Partee 1995: Towards a compositional theory

Chris Potts, Ling 130a/230a: Introduction to semantics and pragmatics, Winter 2016

Jan 7

1 Overview

Themes

• The interpretation of proper names
• A typology of modifier meanings
• The prevalence of vagueness and context-dependence
• Compounds and the limits of compositionality

Page references are to Partee 1995. For more on the issues raised by this article for cognitive science more generally should check out Kamp & Partee 1995.

2 Guiding principles

Compositionality

A. J. Ayer’s ‘principle of verification’ (Ayer 1936:48) “We say that a sentence is factually signif-
icant to any given person if, and only if, he knows how to verify the proposition which it purports
to express — that is, if he knows what observations would lead him, under certain conditions, to
accept the proposition as being true, or reject it as being false.”

Lewis’s advice “In order to say what a meaning is, we may first ask what a meaning does, and
then find something that does that.”

Creswell’s “Most Certain Principle” “For two sentences $\alpha$ and $\beta$, if [in some possible situation
– BHP] $\alpha$ is true and $\beta$ is false, $\alpha$ and $\beta$ must have different meanings.”

Converse Creswell If $\alpha$ and $\beta$ have different meanings, then some situation should be such that
$\alpha$ is true and $\beta$ is false.
Partee’s methodology  “Compositional semantic analysis is typically a matter of working backward from intuitions about sentences’ truth-conditions […] ; and reasoning our way among alternative hypotheses concerning (a) lexical meanings, (b) syntactic structure, and (c) modes of semantic composition. Choices of any one of those constrain choices among the others; some choices lead to dead ends or at least make things much harder; others survive.” (p. 322)

3 Interpretation
The interpretation function is [ ]. It is our bridge from language to the world.

4 Proper names
4.1 Kripke’s (1980) direct-reference theory of proper names
Proper names refer directly to the entities they pick out.

\[
[Bart] = \text{Bart} \quad [Burns] = \text{Burns}
\]

i. Baptism: There is an initial “baptism”, in which the entity is named.

ii. Convention: From then on, it is a convention of the language (and the society), that that name picks out that particular entity.

iii. A historical chain of users: Speaker \( S_n \) acquires the name from speaker \( S_{n-1} \), who acquires it from \( S_{n-2} \), and so forth, all the way back to people who were present at the “baptism”.

iv. Intentions: If I am not part of such a historical chain but I use the name anyway, then I do so with the intention to refer to the same entity that speakers in the chain intend to refer to.
4.2 Proper names and definite descriptions: A comparison

Some confusion about authorship

It happens that

(1) \[ \text{The author of } \text{Syntactic Structures} = \]

(2) \[ \text{Noam Chomsky} = \]

Suppose we learned that Chomsky did not in fact write \text{Syntactic Structures}. Suppose it was written by Kurt Vonnegut. What would happen to our intuitions about the values in (1) and (2)?

Some confusion about the meaning of a proper name

Suppose I falsely believe the equation in (3) (because I am not part of the historical chain for this name):

(3) \[ \text{Noam Chomsky} = \]

What truth values does the direct-reference theory assign to the utterances in (4) and (5)?

(4) “Noam Chomsky wrote \text{Syntactic Structures}.”

(5) “Noam Chomsky wrote \text{Slaughterhouse-Five}.”
5 Modification

5.1 The typology

Intersective  An adjective ADJ is intersective iff (‘if and only if’), for all N, $[ADJ N] = [ADJ] \cap [N]$

Subsective  An adjective ADJ is subsective iff, for all N, $[ADJ N] \subseteq [N]$

Nonsubsective  An adjective ADJ is nonsubsective iff ADJ is not subsective, i.e., there is at least one N such that $[ADJ N] \not\subseteq [N]$

Privative  An adjective ADJ is privative iff, for all N, $[ADJ N] \cap [N] = \emptyset$

Examples

(6) a. future
    b. so-called
    c. virtual
    d. foreign
    e. boring
    f. current
    g. actual
    h. non-

Question  What problems do we face if we try to define $[former]$ and $[skillful]$ as sets?
5.2 Interpretation

(7) If ADJ is intersective:

$$[\text{ADJ}] \cap [\text{N}]$$

(8) If ADJ is not intersective:

$$[\text{ADJ}][\text{N}]$$

(The other nonintersective subtypes tell us something about what function \([\text{ADJ}]\) is, but there is still an incredible amount of room for variation in meaning.)

Predicate-to-Prenominal Shift (p. 345)  If ADJ has an interpretation as denoting a set \(S_{\text{ADJ}}\), then that ADJ also has a possible interpretation as a function applying to a set, namely as the function \(F_{\text{ADJ}}\) such that \(F_{\text{ADJ}}(S_N) = S_N \cap S_{\text{ADJ}}\).

(9) If \([A]\) is an individual, then \([A \text{ BE ADJ}]\) is interpreted as \([A] \in [\text{ADJ}]\).
6 Vagueness and context dependency

“Even the line between vague and nonvague predicates is vague; a concept may count as sharp for most purposes but vague relative to the demands of scientific or legal or philosophical argument. Probably almost every predicate is both vague and context-dependent to some degree.” (p. 332)

The role of context

(10) a. Win is a tall 14-year-old. (p. 330)
    b. Win is a basketball player.
    c. Therefore Win is a tall basketball player.

(11) a. My 2-year-old son built a really tall snowman yesterday. (p. 331)
    b. The D.U. fraternity brothers built a really tall snowman last weekend.

Sorites Paradox

(12) a. A $5 cup of coffee is expensive (for a cup of coffee).
    b. Any cup of coffee that costs 1 cent less than an expensive cup of coffee is expensive (for a cup of coffee).
    c. Therefore, any free cup of coffee is expensive. (Kennedy 2007)

(13) “12:01 is noonish”, “one hair on his head”, “10,000 grains of sand is a heap”, . . .

(14) \[\text{expensive}^c = \{x \mid x \text{ is above } c \text{ on the scale of costs}\}\]

A closing note

it is also worth noting that as one studies how vagueness works in more detail, one quickly overcomes the common prejudice that vagueness is always a bad thing, that it is some kind of “defect” of natural language. (p. 336)
7 Compounds and the limits of compositionality

<table>
<thead>
<tr>
<th>Modifier-head</th>
<th>Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>black BIRD</td>
<td>BLACK bird</td>
</tr>
<tr>
<td>black BOARD</td>
<td>BLACK board</td>
</tr>
<tr>
<td>white HOUSE</td>
<td>WHITE house</td>
</tr>
<tr>
<td>toy STORE</td>
<td>TOY store</td>
</tr>
<tr>
<td>brick FACTORY</td>
<td>BRICK factory</td>
</tr>
</tbody>
</table>

From one of Lelia Glass's guest lectures last year, reporting on joint work with Dan Jurafsky and Beth Levin (Levin et al. 2014):

Partee on compounds
* “Semanticists... do not expect a semantic theory to provide a compositional semantics for compounds”
* “One of the challenging parts of the problem is how to articulate the interface between linguistic and non-linguistic contributions...”
* “[Compounding], like … vagueness and context-dependence, appears to exploit the cognitive capabilities of language users in ways that allow natural languages to be much more flexible than we can allow … formal languages to be”

Our study
* 948 two- and three-word noun-noun and adjective-noun compounds in the conceptual domain of food and cooking, scraped from the web:
  + Greens and legumes (clear natural kinds)
  + Cooking utensils (clear artifacts)
  + Cake/cookie recipes (also artifacts, but less function-oriented)
* Coded each compound for the relation between head and modifier

Examples
<table>
<thead>
<tr>
<th>Greens/beans</th>
<th>Utensils</th>
<th>Cakes/cookies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lima bean</td>
<td>Apple corer</td>
<td>Honey cake</td>
</tr>
<tr>
<td>Adzuki bean</td>
<td>Citrus sprayer</td>
<td>Date bars</td>
</tr>
<tr>
<td>Green bean</td>
<td>Bottle opener</td>
<td>Skillet cake</td>
</tr>
<tr>
<td>Kidney bean</td>
<td>Bread knife</td>
<td>Cowboy cookies</td>
</tr>
<tr>
<td>Winter pea</td>
<td>Cheese grater</td>
<td>Tea cake</td>
</tr>
</tbody>
</table>

Results
* We grouped the head-modifier relations into four meta-relations:
  + (i) describe entity’s perceptual properties
  + (ii) describe entity’s environment
  + (iii) evoke associated event
  + (iv) used a borrowed word (e.g, adzuki bean)

<table>
<thead>
<tr>
<th>Metarelations</th>
<th>Greens/Legumes</th>
<th>Utensils</th>
<th>Cakes/cookies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual</td>
<td>43%</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Environmental</td>
<td>30%</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Associated</td>
<td>8%</td>
<td>80%</td>
<td>73%</td>
</tr>
<tr>
<td>Borrowed</td>
<td>13%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
<td>10%</td>
<td>5%</td>
</tr>
</tbody>
</table>
References


Levin, Beth, Lelia Glass & Daniel Jurafsky. 2014. Corpus evidence for systematicity in English compounds. In *Sinn und bedeutung 19*,.