Complementation

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PHIL 43916

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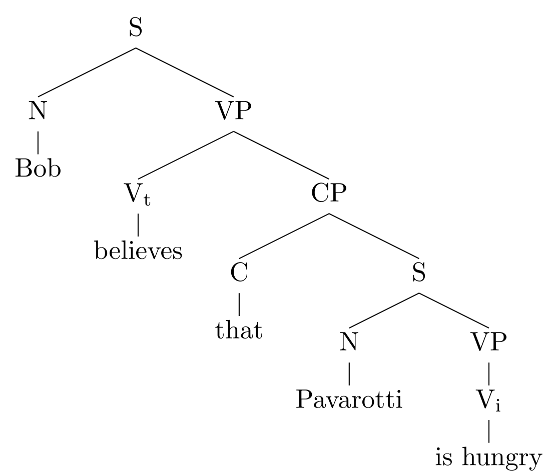
1 Sentence embedding

Consider the sentence

> Bob believes that Pavarotti is hungry.

What is the logical form of this sentence?

A plausible thought is that to answer this question we need to add two new categories to our syntax: the categories of complementizer (C) and complementizer phrase (CP). Using these categories, we might (ignoring tense for now) give the tree for this sentence as



The question is now how we understand the semantics of complementizers like 'that' and verbs like 'believes.'

We are accustomed to treating the semantic values of sentences as truth-values. Suppose that we just treated 'that' as semantically null, and let the semantic value of the CP node be the same as the semantic value of its daughter S node. What would be wrong with this strategy?

Suppose instead that we gave 'that' a semantic value – say, a function which took as argument the semantic value of the S node. Would this help?

A better approach is to treat 'that' in the way that we have treated 'former', 'necessarily', and 'it was the case that' – as operating on the intension, rather than the semantic value, of the relevant sentence.

For our purposes, we can think of S's *intension* as the set of worlds in which S is true. On this way of doing things, we'd give the rule for 'that' as

$$[\![[_{\text{CP}}\text{ that S}]]\!]^{M,w,i,g}=\{\text{w*:w*}\in\text{W and }[\![\text{S}]\!]^{M,w*,i,g}=1\}$$

This let's the semantic value of the complementizer phrase be identical to the intension, rather than the semantic value, of the S.

The text treats the semantic value of a that-clause as the characteristic function of the relevant set of worlds – i.e., the function which has value 1 when given as argument a world in the set, and value 0 otherwise. On that view we could give the lexical entry of 'that' as follows:

$$[\![[_{\text{CP}}\text{ that S}]]\!]^{M,w,i,g} = \text{f:f(w*)=1 iff }[\![\text{S}]\!]^{M,w*,i,g}=1$$

I'll stick with the more intuitive 'sets of worlds' way of doing things – nothing hangs on the choice.

How do we combine this with an account of 'believes'? The idea is that we can model the beliefs of a subject as a set of worlds: it is the set of worlds in which everything that that subject believes is true. So suppose my only beliefs are that South Bend is cold and that Los Angeles is hot. Then my 'belief set' is the set of possible worlds in which South Bend is cold and Los Angeles is hot.

Does your belief set include the actual world? Why or why not? How many worlds would be in God's belief set?

A connection to epistemology: the link between this view of belief and a conception of inquiry as eliminating possibilities.

Now consider some sentence

> Jeff believes that S

For this to be true, it must be the case that S is true in every world which is a member of my belief set – i.e., it must be true that, for all $w \in$ Jeff's belief set, $[\![\text{S}]\!]^{w}=1$. In other words, there must be no world in which S is false which is compatible with everything I believe.

Syntactically, we are treating complementizer phrases just like noun phrases – in particular, they are things which can combine with V_t's to form VP's. Suppose that we want to semantically treat the combination of 'believes' with a CP using our old rule for combining V_t's with names. What should the lexical entry be for 'believes'?

It would have to be a set of ordered pairs of individuals and sets of worlds. But which one?

An interesting consequence of this view of the syntax and semantics of belief (and other attitude) ascriptions concerns its interaction with quantification. Consider the sentence

> Jeff believes that a student in PHIL 43916 is a spy.

Our rules for the treatment of 'a student' permit us to form two different trees for this sentence. What are they? Do they correspond to a difference in truth conditions? Are there really two interpretations of the above English sentence?

What about our syntax for this sentence lets us generate this scope ambiguity?

Given our syntax for attitude ascriptions, we can talk about the scope of attitude verbs – just as we are accustomed to talk about the scopes of modal and tense operators, negation, and quantified noun phrases.

2 Infinitive & gerund embedding

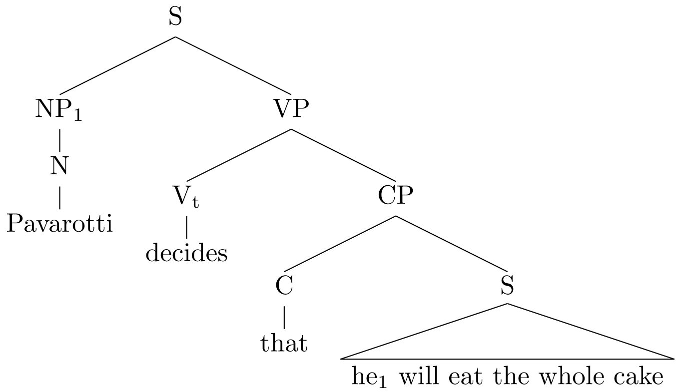
There are some similarities between sentence embedding and embedding of infinitival and gerundive phrases (IG's), as in the following sentences:

> Pavarotti suggested *eating the whole cake* .
>
> Pavarotti decided *to eat the whole cake* .

One natural suggestion is that we treat sentences like these as elliptical versions of cases of sentence embedding. So, for example, we might treat the second as elliptical for

> Pavarotti decided that he would eat the whole cake

which would have a logical form corresponding to the following tree:



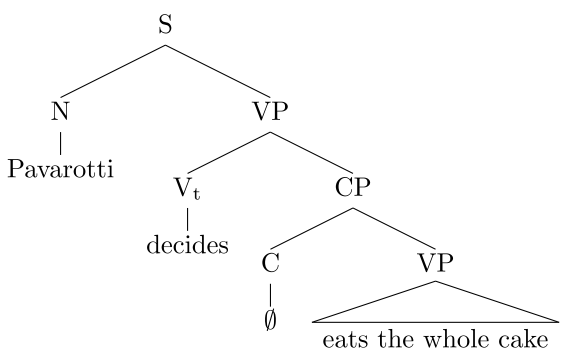
which we could understand using the semantics for 'that' developed above. But this sort of analysis faces a problem. Consider the following argument:

1. Pavarotti decided to eat the whole cake.
2. Loren decided the same thing Pavarotti decided.

C. Loren decided to eat the whole cake.

Is this argument valid? If so, is this predicted by our analysis?

One way to explain the validity of this argument is to modify our treatment of IG's. Perhaps we should take them to have, not the form described above, but rather something like



where '$\emptyset$' stands for the 'null complementizer.'

Let's first ask why we should posit the null complementizer at all. What would go wrong if we simply let the semantic value of the CP be the semantic value of the VP? What sort of thing is the semantic value of the VP?

So the null complementizer has to play some semantic role. How should we understand its semantics? We can understand them in a way parallel to the way we treated the complementizer 'that' above. Just as $[\![\text{that S}]\!]$ is the intension of S, so the semantic value of the above CP will be the intension of the VP 'eats the whole cake.' What sort of thing will this be?

In general, intensions are functions from worlds and times to semantic values. Since the semantic value of a VP is a set of individuals, the intension of a VP is a function from worlds and times to sets of individuals. Intuitively, it will be the function from a world w and time i to the set of things that eat the whole cake in w at i.

How would this analysis explain the validity of the above argument?

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Brief discussion of the relationship between sentence intensions and propositions, and VP intensions and properties.