

## What is Linguistics?

*Linguistics* is the scientific study of language. *Linguists* (experts in linguistics) work on specific languages, but their primary goal is to understand the nature of language in general by asking questions such as:

- What distinguishes human language from other animal communication systems?
- What features are common to all human languages?
- How are the modes of linguistic communication (speech, writing, sign language) related to each other?
- How is language related to other types of human behavior?

The main goal of linguistics, like all other intellectual disciplines, is to increase our knowledge and understanding of the world. Since language is universal and fundamental to all human interactions, the knowledge attained in linguistics has many practical applications. Linguists, with some training in other appropriate disciplines, are thus prepared to seek answers to questions such as:

- How can a previously unstudied language be analyzed and written?
- How can foreign languages best be taught and learned?
- How can speech be synthesized on a computer or how can a computer be programmed to understand human speech?
- How can the language problems of people with speech abnormalities be analyzed and rectified?
- How are linguistic issues in legal matters to be handled?

### Who Is Noam Chomsky?

Noam Chomsky is a linguist, philosopher, cognitive scientist, historical writer, social critic, and political activist from the United States. Chomsky is known as the "father of linguistics" and is a key figure in philosophy. **Linguistics** can be defined as the study of language and its structure. In addition, Chomsky is one of the founders of cognitive science.

### Chomsky's Theory of Language Acquisition

Chomsky's **theory of language acquisition** views [language acquisition](#) as a biologically determined process that uses neural circuits in the brain which have evolved to contain linguistic signals. Chomsky concluded that language acquisition requires an inborn faculty in children, a concept known as the [language acquisition device](#). In other words, humans are born with an innate language "device" that enables them to learn any human language. Prior to Chomsky, it was widely agreed that language was acquired through [experiential learning](#), but his theory argues that human brain structures naturally allow for the capacity to learn and use languages. According to Chomsky, humans acquire language by unconsciously storing information in the brain which can later be used for many types of written and oral communication. He also believes in the importance of children acquiring and developing effective language skills during early critical development stages. This is because language helps the child to function in society, teaching them how to socialize and learn.

## Universal Grammar

**Universal grammar** is defined as "the system of categories, mechanisms and constraints shared by all human languages and considered to be innate." This system is thought to include formal universals and principles, with specific options and parameters for variation in grammar and features between languages. Chomsky's theory of universal grammar thus argues that all languages contain structures and rules. For example, most languages contain the word classes of nouns, verbs, and adjectives. Another shared commonality in language is recursion, or the repetition of a particular linguistic element or grammatical structure in sequence. For example, adjectives can be repeated a number of times to describe a narrative and expand a sentence. An example can be seen in Brian Hyland's famous song: "She wore an itsy-bitsy, teenie-weenie, yellow polka-dot bikini."

## The Sub-Fields of Linguistics

Language is a phenomenon with many layers, from the sounds that speakers produce to the meanings that those sounds express. The field of Linguistics is comprised of several sub-fields. Most professional linguists become specialists in one or more of these sub-fields. The major ones are:

### *Phonetics*

The study of speech sounds. *Phoneticians* study both the production of speech sounds by the human speech organs (*articulatory phonetics*) and the properties of the sounds themselves (*acoustic phonetics*). Phoneticians are concerned with such questions as:

- What are the sounds, from among all those that humans could make, that actually exist in the world's languages?
- What specially defines different "accents"?
- Can speakers be identified by "voiceprints"?
- What are the properties of sounds that would apply in computerized speech synthesis?

### *Phonology*

The study of language sound systems. *Phonologists* are concerned with questions such as:

- What sounds *contrast* in one language but not another (answers to such questions explain why Spanish speakers have trouble with the difference between English *sh* and *ch*, or why English speakers have trouble with the different "u" sounds in French words like *rue* 'street' and *roue* 'wheel'.)?
- What sounds of a language can or cannot occur one after the other (for example, why can words begin in *st-* in English but not in Spanish)?
- How do poets or writers or song lyrics intuitively know how to match the rhythm of speech to the abstract rhythmic pattern of a poetic or musical meter?

### *Morphology*

The study of word structure. *Morphologists* examine such questions as:

- To what extent are ways of forming words “productive” or not (e.g. why do English speakers say *arrival* and *amusement* but not \**arrivement* and \**amusal*)?
- What determines when words change form (for example, why does English have to add *-er* to adjectives when making comparisons, but Hebrew does not add any equivalent)?
- How can humans program computers to recognize the “root” of a word separated from its “affixes” (e.g. how could a computer recognize *walk*, *walks*, *walking*, and *walked* as the “same” word)?

### *Syntax*

The study of how linguistic units larger than the word are constructed. *Syntacticians* address such questions as:

- How can the number of sentences that speakers can create be infinite in number even though the number of words in any language is finite?
- What makes a sentence like *visiting relatives can be boring* ambiguous?
- Why would English speakers judge a sentence like *colorless green ideas sleep furiously* to be “grammatical” even though it is nonsensical?
- How can languages express the same thoughts even though they construct their sentences in different ways (e.g. Why does English *I saw them there* mean the same thing as French *je les y ai vus* even though the order of elements in French is *I them there have seen*)?
- How can humans program a computer to analyze the structure of sentences?

### *Semantics*

The study of meaning. *Semanticists* answer such questions as:

- How do speakers know what words mean (e.g. How does one know where *red* stops and *orange* starts)?
- What is the basis of metaphors (e.g. Why is *my car is a lemon* a “good” metaphor but *my car is a cabbage* is not)?
- What makes sentences like *I’m looking for a tall student* or *the student I am looking for must be tall* have more than one meaning?
- In a sentence like *I regret that he lied*, how do we know that, in fact, he did lie?
- How many meanings can be found in a sentence like *three students read three books* and why do just those meanings exist?

### *Historical linguistics*

The study of how languages change over time, addressing such questions as why modern English is different from Old English and Middle English or what it means to say that English and German are “more closely related” to each other than English and French.

### *Sociolinguistics*

The study of how language is used in society, addressing such questions as what makes some dialects more “prestigious” than others, where slang comes from and why it arises, or what happens when two languages come together in “bilingual” communities.

### *Psycholinguistics*

The study of how language is processed in the mind, addressing such questions as how we can hear a string of language noises and make sense of them, how children can learn to speak and understand the language of their environment as quickly and effortlessly as they do, or how people with pathological language problems differ from people who have “normal” language.

### *Neurolinguistics*

The study of the actual encoding of language in the brain, addressing such questions as what parts of the brain different aspects of language are stored in, how language is actually stored, what goes on physically in the brain when language is processed, or how the brain compensates when certain areas are damaged.

### *Computational linguistics*

Learning and understanding a language involves computing the properties of that language that are described in its phonology, syntax, and semantics. The challenge of describing this process connects linguistics with computational issues at a very fundamental level. How could syntactic structures be computed from spoken language, how are semantic relations recognized, and how could these computational skills be acquired?