P-set 3[1]

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[1] 24.979: Topics in semantics

Getting high: Scope, projection, and evaluation order

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1 Continuation semantics with assignments

In class I laid out one way of incorporating the "standard" theory of pronouns into continuation semantics, in such a way that Barker & Shan's theory of Weak Crossover (WCO) is preserved.

We assumed that pronouns (i) contribute an individual locally, (ii) *expect* a proposition, (iii) and *return* an assignment sensitive proposition.

(1) Pronoun (def.)

$$\mathsf{pro}_n := \frac{\lambda g\,.\,[]}{g_n} \qquad\qquad \mathsf{pro}_n : \frac{\mathrm{g} \to \mathrm{t} \mid \mathrm{t}}{\mathrm{e}}$$

Exercise 1: warming up

Compute the meaning of the following sentence, assuming the meaning for pronouns outlined above. Lower the result. What do you get? N.b. assume that the pronoun is *free*.

(2) Jo likes him_1.

Remember that, in order to accommodate tower types where the expected and return types differ, Scopal Function Application (SFA) has a more general typing (adjacent types must match, and cancel out):

(3) $\mathsf{S} : \frac{\mathrm{r} \mid \mathrm{i}}{\mathrm{a} \to \mathrm{b}} \to \frac{\mathrm{i} \mid \mathrm{e}}{\mathrm{a}} \to \frac{\mathrm{r} \mid \mathrm{e}}{\mathrm{b}}$

Lower also has a more general typing:

(4) $\downarrow : \frac{\mathrm{a} \mid \mathrm{t}}{\mathrm{t}} \to \mathrm{a}$

The definitions of these operations don't change.

On this account, quantifiers must be type-shifted into binders via an operation we called *abstract*:[4]

[4] This is the categorematic counterpart of Heim & Kratzer's *Predicate Abstraction* rule.

(5) Abstract (def.)

$$\Lambda_n\ m \coloneqq \lambda k\ .\ \lambda g\ .\ m\ (\lambda x\ .\ k\ x\ g^{[n \to x]}) \qquad \Lambda_n : \frac{t}{e} \to \frac{g \to t}{e}$$

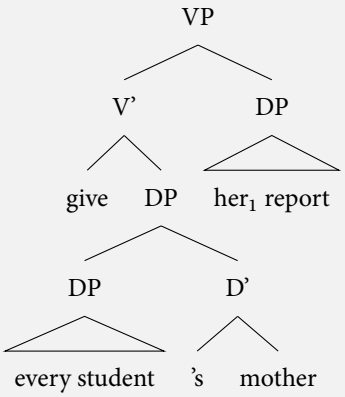
Exercise 2: getting hotter

Compute the meaning of the following sentence by abstract-shifting the binder:

(6) The teacher gave every student[1]'s mother her$_1$ report.

Assume that the Double Object Construction (DOC) has an *ascending* structure, i.e.:

(7)



See Janke & Neeleman 2012 for recent arguments that this structure *must* be available, at least some of the time, for the English verb phrase.

Exercise 3: Handling multiple pronouns

Try to compute and lower the meaning of the following sentence; explain what goes wrong (both pronouns are free).

(8) He$_1$ likes her$_2$.

2 *Going monadic*

In the answer to the previous question, you'll observe that there's a problem with the way in which we turn pronouns into scope-takers.[5] Recall pronouns in the standard theory has the following meaning:

[5] Keny Chatain inspired this set of exercises by pointing out this deficiency.

(9) Pronouns (standard def.)

$\mathsf{pro}_n \coloneqq \lambda g \,.\, g_n$ $\qquad\qquad$ $\mathsf{pro}_n : \mathsf{g} \rightarrow \mathsf{e}$

There's a different way to shift standard pronouns into scope-takers, via a function we'll call ⋆ (star).[6]

[6] Star is the *bind* of a `Reader` monad. In his dissertation, Charlow (2014) shows that for a given monad m the bind of that monad can be used to shift an inhabitant of m into a scope-taker. Here, we implicitly make use of the same idea.

(10) Star (def.)

$\star\, m \coloneqq \lambda k \,.\, \lambda g \,.\, k\, (m\, g)\, g$ $\qquad\qquad$ $\star : (\mathsf{g} \rightarrow \mathsf{a}) \rightarrow \dfrac{\mathsf{g} \rightarrow \mathsf{b}}{\mathsf{a}}$

Star-shifting a pronoun gives us the following entry:

(11) Star-shifted pronoun

$\star\, \mathsf{pro}_n = \lambda k \,.\, \lambda g \,.\, k\, g_n\, g$ $\qquad\qquad$ $(\star\, \mathsf{pro}_n) : \dfrac{\mathsf{g} \rightarrow \mathsf{t}}{\mathsf{e}}$

We can represent this meaning as a tower in the following way:

(12) Star-shifted pronoun (tower version)

$$\mathsf{pro}_n \coloneqq \frac{\lambda g \,.\, ([]\, g)}{g_n}$$

In order to accommodate the result of adopting this entry for the pronoun, we'll need a slightly different entry for lower:

(13) Lower (revised version)

$m^{\downarrow} \coloneqq m\, (\lambda p g \,.\, p)$ $\qquad\qquad$ $\downarrow : \dfrac{\mathsf{g} \rightarrow \mathsf{t}}{\mathsf{t}} \rightarrow g \rightarrow t$

Exercise 4

Convince yourself that our basic theory of variable binding remains intact. Compute the meaning of the following sentence, assuming the star-shifted def for the pronoun and the revised version of lower. We can keep our old version of abstract.

(14) Every boy^2 loves his$_2$ mother.

Now demonstrate how the star-shifted entry for the pronoun handles multiple pronouns in the following example:

(15) He$_1$ likes her$_2$.

References

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Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar* (Blackwell textbooks in linguistics 13). Malden, MA: Blackwell. 324 pp.

Janke, Vikki & Ad Neeleman. 2012. Ascending and Descending VPs in English. *Linguistic Inquiry* 43(2). 151–190.

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