Condition B and the Quantifier Puzzle

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The Quantifier Puzzle

- A non-reflexive pronoun can't take a local c-commanding antecedent.
  - It cannot corefer with a local c-commanding DP — (1b).
  - Nor can it be bound by a local c-commanding quantifier — (2b):

(1) a. John loves his mother.
    b. *John loves him. (where him = John)

(2) a. Every boy loves his friend. (every boy x loves x's friend)
    b. *Every boy loves him. (every boy x loves x)

Question: Are both (1b) and (2b) blocked by the same constraint?

Yes: they are both blocked by Condition B
Heim (1993, 2007).

No: only (2b) is blocked by Condition B
Reinhart (1983), Fox (2000), Büring (2005).

Talk Overview

- Heim is right: both (1b) and (2b) are Condition B violations.
- But there are some outstanding problems with Heim's approach:[1]
  - Overgenerates readings for elided VPs.
  - Condition B doesn't always prevent a pronoun taking a local c-commanding antecedent.
- My solution:
  - The **Fixed Reference Constraint**. This is a generalization of the principle that DPs that are not co-indexed must refer to different individuals.
  - Condition B is not a constraint in its own right, but a side effect of Object Shift.

[1] These are discussed in Heim (2007), but no very definite solutions are proposed.

1 Heim's analysis

- Can we bring the referential and quantificational cases together using indices?

(3) a. *[Every boy]$_1$ loves him$_1$. b. *John$_1$ loves him$_1$.

(4) **Condition B**
A non-reflexive pronoun can't be coindexed with a local c-commanding DP.

- But how do we interpret co-indexation?
- Heim assumes that quantifier phrases such as *every boy* must undergo QR.
- Following QR, the quantifier phrase transfers its index to a λ-node, which binds its trace.

(5) *[Every boy] [λ_1 [t_1 loves him$_1$]]
QR

- Condition B in (5) is triggered by t_1 and him$_1$.
- Indexed DPs are interpreted via **assignments**.
- An assignment maps indices to individuals, e.g. $\{1 \mapsto \mathbf{John}, 2 \mapsto \mathbf{Mary}\}$.

(6) He$_1$ is tall.
$[\![\text{He}_1 \text{ is tall}]\!]^{\{1 \mapsto \mathbf{John}\}}$ = **true** iff John is tall.
$[\![\text{He}_1 \text{ is tall}]\!]^{\{1 \mapsto \mathbf{Bill}\}}$ = **true** iff Bill is tall.

(7) [Every boy] [λ_1 [t_1 loves his$_1$ mother]]
$[\![t_1 \text{ loves his}_1 \text{ mother}]\!]^{\{1 \mapsto \mathbf{John}\}}$ = **true** iff John loves John's mother.
$[\![t_1 \text{ loves his}_1 \text{ mother}]\!]^{\{1 \mapsto \mathbf{Bill}\}}$ = **true** iff Bill loves Bill's mother.
...

- Our two cases now have something semantically in common:

(8) a. [John$_1$ loves him$_1$] b. [Every boy] [λ_1 [t_1 loves him$_1$]]

2 Indices gone wild

- Bach and Partee (1980) observe there are many logically distinct ways of linking multiple pronouns to the same quantifier:

(9) Every boy knows he said he loves his mother.

(10) Every boy knows he said he loves his mother.

(11) Every boy knows he said he loves his mother.

(12) Every boy knows he said he loves his mother.

(13) Every boy knows he said he loves his mother.

(14) Every boy knows he said he loves his mother.

- All of these different patterns can be distinguished in Heim's system:

(15) [Every boy] [λ_1 [t_1 knows he$_1$ [λ_2 [t_2 said he$_2$ [λ_3 [t_3 loves his$_3$ mother]]]]]]

(16) [Every boy] [λ_1 [t_1 knows he$_1$ said he$_1$ [λ_2 [t_2 loves his$_2$ mother]]]]

(17) [Every boy] [λ_1 [t_1 knows he$_1$ [λ_2 [t_2 said he$_2$ loves his$_2$ mother]]]]

(18) **[Every boy]** [λ_1 **[t_1 knows he$_1$** [λ_2 [t_2 said **he$_2$ loves his$_1$ mother**]]]]

(19) **[Every boy]** [λ_1 **[t_1 knows he$_1$** [λ_2 **[t_2 said he$_1$ loves his$_2$ mother**]]]]

(20) [Every boy] [λ_1 [t_1 knows he$_1$ said he$_1$ loves his$_1$ mother]]

- If the antecedent is a referential expression there are even more possibilities.
- The pronoun can either be coreferential with the antecedent, bound by the antecedent as a variable, or bound by another a pronoun already linked to the antecedent.
- Here's the range of options for two pronouns and one referential antecedent:

(21) John$_1$ knows that he$_1$ loves his$_1$ mother.

(22) John$_1$ [λ_2 [t_2 knows that he$_2$ loves his$_1$ mother]]

(23) **John$_1$** [λ_2 **[t_2 knows that he$_1$ loves his$_2$ mother**]]

(24) John$_1$ [λ_2 [t_2 knows that he$_2$ loves his$_2$ mother]]

(25) John$_1$ [λ_2 [t_2 knows that he$_2$ [λ_3 [t_3 loves his$_3$ mother]]]]

- The structures in bold turn out to be troublesome because:
  - (19) and (23) give rise to unwanted readings for elided VPs.
  - (18) and (19) make it possible to "sneak around" Condition B.

3 Overgenerating readings for elided VPs

- A simple example of VP ellipsis:

(26) John [$_{VP}$ smokes]. Bill does ~~[$_{VP}$ smoke]~~ too.

- The most constrained theory of VP ellipsis imposes two requirements:

(27) **Semantic Indentity**
The elided VP must denote the same property as the antecedent VP.

(28) **Parallelism**
A bound pronoun in an elided VP must be bound in a manner structurally parallel to its counterpart in the antecedent VP.

- I won't mention Semantic Identity again — we'll only be considering sentences where it's satisfied.
- But parallelism will play an important role in ruling out unwanted readings.
- **Even with Semantic Identity and Parallelism in place, Heim's system still overgenerates**.

Example of the constraining role of parallelism

- Parallelism blocks the unavailable reading of the elided VP glossed in (29b):

(29) John knows that Mary loves his mother.
and Jane knows that Bill does ~~[$_{VP}$ love his mother]~~.

a. . . . and Jane knows that Bill loves John's mother.
b. *. . . and Jane knows that Bill loves Bill's mother.

- This reading requires the pattern of binding dependencies in (30), which violates parallelism:

(30) *John$_1$ [λ_2 [t_2 knows that Mary [$_{VP}$ loves his$_2$ mother]]]
and Jane$_3$ [λ_4 [t_4 knows that Bill$_5$ [λ_6 [t_6 does [$_{VP}$ love his$_6$ mother]]]]]

- In the antecedent VP, *his* is bound by the matrix subject.
- In the elided VP, *his* is bound by the embedded subject.

Overgeneration case 1: Dahl's paradigm

- The problematic pattern of binding dependencies:

(31) *John$_1$ [λ_2 said that he$_1$ loves his$_2$ mother]

- Dahl's paradigm (Dahl 1973):

(32) John said that he loved his mother
and Bill did ~~[$_{VP}$ say that he loves his mother]~~ too.
≠ ". . . and Bill said that John loves Bill's mother."

(33) *John$_1$ [λ_2 [t_2 said that he$_1$ [$_{VP}$ loves his$_2$ mother]]]
Bill$_3$ [λ_4 [t_2 did say that he$_1$ [$_{VP}$ loves his$_4$ mother]]] too

- Parallelism is satisfied — *his* is bound by the matrix subject in both the antecedent and elided VPs.

Overgeneration case 2: embedded Dahl's paradigm

- The problematic pattern of binding dependencies:

(34) *Every boy [λ_1 [t_1 knows that he$_1$ [λ_2 [t_2 said he$_1$ loves his$_2$ mother]]]]

- The embedded Dahl paradigm (Roelofsen 2011):

(35) Every boy knows that he said he loves his mother
and that the teacher did ~~[$_{VP}$ say he loves his mother]~~ too.
≠ ". . . and that the teacher said the boy loves the teacher's mother."

(36) *Every boy [λ_1 [t_1 knows that he$_1$ [λ_2 [t_2 said he$_1$ loves his$_2$ mother]]
and that TT$_3$ [λ_4 [t_4 did say he$_1$ loves his$_4$ mother]]]]

- Parallelism is satisfied.

The Fixed Reference Constraint

- The following generalizations emerge from the preceding data:

(37) **Ban on binding over a coreferential DP**
A pronoun may not be bound across a c-commanding referential DP with the same value as the pronoun's antecedent.

(38) **Ban on crossing binding dependencies**
In cases where multiple pronouns are bound (directly or indirectly) by a single antecedent, the binding dependencies may nest but not cross.

- I propose to capture (37)–(38) by extending a constraint that is already implicit in Heim's theory:

(39) **Implicit constraint**
If two contraindexed referential DPs stand in a c-command relation, their indices cannot map to the same individual.

- This constraint is necessary to explain why e.g. the indexation in (40a) cannot give rise to the interpretation in (40b):

(40) a. John$_1$ loves him$_2$.
b. #John loves John. (not a possible interpretation of (a))

- The key idea is to generalize the notion of a referential DP to the notion of a FIXED DP.[2]
- This is a relative notion: a DP is or is not FIXED **with respect to** another DP.

(41) A DP α is FIXED with respect to a DP β iff
  (i) α c-commands β,
  (ii) α and β are contraindexed, and
  (iii) for every phrase Φ, α is bound within $\Phi \rightarrow \beta$ is bound within Φ.

- Condition (iii) of (41) is satisfied iff either:
  (a) α is not bound at all, or
  (b) every phrase containing the binder of α also contains the binder of β.
- We can now state the extended version of the constraint in (39):

(42) **Fixed Reference Constraint** (FRC)
If α is FIXED with respect to β, then no phrase containing α and β may be evaluated under an assignment g such that $[\![\alpha]\!]^g = [\![\beta]\!]^g$.

The base case

(43) $[_{\text{TP}}$ John$_1$ loves him$_2]$
$*\{1 \mapsto \textbf{John}, 2 \mapsto \textbf{John}, \ldots\}$

- *John* is FIXED with respect *him* (since the two DPs are contraindexed, *John* c-commands *him*, and there is no constituent containing a binder of *John*).
- *John* and *him* denote the same individual (John) under the assignment shown.
- When TP is evaluated under this assignment, FRC is therefore violated.

No binding over a coreferential DP

- In the following LF, *he* is coreferential with *John* and *his* is bound by *John*:

(44) *John$_1$ [λ_2 $\boxed{\Phi}$[t_2 said that he$_1$ loves his$_2$ mother]].

- *He* is FIXED with respect to *his*.
- The assignment for Φ is $\{1 \mapsto \textbf{John}, 2 \mapsto \textbf{John}\}$, and *he* and *his* denote the same individual (John) under this assignment.

(45) $[\![\text{John}]\!]^{\{1\mapsto\textbf{John}\}}([\![[\lambda_2\ [t_2 \text{ said that he}_1 \text{ loves his}_2 \text{ mother}]]]\!]^{\{1\mapsto\textbf{John}\}})$
$= [\![[t_2 \text{ said that he}_1 \text{ loves his}_2 \text{ mother}]]\!]^{\{1\mapsto\textbf{John},2\mapsto\textbf{John}\}}$

- Thus, FRC is violated.
- If we swap the positions of the coreferential and bound pronouns, FRC is no longer violated, since no DP within Φ is FIXED with respect to any other DP in Φ:

(46) John$_1$ [λ_2 $\boxed{\Phi}$[t_2 said that he$_2$ loves his$_1$ mother]].

No crossing binding dependencies

(47) [Every boy] [λ_1 [t_1 knows he$_1$ [λ_2 $\boxed{\Phi}$[t_2 said he$_1$ loves his$_2$ mother]]]]

- *He* within Φ is FIXED with respect to *his*.
- Suppose that the domain contains a single boy, Tom.
- The assignment for Φ is $\{1 \mapsto \textbf{Tom}, 2 \mapsto \textbf{Tom}\}$, and *he* and *his* denote the same individual (Tom) under this assignment.

(48) $[\![\text{Every boy}]\!]([\![[\lambda_1 \ldots]]\!])$
$= [\![[t_1 \text{ knows he}_1\ [\lambda_2\ [t_2 \text{ said he}_1 \text{ loves his}_2 \text{ mother}]]]]\!]^{\{1\mapsto\textbf{Tom}\}}$
$= [\![\text{knows}]\!]([\![[\text{he}_1\ [\lambda_2\ [t_2 \text{ said he}_1 \text{ loves his}_2 \text{ mother}]]]]\!]^{\{1\mapsto\textbf{Tom}\}})(\textbf{Tom})$
$= [\![\text{knows}]\!]([\![\text{he}_1]\!]^{\{1\mapsto\textbf{Tom}\}}([\![[\lambda_2\ [t_2 \text{ said he}_1 \text{ loves his}_2 \text{ mother}]]]]\!]^{\{1\mapsto\textbf{Tom}\}}))(\textbf{Tom})$
$= [\![\text{knows}]\!]([\![[t_2 \text{ said he}_1 \text{ loves his}_2 \text{ mother}]]]]\!]^{\{1\mapsto\textbf{Tom},2\mapsto\textbf{Tom}\}})(\textbf{Tom})$

- FRC is therefore violated.
- Establishing that FRC is **not** violated by nested binding structures is a bit more involved, since we need to check every evaluation of every relevant constituent.

(49) $\boxed{\text{A}}$[EB $\boxed{\text{B}}$[λ_1 $\boxed{\text{C}}$[t_1 says he$_1$ $\boxed{\text{D}}$[λ_2 $\boxed{\text{E}}$[t_2 thinks $\boxed{\text{F}}$[he$_2$ loves his$_1$ mother]]]]]

- $\boxed{\text{A}}$ can be evaluated with respect to an empty assignment so that there is no possibility of FRC being violated.
- Assume again that the domain contains a single boy, Tom. If we start from an empty assignment, $\boxed{\text{B}}$ will be evaluated with respect to the assignment $\{1 \mapsto \textbf{Tom}\}$, which cannot violate FRC.

[2]Schlenker (2005) has argued that significant insight can be gained by having a version of (39) play a greater role in the theory. I will develop a similar intuition along rather different technical lines.

- The same goes for $\boxed{\text{C}}$, $\boxed{\text{D}}$.
- $\boxed{\text{E}}$ will be evaluated with respect to the assignment $\{1 \mapsto \textbf{Tom}, 2 \mapsto \textbf{Tom}\}$. This raises the possibility of a violation of FRC. However, no DP within $\boxed{\text{E}}$ is FIXED with respect to any other DP within $\boxed{\text{E}}$, so there can be no violation of FRC.
- The same goes for $\boxed{\text{F}}$.

4 Sneaking around Condition B

(50) *Every boy [λ_1 [t_1 knows he$_1$ [λ_2 [t_2 said he$_2$ loves him$_1$]]]]

- Since *him* is not co-indexed with the second *he* in (50), Condition B is not violated.
- Unfortunately there is evidence that the pattern of binding dependencies in (50) is available.
- (52) is the only structure that can derive the indicated reading of the second conjunct of (51) without violating parallelism:

(51) Every boy knows that he said he loves his mother
and that the teacher did ~~[VP say he loves his mother]~~ too.
= "...that the teacher said he loves the boy's mother."

(52) Every boy [λ_1 [t_1 knows that he$_1$ [λ_2 [t_2 said he$_2$ loves his$_1$ mother]]
and that TT$_3$ [λ_4 [t_4 did say he$_4$ loves his$_1$ mother]]]]

- This raises quite a tough problem, because it seems that we must either
  - complicate Condition B, or
  - weaken the parallelism constraint on VP ellipsis.

Complicate Condition B?

- Heim (1993):

(53) α and β are codetermined iff
(i) $\alpha = \beta$,
(ii) either one of α or β is bound by the other via a λ,
(iii) α and β are bound via the same λ, or
(iv) for some γ, α and γ are codetermined and so are γ and β.

(54) Condition B (Heim's version)
A non-reflexive pronoun may not be not codetermined with a local c-commanding DP

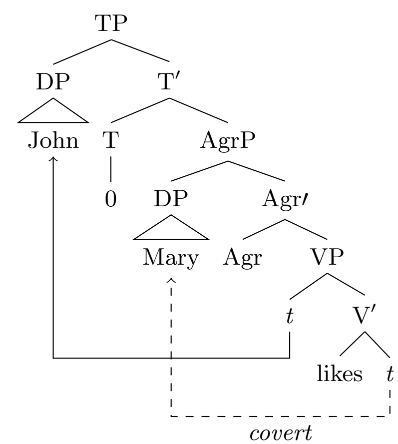
Weaken the parallelism constraint?

- Fox (2000), Schlenker (2005), Büring (2005), Roelofsen (2011) each in various ways propose to relax the parallelism constraint on VP ellipsis.
- In Büring's system, for example, all readings of the elided VP can be derived if the first conjunct has the pattern of binding dependencies in (9).

A third option: Condition B as a side effect of Object Shift

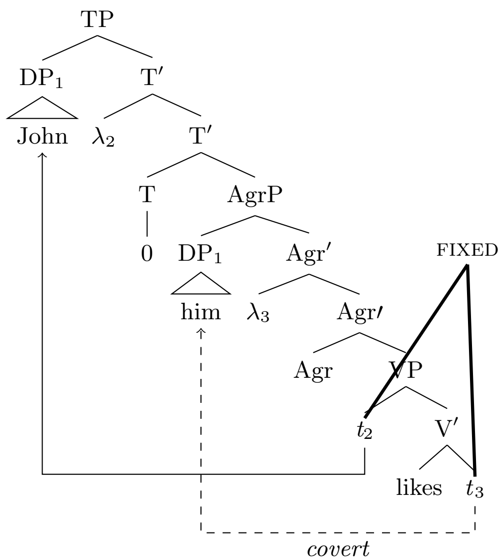
(55) **Object Shift**
Objects in English raise covertly to the specifier of AgrP above VP.
(Johnson 1991, Chomsky 1992)

(56) John likes Mary.



- As a consequence of Object Shift, Condition B configurations will violate the Ban on Crossing Binding Dependencies (and hence FRC):

(57) John$_1$ likes him$_1$.



- The trace of A-movement is interpreted as a variable bound via a λ-node that adjoins below the landing site (Heim 1993, Heim and Kratzer 1998).
- In (57), *him* is FIXED with respect to t_2 and yet the two expressions denote the same individual. This leads to a FRC violation.
- Independently-motivated constraint requires t_2 and t_3 to be contraindexed:

(58) **Don't Steal My Trace!**
A moved phrase can bind no traces other than its own.

- We can now return to (50), the original problematic case, following object shift of the offending pronoun *him*:

(59)
*[EB] [λ_1 [t_1 knows he$_1$ [λ_2 [t_2 said [$_{TP}$ he$_2$ [λ_3 [$_{AgrP}$ him$_1$ [λ_4 [$_{VP}$ t_3 loves t_4]]]]]]]]]
(FIXED: t_3 — t_4)

- FRC is violated as a result of t_3 being FIXED with respect to t_4.

- Pronouns non-local to their antecedents don't trigger FRC violations:

(60) John$_1$ loves his$_1$ mother.
[$_{TP}$ John$_1$ [λ_2 [$_{AgrP}$ [his$_1$ mother]$_3$ [λ_4 [$_{VP}$ t_2 loves t_4]]]

- In (60), t_2 is again FIXED with respect to t_4, but since they denote distinct individuals (John and John's mother), there is no FRC violation. *His mother* is FIXED with respect to t_2, but for the same reason, this does not give rise to a FRC violation. *John* is FIXED with respect to t_2, but for all constituents which contain both *John* and t_2, the assignment is simply $\{1 \mapsto \textbf{John}\}$, so there is no FRC violation. The same logic applies with regard to *his mother* and t_4.

5 Main advantages of the analysis

- Unified treatment of Dahl's paradigm and the embedded Dahl paradigm.
- We can keep the parallelism constraint on VP ellipsis.
- No need to complicate Condition B — in fact we don't need it at all.

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