Handout 12
Compositional Semantics I:
Productivity, Compositionality, Syntax

We've already asked "what are the meanings of *whole sentences*?" and seen the standard answer: a proposition. Now we'll ask: "what are the meanings of *words*?"

Productivity and Compositionality

(1) Yesterday the president of the United States danced around the Cathedral of Learning for 14 hours straight while wearing a pink wig.

You probably have never heard (1), but you understand it...how?

Productivity: the feature of language acquisition whereby speakers are able to understand a vast, indefinite range of meaningful expressions with only a finite, and very limited, amount of linguistic training.

Suggestion:

(Principle of) Compositionality: the meanings of wholes (e.g. sentences) are determined by the meanings of their parts and how those parts are put together.

An example of "how things are put together" could matter:

(2) Lola hit Patel.
(3) Patel hit Lola.

A **compositional semantics** for a language is a theory which exhibits how the meanings of parts combine to make meaningful wholes. This is done by specified by assigning

(A) "meanings" to every word, and
(B) rules for combining those meanings to every grammatical way of combining words.

The meanings assigned in this system are known as *semantic values*.

So what *are* semantic values? They are constrained by:

A conception of informational content + the principle of compositionality.

Say you are a Fregean. Then the semantic values of expressions *must* be the kinds of things which, when combined appropriately, generate a *Fregean proposition*. Likewise for the Russellian, and the truth-conditional semanticist.

So

> ***Semantic value*** of a *sentence* = something that is or determines the kind of proposition that foundational semantics tells us stand as the meanings of whole sentences.
>
> ***Semantic value*** of a *word*= the kinds of entities, which, when appropriately combined, will generate the semantic values of whole sentences as needed.

Remember a compositional semantics has two parts:

> – meanings assigned to words
> – rules for combining those meanings corresponding to ways of combining the words.

We have a decent grip on the first of these two parts. What about the second?

> ***Syntax***: the study of rules for generating the grammatical sentences of languages.

E.g., (4) is a grammatical sentence of English, but (5) is not.

> (4) Sam walks.
> (5) Walks sam.

Syntax (in part) asks: what are the *rules* which tell us the good sentences from the bad? In its barest forms, many forms of syntactic theory sees a language as generated from a *lexicon* with grammatical categories, and rules for those categories relate.

> ***Lexicon***: the stock of vocabulary that belongs to a language.

E.g., for a fragment of English, a simplified lexicon might look the following:

Lexicon	
Nouns (N)	Julio
	Martha
	Sam
Intransitive Verbs (V_I)	walks
	talks
Transitive Verbs (V_T)	kisses

And we might have the following rules for how these categories of words can combine.

> Rule 1: A sentence S can only be made up of a noun N followed by a verb phrase VP.

> Rule 2: A verb phrase VP can be made up either
> > (i) of an intransitive verb V_I, or
> > (ii) of a transitive verb V_T followed by a noun N.
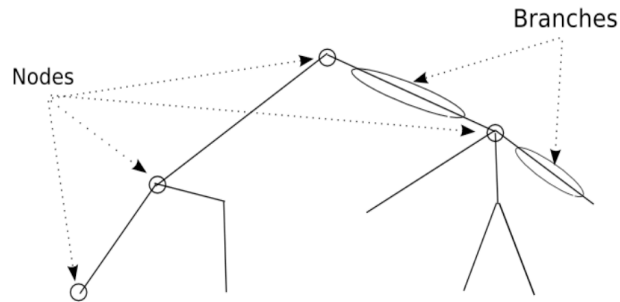
These rules allow, for example:

> (6) Julio talks
> (7) Martha kisses Sam.

Often linguists will represent the way in which a grammatical sentence is built up by a "tree".

Tree: a mathematical abstraction used to represent anything with a "branching" structure.

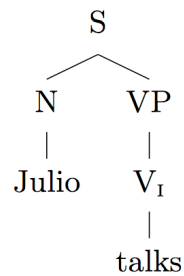A typical tree and its parts:

A Tree
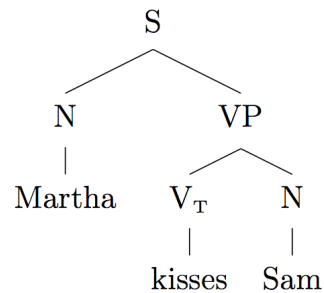
So for

(6) Julio talks

we have

and for

(7) Martha kisses Sam.

we have

A compositional semantics is typically "laid over" a syntax for a language. This enables us to state more clearly what is required of a compositional semantics for a language:
   – A meaning for each *element of the lexicon in the language*.
   – A rule for composing those meanings, *for each rule governing the combinations of expressions from the lexicon*.