24.903 Week #3 – 2022-02-14 + 2022-02-16

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1 The compositionality puzzle of modification

The intransitive predicate *foggy* can be used to attribute a property of an individual (as in *London (is) foggy*). But it can also be used to modify another predicate:

(1) London (is a) foggy town.

This presents us with a "compositionality puzzle", since two elements of type $\langle e, t \rangle$ cannot combine via Function Application.

2 General strategies

In general, there are several possible strategies for resolving compositionality puzzles:

1. Rethink assumptions about syntactic structure: different hierarchical structure, covert terminal elements, syntactic transformations on the way to surface realization
2. Rethink the meanings: meaning of the combination, meanings of the parts
3. Rethink assumptions about the inventory of composition principles

In class, we discussed some of the syntactic options, including the idea that (1) is the result of a "Conjunction Reduction" transformation from a source of the form *London is foggy and London is a town*.

Since this is a semantics class, we focus on semantic solutions. This will eventually contribute to a clear understanding on the space of options.

At first, we will be working with the same intuition as the syntactic options: that the way *foggy* and *town* combine is essentially conjunction. Both are

one-place predicates and the combination is true of an individual iff both components are true of that individual.

3 Two main options

The main two semantic solutions to the puzzle posed by (1) are:

- a "higher" type ($\langle\langle e,t\rangle,\langle e,t\rangle\rangle$) for one of the elements (we chose *foggy*)
- a new composition principle

Type $\langle et, et\rangle$:

(2) For any world w,
$[\![\text{foggy}]\!]^w = \lambda f_{et}.\ \lambda x_e.\ x$ is foggy in w and $f(x) = 1$

The new composition principle:

(3) PREDICATE MODIFICATION
If a constituent α has two daughters β and γ that are both of type $\langle e,t\rangle$, then for any world w, $[\![\alpha]\!]^w = \lambda x_e :\ [\![\beta]\!]^w(x) = [\![\gamma]\!]^w(x) = 1$.

The higher type meaning allows us to stay with just Function Application as our semantic engine. On the other hand, adding Predicate Modification allows us to stay with lower types.

4 Two *foggy*s?

Positing a higher type meaning for *foggy* raises the question of what happens in uses where it's not used as a modifier but as a predicate itself. Are there two meanings for *foggy*?

(4) a. London is foggy.

b. London is a foggy town.

We could rethink (4a) and say that *foggy* is of type $\langle et, et\rangle$ there too. But then, we need to provide it with a "dummy" predicate to modify (perhaps a covert element that denotes D_e?).

Or, we could accept that there are two meanings for *foggy*. To minimize the cost, we can explore deriving one meaning from the other by what is called a "type-shifting" operation. This operation could be associated with a covert

element in the syntax or it could be deployed "in the lexicon". Let's develop the latter idea:

(5) For any (?) adjective (?) α of type $\langle e,t\rangle$, there is a homophonous adjective α' with the following meaning:
for any world w: $[\![\alpha']\!]^w = \lambda f_{\langle e,t\rangle}.\ \lambda x_e.\ f(x) = 1$ and $[\![\alpha]\!]^w(x) = 1$.

The operation in (5) is called a form of "type-*lifting*". We could also go the other way and do "type-*lowering*":

(6) For any (?) adjective (?) α of type $\langle et, et\rangle$, there is a homophonous adjective α' with the following meaning:
for any world w: $[\![\alpha']\!]^w = \lambda x_e.\ [\![\alpha]\!]^w(\lambda y_e.1)(x) = 1$.

5 An argument for the $\langle et, et\rangle$ type?

The high-type analysis gives us additional power: it is possible to define meanings that go far beyond mere conjunction of two one-place predicates. One can couch this as a reason not to go that way: the analysis allows too many possible meanings. We discussed that the higher type contains meanings that are unattested:

(7) For any world w, $[\![\text{blarble}]\!]^w = \lambda f_{e,t}.\ \lambda x_e.$ there is a $y \in D_e$ such that x lives in y in w.

This would make *Aline is a blarble town* mean that Aline lives in a town. Such meanings don't exist for adjectives.

But one can also try to devise arguments for this analysis from cases where it seems that the combination goes beyond mere conjunction.

(8) Alex is a tall horse.

Alex is tall *for a horse*, not necessarily tall compared to a giraffe.

(9) For any world w, $[\![\text{tall}]\!]^w = \lambda f_{et}.\ \lambda x_e.\ (f(x) = 1$ and
x is taller in w than the average member of $\text{Char}_f)$

(Here, Char_f is the set of individuals characterized by the function f.)

6 Further examples

We can show that the set of individuals that *tall* compares its subject to is not always (solely) provided by its sister.

(10) My horse, Alex, is tall.

(11) My 2-year-old son built a really tall snowman yesterday.

(12) The students on built a really tall snowman last weekend.

(13) (Pauline is a horse, shorter than the average horse. She hangs out with a group of ponies, smaller animals than her.)
Pauline is a tall horse.

(14) (Jumbo is an elephant in a scenario populated with an army of monsters like King Kong.)
Jumbo doesn't have a chance; he's only a small elephant.

7 Interim conclusion

(Heim & Kratzer 1998)'s proposal on p.71, (19):

(15) $[\![\text{small}]\!] = \lambda x_e$. x's size is below c, where c is the size standard made salient in the utterance context.

But we can show that somehow, the context needs to be different for each animal in (16) and for the cat and the horse in (17).

(16) Every animal in this book is small.

(17) This cat is big and this horse is small.

Clearly, we have much work to do in understanding how context interacts with meaning.

References

Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar*. Oxford: Blackwell.