Relative Clauses, Variables, Variable Binding (Part III)

Heim and Kratzer

Chapter 5

5.5 interpretability and syntactic constraints on indexing

- We found a way of indexing (1), namely (2), which gave us the reading that intuitively this NP has.

- But we haven't showed yet that our grammar doesn't generate any additional, intuitively unavailable readings for (1).

(1) **man such that Mary reviewed the book wh he wrote t**

(2) **man such$_1$ that Mary reviewed the book wh$_2$ he$_1$ wrote t$_2$**

5.5 interpretability and syntactic constraints on indexing (cont.)

- Since indices are not overt on the surface, the surface structure of (1) could be associated with as many different structures as there are different possible indexings.

- Many of the infinitely many possibilities are semantically equivalent.

- But there are some incorrect indexings that we'll need to rule out either semantically or syntactically.

Gaps versus resumptive pronouns

(3) **man such$_1$ that Mary reviewed the book wh$_2$ he$_2$ wrote t$_1$**

- This reading can be expressed in English: "man such that Mary reviewed the book that wrote him".

- There are several things wrong with (3).

- "Such" in (3) binds a trace, rather than a pronoun, and this leads to ungramaticality as in the simpler example in (4).

(4) **the man such$_1$ that he$_1$/*t$_1$ left**

- Another problem is that the relative pronoun in (3) binds a pronoun rather than a trace.

- Such "resumptive pronouns" are generally ruled out syntactically in English, at least when the pronoun is so close to its binder:

(5) **the man who$_1$ *he$_1$/t$_1$ left**

- Resumptive pronouns are okay in other languages, and English sometimes tolerates them over longer distances:

the man who$_1$ Mary wonders where he$_1$ went.

- It could be that there is some subtle semantic difference traces and pronouns that would derive the distribution in English, and there could be differences between the vocabularies of different languages in this regard.

- But at this stage of research, it seems to be reasonable to conclude that pronouns and traces are identical semantically, but that English syntax rules out relative pronouns binding pronouns.

Gender agreement

(3) **man such$_1$ that Mary reviewed the book wh$_2$ he$_2$ wrote t$_1$**

- Another thing wrong with (3) is that there is a gender clash between "he" and "book". Simpler examples show this:

(6) **the book such$_1$ that Mary reviewed *him$_1$/it$_1$**

- We could treat this as a violation of syntactic agreement principles.

- But intuitively it seems that "him" can't refer to an inanimate thing like a book, which sounds like a semantic explanation.

- Of course bound variables don't *refer* to individuals, but we could say that "him$_1$" cannot denote a non-male individual *under any assignment*.

- The immediate prediction is that "Mary reviewed him$_1$" will have a truth value only under those assignments which map 1 to a male.

- For assignments that don't meet this condition, $[\![$**Mary reviewed him$_1$**$]\!]$ is undefined.

- "Mary reviewed it$_1$", by contrast, gets a truth-value only under those assignments which map 1 to a nonhuman.

- To see this, we need the pedantic version of the Predicate Abstraction Rule.

(7) *Predicate Abstraction Rule* (PA)

    If α is a branching node whose daughters are β_i and γ, where β is a relative pronoun or "such", and i $\in |$N, then for any variable assignment a, $[\![\alpha]\!]^a =$ λx: x $\in$ D and γ is in the domain of $[\![\ ]\!]^{a^{x/i}}$. $[\![\gamma]\!]^{a^{x/i}}$.

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- Given (7), we have:

(8) (a) $[\![\textbf{such}_1 \textbf{ that Mary reviewed him}_1]\!]=$
$\qquad \lambda x : x \in D$ and x is male . Mary reviewed x.

$\quad$ (b) $[\![\textbf{such}_1 \textbf{ that Mary reviewed it}_1]\!]=$
$\qquad \lambda x : x \in D$ and x is nonhuman . Mary reviewed x.

- To combine $[\![\textbf{book}]\!]$ with the partial function in (8a), we need the pedentic version of the Predicate Modification rule:

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(9) *Predicate Modification* (PM)

   If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters, then, for any assignment a, α is in the domain of $[\![\ ]\!]^a$ if both β and γ are, and $[\![\beta]\!]^a$ and $[\![\gamma]\!]^a$ are both of type $< e, t >$. In this case, $[\![\alpha]\!]^a = \lambda x : x \in D$ and x is in the domain of $[\![\beta]\!]^a$ and $[\![\gamma]\!]^a$. $[\![\beta]\!]^a(x) = [\![\gamma]\!]^a(x) = 1$.

- GIven (9), the denotation of **book such$_1$ that Mary reviewed him$_1$** is a function that does not map anything to 1, regardless of what the facts are: only male individuals are in its domain, and of those, none are books. Therefore the definite DP **the book such$_1$ that Mary reviewed him$_1$** can never get a denotation.

- Combining $[\![$**book**$]\!]$ with the function in (8b) yields a function that maps all books that Mary reviewed to 1, and all nonhuman things that are either not books or not reviewed by Mary to 0. Under appropriate circumstances, the definite description formed from this NP thus denotes.

- This is only a sketch of a semantic account of gender agreement, but it looks like it could be made to work.

- For the purposes of this book, we may leave it open whether the feature mismatches in (3) and (6) are ruled out by the syntax or the semantics.

Vacuous binding

- The syntactic constraint in (12) rules out cases of "vacuous binding" as in (10). In (10) both variables are bound by the relative pronoun even though "such" c-commands them. They are bound by the closest possible binder.

(10) **man such$_1$ that Mary reviewed the book wh$_1$ he$_1$ wrote t$_1$**

(11) Each variable binder must bind at least one variable.

- Simpler examples illustrate this constraint:

(12) (a) ***the man such that Mary is famous**
    (b) ***the man who Mary is famous**

- (12a) and (12b) predict that if Mary is famous and there happens to be a unique man in D, then these NPs denote that unique man. Otherwise they denote nothing. They are tantamount to the simple DP **the man**, except that they convey an additional presupposition that Mary is famous.

- (10) has the weird meaning, "man such that Mary reviewed the book that wrote itself".

- We need the syntactic constraint in (11) to rule out these indexings.

Binding conditions

(13) **the man who$_1$ t$_1$ talked to the boy who$_2$ t$_2$ visited him$_{1/*2}$**

- BInding Condition B rules out this coindexing: a non-reflexive pronoun cannot be co-indexed with a c-commanding position in the same minimal clause.

- Binding constraints belong to the syntax: they talk about indices, c-command, and morphological properties of indexed DPs.

- Any semantic predictions they imply (about possible and impossible meanings) come about indirectly, and depend crucially on the semantics that interprets indexed structures.

5.5 interpretability and syntactic constraints on indexing (cont.)

- In sum, our semantics for variables and variable binding works for a wide range of relative clause constructions, provided it is combined with suitable syntactic constraints which cut down on the number of possible indexings.

- The constraints we need are well-established in syntactic theory.