Compositional Semantics
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1 Two Simple Examples

We begin with the following example sentence:

(1) Midge grins.

What we write in Figures 1 and 2 as

$$[\![\text{Midge grins}]\!]$$

is called the "semantic value" *Semantic value* is a theory neutral term that means whatever your particular semantic theory is using as the semantics of an expression today.

In the first example, Figure 1, we compute the semantics using only extensions, so the semantic value is always an extension.

In the next example, Figure 2, we compute the semantics using intensions.

To do semantics we need semantic rules that tell us how to compute the semantic values of the whole from the semantic values of the parts.

For our purposes the rule for Figure 1 looks like this

$$\begin{array}{l} \text{S} \rightarrow \text{NP VP} \\ [\![\text{S}]\!] = \text{true iff} \\ \qquad [\![\text{NP}]\!] \in [\![\text{VP}]\!];\ \text{otherwise} \\ [\![\text{S}]\!] = \text{false} \end{array}$$

This says the sentence is true if and only if the extension of the NP is IN the extension of the VP. The extension of the NP is an individual like Midge and the extension of the VP is a set of individuals, like

$$\{\ \text{Midge}, \text{Sue}, \text{Fred}\ \}$$

This is shown in Figure 1.

For our purposes the intension rule for Figure 2 looks like this:

$$\begin{array}{l} \text{S} \rightarrow \text{NP VP} \\ [\![\text{S}]\!]^w = \text{true iff} \\ \qquad [\![\text{NP}]\!]^w \in [\![\text{VP}]\!]^w;\ \text{otherwise} \\ [\![\text{S}]\!] = \text{false} \end{array}$$

Here we use

$$[\![\text{Midge grins}]\!]$$

for the intension of *Midge grins* and we use

$$[\![\text{Midge grins}]\!]^w$$

for the result of looking up the value of $[\![\text{Midge grins}]\!]$ at world w. So for example, given the intension computed for the sentence at the top of the tree in Figure 2, we have:

$$[\![\text{Midge grins}]\!]^{w_4} = \text{false}.$$

2 Exercises

1. Construct the tree showing the compositional semantic treatment for the following sentence:

   (2) Midge grins and Biff frowns.

   Give an extensional treatment using the extensions in Figure 1 and use the following extension for *frowns*:

   $$[\![[_{\text{V}} \text{ frowns }]]\!] = \{\text{Biff}, \text{Sue}, \text{Alice}\}$$

   Assume

   $$[\![[_{\text{Name}} \text{ Biff }]]\!] = \text{ Biff}$$

   For the compositional semantic treatment of *and*, use this rule:

   $$\begin{array}{l} \text{S} \rightarrow \text{S1 and S1} \\ [\![\text{S}]\!] = \text{true iff} \\ \qquad [\![\text{S1}]\!] = \text{true and } [\![\text{S2}]\!] = \text{true; otherwise} \\ [\![\text{S}]\!] = \text{false} \end{array}$$

   For more on the compositional semantic treatment of *and*, see the lecture on intension and extension. Be sure and compute what the extension of the complete sentence is; that is, be sure and determine whether the sentence is true or false with the given extensions.

2. Now construct the tree giving an intensional treatment and using the intensions in Figure 2. Again, give *and* a syncategorematic treatment. Use the following intension for *frowns*:

   $$[\![[_{\text{V}} \text{ frowns }]]\!] = \begin{array}{|c|c|} \hline w_1 & \{\text{Ned}, \text{Hugh}, \text{Lisa}\} \\ \hline w_2 & \{\text{Hugh}, \text{Tom}, \text{Mandy}\} \\ \hline w_3 & \{\text{Fred}, \text{Biff}, \text{Alice}\} \\ \hline w_4 & \{\text{Biff}, \text{Sue}, \text{Alice}\} \\ \hline \end{array}$$

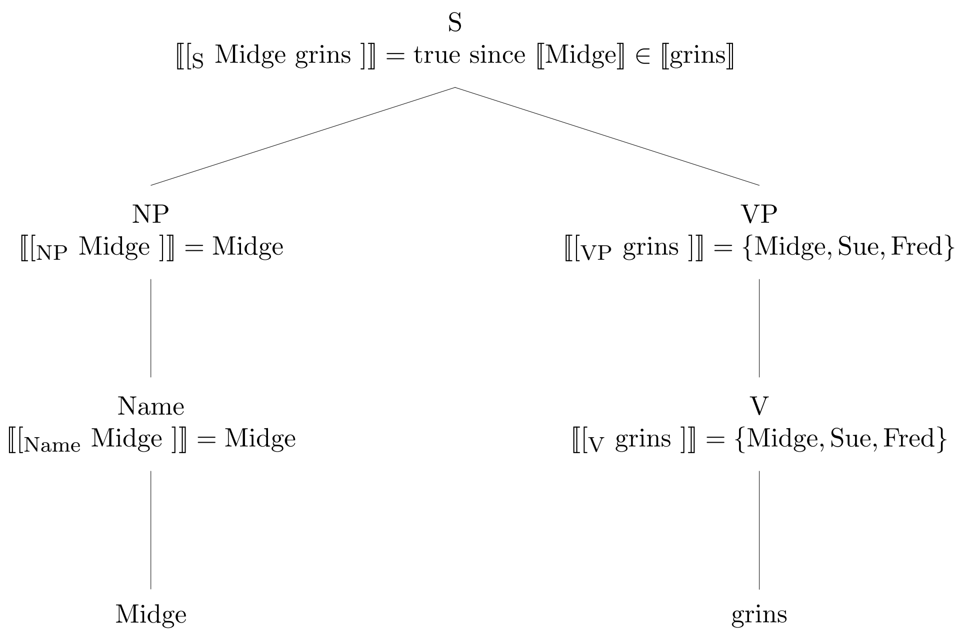

Figure 1: This tree uses only extensions

S

$[\![[_{\mathrm{S}}$ Midge grins $]]\!]^w =$ true iff $[\![\mathrm{Midge}]\!]^w \in [\![\mathrm{grins}]\!]^w$

w_1	Midge $\in$ {Midge, Sue, Fred}	true
w_2	Midge $\in$ {Midge, Randie, Fred}	true
w_3	Midge $\in$ {Midge, Sue, Alice}	true
w_4	Midge $\in$ {Biff, Frank, Joe}	false

NP

$[\![[_{\mathrm{NP}}$ Midge $]]\!] =$

w_1	Midge
w_2	Midge
w_3	Midge
w_4	Midge

VP

$[\![[_{\mathrm{VP}}$ grins $]]\!] =$

w_1	{Midge, Sue, Fred}
w_2	{Midge, Randie, Fred}
w_3	{Midge, Sue, Alice}
w_4	{Biff, Frank, Joe}

Name

$[\![[_{\mathrm{Name}}$ Midge $]]\!] =$

w_1	Midge
w_2	Midge
w_3	Midge
w_4	Midge

V

$[\![[_{\mathrm{V}}$ grins $]]\!] =$

w_1	{Midge, Sue, Fred}
w_2	{Midge, Randie, Fred}
w_3	{Midge, Sue, Alice}
w_4	{Biff, Frank, Joe}

Midge

grins

Figure 2: This tree uses intensions