human language. But now some people claim that it exists also in bird-song, where each individual note is meaningless. It is the combination of notes into longer sequences which constitutes a meaningful melody.

The need for learning

Most animals automatically know how to communicate without learning. Their systems of communication are genetically inbuilt. Bee-dancing, for example, is substantially the same in bee colonies in different parts of the world, with only small variations. Even in cases where an element of learning is involved, this is usually minor. In one experiment a chaffinch reared in a soundproof room away from other chaffinches developed an abnormal type of song. Yet when the bird was exposed to only occasional tape recordings of other chaffinches, its song developed normally.

This is quite different from the long learning process needed to acquire human language, which is culturally transmitted. A human being brought up in isolation simply does not acquire language, as is shown by the rare studies of children brought up by animals without human contact. Human language is by no means totally conditioned by the environment, and there is almost certainly some type of innate predisposition towards language in a new-born child. But this latent potentiality can be activated only by long exposure to language, which requires careful learning.

Displacement

Most animals can communicate about things in the immediate environment only. A bird utters its danger cry only when danger is present. It cannot give information about a peril which is removed in time and place. This type of spontaneous utterance is nearer to a human baby's emotional cries of pain, hunger or contentment than it is to fully developed language.

Human language, by contrast, can communicate about things that are absent as easily as about things that are present. This apparently rare phenomenon, known as **displacement**, does occasionally occur in the animal world, for example, in the communication of honey bees. If a worker bee finds a new source of nectar, it returns to the hive and performs a complex dance in order to inform the other bees of the exact location of the nectar, which may be several miles away. But even bees are limited in this ability. They can inform each other only about nectar. Human language can cope with any subject whatever, and it does not matter how far away the topic of conversation is in time and space.

Creativity (Productivity)

Most animals have a very limited number of messages they can send or receive. The male of a certain species of grasshopper, for example, has a choice of six, which might be translated as follows:

- 1 I am happy, life is good.
- 2 I would like to make love.
- 3 You are trespassing on my territory.
- 4 She's mine.
- 5 Let's make love.
- 6 Oh how nice to have made love.

Not only is the number of messages fixed for the grasshopper, but so are the circumstances under which each can be communicated. All animals, as far as we know, are limited in a similar way. Bees can communicate only about nectar. Dolphins, in spite of their intelligence and large number of clicks, whistles and squawks, seem to be restricted to communicating about the same things again and again. And even the clever vervet monkey, who is claimed to make thirty-six different vocal sounds, is obliged to repeat these over and over.

This type of restriction is not found in human language, which is essentially creative (or productive). Humans can produce novel utterances whenever they want to. A person can utter a sentence which has never been said before, in the most unlikely circumstances, and still be understood. If, at a party, someone said, 'There is a purple platypus crawling across the ceiling', friends might think the speaker was drunk or drugged, but they would still understand the words spoken. Conversely, in an everyday routine situation, a person is not obliged to say the same thing every time. At breakfast, someone might say 'This is good coffee' on one day, 'Is this coffee or dandelion tea?' on the next, and 'It would be cheaper to drink petrol' on the next.

Patterning

Many animal communication systems consist of a simple list of elements. There is no internal organization within the system.

Human language, on the other hand, is most definitely not a haphazard heap of individual items. Humans do not juxtapose sounds and words in a random way. Instead, they ring the changes on a few well-defined patterns.

Take the sounds *a*, *b*, *s*, *t*. In English, there are only four possible ways in which these sounds could be arranged, *bats*, *tabs*, *stab* or *bast* 'inner bark of lime'. All other possibilities, such as **sbat*, **abts*, **stba*, are excluded (an asterisk indicates an impossible word or sentence). The starred words are not excluded in this case because such sequences are unpronounceable, but because the 'rules' subconsciously followed by people who know English do not allow these combinations, even for new words. A new washing powder called *Sbat* would be unlikely to catch on, since English does not permit the initial sequence *sb*, even though in some other languages (for example, ancient Greek) this combination is not unusual.

Similarly, consider the words, *burglar*, *loudly*, *sneezed*, *the*. Here

What We Know About Language

There are many things we do not yet know about the nature and origin of language. The science of linguistics is concerned with these questions. The investigations of linguists throughout history and the analysis of spoken languages date back at least to 1600 B.C. in Mesopotamia. We have learned a great deal since that time. A number of facts pertaining to all languages can now be stated.

1. Wherever humans exist, language exists.
2. There are no "primitive" languages—all languages are equally complex and equally capable of expressing any idea in the universe. The vocabulary of any language can be expanded to include new words for new concepts.
3. All languages change through time.
4. The relationships between the sounds and meanings of spoken languages and between the gestures (signs) and meanings of sign languages are for the most part arbitrary.
5. All human languages utilize a finite set of discrete sounds (or gestures) that are combined to form meaningful elements or words, which themselves form an infinite set of possible sentences.
6. All grammars contain rules for the formation of words and sentences of a similar kind.
7. Every spoken language includes discrete sound segments like *p*, *n*, or *a*, which can all be defined by a finite set of sound properties or features. Every spoken language has a class of vowels and a class of consonants.
8. Similar grammatical categories (for example, noun, verb) are found in all languages.
9. There are semantic universals, such as "male" or "female," "animate" or "human," found in every language in the world.
10. Every language has a way of referring to past time, negating, forming questions, issuing commands, and so on.
11. Speakers of all languages are capable of producing and comprehending an infinite set of sentences. Syntactic universals reveal that every language has a way of forming sentences such as:
 - Linguistics is an interesting subject.
 - I know that linguistics is an interesting subject.
 - You know that I know that linguistics is an interesting subject.
 - Cecilia knows that you know that I know that linguistics is an interesting subject.
 - Is it a fact that Cecilia knows that you know that I know that linguistics is an interesting subject?
12. Any normal child, born anywhere in the world, of any racial, geographical, social, or economic heritage, is capable of learning any language to which he or she is exposed. The differences we find among languages cannot be due to biological reasons.

A consolidation of the definitions of language yields the following composite definition.

1. Language is systematic and generative.
2. Language is a set of arbitrary symbols.
3. Those symbols are primarily vocal, but may also be visual.
4. The symbols have conventionalized meanings to which they refer.
5. Language is used for communication.
6. Language operates in a speech community or culture.
7. Language is essentially human, although possibly not limited to humans.
8. Language is acquired by all people in much the same way—language and language learning both have universal characteristics.

These eight statements provide a reasonably concise "twenty-five-words-or-less" definition of language. But the simplicity of the eightfold definition should not be allowed to mask the sophistication of linguistic endeavor underlying each concept. Enormous fields and subfields, year-long university courses, are suggested in each of the eight categories. Consider some of these possible areas:

1. Explicit and formal accounts of the system of language on several possible levels (most commonly syntactic, semantic, and phonological).
2. The symbolic nature of language; the relationship between language and reality; the philosophy of language; the history of language.
3. Phonetics; phonology; writing systems; kinesics, proxemics, and other "paralinguistic" features of language.
4. Semantics; language and cognition; psycholinguistics.
5. Communication systems; speaker-hearer interaction; sentence processing.
6. Dialectology; sociolinguistics; language and culture; bilingualism and second language acquisition.
7. Human language and nonhuman communication; the physiology of language.
8. Language universals; first language acquisition.

ANIMAL COMMUNICATION: TRUE LANGUAGE?

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Humans are not the only creatures which communicate. All varieties of birds make short calls and sing songs, cats meow to be fed or let outside, dogs bark to announce the arrival of strangers or growl and bare their teeth to indicate their intent to attack, and so on. The fact that other animals send and receive messages is in evidence all around us. One approach to determining the nature of language is to investigate the way other animals communicate and to explore the possibility that some species use a system which is fundamentally the same as human language. Most people assume that only humans use language—it is something that sets us apart from all other creatures. But is it possible that when we examine animal communication systems we will discover our assumption was wrong?

The task of comparing human language with various animal communication systems is not an easy one. First, we need a suitable working definition of "language" on which to base our comparisons. Unfortunately, no definition seems to adequately define language or be agreeable to everyone. One approach to getting around this problem, suggested by the linguist Charles Hockett, is that we identify some descriptive characteristics of language rather than attempting to define its fundamental nature. Then we can determine whether a particular animal communication system exhibits these characteristics as well. His list of characteristics, known as "design features", has been modified over the years, but a standard list is provided below. From what we now know about animal communication systems, we have found that none possesses all of these features and thus we conclude that no non-human species uses language. Instead, they communicate with each other in systems called signal codes.

All communication systems have some features in common, and they are:

1. **A Mode of Communication.** This refers to the means by which the messages are transmitted. The mode of communication may be vocal-auditory, as in most human and most animal systems—the signals are transmitted by sound produced in the vocal tract and are received by the auditory system. The mode may be visual (e.g., apes' gestural signals), tactile (e.g., bees), or even chemical (e.g., moths).
2. **Semanticity.** The signals in any communication system have meaning.
3. **Pragmatic Function.** All systems of communication serve some useful purpose, from helping the species to stay alive, to influencing others' behavior.

Some communication systems exhibit these features as well:

4. **Interchangeability.** This refers to the ability for individuals to both send and receive messages. Human language exhibits this feature because each individual human can both send messages (usually by speaking) and comprehend the messages of others (usually by listening). But not all animals can both send and receive messages. For example, the *Bombyx Mori* (silkworm) moth uses a chemical communication system. When the female is ready to mate, she secretes a chemical which males can trace back to her. The males themselves cannot secrete this chemical; they can only be receivers.

In the comparison of human language with animal communication systems, a debate has arisen about whether the two systems are *qualitatively* or *quantitatively* different. If there is merely a quantitative difference, then we would find an animal system which possessed *all* of these features, but some would not be present to the degree that they are found in human language. If, however, the two systems differ qualitatively, we would find no animal communication system which possessed each and every design feature. While this seems straightforward enough, there is still some disagreement on the application of this point.

Consider the feature of displacement, for example. It seems as if the bees' signal code exhibits this to a limited degree since they communicate about food which is not visible while they are transmitting their message (see File 12). But note that we can "translate" the message of their behavior in a number of ways. We're in the habit of interpreting the bees' message as something like "there's a food source 40 feet from the hive at a 45° angle from the sun." In other words, our translation assumes they're relaying a message *about* a distant, invisible object. But the message can be represented differently—more simply, e.g., "perform this behavior *now*" that is, "fly 45° for 2 minutes." This is no different from most messages sent in animal systems. Think, for example, of a chimpanzee who adopts a grooming posture. This communicates the chimp's desire for another chimp to perform a particular behavior. The bees' messages are of this type—messages sent to alter the behavior of other individuals; their signals may not *represent* objects not present. Thus, some linguists claim the bees' system exhibits *limited* displacement, while others maintain it does not possess this feature in any degree.

At any rate, we say that a communication system must have *all* the design features to be considered qualitatively the same as human language, and no animal communication system to date has been identified which meets this criterion.