

## Part I

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## Fundamentals

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# 1 Semantics in Language and Linguistics

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*Further Reading*

This chapter – together with Ch. 2 – sets the scene for everything that follows. It briefly characterizes semantics and its place in language and general linguistic theory (Section 1), and then presents the framework of our own approach to semantics, namely, Meaning-Text linguistic theory and its functional models of languages (Section 2).

## 1 Semantics and Its Place in Language and Linguistics

The English noun SEMANTICS has its (remote) origin in the Ancient Greek noun SĒMA ‘sign’, so that, etymologically, *semantics* roughly means ‘handling of signs’.<sup>1</sup> (In this book, we will see the root **sem-** on fairly numerous occasions.) Today, the term *semantics* denotes both a specific component of language and the linguistic discipline that studies this component. In most cases the context helps resolve this ambiguity; however, when the context is insufficient, we will use subscripts:

- semantics<sub>1</sub> is a component of a particular language;
- semantics<sub>2</sub> is a branch of linguistics – that is, a linguistic discipline – that studies different particular semantics<sub>1</sub>.

<sup>1</sup> In its turn, SĒMA goes back to the Proto-Indo-European root \***dheye-** ‘see, contemplate’ (the asterisk indicates, as is a rule in diachronic linguistics, that this form is not attested in a language, but is reconstructed). This root underlies, among other things, the noun ZEN (as in *Zen Buddhism* – via Sanskrit and Chinese); literally, SĒMA means ‘what is seen’.

To characterize semantics as a component of language – that is, semantics<sub>1</sub> – we must first characterize the notion of language.

**Definition 1.1:** Natural Language

A (natural) language **L** is a set of rules encoded in the brains of its speakers that establish a correspondence between meanings of **L** and their expression, or texts of **L**.

The terms *meanings* and *texts* are used here in a special, technical sense. For the time being, let us say that a meaning is an informational content that can be verbalized in the given language – according to Roman Jakobson, meaning is “something conceivable and translatable.” Thus, meaning is understood here in the narrowest way possible – strictly as **linguistic** meaning (on the opposition linguistic [= “shallow”] ~ real [= “deep”] meaning, see Ch. 3, 1.2). A text is material support for the meaning, a fragment of speech of any length – again, in R. Jakobson’s terms, “something immediately perceptible,” for instance, an acoustic or graphic string. As for linguistic rules, at this stage you may think of a rule as an instruction telling you how some linguistic items – meanings, words, phrases, speech sounds, etc. – should be manipulated in speech production and understanding. More formally, a linguistic rule is an expression of the form  $X \Leftrightarrow Y \mid C$ , where  $X$  is some content,  $Y$  the expression for this content,  $\Leftrightarrow$  means ‘corresponds to’ and  $C$  is the set of conditions under which a given correspondence holds. On linguistic rules in general, see Ch. 2, 1.6.2, and on semantic rules in particular, Subsection 2.3 below.

The correspondence between linguistic meanings and their expression is extremely complex (this will be illustrated in due course) and has to be established in stages that correspond to different language components. Besides semantics, these are syntax (responsible, roughly, for sentence structure), morphology (word structure) and phonology (sound and intonation patterns of words and sentences). The semantic component of language **L** will be called **L**’s semantics<sub>1</sub>; it fulfills the task of linking the meanings of **L** to the “deepest” form of their expression that could be viewed as the skeleton, or understructure, of future phrases, clauses and sentences (Ch. 2, 2.1). Thus, a semantics<sub>1</sub> is necessarily that of a particular language: semantics<sub>1</sub> of English, Russian, Swahili, Nez Perce, etc. (The tasks of semantics<sub>1</sub> will be stated in a more precise way in Subsection 2.3, after some necessary concepts have been introduced.)

Semantics<sub>2</sub>, on the other hand, is a branch of linguistics that develops the conceptual tools and other formal means necessary to construct the (rules of) semantics<sub>1</sub> of individual languages; in other words, semantics<sub>2</sub> is general semantics. Semantics<sub>2</sub> also deals with questions such as the nature of linguistic meaning, the semantic properties of linguistic units, and types of relations between those units.

**NB:** The dichotomy “component of language ~ corresponding linguistic discipline” exists at all levels of linguistic description; thus, we distinguish syntax<sub>1/2</sub>, morphology<sub>1/2</sub> and phonology<sub>1/2</sub>.

To make the distinction “semantics<sub>1</sub> ~ semantics<sub>2</sub>” more tangible, let us see, first, what kinds of questions arise when one studies semantics<sub>1</sub>, and then compare these with those that come up in semantics<sub>2</sub>.

If you work on semantics<sub>1</sub> of, say, English, you will have to answer questions like these:

- How can a given “simple” (= non-complex) meaning be expressed in English? (By simple meanings, or *semantemes*, we understand the meanings of lexical units [LUs]; see Ch. 4, 2.) For instance, how is the meaning ‘X takes too much time to do something because X does not want to do it’ expressed in this language? Some possible answers: *X drags X's feet* (in doing something); *X is stalling* (something); *X is procrastinating*. The same questions have to be answered in a systematic and coherent way for all simple meanings of English, which are, as we will see later (Ch. 2, 1.6.2, Footnote 5), about a million!
- What is the meaning of the LU FREAK OUT, as in *I freaked out when I realized that I had bird flu*, and how is this meaning to be represented? Here is a suggestion: ‘person X freaks out over fact Y’ = ‘X becomes very upset, which is caused<sup>1</sup> by fact Y adversely impacting X, this possibly causing<sup>1</sup> X to lose self-control’.<sup>2</sup> Again, the same questions have to be answered for all LUs of English, that is, as we have just said, for about a million of these.
- What other English LUs and expressions is FREAK OUT related to? In what way are they related? For instance, synonymous verbs and expressions: *flip out, lose it, lose one's cool* (*composure*), *fly off the handle* ...; antonymous verbs and expressions: *keep one's shirt on, keep calm, keep one's cool* ...; adjectives characterizing someone who freaked out: *freaked-out, upset, anxious, afraid* ...; and so on.
- By what English sentence(s) can a given meaning be expressed? Or, inversely, what is the meaning that a given English sentence expresses?

And this is not the end of the story: in addition to having to provide answers to these and many other similar questions, the researcher must come up with formal rules that model the answers in a sufficiently parsimonious and elegant way. In fact, linguists are supposed – among other things – to formulate the rules that allow for computing the correct expressions for any meaning of English, and vice versa; this includes establishing links not only between LUs and their meanings, but also between English sentences and their meanings – a daunting task, given the fact that the number of possible sentences is infinite.

<sup>2</sup> ‘Cause<sup>1</sup>’ stands for a non-agentive, non-voluntary causation: ‘be the cause of’.

But if you work on semantics<sub>2</sub> (= general semantics), the questions you will face are very different:

- In terms of which units and which relations can one describe the meaning of a lexical unit or a sentence of any given language?
- How are our semantic descriptions to be structured and organized?
- Which notions are necessary and sufficient to describe semantic phenomena?
- Which substantial and formal constraints should be imposed on semantic descriptions?
- What is the optimal form of rules that associate linguistic meanings to their expressions?

And so on.



Semantics<sub>1</sub> is not “just another component” of a linguistic system: it occupies within it a special place because language is above all a communication tool – that is, a means for conveying meaning.

Meaning properties of linguistic expressions determine in large part their syntactic behavior and influence their morphology. Thus, the meaning of an LU *L* is predictive of the number of *L*'s semantic actants (≈ obligatory participants in the situation denoted by *L*), as well as of the collocations it can form (on collocations, see below, 2.2.3, point 3). For instance, ‘catastrophe’ is, roughly, ‘an event that causes great damage to someone or something’. Therefore, the noun *CATASTROPHE* must have at least one semantic actant *X*, which denotes this someone or something that undergoes the catastrophe and which is featured in collocations like *a catastrophe befell* ⟨happened to⟩ *X* and *X suffered a catastrophe*. At the same time, because the meaning of *CATASTROPHE* contains the component ‘damage’, we can expect it to form collocations with intensifiers, like *great* ⟨grand, huge⟩ *catastrophe*. All this clearly shows that semantics<sub>1</sub> has a place of choice within the description of a language.

Consequently, semantics<sub>2</sub>, which supplies all the tools and terms for dealing with the semantics<sub>1</sub> of different languages, constitutes a discipline which is the very foundation of linguistics.

Linguistic semantics<sub>2</sub> is a very young science, much younger than linguistics itself, which is fairly young in comparison with most sciences.

REMARK. We are not claiming, of course, that linguistic inquiry started with the advent of linguistics as an autonomous and full-blown discipline. On the contrary: Aristotle's analytic lexicographic definition has been around since the fourth century BC; Panini's description of Sanskrit grammar, still amazing even by today's standards, is about 2500 years old; and Arabic grammarians – among them, for instance, the brilliant Sibawayhi – created a coherent syntactic theory in the eighth century AD; etc. We are just saying that linguistics as a

unified science in the modern sense of the word is one of the youngest sciences.

For a long time, linguistics was centered around phonology and morphology, because these disciplines manipulate the most observable, “superficial” data; syntax came to the fore only in the 1940s, and linguistic semantics<sub>2</sub> picked up steam a couple of decades later. Semantics<sub>2</sub> was first practiced by philosophers and logicians, who to this day continue to be interested in fundamental questions of semantics<sub>2</sub>, such as the nature of linguistic meaning and its links with thought, meaning expressibility and meaning representation. In fact, formal languages that linguists use today to represent meaning are based on formalisms invented by logicians. Because of the close links between meaning and thought, other sciences – psychology, cognitive science, Artificial Intelligence, and so on – have a vested interest in the study of meaning and, especially, linguistic meaning.

Within linguistics itself, semantics<sub>2</sub> was for a long time treated as a poor cousin of other linguistic disciplines, in part because of the extreme complexity of semantic<sub>1</sub> data. Today, however, this trend has finally been reversed, and there is an abundance of studies dedicated to various aspects of the discipline. A renewed interest in linguistic meaning has drawn linguists towards the study of the meaning of words, i.e., lexical semantics. This in turn has given a new impetus to lexicology, the linguistic discipline that studies LUs of a language in their semantic and syntactic aspects. Since a set of all lexical descriptions for a given language constitutes a dictionary of this language, it is only normal that linguists have started paying more attention to lexicography, whose task is to compile dictionaries. This expansion of modern semantics is due to the fact that its role has been strengthened by certain major applications of linguistics: on the one hand, natural language processing (e.g., machine translation and automatic text generation) and on the other hand, language learning and teaching. This is quite understandable: in both domains, the main objective is the transmission of meaning.

There is currently a plurality of approaches to semantics: Formal Semantics, Generative Semantics, Cognitive Semantics, Frame Semantics and Natural Semantic Metalanguage, to mention just the most current ones. They make use of very different conceptual tools, which are not easily “intertranslatable.” We cannot offer here an overview of these differences and will limit ourselves to presenting a single point of view: that of Meaning-Text theory. However, we will provide pointers towards, and cursory comparisons with, approaches similar to our own.

## 2 Doing Semantics with Meaning-Text Linguistic Theory

We could succinctly characterize Meaning-Text linguistic theory [MTT] by laying out two of its crucial properties:

- It is synthesis-oriented – that is, it aims at speech production (rather than speech understanding); as a result, MTT concentrates on the description of how meaning is expressed by the corresponding texts. (For more on this, see Subsection 2.2.3 below.)
- It is dependency-based – that is, all semantic and syntactic representations it uses are conceived in terms of dependency relations (see Ch. 2, 1.3).

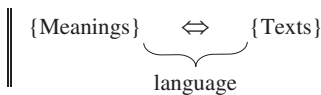
MTT is a framework for the construction of functional models of languages, with a strong formal flavor, implying recourse to various formalisms: semantic networks, syntactic trees, lexical functions, paraphrasing rules, and so on. It has good potential for applications in natural language processing and language learning and teaching.

We will start by presenting the basic tenets of the Meaning-Text theory and the architecture of its language models (2.1 & 2.2); we will then restate in a formal way the tasks of semantics<sub>1</sub>, informally described above (2.3); we will conclude by situating Meaning-Text linguistic models within an overall model of human linguistic behavior (2.4).

## 2.1 Language as Meaning-Text Correspondence

From a functional viewpoint, language allows a speaker to express meanings by texts and, conversely, to extract meanings from texts. We can say that language establishes a correspondence between a set of meanings and a set of texts; this statement can be represented as follows (curly brackets “{ ... }” symbolize a set; see Appendix, 1):

### Language correspondence



Language correspondence is bi-directional. If considered in the direction from meaning to text, we are dealing with linguistic synthesis, or speech production:  $\{ \text{Meanings} \} \Rightarrow \{ \text{Texts} \}$ . And if the correspondence is considered in the opposite direction, we are looking at analysis, or speech comprehension:  $\{ \text{Texts} \} \Rightarrow \{ \text{Meanings} \}$ . Linguistic synthesis and analysis correspond, respectively, to the activity of the two participants of the speech act: the Speaker and the Addressee.



The noun **SPEAKER** is ambiguous: ‘someone who speaks language **L**’ and ‘someone who is speaking (now)’  $\approx$  ‘someone who is saying this’. To distinguish these two senses, we will write *Speaker* with the capital *S* when we wish to name the main participant of a speech act – ‘someone who is saying this’. (The same holds for *Addressee*.)



The meaning ~ text correspondence has a very important property which determines the structure of language and, consequently, the structure of linguistics.

**NON-UNIVOCITY OF LANGUAGE CORRESPONDENCE**

The correspondence {Meanings} ↔ {Texts} is not a one-to-one correspondence: a meaning can correspond to several texts, and a text can correspond to several meanings.

Two simple illustrations:

- (1) a. **Meaning:** 'individual living permanently in Montreal'  
 ⇔ **Text 1:** [*an*] *inhabitant of Montreal*  
 ⇔ **Text 2:** [*a*] *Montrealer*
- b. **Meaning:** 'I ask you to give me some salt' [at the table, during a meal]  
 ⇔ **Text 1:** *Could you pass (me) the salt?*  
 ⇔ **Text 2:** *Pass the salt, please.*  
 ⇔ **Text 3:** *The salt, please.*
- (2) a. **Text:** *window*  
 ⇔ **Meaning 1:** 'opening in the outer wall of a room, designed for letting in light and air'  
 ⇔ **Meaning 2:** 'part of the image on a computer screen, designed for displaying data of a certain type'
- b. **Text:** *Giant poster sale* [on a sign advertising a sale]  
 ⇔ **Meaning 1:** 'a sale of very large posters'  
 ⇔ **Meaning 2:** 'a very large sale of posters'

The above examples illustrate two basic phenomena observed in natural languages: synonymy (1a–b) and equinomy (2a–b). Synonymy is the relation between two linguistic expressions that have the same meaning but different physical forms; equinomy is the relation between two linguistic expressions that have different meanings but the same physical form (see Ch. 9, 2.4, Definition 9.8).

**NB:** Instead of speaking of two equinomous expressions **E** and **E'**, in linguistic literature it is more current to say that the expression **E** is ambiguous between two meanings '**E**' and '**E**'; this is actually an abbreviation for *expression E's signifier coincides with the signifier of another expression, E', whose meaning 'E' is different from '**E**'. Unlike synonymy and equinomy, ambiguity is not a relation: it is a property of an expression that corresponds alternatively to more than one meaning; this is why we need the new term of *equinomy*. However, alongside *equinomy/equinomous expressions*, we will use the terms *ambiguity/ambiguous expression* for their familiarity and commodity. Note that equinomy covers both homonymy and polysemy (Ch. 6,*

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*1.3.1*): if two expressions have identical signifiers and different signifieds (that is, if they are equinymous), their signifieds can be either unrelated, in which case the expressions in question are homonymous, or related, in which case they are polysemous.

Synonymy and equinomy, in conjunction with other factors which will be addressed later, make the study of language extremely complex.

Let us now see how linguistics sets out to model, from an MTT viewpoint, the correspondence characterized above.

## 2.2 Modeling Meaning-Text Correspondence

We will start by discussing the method favored by the Meaning-Text approach for describing the aforesaid language correspondence: namely, the construction of functional models of language (2.2.1). Then we will underscore the stratificational (= multi-stratal) character of these models, in particular that of the Meaning-Text Model (2.2.2). We will conclude by invoking the reasons for which Meaning-Text modeling of language adopts linguistic synthesis as the preferred direction – i.e., the viewpoint of the Speaker rather than that of the Addressee (2.2.3).

### 2.2.1 Functional Models of Language

The meanings and texts of a given language are directly accessible to its speakers: meanings are accessible thanks to introspection (ideally, a speaker knows what he wants to say), and texts – thanks to perception. Therefore, meanings and texts constitute linguistic data, language facts observed by linguists and used by them in order to construct their model and check its functioning.

Let us emphasize the following crucial fact:

Linguistics does not study meanings and texts in their psychoneurological and physical reality; rather, it studies their symbolic representations, written in terms of different formal languages (Appendix, 4), which reflect different aspects of linguistic phenomena under study (see below, 2.2.2).

A representation of the studied object must be isomorphic (Appendix, 3.3) to this object in the relevant aspect(s); this means that the elements of the representation must entertain the same relations among themselves as the corresponding source elements of the represented object. (We will have more to say on this topic in Ch. 9, 1.3 & 2.4.4 and Ch. 10, 2.2.) As will be seen below, modern linguistics makes use of different formal representational languages,