Ling 320: Semantics. Solution to the Final Exam. Dec 5th, 2007.

Part 1.

i. Solving first for $\llbracket \mathrm{NP_a} \rrbracket^{s,g}$:

$\llbracket \mathrm{NP_a} \rrbracket^{s,g} =$	
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{S} \rrbracket^{s,g[2\to x]} = 1\}$	(i),(j)
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{VP_b} \rrbracket^{s,g[2\to x]} \in \llbracket \mathrm{DP_d} \rrbracket^{s,g[2\to x]}\}$	(a)
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{VP_b} \rrbracket^{s,g[2\to x]} \in \{A \mid \llbracket t^2 \rrbracket^{s,g[2\to x]} \in A\}\}$	(h)
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{VP_b} \rrbracket^{s,g[2\to x]} \in \{A \mid x \in A\}\}$	(k)
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid x \in \llbracket \mathrm{VP_b} \rrbracket^{s,g[2\to x]}\}$	$\in$
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid <x, \llbracket \mathrm{DP_e} \rrbracket^{s,g[2\to x]}> \in \llbracket \mathrm{V_{t,b}} \rrbracket^{s,g[2\to x]}\}$	(f),$\in$
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid <x, \text{Parissa}> \in \llbracket \mathrm{V_{t,b}} \rrbracket^{s0,g[2\to x]}\}$	(b),(b),(c)
$\llbracket \mathrm{NP_b} \rrbracket^{s,g} \cap \{x \mid x \text{ called Parissa in } s\}$	$\in$
$\{x \mid x \text{ is a guy in } s\} \cap \{x \mid x \text{ called Parissa in } s\}$	(b),(b),(c)
$\{x \mid x \text{ is a guy in } s \text{ and } x \text{ called Parissa in } s\}$	(c),$\cap$

ii. For any s, g, $\llbracket \mathrm{S_a} \rrbracket^{s,g} = 1$ iff

$\{x \mid \llbracket \mathrm{S_b} \rrbracket^{s,g[1\to x]} = 1\} \in \{A \mid <\llbracket \mathrm{NP_a} \rrbracket^{s,g}, A> \in \llbracket \mathrm{D} \rrbracket^{s,g}\}$	(l),(g)
$<\llbracket \mathrm{NP_a} \rrbracket^{s,g}, \{x \mid \llbracket \mathrm{S_b} \rrbracket^{s,g[1\to x]} = 1\}> \in \llbracket a \rrbracket^{s,g}$	$\in$,(b)
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{S_b} \rrbracket^{s,g[1\to x]} = 1\} \neq \varnothing$	(c),$\in$
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{VP_a} \rrbracket^{s,g[1\to x]} \in \llbracket \mathrm{DP_b} \rrbracket^{s,g[1\to x]}\} \neq \varnothing$	(a)
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid \llbracket \mathrm{VP_a} \rrbracket^{s,g[1\to x]} \in \{A \mid \llbracket t^1 \rrbracket^{s,g[1\to x]} \in A\}\} \neq \varnothing$	(h)
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid x \in \llbracket \mathrm{VP_a} \rrbracket^{s,g[1\to x]}\} \neq \varnothing$	$\in$,(k)
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid x \in \{y \mid <y, \llbracket \mathrm{DP_c} \rrbracket^{s,g[1\to x]}> \in \llbracket \mathit{knows} \rrbracket^{s,g[1\to x]}\} \neq \varnothing$	(f),(c)
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid <x, \llbracket \mathrm{DP_c} \rrbracket^{s,g[1\to x]}> \in \llbracket \mathit{knows} \rrbracket^{s,g[1\to x]}\} \neq \varnothing$	$\in$
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid <x, g(3)> \in \llbracket \mathit{knows} \rrbracket^{s,g[1\to x]}\} \neq \varnothing$	(b),(b),(c)
$\llbracket \mathrm{NP_a} \rrbracket^{s,g} \cap \{x \mid x \text{ knows } g(3) \text{ in } s\} \neq \varnothing$	(c),$\in$
$\{x \mid x \text{ is a guy in } s \text{ and } x \text{ called Parissa in } s\} \cap \{x \mid x \text{ knows } g(3) \text{ in } s\} \neq \varnothing$	i.
$\{x \mid x \text{ is a guy in } s \text{ and } x \text{ called Parissa in } s \text{ and } x \text{ knows } g(3) \text{ in } s\} \neq \varnothing$	$\cap$

Part 2. Bound and Referential Pronouns.

i. Solving first for $\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]}$:

$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} =$	
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid \llbracket \mathrm{S} \rrbracket^{s0,[1\to S,\, 2\to x]} = 1\}$	(i),(j)
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid \llbracket \mathrm{VP_b} \rrbracket^{s0,[1\to S,\, 2\to x]} \in \llbracket \mathrm{DP_d} \rrbracket^{s,[1\to S,\, 2\to x]}\}$	(a)
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid \llbracket \mathrm{VP_b} \rrbracket^{s0,[1\to S,\, 2\to x]} \in \{A \mid \llbracket t^2 \rrbracket^{s,[1\to S,\, 2\to x]} \in A\}\}$	(h)
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid \llbracket \mathrm{VP_b} \rrbracket^{s0,[1\to S,\, 2\to x]} \in \{A \mid x \in A\}\}$	(k)
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid x \in \llbracket \mathrm{VP_b} \rrbracket^{s0,[1\to S,\, 2\to x]}\}$	$\in$
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid <x, \llbracket \mathrm{DP_e} \rrbracket^{s0,g[1\to S,2\to x]}> \in \llbracket \mathrm{V_{t,b}} \rrbracket^{s0,g[1\to S,2\to x]}\}$	(f),$\in$
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid <x, x\text{'s cousin}> \in \llbracket \mathit{married} \rrbracket^{s0,g[1\to S,2\to x]}\}$	(c),(b)
$\llbracket \mathrm{NP_b} \rrbracket^{s0,[1\to S]} \cap \{x \mid x \text{ married } x\text{'s cousin in } s_0\}$	(b),(c),$\in$
$\{x \mid x \text{ is a woman in } s_0\} \cap \{x \mid x \text{ married } x\text{'s cousin in } s_0\}$	(b),(b),(c)
$\{x \mid x \text{ is a woman in } s_0 \text{ and } x \text{ married } x\text{'s cousin in } s_0\}$	$\cap$

ii. $\llbracket \mathrm{S_a} \rrbracket^{s0,[1\to S]} = 1$ iff

$\{x \mid \llbracket \mathrm{S_b} \rrbracket^{s0,[1\to x]} = 1\} \in \llbracket \mathrm{DP^1{}_a} \rrbracket^{s0,[1\to S]}$	(l)
$\{x \mid \llbracket \mathrm{S_b} \rrbracket^{s0,[1\to x]} = 1\} \in \{A \mid <\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]}, A> \in \llbracket \mathrm{D} \rrbracket^{s0,[1\to S]}\}$	(g)
$<\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]}, \{x \mid \llbracket \mathrm{S_b} \rrbracket^{s0,[1\to x]} = 1\}> \in \llbracket \mathit{every} \rrbracket^{s0,[1\to S]}$	$\in$,(b)
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid \llbracket \mathrm{S_b} \rrbracket^{s0,[1\to x]} = 1\}$	(c),$\in$
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid \llbracket \mathrm{VP_a} \rrbracket^{s0,[1\to x]} \in \llbracket \mathrm{DP_b} \rrbracket^{s0,[1\to x]}\}$	(a)
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid \llbracket \mathrm{VP_a} \rrbracket^{s0,[1\to x]} \in \{A \mid \llbracket t^1 \rrbracket^{s0,[1\to x]} \in A\}\}$	(h)
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid \llbracket \mathrm{VP_a} \rrbracket^{s0,[1\to x]} \in \{A \mid x \in A\}\}$	(k)
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid x \in \llbracket \mathrm{VP_a} \rrbracket^{s0,[1\to x]}\}$	$\in$
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid x \in \{y \mid y \text{ is a little crazy in } s_0\}\}$	assumed
$\llbracket \mathrm{NP_a} \rrbracket^{s0,[1\to S]} \subseteq \{x \mid x \text{ is a little crazy in } s_0\}$	$\in$
$\{x \mid x \text{ is a woman in } s_0 \text{ and } x \text{ married } x\text{'s cousin in } s_0\} \subseteq \{x \mid x \text{ is a little crazy in } s_0\}$	i.

i. Solving first for $[\![\text{NP}_a]\!]^{s0,[1\to S]}$:

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} =$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap [\![\text{CP}]\!]^{s0,[1\to S]} \qquad \text{(i)}$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid [\![\text{S}]\!]^{s0,[1\to S,\ 2\to x]} = 1\} \qquad \text{(j)}$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid [\![\text{VP}_b]\!]^{s0,[1\to S,\ 2\to x]} \in [\![\text{DP}_d]\!]^{s,[1\to S,\ 2\to x]}\} \qquad \text{(a)}$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid [\![\text{VP}_b]\!]^{s0,[1\to S,\ 2\to x]} \in \{A \mid [\![t^2]\!]^{s,[1\to S,\ 2\to x]} \in A\}\} \qquad \text{(h)}$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid [\![\text{VP}_b]\!]^{s0,[1\to S,\ 2\to x]} \in \{A \mid x \in A\}\} \qquad \text{(k)}$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid x \in [\![\text{VP}_b]\!]^{s0,[1\to S,\ 2\to x]}\} \qquad \in$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid x \in \{y \mid <y, [\![\text{DP}_e]\!]^{s0,g[1\to S,2\to x]}> \in [\![\text{V}_{t,b}]\!]^{s0,g[1\to S,2\to x]}\}\} \qquad \in$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid <x, [\![\text{DP}_e]\!]^{s0,g[1\to S,2\to x]}> \in [\![\text{V}_{t,b}]\!]^{s0,g[1\to S,2\to x]}\} \qquad \in$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid <x, \text{S's cousin}> \in [\![\text{V}_{t,b}]\!]^{s0,g[1\to S,2\to x]}\} \qquad \text{(c)}$$

$$[\![\text{NP}_b]\!]^{s0,[1\to S]} \cap \{x \mid x \text{ married S's cousin in } s_0\} \qquad \text{(b),(c),}\in$$

$$\{x \mid x \text{ is a woman in } s_0\} \cap \{x \mid x \text{ married S's cousin in } s_0\} \qquad \text{(b),(b),(c)}$$

$$\{x \mid x \text{ is a woman in } s_0 \text{ and } x \text{ married S's cousin in } s_0\} \qquad \cap$$

ii. $[\![\text{S}_a]\!]^{s0,[1\to S]} = 1$ iff

$$\{x \mid [\![\text{S}_b]\!]^{s0,[1\to x]} = 1\} \in [\![\text{DP}^1{}_a]\!]^{s0,[1\to S]} \qquad \text{(l)}$$

$$\{x \mid [\![\text{S}_b]\!]^{s0,[1\to x]} = 1\} \in \{A \mid < [\![\text{NP}_a]\!]^{s0,[1\to S]}, A> \in [\![\text{D}]\!]^{s0,[1\to S]}\} \qquad \text{(g)}$$

$$< [\![\text{NP}_a]\!]^{s0,[1\to S]}, \{x \mid [\![\text{S}_b]\!]^{s0,[1\to x]} = 1\}> \in [\![\textit{every}]\!]^{s0,[1\to S]} \qquad \in\text{,(b)}$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid [\![\text{S}_b]\!]^{s0,[1\to x]} = 1\} \qquad \text{(c),}\in$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid [\![\text{VP}_a]\!]^{s0,[1\to x]} \in [\![\text{DP}_b]\!]^{s0,[1\to x]}\} \qquad \text{(a)}$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid [\![\text{VP}_a]\!]^{s0,[1\to x]} \in \{A \mid [\![t^1]\!]^{s0,[1\to x]} \in A\}\} \qquad \text{(h)}$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid [\![\text{VP}_a]\!]^{s0,[1\to x]} \in \{A \mid x \in A\}\} \qquad \text{(k)}$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid x \in [\![\text{VP}_a]\!]^{s0,[1\to x]}\} \qquad \in$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid x \in \{y \mid y \text{ is a little crazy in } s_0\}\} \qquad \text{assumed}$$

$$[\![\text{NP}_a]\!]^{s0,[1\to S]} \subseteq \{x \mid x \text{ is a little crazy in } s_0\} \qquad \in$$

$$\{x \mid x \text{ is a woman in } s_0 \text{ and } x \text{ married S's cousin in } s_0\} \subseteq \{x \mid x \text{ is a little crazy in } s_0\} \qquad *$$

(ii) (3) produces the bound variable interpretation, and (4) produces the referential interpretation.

Part 3. Lack of Bound Variable Readings.

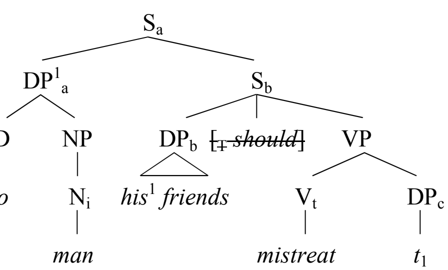
Our grammar correctly predicts that *her* cannot be interpreted as a bound variable in (5), while it can be in (2). In our system, a pronoun may be interpreted as a bound variable just in case the pronoun occurs in an S out of which a co-indexed DP has moved. That is, that pronoun is interpreted as a bound variable iff:

(a) it occurs in an S that is sister to a moved DP; and
(b) is co-indexed with that DP.

A bound variable interpretation for *her* is possible for sentence (2), as (4) illustrates: In this case, *her* occurs in an S out of which a co-indexed DP has moved. A bound variable interpretation for *her* is NOT possible for sentence (5), as in this case the pronoun does NOT occur in an S out of which a co-indexed DP has moved. As a result, in (5), *her* is necessarily referential.

Bonus

No man is predicted to be able to antecede *his* in (9b): Once *no man* quantifier raises, *his* will be interpreted as a bound variable if the two share their index:



$[\![\text{S}_a]\!]^{s,g} = 1$ iff

$$\{x \mid [\![\text{S}_b]\!]^{s,g[1\to x]} = 1\} \in [\![\text{DP}^1{}_a]\!]^{s,g} \qquad \text{(l)}$$

$$\{x \mid [\![\text{S}_b]\!]^{s,g[1\to x]} = 1\} \in \{A \mid < [\![\text{NP}]\!]^{s,g}, A> \in [\![\text{D}]\!]^{s,g}\} \qquad \text{(g)}$$

$$< [\![\text{NP}]\!]^{s,g}, \{x \mid [\![\text{S}_b]\!]^{s,g[1\to x]} = 1\}> \in [\![\textit{no}]\!]^{s,g} \qquad \in\text{,(b)}$$

$$[\![\text{NP}_a]\!]^{s,g} \cap \{x \mid [\![\text{S}_b]\!]^{s,g[1\to x]} = 1\} = \varnothing \qquad \text{(c),}\in$$

$$[\![\text{NP}_a]\!]^{s,g} \cap \{x \mid [\![\text{VP}]\!]^{s,g[1\to x]} \in [\![\text{DP}]\!]^{s,g[1\to x]}\} = \varnothing \qquad \text{(c),}\in$$

$$[\![\text{NP}_a]\!]^{s,g} \cap \{x \mid [\![\text{VP}]\!]^{s,g[1\to x]} \in \{A \mid x\text{'s friends} \in A\}\} = \varnothing \qquad \text{(h),(c)}$$

$$[\![\text{NP}_a]\!]^{s,g} \cap \{x \mid x\text{'s friends} \in [\![\text{VP}]\!]^{s,g[1\to x]}\} = \varnothing \qquad \in$$

$⟦NP_a⟧^{s,g} \cap \{x \mid x\text{'s friends} \in \{y \mid \langle y, ⟦DP_c⟧^{s,g[1\to x]}\rangle \in ⟦V_t⟧^{s,g[1\to x]}\}\} = \varnothing$ (f)

$⟦NP_a⟧^{s,g} \cap \{x \mid \langle x\text{'s friends}, ⟦DP_c⟧^{s,g[1\to x]}\rangle \in ⟦V_t⟧^{s,g[1\to x]}\} = \varnothing$ $\in$

$⟦NP_a⟧^{s,g} \cap \{x \mid \langle x\text{'s friends}, x\rangle \in ⟦V_t⟧^{s,g[1\to x]}\} = \varnothing$ (b),(k)

$⟦NP_a⟧^{s,g} \cap \{x \mid \langle x\text{'s friends}, x\rangle \in ⟦\textit{mistreat}⟧^{s,g[1\to x]}\} = \varnothing$ (b)

$⟦NP_a⟧^{s,g} \cap \{x \mid x\text{'s friends mistreat } x \text{ in } s\} = \varnothing$ (c),$\in$

$\{x \mid x \text{ is a man in } s\} \cap \{x \mid x\text{'s friends mistreat } x \text{ in } s\} = \varnothing$ (b),(b),(c)

The system can be revised in a number of ways to handle this, including:

(i) Disallowing a DP to move past a pronoun that shares its index (the so-called *weak crossover* constraint);

(ii) Requiring that a DP syntactically bind a pronoun at surface structure in order to semantically bind it after Quantifier Raising applies.