Truth-Condition, Entailment, Contradiction and Presupposition

Yasutada Sudo

24.900 Introduction to Linguistics

March 18, 2009
We’ve just looked at the interpretations of pronouns and structural constraints on them.

Now we will look at another unit of meaning, sentences.

Levels of meaning:

What does a word/morpheme mean?

(1) a. dog
    b. -s
    c. dogs

What do phrases mean?

(2) a. The science of language
    b. The language of science

What do sentences mean?
Sentence Meaning

- We only look at declarative sentences (not questions, imperatives, exclamatives, etc.).
- What is the meaning of a sentence?
- A sentence is true or false.

(3) a. We are in the Stata Center now.
   b. We are in Canada.
(4) John is at MIT now.

a. When John is somewhere at MIT now, (4) is true.
   (i) John is in the Stata Center now
   (ii) John is in MacGregor House now.

b. When John is not at MIT now, (4) is false.
   (i) John is at Harvard now
   (ii) John is in Tokyo now
   (iii) John was at MIT yesterday, but not now.

(5) The sentence ‘John is at MIT now’ is true iff (=if and only if) John is at MIT now.
The truth-condition of a sentence S might look trivial:

‘S’ is true iff S.

It’s not trivial!
- Suppose you hear ‘$!d%@ #$p’ in some unknown language.
- You don’t know what it means.
  = you don’t know when it is true or when it is false.
- You asked native speakers of that language and found out that it is true iff John is a genius.
- Now you know the meaning of the sentence: it means the same thing as the sentence ‘John is a genius’.

If two sentences have the same truth-condition, they mean the same thing.
Knowing the meaning of a sentence involves knowing its truth-condition.

A native speaker has intuitions about the truth-condition of any given sentence in her language.

We also know relations among the truth-conditions of sentences: *entailment* and *contradiction*
Entailment

Sentence $A$ **entails** Sentence $B$ iff whenever $A$ is true, $B$ is also true.

(6) John is a middle-aged American man.
   a. John is male. \hspace{1cm} (6) entails (a)
   \hspace{1cm} (a) does not entail (6)
   b. John is an American. \hspace{1cm} (6) entails (b)
   \hspace{1cm} (b) does not entail (6)
   c. John is married. \hspace{1cm} (6) does not entail (c)
   \hspace{1cm} (c) does not entail (6)
Contradiction

Sentence $A$ **contradicts** Sentence $B$ iff whenever $A$ is true, $B$ is false.

(7) John is a middle-aged American man.

a. John is female.  
   (7) contradicts (a)  
   (a) contradicts (7)

b. John is a child.  
   (7) contradicts (b)  
   (b) contradicts (7)

c. John is married.  
   (7) does not contradict (c)  
   (c) does not contradict (7)
Remarks

▸ When $A$ entails $B$ and $B$ entails $A$ (i.e. $A$ and $B$ entail each other), $A$ and $B$ have the same truth-condition.

1. $A$ entails $B$  
   ⇒ In all circumstances where $A$ is true, $B$ is also true.

2. $B$ entails $A$  
   ⇒ In all circumstances where $B$ is true, $A$ is also true.

3. 1. and 2.  
   ⇒ $A$ and $B$ are true under the same circumstances.  
   ⇒ $A$ and $B$ have the same truth-condition.

▸ When $A$ contradicts $B$, it necessarily follows that $B$ contradicts $A$. (i.e. it’s impossible that $A$ contradicts $B$ but $B$ doesn’t contradict $A$).
More examples

(8) Alvin kissed Elvina passionately.
   a. Alvin kissed Elvina.
   b. Alvin kissed Elvina many times.
   c. Alvin did not kiss Elvina.
   d. Elvina was kissed by Alvin.
   e. Alvin touched Elvina with his lips.
   f. Elvina kissed Alvin.
   g. Elvina was kissed.

- (8) entails (8a), (8d), (8e), (8g).
- (8) is entailed by none.
- (8) contradicts (8c); (8c) contradicts (8)
Neither true nor false

- A sentence is actually not always true or false. Sometimes it is neither true nor false.

(9)  
   a. The king of U.S. is from Boston.
   b. The king of U.S. is not from Boston.

(10) 
   a. Yasu is from Boston.
   b. Yasu is not from Boston.

- The sentences in (9) become true or false when the king of U.S. exists.

- We call this: presupposition.
Presupposition

Sentence $A$ **presupposes** Sentence $B$ iff

1. When $A$ is true, $B$ is true; and
2. When $A$ is false, $B$ is still true; and
3. When $B$ is false, $A$ is neither true nor false.

(11) a. The king of U.S. is from Boston.
    b. The king of U.S. exists.
More examples

(12) The mayor of Liverpool is bald.
    The mayor of Liverpool exists.

(13) Bill stopped smoking.
    Bill used to smoke.

(14) Someone is reading a book.
    NO PRESUPPOSITION

(15) Ken knows that it’s raining.
    It’s raining.

(16) My cousin lives in California with her family.
    I have a cousin, and she has a family.