

Ling 320. Lecture Notes. 20 Sept 2007. (Revised, w/o typos, and w/ references.)

1. Sentence Meaning, Truth Conditions and Compositionality¹

What do you know when you know the meaning of a sentence?

The proposal we will explore:

To know the meaning of a sentence is to know its *truth conditions*.

For example, as a (native) speaker of English, you know the meaning of the following sentence:

- (1) There is a circle inside the square.

By knowing the meaning of this sentence, you have a certain ability: you are able to determine, given a possible situation, whether or not the sentence is true or false in that situation. For example, given the following situations, you can identify those that make the sentence true, and those that make the sentence false.

s_1 s_2 s_3 s_4

Based on this ability, we can say that knowing the meaning of a sentence involves *at least* knowing the conditions under which a sentence is true, it involves at least knowing what things have to be like for the sentence to be true.

Note that you don't actually need to know whether a sentence is in fact true or false to know what it means. You can know the meaning of a sentence without knowing whether it's true or false, or even having prospects for ever finding out. If I say to you, *There is someone behind you*, you know what circumstances must be like for the sentence to be true, without necessarily knowing whether it is in fact true.

We want a theory of sentence meaning, then, that pairs sentences with their truth conditions:

- (2) *There is a circle inside the square* is true in any situation s iff there is a circle inside the square in s .

¹ This section is adapted from Chapter 1 of *What is Meaning*, (Portner 2005).

We want a theory that gives us, for any situation s , and any sentence S :

- (3) S is true in s iff p .
Where p describes the conditions that must obtain for S to be true in s .

Because there are an infinite number of sentences in English, we cannot just have memorized the truth conditions for every sentence. Rather, we must have some way of deriving the truth conditions of a sentence based on the semantic contributions of its parts, and the way in which they are assembled syntactically.

What are the parts of a sentence, and how are those parts assembled syntactically?

We will start out with very simple sentences whose subject is a proper noun (a name) and whose predicate is an intransitive verb, as in (4). We will neglect for now the semantic contribution of tense.

- (4) Laure smokes. Carla drinks. Lindsay sings. Gorka dances. ...

Each of these sentences comprises two parts. We can represent this with the following tree structure, where S stands for sentence.



Now we need a rule for interpreting this structure. We want to derive the truth conditions of the whole sentence based on the semantic contribution of its parts.

What does each part mean?

A starting point: Names stand for things in the actual world. For example:

- (6) *Lindsay* stands for Lindsay.
Carla stands for Carla etc.

Note: We will distinguish expressions (*Brazil*) from the things they refer to (Brazil) using italics, underlining, or boldface:

Brazil is a word. Brazil is a country.
Brazil has 2 vowels and 4 consonants. Brazil has nice beaches.

More formally:

Terminology: Instead of the verbs *stand for* or *mean* we will use the more technical term *denote*. Instead of the noun *meaning*, we will use the term *denotation*.

Notation: $[[\alpha]]^s$ symbolizes the denotation of α in situation s .

$[[\alpha]]^s$ is read as “The denotation of α in s ”.

Proper nouns denote individuals (the same individual in any situation).

E.g., For any situation s , $[[Lindsay]]^s = Lindsay$

Intransitive verbs denote sets of individuals relative to a situation.

E.g., $[[sings]]^s = \{x \mid x \text{ sings in } s\}$

Sentences denote truth values - true (1) or false (0) - relative to a situation.

E.g., For any situation s , $[[S]]^s = 1$ iff $[[Lindsay]]^s \in [[sings]]^s$

2. Syntactic Assumptions

In order to state general rules for interpreting sentences, we need to establish some assumptions about syntactic structure.

Syntax concerns the rules that govern how words are assembled into sentences. For example, all of the above sentences are made up of both a noun (N) and a verb (V). We can state a general rule for forming such sentences as follows:

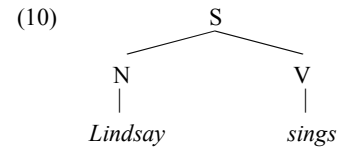
$$(7) \quad S \rightarrow N V$$

The ‘ \rightarrow ’ reads as ‘is composed of’, so that the whole rule reads as ‘S is composed of an N and a V’.

Along with this rule, we need a rule for N, and a rule for V:

$$(8) \quad N \rightarrow Lindsay, Carla, \text{ etc.} \quad (9) \quad V \rightarrow sings, smokes, drinks, \text{ etc.}$$

The output of these three rules combined can be represented in the form of a tree structure, as in the following:



Such rules are referred to as *phrase structure rules*. They dictate how words are assembled into phrases and sentences.

3. A Grammar of a Small Fragment of English

Our grammar has three components:

- (i) A *lexicon*, which states the category and denotation of each word;
- (ii) A set of *syntactic rules*, which assemble words into sentences;
- (iii) A set of *semantic rules of composition*, which interpret the structures derived by the syntactic rules.

(i) Lexicon

N's: $[[Lindsay]]^s = Lindsay$, $[[Carla]]^s = Carla$, ...

V's: $[[sings]]^s = \{x \mid x \text{ sings in } s\}$, $[[smokes]]^s = \{x \mid x \text{ smokes in } s\}$, ...

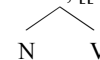
(ii) Syntactic rules

$S \rightarrow N V$ $N \rightarrow Lindsay, Carla, \dots$ $V \rightarrow drinks, smokes, sings, \dots$

(iii) Semantic rules of composition

For any situation s ,

(a) If α has the form S, $[[\alpha]]^s = 1$ iff $[[N]]^s \in [[V]]^s$.



(b) If α is a non-branching node whose daughter node is β , then $[[\alpha]]^s = [[\beta]]^s$.

(c) If α is a terminal node, then $[[\alpha]]^s$ is specified in the lexicon.