24.903 Week #4 – 2022-02-22 + 2022-02-23

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1 Cautionary remarks about meta-language

1. Write "in w" only for meanings that are in fact world-dependent. Negation, conjunction, *the* (see below) are expressions that in themselves are not world-dependent. The world-dependence of the sentences they occur in is due to one or more predicates that are world-dependent.
2. "$f(x)$" is a truth-value (assuming f is of type $\langle e, t\rangle$ and x is of type e), so, "$f(x) = 1$ and $g(x) = 1$" is a sensible thing to state in the meta-language: that both truth-values are the truth-value 1; on the other hand, "$f(x)$ and $g(x)$" does not make sense, since meta-language "and" should conjoin meta-language statements
3. Try to stick to the convention of using x, y, z as variables for individuals and f, g, h as variables for functions.

2 Sample calculation of the day

Here's a finger exercise: calculate the truth-conditions of (1).

(1) Luana (is) (an) athlete and from Brazil.

Use the meaning of *and* of type $\langle\langle e, t\rangle, \langle\langle e, t\rangle, \langle e, t\rangle\rangle\rangle$ that we've used before.

Because some of the calculation gets quite involved, we will work on some smaller constituents separately and then feed their meanings into the calculations of the bigger constituents.

(2) For any world w, $[\![\text{from Brazil}]\!]^w$
$= [\![\text{from}]\!]^w([\![\text{Brazil}]\!]^w)$
$= [\![\text{from}]\!]^w(\text{Brazil})$
$= (\lambda x_e.\lambda y_e.\ y \text{ is from } x \text{ in } w)(\text{Brazil})$
$= \lambda y_e.\ y \text{ is from Brazil in } w$

(3) For any world w, $[\![\text{and from Brazil}]\!]^w$
$= [\![\text{and}]\!]^w([\![\text{from Brazil}]\!]^w)$
$= [\![\text{and}]\!]^w(\lambda y_e.\ y \text{ is from Brazil in } w)$
$= (\lambda f_{et}.\lambda g_{et}.\lambda x_e.\ f(x) = 1 \text{ and } g(x) = 1)(\lambda y_e.\ y \text{ is from Brazil in } w)$
$= \lambda g_{et}.\ \lambda x_e.\ (\lambda y_e.\ y \text{ is from Brazil in } w)(x) = 1 \text{ and } g(x) = 1$
$= \lambda g_{et}.\ \lambda x_e.\ x \text{ is from Brazil in } w \text{ and } g(x) = 1$

(4) For any world w, $[\![\text{athlete and from Brazil}]\!]^w$
$= [\![\text{and from Brazil}]\!]^w([\![\text{athlete}]\!]^w)$
$= (\lambda g_{et}.\ \lambda x_e.\ x \text{ is from Brazil in } w \text{ and } g(x) = 1)([\![\text{athlete}]\!]^w)$
$= \lambda x_e.\ x \text{ is from Brazil in } w \text{ and } ([\![\text{athlete}]\!]^w)(x) = 1$
$= \lambda x_e.\ x \text{ is from Brazil in } w \text{ and } (\lambda y_e.\ y \text{ is an athlete in } w)(x) = 1$
$= \lambda x_e.\ x \text{ is from Brazil in } w \text{ and } x \text{ is an athlete in } w$

(5) For any world w, $[\![\text{Luana athlete and from Brazil}]\!]^w$
$= [\![\text{athlete and from Brazil}]\!]^w([\![\text{Luana}]\!]^w)$
$= [\![\text{athlete and from Brazil}]\!]^w(\text{Luana})$
$= (\lambda x_e.\ x \text{ is from Brazil in } w \text{ and } x \text{ is an athlete in } w)(\text{Luana})$
$= 1$ iff Luana is from Brazil in w and Luana is an athlete in w

3 The determiner *the*

From Bertrand Russell's *Introduction to Mathematical Philosophy* (1919):

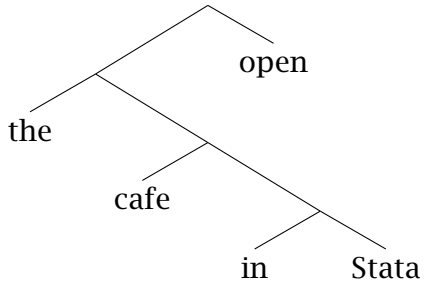
> … in this chapter we shall consider the word "the" in the singular, and in the next chapter we shall consider the word *the* in the plural. It may be thought excessive to devote two chapters to one word, but to the philosophical mathematician it is a word of very great importance: like Browning's grammarian with the enclitic *de*, I would give the doctrine of this word if I were "dead from the waist down" and not merely in prison.

We have now seen two uses of "one-place" predicates: as the main predicate in sentences (*London is foggy*) and as modifiers of other predicates (*foggy town*). Here's yet another: they can be used to refer to individuals. The element that makes that possible is the definite determiner *the*, which is used to form "definite descriptions":

(6) The cafe in Stata is open.

How does the sentence in (6) work? We worked with the following structure:

(7)



The idea we developed is that *the* combines with the one-place predicate *cafe in Stata* and refers to the unique individual that predicate is true of.

This will only work if the predicate is in fact true of a unique individual. Otherwise, *the* cannot do its job of referring to the unique "truth-maker" of the predicate.

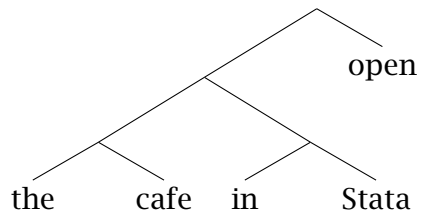
We arrived at the following meaning for *the*:

(8) For any world w,
$[\![\text{the}]\!]^w = \lambda f :\ f \in D_{\langle e,t\rangle}$ and $|\{x \in D_e :\ f(x) = 1\}| = 1$.
the unique individual $y \in D_e$ such that $f(y) = 1$

The determiner *the* is a function that is only defined for arguments of type $\langle e, t\rangle$ that are true of exactly one individual; when defined, it returns the unique individual that the argument function is true of.

A question to ponder: what would happen if the structure of (7) were the following?

(9)



4 A problem?

Imagine you come home and you're told:

(10) The dog is tired.

It's unlikely that the speaker or you are under the delusion that there is only one dog in the world. But still such uses of definite descriptions are widespread and in fact perhaps the most common use.

What we say about this is that *the* doesn't require absolute uniqueness of its sister; rather, what's needed is contextual uniqueness: there needs to be a unique dog that is salient in the context.

Heim & Kratzer 1998 propose the following meaning for *the*:

(11) For any world w,
$[\![\text{the}]\!]^w = \lambda f :\ f \in D_{\langle e,t\rangle}$ and $|\{x \in D_e \cap C :\ f(x) = 1\}| = 1$.
the unique individual $y \in D_e \cap C$ such that $f(y) = 1$,
where C is a contextually salient subset of D_e.

This is the second time that we run across the need to refer to something being contextually salient. The first time was when we discussed the contextually salient comparison set that adjectives like *tall, small*, etc. are sensitive to.

It is clear that we will have to tackle this phenomenon more systematically.

5 Many context-dependent items

5.1 Classic indexicals: *I, here, now*

- The pronoun *I* refers to the speaker in the context of an utterance.
- The locative adverb *here* refers to the location of the context of an utterance.
- The temporal adverb *now* refers to the time of the context of an utterance.

We introduce "the context" as an additional parameter of our interpretation system. Like the world parameter, we write it as a superscript on the right

of the semantic value brackets, but in reality it is an additional argument of the meanings of expressions.

So, we can now write:

(12) For any context c and any world w, $[\![\text{I}]\!]^{c,w}$ = the speaker of c.

And the meaning for *the* can become:

(13) For any world w,
$[\![\text{the}]\!]^{c,w} = \lambda f :\ f \in D_{\langle e,t\rangle}$ and $|\{x \in D_e \cap C :\ f(x) = 1\}| = 1$.
the unique individual $y \in D_e \cap C$ such that $f(y) = 1$,
where C is the subset of D_e that is salient in c.

5.2 The Answering Machine Paradox

Consider the following outgoing message on an old-fashioned answering machine:

(14) I'm not here right now, but you can leave a message after the beep.

What is "the context" for such an utterance? Clearly, the speaker was "here right now" when they recorded the message (how else could they have recorded the message?). So, is (14) a blatant falsity? We brainstormed an initial response. For more on this puzzle, see Cohen & Michaelson 2013.

5.3 Contextual glue

Consider nominal compounds like *swan boat*. These compounds function as one-place predicates:

(15) a. Esmeralda is a swan boat.

b. The swan boat has a leak.

What are the roles of the two components of the compound?

The right hand noun is the "head" of the construction. A *swan boat* is a kind of boat, not a kind of swan. In fact, all English nominal compounds are right-headed. A *tea man*, whatever that is, will be a man. The *apple juice seat*, whatever that is, will be a seat.

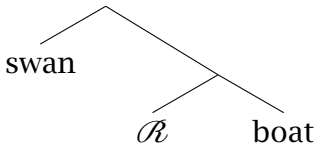
The other half of the compound is a modifier of the head. But what meaning does it contribute? Not only does this differ from example to example, a single compound like *swan boat* has multiple possible meanings, in fact an endless series of possible meanings:

- a boat shaped like a swan
- a boat pulled by a swan
- a boat with a depiction of a swan on its prow
- a boat that is transporting swans
- and so on, and so on

How can we capture this variability?

We propose that there is a covert element in the structure of nominal compound that functions as "glue" and that introduces a reference to context. *swan boat* has the following structure:

(16)



The covert element $\mathscr{R}$ has the following meaning:

(17) For any context c and any world w,
$[\![\mathscr{R}]\!]^{c,w} = \lambda f_{\langle e,t\rangle}.\ \lambda g_{\langle e,t\rangle}.\ \lambda x_e.\ f(x) = 1$ and there is a $y \in D_e$ such that $g(y) = 1$ and x stands in relation R to y in w, where R is the relation salient in c

This is just a first attempt. Much more sophistication is needed. A classic study of the range of meanings that nominal compounds can have is Downing 1977. An account that elaborates on the idea we sketched can be found in Weiskopf 2007.

6 What's next

In the next few weeks, we will look at several other ways in which context interacts with meaning.

7 Postscript

If you're curious, here are some verses from Browning's "A Grammarian's Funeral", which Russell alludes to:

> So, with the throttling hands of death at strife,
> Ground he at grammar;
> Still, thro' the rattle, parts of speech were rife:
> While he could stammer
> He settled *hoti*'s business let it be!
> Properly based *oun*
> Gave us the doctrine of the enclitic *de*,
> Dead from the waist down.

You can read the full poem at the website of the Poetry Foundation.

References

Cohen, Jonathan & Eliot Michaelson. 2013. Indexicality and the Answering Machine Paradox. *Philosophy Compass* 8(6). 580–592. DOI: 10.1111/phc3.12039.

Downing, Pamela. 1977. On the creation and use of English compound nouns. *Language* 53(4). 810–842. JSTOR: 412913.

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

Weiskopf, Daniel A. 2007. Compound nominals, context, and compositionality. *Synthese* 156(1). 161–204. DOI: 10.1007/s11229-005-3489-1.