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24.903  
Language & Structure III: Semantics and Pragmatics  
Spring 2003, 2-151, MW 1-2.30  
February 24, 2003  
Solutions to Assignment 1

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- (1) Many words can be thought of as related by a subset relation e.g. *dog* and *mammal*. The set of dogs is a subset of the set of mammals. Such words are said to be related by the hyponymy relation with *dog* being a hyponym of *mammal*. In many cases, hyponymy between words relates to entailment between sentences in the following way:  
If we have a sentence  $[\dots \alpha \dots]$ , and  $\beta$  is a hyponym of  $\alpha$ , then the sentence  $[\dots \beta \dots]$  entails (is a hyponym of) the sentence  $[\dots \alpha \dots]$ . Example: *chihuahua* is a hyponym of *dog*; hence *Halle owns a chihuahua* entails *Halle owns a dog*.  
Find an example in which this rule does **not** hold.

Some examples:

*All frogs are amphibians* ↗ *All animals are amphibians*  
*Halle doesn't have a chihuahua* ↗ *Halle doesn't have a dog*  
*Birds have wings* ↗ *Living creatures have wings*  
*I enjoy playing soccer* ↗ *I enjoy playing sports*  
*Jumbo is a small elephant* ↗ *Jumbo is a small animal*  
*Eldritch believes he is a bat* ↗ *Eldritch believes he is a mammal*

**Note:** Some of you provided entailments that failed by virtue of questionable hyponyms - e.g. *alleged criminal* and *criminal*. Since alleged criminals are not necessarily criminals, there is no reason to consider *alleged criminals* to be a hyponym of *criminal*. Also some of you offered examples like *I went to the bank* and *I went to the financial institution*, noting that entailment failed because the latter sentence lacked the ambiguity of *bank*. But on the river bank sense, *bank* is not a hyponym of financial institution. Therefore the absence of an entailment on that reading is hardly surprising.

- (2) The principle of compositionality states that the meaning of a complex expression can be derived from the meanings of its syntactic parts. Discuss why this is a plausible principle for human languages.

Our brains are finite objects. Because of this limitation, we can only know a finite number of lexical items, and a finite number of syntactic rules. Yet it is a well-known fact that linguistic competence consists of knowing a potentially infinite set of sound meaning pairs i.e. given a novel sentence, a native speaker is able to compute its meaning. The principle of compositionality is the only way we can generalize from a finite knowledge base (words, rules) to arbitrarily complex novel sentences.

Are there exceptions to this principle?

Yes. Idioms constitute the classic exception to the compositionality principle. These are cases like *kick the bucket*, *make headway*, *pay lip service* etc. In these cases, the meaning of the verb phrase does not seem to

emerge in any obvious fashion from the meaning of *kick* and *the bucket*. In fact, doing the straightforward meaning composition yields the literal meaning, if one exists.

Some of you pointed out that metaphors e.g. *My boss is a piranha*, irony e.g. *He's a genius, isn't he?*, and speech acts e.g. *It's hot in here* as a request for cooling as exceptions to the compositionality principles. I think that they are only partial exceptions because in order to understand these sentences, we first need to compute the compositional meaning. Once we have that, we need to do more. So such cases show that compositional semantics is not enough, and not that it is not relevant. Idioms are a more serious problem because in many cases the compositional meaning of the idiom is absurd (e.g. what is 'headway' and how does one construct it?) and it really seems to be the case that there is no compositional semantics to be done.

If you find any, discuss how they may fit into the general picture of a semantic theory that takes the compositionality principle for granted.

First let us consider idioms. Idioms only constitute a violation of the compositionality principle if we assume that words and atomic meanings (the smallest units of meaning) go hand in hand i.e. every word has a meaning and atomic meanings can only be assigned to individual words. This assumption is empirically flawed.<sup>1</sup> Some words seem to be semantically vacuous, other seem to have semantically complex meanings i.e. one word corresponding to two or more atoms of meaning. Further the existence of idioms provides evidence that atomic meanings can be assigned to pieces of phrase structure, and not just words. Once we relax our assumptions about what elements can constitute the atoms of semantic composition, the problem for the compositionality hypothesis disappears. As far as the semantic system is concerned *kick the bucket* just means *die*.

The case of metaphor, irony, and speech acts is somewhat simpler, at least at a programmatic level. As discussed above, we need to compute the compositional meanings as usual. In addition, we need to add modules to our theory to deal with metaphor, irony, and speech acts. There is some controversy regarding whether these systems are part of the linguistic system or whether they are part of our larger cognitive-inferential abilities.

**Note:** Some of you suggested ambiguous sentences as an exception to the principle of compositionality. It is not clear that they are. The different meanings of ambiguous sentences generally correspond to distinct syntactic structures, and it should be kept in mind that the input to compositional semantics isn't a string of words but a syntactic structure. In any case, even if many meanings sprung from the same syntactic structure, it would not form a violation to the compositionality principle. It would just tell us that our compositional mechanism should be a relation rather a function (i.e. single input, many outputs).

(3) Describe the readings of the following ambiguous sentences:

- a. Everything doesn't fit into this container. Scope ambiguity: Every > Negation: Everything is such that it does not fit into this container (i.e. Nothing fits into this container), Negation > Every: It is not the case that everything fits into this container (i.e. Somethings do not fit into this container).

There is also a third collective reading: The sum total of things do not fit into this container collectively (they may all do so individually).

- b. Ludo saw her duck under the table.

Ignoring whether *her* refers to *Ludo* or not:

There are two issues here - the lexical ambiguity of *duck* between a noun and a verb and the interpretation/attachment of *under the table*.

(i) the duck was seen, the duck was under the table

(ii) the duck was seen, Ludo was under the table

(iii) Ludo saw the woman duck, as a result of the ducking the woman ended up under the table

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<sup>1</sup>One problem with assumption is that it involves reference to the problematic notion *word*. Non-lexicalist theories of morphology (e.g. Distributed Morphology) have argued against using the notion *word* as a theoretical primitive. The appropriate notion seems to be *syntactic node*.

(iv) Ludo saw the woman duck, the ducking took place under the table

(v) Ludo saw the woman duck, Ludo was under the table

c. The missionaries are too hot to eat.

(i) the missionaries feel so hot that they don't want to eat.

(ii) the missionaries are so hot that they cannot be eaten.

The ambiguity depends upon the fact that we can relate either the subject or the object position of *eat* with missionaries. The first option is available because *eat* can appear without an object as in *I have already eaten*. Consider *put* which requires an object cf. *\*John put on the table*. Now consider *The missionaries are too hot to put on the table*. The subject reading disappears.

d. Visiting relatives can be pleasant.

*Visiting* could be an adjective on *relatives* or it could be a gerund and *relatives* its direct object. In the first case, it's the relatives who visit, and in the second case it is the activity of going to see one's relatives that is being commented upon.

e. They decided to meet on Tuesday.

An attachment ambiguity: *on Tuesday* could be part of the embedded clause or the matrix clause. When part of the lower clause, the sentence means that the meeting is planned for Tuesday. With the matrix clause attachment, the decision took place on Tuesday.

f. The first book that John said that Tolstoy wrote is on sale.

This sentence is a data point in the analysis of relative clauses.

The 'high' reading: *first* modifies *said*

The 'low' reading: *first* modifies *wrote*

g. John needs to drive faster than Mary does.

Case 1: *does* is replaced by *needs to drive*. This could be true under the following scenario: John is in El Paso, and Mary is in Dallas, and they both have to be in Austin by tomorrow morning. Then the speed that John needs to drive at is greater than the speed that Mary needs to drive at. Case 2: *does* is replaced by *drives*. This could be true under two scenarios: (i) Mary drives very slowly, never going above 30mph. John needs to drive faster than 30 mph. (ii) John is competing with Mary in a race. We don't know how fast Mary will drive, but if John is to win he must drive faster than she does.

h. My father tells me to work harder than my boss does.

Case 1: *does* is replaced by *tells me to work*. True under the following scenario: my father tells me to work 10 hrs. a day and my boss tells me to work 7 hrs. a day.

Case 2: *does* is replaced by *work*. True under the following two scenarios: (i) My boss works 7 hrs. a day. My father tells me to work 9 hrs. a day, (ii) My father doesn't know how much my boss works. He just tells me to work more than boss works.

(4) Identify the assertion, the implicatures, and the presuppositions (if any) of the following sentences.

a. Mary danced, too.

The presupposition is (ii). One way to test this is by converting *Mary came, too* into a non-declarative sentence and verifying which parts of its meaning survive:

Question: Did Mary come, too?

Negation: It is not the case that Mary came, too. Non-cancellability of Presupposition: # Mary came, too, but no one else came.<sup>2</sup>

b. It has been five years since I've seen John.

Assertion: I haven't seen John in the last five years.

Presupposition: I saw John five years ago.

c. I haven't seen John in five years.

Assertion: I haven't seen John in the last five years.

Implicature: I saw John five years ago.

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<sup>2</sup># is used to mark a semantically anomalous sentence.

- d. Only Sally talks to Sam.  
Assertion: Nobody but Sally talks to Sam.  
Presupposition: Sally talks to Sam.
- e. Even Sally talks to Sam.  
Assertion: Sally talks to Sam.  
Presupposition: On the scale of people likely to talk to Sam, Sally is quite low.

**Note:** Some of you correctly observed that *too* does not necessarily carry the presupposition that someone else came. Depending upon what is focussed, the presupposition could be that Mary did something else. Usually the intonation disambiguates. The contribution of *too* is that it presupposes an alternative proposition determined by focus. This point is also true for *only* and *even*.

(5) Exercise on Page 9 of Heim & Kratzer.

- a.  $\{a\} = \{b\}$   
Equal iff  $a = b$
- b.  $\{x : x = a\} = \{a\}$   
Always Equal
- c.  $\{x : x \text{ is green}\} = \{y : y \text{ is green}\}$   
Always Equal, variable names do not matter as long as the dependencies are the same.
- d.  $\{x : x \text{ likes } a\} = \{x : x \text{ likes } b\}$   
Equal iff all the people who like  $a$  like  $b$ , and vice versa. This is trivially true if  $a = b$ .
- e.  $\{x : x \in A\} = A$   
Always Equal
- f.  $\{x : x \in \{y : y \in B\}\} = B$   
Always Equal
- g.  $\{x : \{y : y \text{ likes } x\} = \phi\} = \{x : \{x : x \text{ likes } x\} = \phi\}$   
These two sets are not necessarily equal. But this does not mean they can never be equal. To determine the circumstances under which they are equal, let us see what they stand for.  
The LHS is the set of people such that the set of people who like them is empty i.e. the LHS is the set of people who nobody likes.  
The RHS is a curious set. The top-level  $x$  does not actually bind anything. Such sets can either denote the universal set  $U$  or  $\phi$  depending upon whether the inner proposition is true or false. The inner proposition is  $\{x : x \text{ likes } x\} = \phi$ . If this proposition is true, it means that the set  $\{x : x \text{ likes } x\}$  is empty i.e. there are no people who like themselves. To rephrase: If the world contains no self-likers, the RHS =  $U$ . If the world contains self-likers, the RHS =  $\phi$ .  
**Case 1:** The LHS is  $\phi$ . If the LHS is  $\phi$ , it means that everyone in this world is liked by someone or the other. If LHS = RHS, this means that RHS =  $\phi$  i.e. the world contains self-likers. So the LHS and RHS can be  $\phi$  when everyone is liked by someone and at least one person likes her/himself.  
**Case 2:** The LHS is  $U$ . If LHS is  $U$ , then no one in this world is liked by anyone. If LHS = RHS, this means that RHS =  $U$  i.e. the world contains no self-likers. These two situations are compatible (in fact the LHS situation entails the RHS situation). So the LHS and RHS can be  $U$  when no one likes anyone.  
To sum up, the two sets are equal if (i) everyone is liked by someone and at least one person likes her/himself, or (ii) no one likes anyone. In all other cases, the two sets are unequal.