Handout 8:
Semantics

November 17th - December 1st

1 Introduction

Semantics is the study of a native speaker's unconscious knowledge of how to compute meaning from words, phrases, and sentences.

- Speakers can interpret sentences they have never heard before.
- Interpretation is structurally dependent (compositional).
- To know the meaning of a sentence is to know how to evaluate the truth of a sentence.
- Speakers understand relations between sentences.

Our agenda:

- Compositionality
- Truth conditions
- Relations between sentences
  - Presupposition and entailment
  - Conjunction and negation
- Pragmatics

2 Compositionality

Every node in a syntax tree gets a meaning, and putting all these meanings together gives you the meaning of the whole sentence.

Three basic types of meaning we'll be concerned with:

- N/NP meaning for proper names and plural count nouns
- Intransitive V/VP meaning
- Sentence (TP) meaning

What do Ns/NPs mean?

- Proper names = referents

(1) a. ⟦Oliver⟧ =
b. ⟦Lauren⟧ =

- Other Ns/NPs = set of individuals that are Noun, {x: x are Noun}

(2) a. ⟦students⟧ =
b. ⟦chocolates⟧ =

What do intransitive Vs/VPs mean?

- Sets of individuals
- Intransitive verbs = set of individuals that Verb, {y: y Verb}

(3) a. ⟦sing⟧ =
b. ⟦sleep⟧ =

- What do sentences (TPs) mean?
  - Hypothesis: The meaning of a sentence is a statement of the conditions under which a sentence is true.

(4) a. Lauren slept.
= True if and only if Lauren slept.

b. Students sang.
= True if and only if students sang.

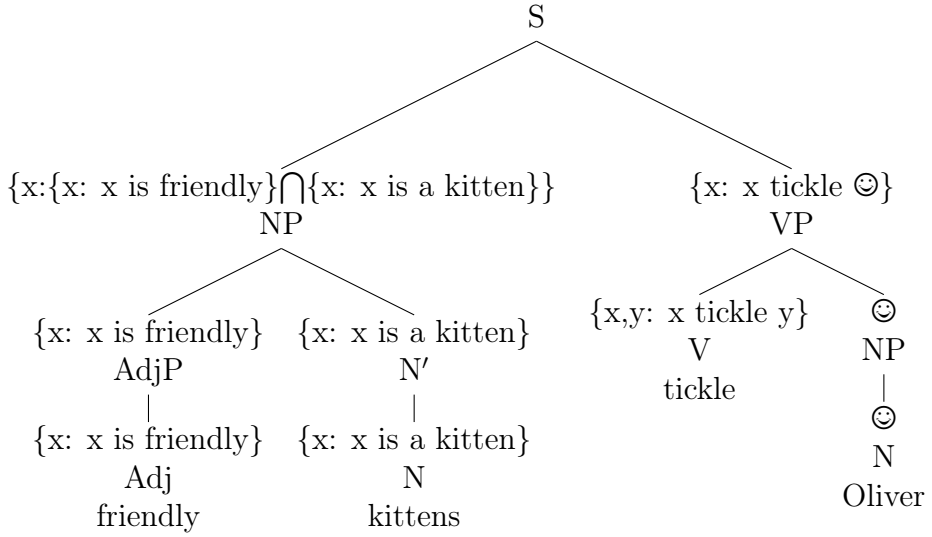
  - How do we get to this meaning compositionally?
    - ◇ TP = True iff the subject NP is in the set denoted by VP
      Formally, for plural count NPs: T iff {x: x are Noun} ⊆ {y: y Verb}
      Formally, for proper nouns: T iff ☺ ⊆ {y: y Verb}

(5) Lauren slept.
= T iff:

(6) Students sang.
=T iff:

If you do semantics in the future...

(7) T iff {x:{x: x is friendly}⋂{x: x is a kitten}}⊆{x: x tickle ☺}



Summary so far:

- When you know the meaning of a sentence, you know its _____.
- This is separate from whether or not a sentence is true or false (or anomalous).
  → Whether a sentence is true or false is the sentence's _____.
- Sentences are interpreted via their structure, bottom-to-top.

3 Types of truth conditions and truth values

- Situationally true/false
  - Compositional; may be true or false given different scenarios in the real world.

(8) a. John has a surfer girlfriend.
b. Dan loves cats.
c. Mary will pass the exam.
d. Lauren's neighbor sings on her way to work.

- Tautology
  - Compositional and always true.

(9) a. Socrates is either mortal or he's not.
b. The happy swimmer is happy.
c. Wool comes from sheep.
d. The bachelor is unmarried.

- Contradiction
  - Compositional and always false.

(10)
a. John is not John.
b. Socrates is neither mortal nor immortal.
c. The happy swimmer is unhappy.
d. It is raining and it is not raining.
e. The bachelor is married.

- Anomaly
  - Nonsensical; not semantically interpretable via composition.

(11)
a. Colorless green ideas sleep furiously.
b. Twas brillig, and the slithy toves did gyre and gimble in the wabe.
c. The cat sewed the milk.

- Metaphor
  - Seems anomalous, but has a conceptual (figurative) compositional interpretation.

(12)
a. In the White House, the walls have ears.
b. Lauren didn't bat an eyelash when we surprised her.
c. In three weeks you'll be free as a bird.
d. Stefan's car cost an arm and a leg.

- Idiom
  - A phrase or sentence that has a fixed, non-compositional meaning.

(13)
a. Harry and Sally really hit it off.
b. John kicked the bucket.
c. Semantics is not rocket science.
d. Lauren is feeling blue.

- Some practice! What type of truth conditions do the sentences in (14) have?

(14)
a. Puppies are young dogs.
b. Rachel gave Ross the cold shoulder.
c. Dan asked if Lauren arrived.
d. Chicken burgers are vegetarian.
e. The children drank some chairs.
f. The professor talks a mile a minute.

4 Relations between sentences

If you know that a given sentence (Sentence A) is true, what else do you know?

- You might be able to tell whether another sentence (Sentence B) is true.
  - If sentence B MUST be true whenever sentence A is true, then A **entails** B.

    (15) Entailment
    a. It stopped raining just now.
    b. It's not raining anymore.

  - If A entails B AND B must be true in order for A to be felicitously uttered, then A **presupposes** B.

    (16) Presupposition
    a. It stopped raining just now.
    b. It was raining before now.

If you know the truth value of several sentences, then you know the truth value of sentences built out of these with conjunction (*and*), disjunction (*or*), and negation (*not*).

(17) C: Jon has four cats. = True
D: Emma has a dog. = False

(18) What is the truth value of...
a. John has four cats and Emma has a dog. (= C *and* D)
b. John has four cats or Emma has a dog. (= C *or* D)
c. Emma doesn't have a dog. (= *not* D)

4.1 Entailment and presupposition

- One sentence **entails** another if whenever the first sentence is true the second one is also true, in all conceivable circumstances (in the normal world).
- Entailment is part of native speaker knowledge of a language: If you hear someone utter a certain sentence, you are able to conclude that its entailments are true as well.

(19) Sentence A entails sentence B.
a. Jack swims beautifully.
b. Jack swims.

(20) Does sentence A entail sentence B?
a. Jack swims.
b. Jack swims beautifully.

(21) Does sentence A entail sentence B?
   a. I have two cats.
   b. I have a cat.

(22) Does sentence A entail sentence B?
   a. Jon has four cats.
   b. Jon loves cats.

(23) Does sentence A entail sentence B?
   a. The president is dead.
   b. The president was assassinated.

(24) Does sentence A entail sentence B?
   a. The president was assassinated.
   b. The president is dead.

(25) Does sentence A entail sentence B?
   a. Lauren got an A on the midterm.
   b. Lauren passed the class.

(26) Does sentence A entail sentence B?
   a. Kaeli can bench press a hundred pounds.
   b. Kaeli can bench press fifty pounds.

(27) Does sentence A entail sentence B?
   a. Kaeli can bench press a hundred pounds.
   b. Lauren can bench press fifty pounds.

- If the B sentence of an entailment is false, then the original sentence, A, must be false as well.
- One sentence **presupposes** another if whenever the first sentence is true, the second one must be true in order for the first sentence to be uttered at all.
  - In the following pairs of sentences, A presupposes B.

(28) a. The king of Spain is bald.
   b. There is a king of Spain.

(29) a. Lauren forgot to do her homework again.
   b. Lauren forgot to do her homework at least once before.

(30) a. Liz quit smoking.
   b. Liz used to smoke.

- Presuppositions are brought about by a grammatical construction or lexical item.

  = **Presupposition trigger**

- In a sense, presuppositions are a subset of entailments (if A is true, B is).

→ For both presupposition and entailment, B is ALWAYS TRUE if A is true.

  – So how do we tell presupposition and (non-presuppositional) entailment apart?

  ⇒ Presupposition is an entailment that "survives" under negation.

    ◇ Given a pair of sentences A and B where A entails B...

      · If you negate A, and B is still true, then A presupposes B.
      (B "survives" A's negation)

      · If you negate A, and B is no longer true, then A entails B.
      (B doesn't "survive" A's negation)

    Step 1: Does A entail B?

    ◇ If yes, proceed to Step 2.

    ◇ If no, A neither entails nor presupposes B.

    (31) a. The king of Spain is bald.
         b. There is a king of Spain.

    Step 2: Does the negation of A (A′) entail B?

    ◇ If yes: A presupposes B.

    ◇ If no: A entails B.

    (32) a′. The king of Spain is **not** bald.
         b. There is a king of Spain.

- Unlike an entailment, if a presupposition turns out to be false, then the original sentence has no truth value; it cannot be true or false, it is just nonsensical.

Some practice: Does A entail B, does A presuppose B, or neither?

(33) a. It stopped raining just now.
     b. It's not raining anymore.

- Does A entail B?
- Does A's negation entail B?
  – Negation of A =
- Does A presuppose B? If so, what is the trigger?

(34) a. It stopped raining just now.
b. It was raining before now.

- Does A entail B?
- Does A's negation entail B?
  - Negation of A =
- Does A presuppose B? If so, what is the trigger?

(35) a. It is 100 degrees outside.
b. It is sunny out.

- Does A entail B?
- Does A's negation entail B?
  - Negation of A =
- Does A presuppose B? If so, what is the trigger?

(36) a. Mary broke the window.
b. The window broke.

- Does A entail B?
- Does A's negation entail B?
  - Negation of A =
- Does A presuppose B? If so, what is the trigger?

(37) a. Ben saw the horse with two heads.
b. There is a horse with two heads.

- Does A entail B?
- Does A's negation entail B?
  - Negation of A =
- Does A presuppose B? If so, what is the trigger?

(38) a. Kaeli and Lauren went to the party.
b. Kaeli went to the party.

- Does A entail B?
- Does A's negation entail B?
  - Negation of A =
- Does A presuppose B? If so, what is the trigger?

(39) a. The student retook the final exam.
b. The student took the final exam at least once before.

- Does A entail B?
- Does A's negation entail B?
  - Negation of A =
- Does A presuppose B? If so, what is the trigger?

Summary: Knowing the truth value of one sentence can **entail** or **presuppose** the truth value of a number of other sentences. This is a part of your knowledge of language.

4.2 Conjunction and negation

There are other things you can infer from your knowledge of truth values, as well. In particular, if you know the truth value of a set of sentences, then you know the truth value of sentences formed out of those sentences using conjunction, disjunction, and negation.

(40) Imagine a world where...
a. Dan went to Lauren's bachelorette party. = False
b. Kaeli went to Lauren's bachelorette party. = True
c. Lauren got married. = True

(41) What is the truth value of...

a. Dan **didn't** go to Lauren's bachelorette party.

b. Kaeli **didn't** go to Lauren's bachelorette party.

c. Kaeli went to Lauren's bachelorette party **and** Lauren got married.

d. Dan went to Lauren's bachelorette party **and** Lauren got married.

e. Dan **didn't** go to Lauren's bachelorette party **and** Kaeli went to Lauren's bachelorette party.

f. Dan went to Lauren's bachelorette party **and** Kaeli **didn't** go to Lauren's bachelorette party.

One way to characterize this knowledge that native speakers have is using **truth tables** that represent how conjunction, disjunction, and negation work.

- Some simple sentences to help make this more concrete:

  (42) A. Carson adopted a kitten.
  B. Carson renovated his bathroom.

- **Negation**

A	**not** A
T	
F	

- **Conjunction**

A	B	A **and** B
T	T	
T	F	
F	T	
F	F	

Knowledge of "truth conditional operators" (e.g., and, not) must be part of what a native speaker knows, since you can apply them to sentences you've never heard before and intuitively understand the results.

Speakers' semantic knowledge consists of (i) denotations, (ii) composition rules, (iii) entailment, (iv) presupposition, and (v) truth conditional operators. These all work together to help you understand and produce an infinite number of sentences.

5 Pragmatics

Pragmatics is a subfield of linguistics that examines how **context** affects **meaning**.

- How we actually use language; how we interpret other people's use of language
- Can be very far from the idealized language we study in other subfields!

Grice: British philosopher, 1900s

- Our successful communication depends on speakers being **cooperative**. In being cooperative, speakers obey four basic maxims (principles) for communicating:
  - Maxim of quantity: say neither more nor less than required
  - Maxim of relevance: say things that are relevant to the topic at hand
  - Maxim of manner: be brief and clear; avoid ambiguity and obscurity
  - Maxim of quality: don't lie; don't make unsupported claims

- Speakers can **violate** maxims for comedic effect or to purposefully mislead someone or sometimes by accident.

What maxim is being obeyed in the following two scenarios?

(43) Context: Person B is standing near an open window.
   a. Person A: "Gee, it's cold in here!"
   b. Person B closes the window.

(44) Context: Person A approaches person B on the street.
   a. Person A: Excuse me sir, where is the post office?
   b. Person B: Take a right at your first light, go two blocks, and you'll see it on your left, next to an ice cream shop.

Which maxims are being violated in the following scenarios?

(45) Context: Person B walks into the room to find person A reading.
   a. Person B: "What are you reading?"
   b. Person A: "Words."

(46) Context: Person A approaches person B on the street.
   a. Person A: Excuse me sir, where is the post office?
   b. Person B: Well, there are two post offices in town. They're pretty much the same, but one of them is newer than the other. We are all very thankful to our town mayor for finding the funding for the new one! The old post office is in a sort of rough neighborhood. The new office is in the town center, next to an ice cream shop that I absolutely love! They have the best ice cream there.

(47) Person A approaches person B in a nightclub.
   a. Person A: Hi sweetheart, can I get your phone number?
   b. Person B: Sorry, I don't have a cell phone.

(48) Person A and person B are old friends.
   a. Person A: Could I copy the math homework from you?
   b. Person B: Gee, have you noticed how nice this bench is?