Lgcs 106, Semantics. Lecture Notes. Mon 31 Jan 2011.

0. Announcements
-Reminder: Assignment 1 due on Wednesday.
-Assignment 2 due a week from today (to be distributed at the end of class).

1. Implicature

Generalized implicatures do not depend on the particular conversational situation:

(1) There were some casualties. (~> *There weren't many casualties*.)
(2) I walked into a house. (~> *It wasn't my house*.)

Particularized implicatures do:

(3) I have to work.
(4) You're the cream in my coffee.

2. Answers to the practice set from last time

(8) a. Stefan sometimes wears a cheese on his head.
b. Stefan doesn't always wear a cheese on his head.

Stefan always wears a cheese on his head entails *Stefan sometimes wears a cheese on his head*; *always* is more informative than *sometimes*. Consquently, in an upward entailing context, using *sometimes* implicates *not always*, due to the Maxim of Quantity. The inference in (b) is both defeasible (*Stefan sometimes wears a cheese on his head, and possibly/in fact always does*) and reinforceable (*Stefan sometimes wears a cheese on his head, but not always*).

(9) a. At most three people in this class are breathing.
b. At most three people in this class are breathing deeply.

(a) entails (b). Thus, *at most three* is downward entailing with respect to its VP. Given our account of NPIs, we predict that NPIs should occur grammatically in VP, which is supported by examples like *At most three people ever came to my office hours last semester*.

(10) a. At least three people in this class are breathing.
b. At least three people in this class are breathing deeply.

(b) entails (a). *At least three* is thus upward entailing with respect to its VP. We predict in this case that NPIs should be ungrammatical in VP, which is supported by examples like **At least three students ever came to my office hours last semester*.

(11) a. Stefan never leaves early.
b. Stefan doesn't always leave early.

(a) entails (b). *Never* is stronger than *not always*.

(12) a. Stefan doesn't always leave early.
b. Stefan sometimes leaves early.

Implicature. *Never* is more informative than *not always*. As a result, stating *not always* implicates *not never*, which is equivalent to *sometimes*. The implicature is both cancellable, *Stefan doesn't always leave early, in fact he never does*, and reinforceable, *Stefan doesn't always leave early, but he sometimes does*.

(13) a. At most three dogs barked.
b. At most three little dogs barked.

(a) entails (b). *At most three* is thus downward entailing with respect to its NP argument. We thus predict NPIs to be grammatical in NP. Class judgments varied on the grammaticality of such examples: *?At most three students who ever came to my office hours got an A*.

(14) a. It was good.
b. It wasn't amazing.

Implicature. Same reasoning as for the implicatures above.

(15) a. That wasn't very cool.
b. That wasn't cool.

Aah… I'm not sure what's going on with this one! Compare:

(16) a. It wasn't amazing.
b. It was good.

3. More Set Theory Practice

Exercise 1. Assume the following sets:

A = {Mars, {∅}, Jeep}	B = {{Mars}, ∅}	C = ∅
D = {∅}	E = {Mars}	F = {Jeep}

U is the union of A, B, C, D, E, F.

(i) True or False:

(17)	Mars $\in E$	(18)	$\varnothing \in B$
(19)	$\varnothing \in A$	(20)	$F \subseteq A$
(21)	$\{\varnothing\} \subseteq A$	(22)	$\{\varnothing\} \subseteq B$
(23)	$E \in B$	(24)	{Mars} $\in \{x \mid x \in B\}$

(ii) Specify the following sets:

(25)	$E \cup F$	(26)	$A \cap E$
(27)	$A - F$	(28)	$D - C$
(29)	$D - A$	(30)	$C \cap D$
(31)	$(U \cup F)'$		

Exercise 2. Describe the following in colloquial English:

(32) {x | x is from Guatemala} ∩ {x | x is a student}
(33) {x | x is a person} ∩ {x | I know x}
(34) {x | x likes x}
(35) {y | y ∈ {x | x likes x}}
(36) {z | z ∈ {y | y ∈ {x | x likes x}}}
(37) {x | {y | y likes x} = U}
(38) {x | {y | x likes y} = ∅}
(39) {x | x ∉ {y | y likes y}}

H&K Exercise, pp. 9-10. The same set can be described in many different ways, often quite different superficially. Here you are supposed to figure out which of the following equalities hold and which ones don't. Sometimes the right answer is not just plain "yes" or "no" but something like "yes but only if…". For example, the two sets in (i) are equal only in the special case where a=b.

(40) {a} = {b} Only if a=b.(ii)
(41) {x | x = a} = {a}
(42) {x | x is alive} = {y | y is alive}
(43) {x | x likes a} = {y | y likes b}
(44) {x | x ∈ A} = A
(45) {x | x ∈ {y | y ∈ B}} = B
(46) {x | x ∉ {y | y likes x}}

PtMW Exercise 4. Consider the following sets:

$S1$ = {{∅}, {A}, A}	$S4$ = {{A}}	$S7$ = {∅}
$S2$ = A	$S5$ = {{A}, A}	$S8$ = {{∅}}
$S3$ = {A}	$S6$ = ∅	$S9$ = {∅, {∅}}

Of the sets $S1$ - $S9$,
(a) which are members of $S1$?
(b) which are subsets of S1?
(c) which are subsets of $S9$?
(d) which are members of $S9$?
(e) which are members of $S4$?

4. Truth-conditions and Compositionality

To know the meaning of a sentence is (at least) to know what the world has to be like for that sentence to be true. This is our starting point.

(47) David is wearing socks.
(48) Jeremy is sitting.

We can understand sentences we've never heard before. How do we do it?

Principle of Compositionality
The meaning (truth-conditions) of a sentence is derived from the 'meanings' of its component parts, and the way they are assembled syntactically.

4.1 Syntax

We'll start out with simple sentences comprising a name and an intransitive verb:

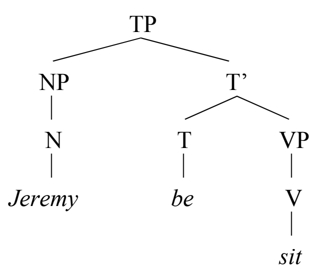
(49) Jeremy is sitting.
(50) Arianna is laughing.

We will adopt the following phrase structure rules to generate such sentences:

(51) TP → NP T'
T' → T VP
NP → N
VP → V
T → *be* N → *Jeremy, Arianna,* etc. V → *sit*, *laugh*, etc.

These rules generate sentences that can be represented in the form of a tree structure:

(52)



Terminology. The lines are called **branches**. The endpoints of branches are **nodes**. The lowest nodes are **terminal nodes**. If a node X immediately dominates a node Y, then X is the **mother** of Y, and Y is the **daughter** of X. For example, in (1'), S is the mother of N and V, and N and V are daughters of S.

Ultimately, we want our syntax to generate *all and only* those sentences judged grammatical by native speakers. Clearly, our current set of rules does not generate every sentence of English. We will be revising our syntactic rules throughout the semester as we try to account for more and more sentences of English.

4.2 Semantics

We now need rules for interpreting the structures that the syntactic rules output.

To know the meaning of a sentence is to know what the world has to be like for that sentence to be true. If that's the case, then we also have to know how the parts of this sentence are related to the world. For example, to know whether (49) is true, we need to know which individual *Jeremy* refers to.

We will take names to stand for individuals in the actual world:

(53) *Jeremy* stands for Jeremy.
Arianna stands for Arianna. etc.

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: ⟦α⟧ symbolizes the denotation of α.
It reads as "The denotation of α".

Restated: Names denote individuals in the actual world:

(54) ⟦*Jeremy*⟧ = Jeremy.
⟦*Arianna*⟧ = Arianna.

Note: We distinguish linguistic expressions (*Arianna*) from the things they denote (Arianna) using italics:

Arianna is a word.	Arianna is a person.
Arianna has four vowels.	Arianna has two arms.

These italicized expressions are called **object language** expressions; the object language is the language we are investigating, in this case, English. The language we use to characterize the truth conditions of the sentences of our object language is called the **metalanguage**. Our metalanguage is thus English, as well, but will include some technical vocabulary and notational conventions.

5. A Grammar of a Fragment of English. Our goal is to build a system of rules that generate and interpret *all and only* sentences of English. We will constantly be revising our grammar to account for more and more sentences of English.

Our grammar has the following components:

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

(i) Inventory of denotations. Let D be the set of all individuals that exist in the actual world. Possible denotations are:

Elements of D, the set of actual individuals.
Elements of {0,1}, the set of truth-values.
Subsets of D.

(ii) Lexicon

N: ⟦*Jeremy*⟧ = Jeremy, ⟦*Arianna*⟧ = Arianna, …
V: ⟦*sit*⟧ = {*x* | sit(*x*)}, ⟦*laugh*⟧ = {*x* | laugh(*x*)}
T: *be* (We neglect for now the semantic contribution of the T node.)

(iii) Syntax

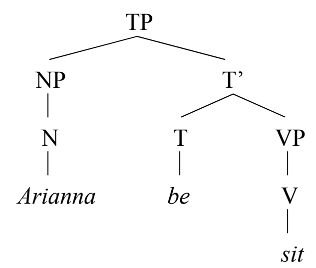
(55) TP → NP T'
T' → T VP
NP → N
VP → V
N → *Jeremy, Arianna,* etc.
T → *be*
V → *sit, laugh, whisper, sleep*

(iv) Semantic rules of composition

(a) If α has the form $[_{TP}$ NP T'], ⟦α⟧ = 1 iff ⟦NP⟧ ∈ ⟦VP⟧.
(b) If α is a non-branching node whose daughter node is β, then ⟦α⟧ = ⟦β⟧.
(c) If α is a terminal node, then ⟦α⟧ is specified in the lexicon.

6. Example derivation of truth-conditions for (52)

(52)



⟦TP⟧ = 1 iff

⟦NP⟧ ∈ ⟦T'⟧	by (a)
⟦N⟧ ∈ ⟦T'⟧	by (b)
⟦N⟧ ∈ ⟦VP⟧	by (b)
⟦*Arianna*⟧ ∈ ⟦VP⟧	by (b)
Arianna ∈ ⟦VP⟧	by (c)
Arianna ∈ ⟦V⟧	by (b)
Arianna ∈ ⟦*sitting*⟧	by (b)
Arianna ∈ {*x* | sit(*x*)}	by (c)

7. Expanding the Grammar

Our grammar does not yet account for the following sentences:

(56) Greg is ecstatic.
(57) Greg is a student.
(58) Greg is not being nice.
(59) Greg is not speaking.
(60) Greg is laughing and screaming.

How can we revise it so that it does?

7. Semantically Vacuous Words.

Certain lexical items are commonly assumed to make no semantic contribution to the structure in which they occur.

One case is the copula *be* in predicative sentences such as *Greg is ecstatic*.

We would want the following equalities, for example:

(61) $[\![$*is ecstatic*$]\!]$ = $[\![$*ecstatic*$]\!]$

Another case is the indefinite article *a* when it occurs in predicate nominals such as *Greg is a student* and *Kaline is a cat*.

Here too we want the following equalities:

(62) $[\![$*a student*$]\!]$ = $[\![$*student*$]\!]$ (63) $[\![$*a cat*$]\!]$ = $[\![$*cat*$]\!]$

We will assume then that the semantic component simply "doesn't see" the copula *be* or the indefinite article *a*. As a result, a structure that is binary branching may be treated as non-branching by the semantic rules, in that a branch occupied by a vacuous item doesn't count.

Ling 106, Assignment 2. Due next Monday.

Part 1. Derivations.

Provide tree structures for the following sentences, **as generated by our syntactic rules**, and derive the truth-conditions for those structures, **given our semantic rules**.

(64) Rebekah is not sleeping.
(65) Will is studying and not laughing.
(66) Rebekah is happy or weird.

Part 2. Ambiguity.

Consider now:

(67) Will is studying and not laughing.
(68) Will is not studying and laughing.

(67) is unambiguous, while (68) is. Does our grammar account for this by assigning two distinct interpretations to (68)? If no, provide the only phrase structure tree and interpretation for this sentence that our grammar generates. If yes, provide the two phrase structure trees and interpretations for this sentence that our grammar generates.

Part 3. More of English.

Our grammar does not yet account for sentences with transitive verbs:

(69) Arianna saved Ryan.
(70) Ryan appreciates Arianna.
(71) Mary invited Mike.

(i) Revise our current syntactic rules so that they generate these sentences.

(ii) Propose a new semantic rule to account for VPs with transitive verbs. Keep all other rules the same.

(iii) Given your two new rules, provide the tree structure for one of the three examples above, and derive its truth-conditions.