Questions: Semantic and Computational Issues

Veneeta Dayal and Chung-chieh Shan

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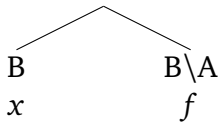
1. Variable-free semantics

(1) Every boy$_i$ loves his$_i$ mother.

Barbara Hall Partee. 1973. Some transformational extensions of Montague grammar. *Journal of Philosophical Logic* 2(4):509–534.

(2) a.



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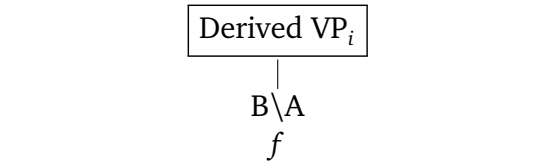

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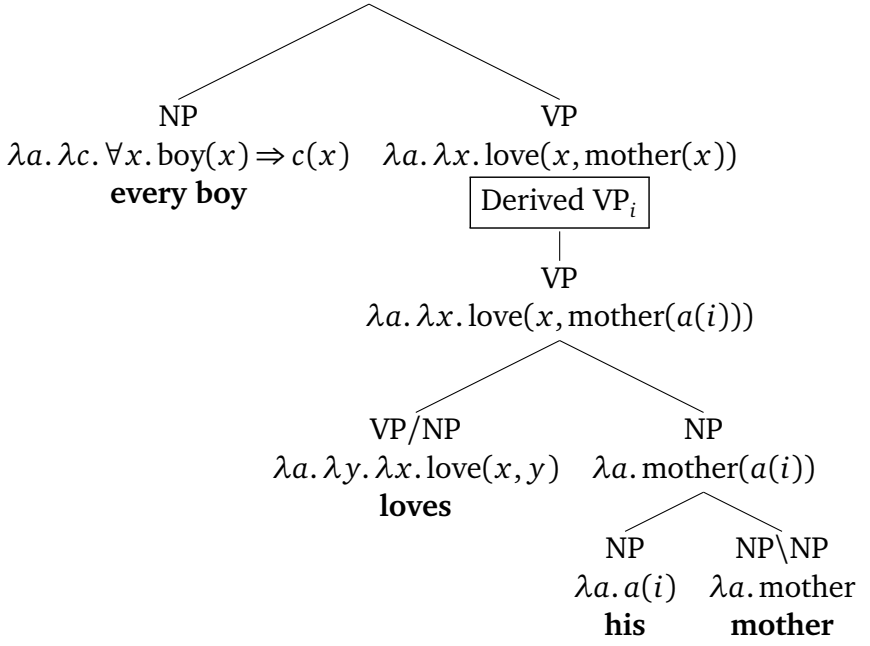
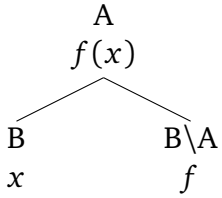


Pauline Jacobson. 1999. Towards a variable-free semantics. *Linguistics and Philosophy* 22(2):117–184.

(4) a.



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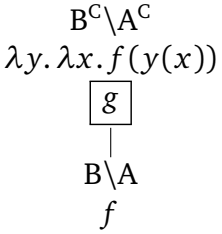

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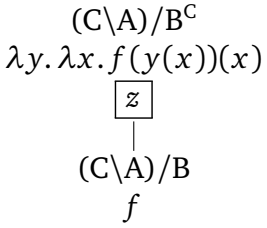
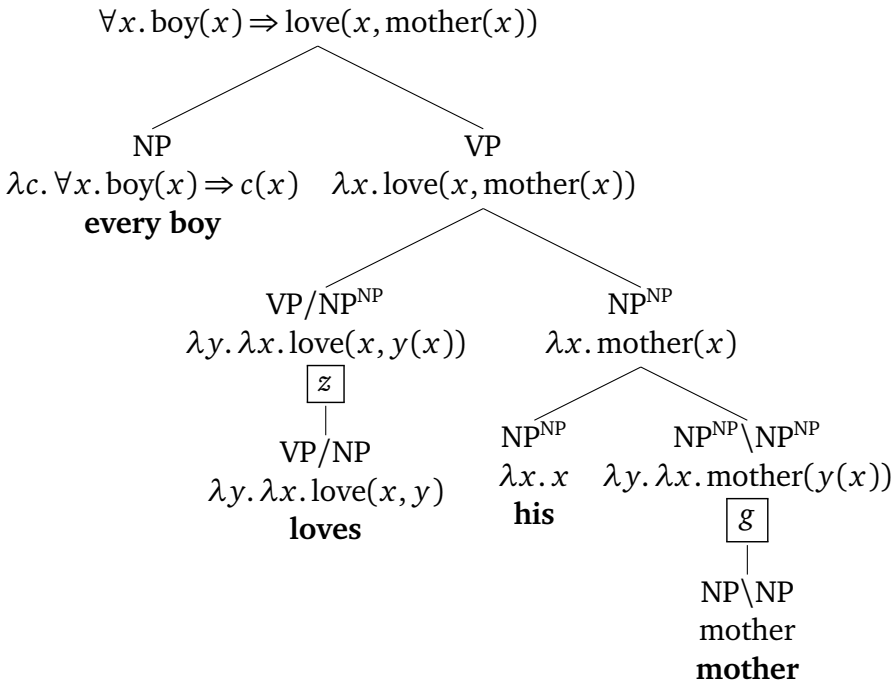


(5)



2. From functional questions to binding connectivity

We would prefer a unified explanation (Groenendijk & Stokhof, Engdahl, von Stechow, Jacobson, Sharvit, Winter).

(6) a. Who does every boy$_i$ love? —His$_i$ mother.
b. Who loves every boy$_i$? —*His$_i$ mother. (crossover)

(7) a. The woman that every boy$_i$ loves is his$_i$ mother. (specificational)
b. *The woman that loves every boy$_i$ is his$_i$ mother. (crossover)
c. *The woman that every boy$_i$ loves is married to his$_i$ father. (predicational)

(8) a. It is his$_i$ mother that every boy$_i$ loves.
b. *It is his$_i$ mother that loves every boy$_i$. (crossover)

Relative clauses stack.

(9) The woman that every boy loves that no boy fears is his mother.

A quantifier in a relative clause can bind into the head.

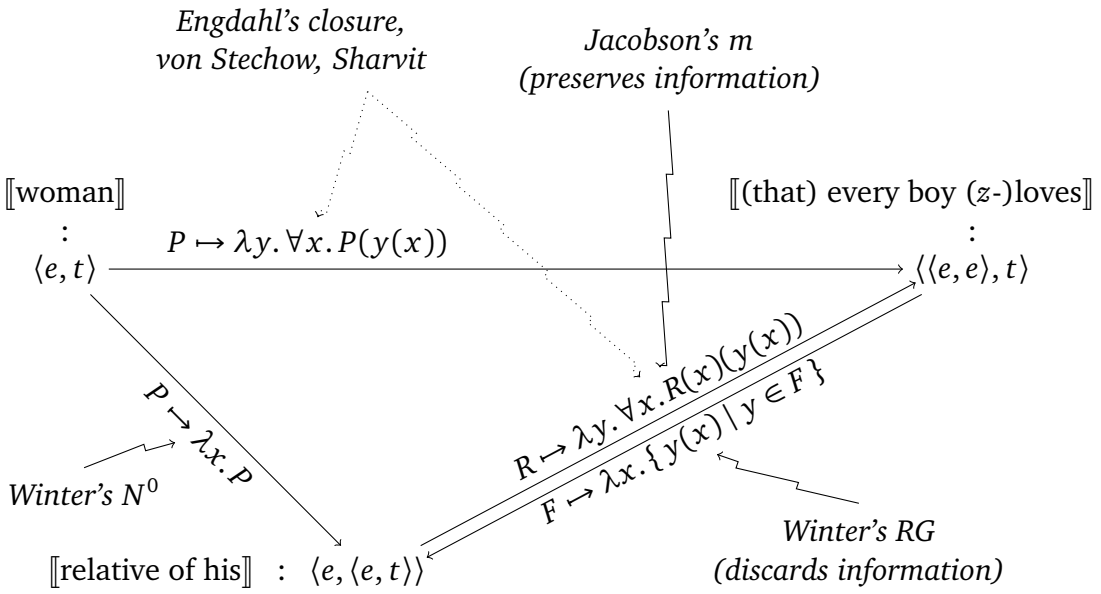
(10) a. Which relative of his$_i$ does every boy$_i$ love? —His$_i$ mother.
b. The relative of his$_i$ that every boy$_i$ loves is his$_i$ mother.

(11) a. The woman that he$_i$ loves that no boy$_i$ fears is his$_i$ mother.
b. The woman that every boy$_i$ loves that he$_i$ does not fear is his$_i$ mother.

(12) The assignment that every student$_i$ gave her$_j$ that every professor$_j$ most praised him$_i$ for was the last one he$_i$ handed in to her$_j$. (against reconstruction)

Compare: a quantifier in a relative clause can bind into pied-piped material.

(13) a. Whose gift to him$_i$ does every boy$_i$ love? —His$_i$ mother.
b. The woman whose gift to him$_i$ every boy$_i$ loves is his$_i$ mother.



Note: "$\forall x. \cdots$" above means "$\forall x. [y(x)$ is defined $\Rightarrow \cdots]$".

Jacobson: {intersect sets of, quantify over, equate, ask for} functions from individuals to individuals.

Winter: {intersect sets of, quantify over, equate, ask for} individuals, pointwise over individuals (compare Winter's ACOND to the reader monad's bind operation (>>=)).

- Hence the functional reading is restricted to specificational sentences.
- Numeral determiners (*{a/one/two/how many} women that every boy loves*) count individuals, not functions.

Like before, these analyses explain the parallel with weak crossover by the quantifier's binding into the gap.

3. The domain of pronouns

(Thanks to Barker, Heycock, Jacobson, Winter.)

Some mothers are not women but deers.

Shifting the head to type $\langle\langle e, e\rangle, t\rangle$ yields a set that excludes any function that maps Bambi to his mother. Therefore, we must let *his mother* not range over all male animate individuals with a mother. The most obvious way is to let *his* denote any partial identity function, even the nowhere-defined partial function.

Although every function in the set *every boy loves* is defined over all boys, many functions in this set further map McCormick to a woman or relative of his. Thus this

set has lots of member functions, so why can *the* apply to it? Which of these functions does *is* equate with *his mother* over which domain?

In general, what determines the domain of a pronoun, if not discourse context (Dimitriadis SALT 2001)? The pragmatics wastebasket seems overflowing.

Aside: Shifting the relative clause to type $\langle e, \langle e, t\rangle\rangle$ yields a relation that relates any non-boy to any individual. Given that there exists a non-boy and lots of individuals, why can *the* apply to this relation pointwise? Regardless, this pointwise application yields a complete function, unlike the partial function *his mother* that it is equated to.

3.1. Underconstrained domain

If any domain is allowed for *his*, then

(14)#{His favorite woman/the woman that he loves} is his mother.

could be a tautology (in particular, if the domain is empty). Is this why it is bad? But compare

(15) The fugitives are still at large.

A somewhat analogous problem shows up in functional questions (and for Engdahl's closure operation).

(16) Which woman that he loves does Bob fear? —His mother.
—#But David doesn't love his mother.

The question above does not ask which function f from male animate individuals to women is such that Bob fears f(Bob) and, for all x where f is defined, x loves $f(x)$. Compare:

(17) Which woman that every Englishman loves does Bob fear? —His mother.
—But David doesn't love his mother (and he is English).

3.2. Overconstrained domain

The judgments seem contested.

(18) %The woman that every man loves is the woman who gave birth to every man.

(19) ✓The woman every Englishman loves is the woman every Frenchman fears.

4. Restrictions on functional quantification (Winter)

(20) {A/the} woman that {every/no/*at most one} man loves is his mother-in-law.

A set of functions F is *closed* iff $m(RG(F)) = F$.

A quantifier Q is *bounded* iff there are two sets X and Y such that $Q = \{A \mid X \subseteq A \subseteq Y\}$. (Example: *every man but no woman*)

Theorem: A quantifier Q is bounded iff, for every relation R, the set of functions $\{f \mid Q(\lambda x.R(f(x))(x))\}$ is closed.