

Binding and Pronouns

1. Preliminaries

- Types of pronouns:

(1) Reflexives

- a. John likes himself.
- b. * John thinks that Mary likes himself.
- c. * John's mother likes himself.
- c'. John's father likes himself.

(2) Non-reflexives

- a. John likes him.
- b. John thinks that Mary likes him.
- c. John's mother likes him.

- Two divisions on the meaning of pronouns

A. The division of deictic-versus-anaphoric:

A pronoun is used **deictically** if it receives its reference from the extralinguistic utterance context, and is used **anaphorically** if it receives its reference from the surrounding text.

- (3) a. I'm surprised that **he** knows Jenny. *deictical*
b. John walked in. **He** whistled. *anaphorical*

However, in linguistic theory, this division is insufficient (Heim & Kratzer 1998). First, it is unclear whether the deictic-anaphoric contrast plays a role in linguistic theory. In both (3a-b), *he* refers to a salient individual. Second, some pronouns don't refer to any individuals, for example:

- (4) a. No man_i would disclose his_i identity.
b. Everyone_i voted for himself_i.

NB: It is incorrect to say that *no man* and *his* in (4a) are co-referential, because "co-referential" implies the existence of a reference. (Heim & Kratzer 1998)

B. The division of referential-versus-bound:

A pronoun is **referential** if its value is provided by the utterance context, as in (3). A pronoun is **bound** if its value is fixed in some sense *sentence-internally*, as in (4).

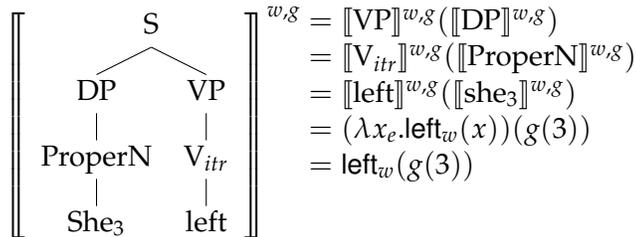
2. Interpreting pronouns

- **Heim and Kratzer's hypothesis:**

All pronouns are variables. Bound pronouns are interpreted as **bound variables**, and referential pronouns are interpreted as **free variables**.

(5) **Pronoun and trace rule**

If α is a pronoun or a trace, g is a variable assignment and $i \in \text{DOM}(g)$, then $\llbracket \alpha_i \rrbracket^{w,g} = g(i)$.



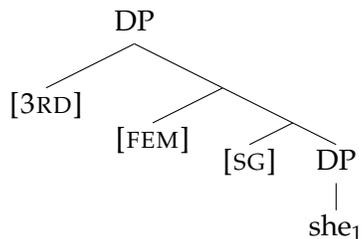
2.1. Interpreting referential pronouns

- The following sentence is utterable only in a context that involves at least two females.

(6) She₁ is taller than her₂.

- **Appropriate Condition:** A context is appropriate for an utterance ϕ only if c determines a variable assignment function g_c s.t. every index that has a free occurrence in the LF of ϕ is in the domain of g_c . (“ g_c ” stands for an assignment function determined by the utterance context c .)
- Gender/number/person features of pronouns are treated as presuppositional identity functions.

(7) $\llbracket [\text{FEM}] \rrbracket^w = \lambda x_e : \text{female}_w(x).x$



2.2. Interpreting bound pronouns

- There is a one-to-one correspondence between syn- and sem- binding (called “Binding Principle”): There is syntactic binding at SS iff there is semantic binding at LF.
 - **Semantic binding** (at LF): α semantically binds β iff α 's trace and β are co-indexed and are c-commanded by a co-indexed abstraction operator.
 - **Syntactic binding** (at SS): α syntactically binds β iff α and β are co-indexed, α is in an A-position and c-commands β (and α doesn't c-command any other expression in an A-position that c-commands and is co-indexed with β).

In (8), $Mary_1$ syntactically binds she_1 , which in turn syntactically binds her_1 . By QR'ing both $Mary$ and she at LF, we can capture the one-to-one correspondence between syn- and sem- binding.

(8) $Mary_1$ said that she_1 saw a shark next to her_1 .

LF: $[_S \text{ Mary } [_S 1 \ t_1 \text{ said that } [_S \text{ she}_1 \ 1 \ [_S \ t_1 \text{ saw a shark next to } \text{her}_1 \]]]]$

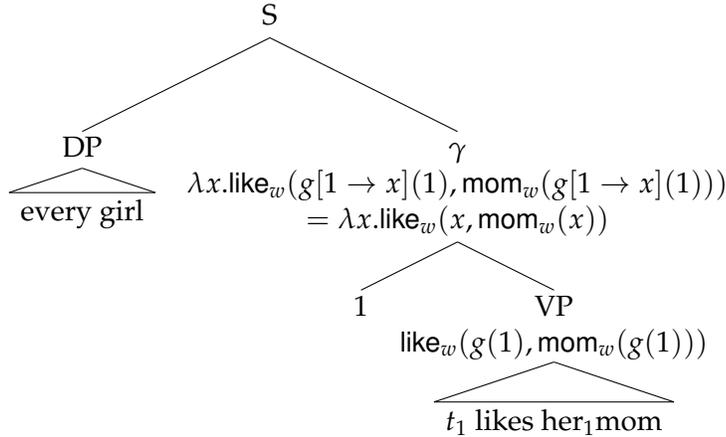
2.2.1 Quantificational binding

- QR and LF afford a rich theory of semantic binding.

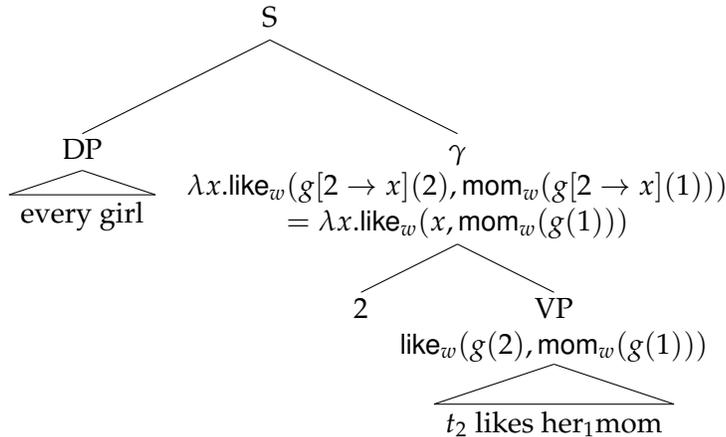
In (9), *her* is bound by *every girl* if it bears the same index as the trace of *every girl*, and is free if it bears a different index. (mom_w is a function (of type $\langle e, e \rangle$) from an individual x to x 's mom in w .)

(9) Every girl likes her mom.

a. Bound *her*



b. Free *her*



- Some constraints on c-commanding at LF

– First, a quantifier Q_1 can bind into another quantifier Q_2 only if Q_1 c-commands Q_2 at LF:

(10) A janitor₇ monitors every room in his₇ charge. (^{OK} $\exists \gg \forall, \# \forall \gg \exists$)

a. $[_S [_{DP} \text{ a janitor}] 1 [_S [_{DP} \text{ every room in his}_1 \text{ charge}] 2 [_{VP} t_1 \text{ monitors } t_2]]]$

b. $[[\text{a janior}]^{w,g} (\lambda x. [[\text{every room in his}_1 \text{ charge}] 2 [t_1 \text{ monitors } t_2]]^{w,g[1 \rightarrow x]})$
 $= [[\text{a janior}]^{w,g} (\lambda x. [[\text{every room in his}_1 \text{ charge}]^{w,g[1 \rightarrow x]} (\lambda y. [t_1 \text{ monitors } t_2]^{w,g[1 \rightarrow x, 2 \rightarrow y]})$)

Compare: if we alternatively let the the universal quantifier take wide scope, *his₇* would be unbound, receiving a free variable interpretation.

(10') a. $\# [_S [_{DP} \text{ every room in his}_1 \text{ charge}] 2 [_S [_{DP} \text{ a janitor}] 1 [_{VP} t_1 \text{ monitors } t_2]]]$

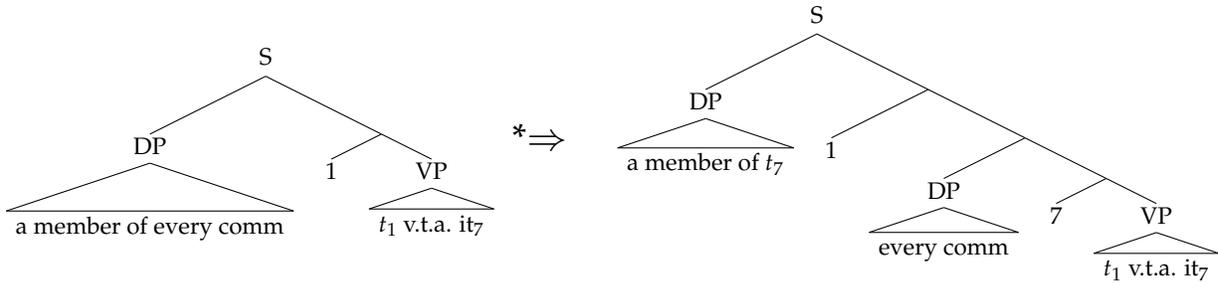
b. $[[\text{every room in his}_1 \text{ charge}]^{w,g} (\lambda y. [[\text{a janitor}] 1 [t_1 \text{ monitors } t_2]]^{w,g[2 \rightarrow y]})$
 $= [[\text{every room in his}_1 \text{ charge}]^{w,g} (\lambda y. [[\text{a janitor}]^{w,g} (\lambda x. [t_1 \text{ monitors } t_2]^{w,g[2 \rightarrow y, 1 \rightarrow x]})$)

– Second, a quantifier Q_1 can bind a pronoun α only if Q_1 c-commands α at LF.

- (11) A member of every committee₇ voted to abolish it₇. ($\# \exists \gg \forall, \text{OK} \forall \gg \exists$)
- a. [_S [_{DP} every committee] ₇ [_S [_{DP} a member of t_7] ₁ [_{VP} t_1 voted to abolish it₇]]]
- b. $\llbracket \text{every committee} \rrbracket^{w,g} (\lambda x. \llbracket \text{a member of } t_7 \text{ voted to abolish it}_7 \rrbracket^{w,g[7 \rightarrow x]})$

NB: The reading yielded by the following QR is very odd, which suggests that QR at LF should never unbound traces.

- (12) $\# \llbracket \text{a member of} \rrbracket^{w,g} (\lambda x. \llbracket \text{every comm} \rrbracket^{w,g[1 \rightarrow x]} (\lambda y. \llbracket t_1 \text{ voted to abolish } t_7 \rrbracket^{w,g[1 \rightarrow x, 7 \rightarrow y]}))$



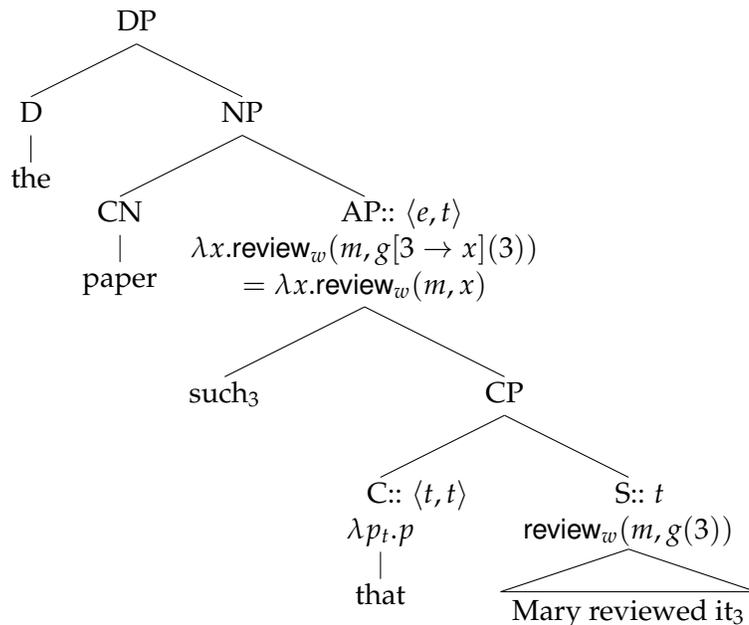
Discussion: Despite of containing two quantifiers, the following sentence is not ambiguous. Explain why and derive its reading compositionally.

- (13) Every candidate_i submitted two papers she_i wrote.

2.2.2 Such that

- In a *such that*-phrase, *such* serves as an abstraction index. It triggers Predicate Abstraction and binds any co-indexed variables (pronouns or traces) that are free in its c-commanding domain.

- (14) the paper such that Mary reviewed it



2.3. Bound/free ambiguity of referential pronouns

- When a pronoun is co-referential with a c-commanding proper name (or any *e*-type NP), then in theory, this pronoun can take both free and bound interpretations.

(15) John hate his father.

- a. As a bound variable (*his* is bound by *John*):

[_S John 1 [_{VP} *t*₁ hate his₁ father]]

- b. As a free variable (*his*₁ is unbound but is co-referential with *John*; i.e., $g_c(1) = \text{John}$):

Option 1:

[_S John hate his₁ father]

without subject movement

Option 2:

[_S John 2 [_{VP} *t*₂ hate his₁ father]]

with subject movement

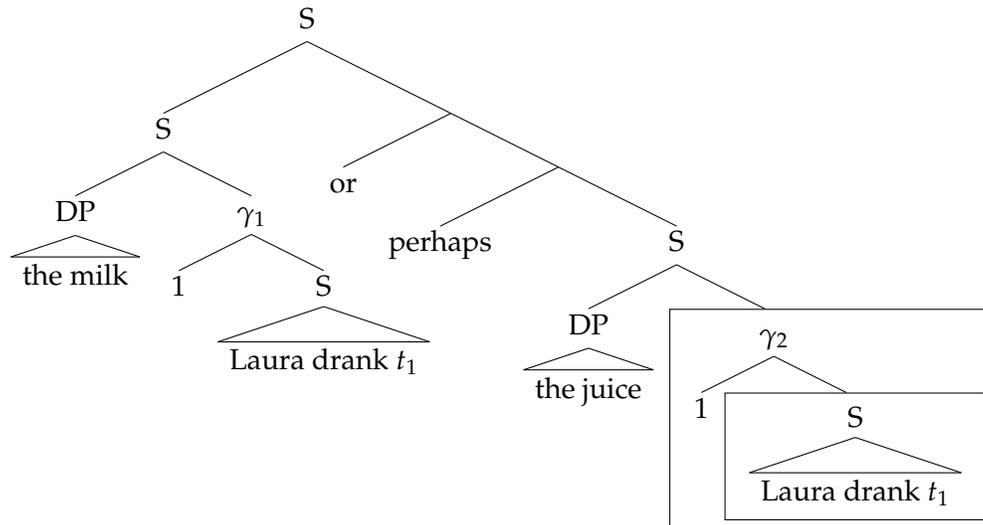
The above bound/free ambiguity is “invisible”; it doesn’t affect the overall semantics of sentence. But, we can find evidence for this ambiguity from other constructions, such as in constructions with ellipsis. (See next section.)

3. Binding and ellipsis

- LF-Identity Condition on Ellipsis** (Heim & Kratzer):

A constituent can be elided at PF (i.e., not pronounced) only if it has an LF-identical antecedent.

(16) Laura drank the milk, or perhaps the juice.



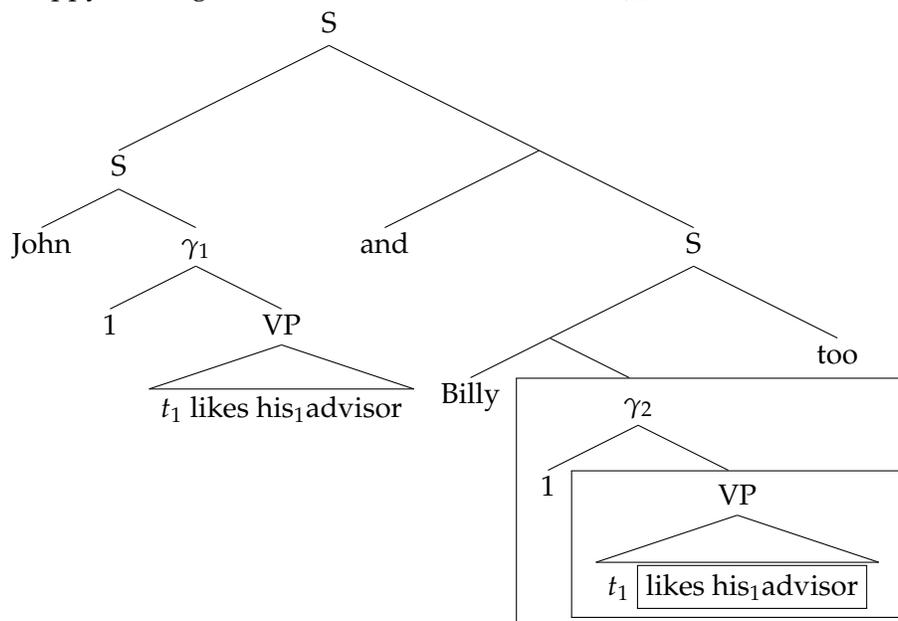
We can either delete the contained S-node (as assumed by Heim & Kratzer) or delete the entire γ_2 -node. The former deletion is allowed by the LF-identity Condition only if the traces are co-indexed. The latter allows the traces not be co-indexed, if assuming a more permissive Ellipsis Condition: a constituent can be deleted iff there is an LF **with the same interpretation**. For example:

(17) [_S[the milk] [_{γ1} 1 [_SLaura drank *t*₁]]], or perhaps [_S[the juice] [_{γ2} 2 [_SLaura drank *t*₂]]]

- The (invisible) bound/free ambiguity of pronouns yields sloppy/strict ambiguity of ellipsis.

(18) John_i likes his_i advisor, and Billy_j does ~~LIKE HIS_i/j~~ ADVISOR, too.

- a. Sloppy reading (elided *his* as a bound variable, γ_2 is elided as it is LF-identical to γ_1)



- b. Strict reading (elided *his* as a free variable co-referential with *John*.)

- i. without subject-movement

[John likes his₁ advisor], and [[Billy₂ like ~~his₁~~ advisor] too]

- ii. with subject-movement

[John [_{gamma_1} 1 [t₁ likes his₁ advisor]]], and [[Billy [_{gamma_2} 2 [t₂ like ~~his₁~~ advisor]]] too]

4. Over-generating binding?

- QR and LF provide a rich theory of binding, but this theory over-generates many unwanted binding relations. Thanks to the one-to-one correspondence of syn- and sem- binding (Binding Principle), we can rule out these binding relations by constraints on syntactic binding.

- **Principle A:** A reflexive pronoun must be co-indexed with a c-commanding NP contained within the same local domain (i.e., the minimal clause that contains the pronoun).

(19) Every cat likes itself.

- a. Every cat₁ [t₁ likes itself₁]
 b. * Every cat₂ [t₂ likes itself₁]

- **Principle B:** A non-reflexive pronoun cannot be co-indexed with a c-commanding NP contained within the same local domain.

(20) Every man likes him.

- a. Every man₁ [t₁ likes him₂]
 b. * Every man₁ [t₁ likes him₁]

(21) Mary likes her.

- a. Mary₁ [t₁ likes her₂].
 b. * Mary₁ [t₁ likes her₁].

- **Principle C:** A trace cannot wind up co-indexed with any c-commanding NP in an A(argument)-position (i.e., subject, object, prepositional object)

- (22) a. We celebrate everyone₁'s birthday his₁ own way
 [everyone₁ [we celebrate *t*₁'s birthday his₁ own way]]
 b. *He₁ celebrates everyone's birthday his₁ own way
 [everyone₁ [he₁ celebrates *t*₁'s birthday his₁ own way]]

Discussion: Which binding principle is violated in (23a-b)? What about in (23c-d)?

- (23) a. *Everyone₁ likes him₁.
 b. *He₁ likes everyone₁.
 c. *A guest of him₁ offended everyone₁.
 d. *She₁ likes the flowers that we bought for Zelda₁.

- **Weak crossover (WCO)**

In (24), the pronoun *him* is not syntactically bound at SS, even though it can be semantically bound by *every driver* with the LF (24a). Binding Principle predicts that this LF shall be ruled out.

- (24) The shark next to him_{*1/2} attacked every driver₁.
 a. *[[every driver] 1 [The shark next to him₁ attacked *t*₁]]
 b. [[every driver] 2 [The shark next to him₁ attacked *t*₂]]

- **Reinhart's principle**

In (21a), *her*₂ is free, which satisfies Principle B. But, one could pick an assignment function *g* s.t. *g*(2) = *Mary*, making *her* and *Mary* can be accidentally coreferential.

Reinhart's principle (Reinhart 1983):

Avoid coreference in structures where bound anaphora is possible.

Reinhart's principle forces to use an LF with binding if available. Compared with (21a), there is an LF of the form "*Mary*₁ [*t*₁ likes herself₁]" with binding and the same meaning.

Discussion: *she/her* can be coreferential with *Zelda* in (25b) but not in (25a). Can you see why?

- (25) a. **She** likes the flowers that we bought for *Zelda*.
 b. The flowers that we bought for **her** pleased *Zelda*.

Explanation:

- (25a) is ruled out by Reinhart's principle because it has the following competing LF which involves a legit binding:

- (26) *Zelda* 1 [*t*₁ likes the flowers that we bought for her₁]

- In contrast, the following competing LFs for (25b) cannot be generated as otherwise giving rise to weak crossover and violating Binding Principle.

- (27) a. **Zelda* 1 [the flowers that we bought for *t*₁ pleased her₁]
 b. **Zelda* 1 [the flowers that we bought for her pleased *t*₁]