Dynamic Semantics, ESSLLI 2010

DONKEY ANAPHORA IS ORDINARY BINDING

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(1) a. If a farmer owns a donkey, he beats it.
b. Every farmer who owns a donkey beats it.

We claim that the relationship between the pronouns and indefinites in (1) *seems* like binding because it *is* just binding. In each case, the indefinites take scope over the pronouns in question, and binding occurs just as in the bound reading of *Everyone thinks he is intelligent*.

Evans, May: scope uniformly clause-bounded

(2) a.*[Everyone$_i$ arrived] and [she$_i$ spoke].
b. [A woman$_i$ arrived] and [she$_i$ spoke].

Reinhart: quantificational binding requires c-command

(3) a. [Everyone$_i$'s mother] loves him$_i$.
b. [Someone from every city$_i$] hates it$_i$.

- Certain quantifiers, including indefinites, can take scope outside of their minimal clause.
- We assume that c-command simply is not a requirement on quantificational binding.

Evans: but the truth conditions!

(4) a. If a donkey eats, it sleeps.
b. $\exists d.(\mathbf{donk}\,d) \wedge [\mathbf{if}(\mathbf{eats}\,d), (\mathbf{sleeps}\,d)]$

- We should conclude rather that the indefinite does not take wider scope than the *if*.

1.2. Sketch of the account

- $if(A, B) = \neg(\mathrm{A} \wedge \neg\mathrm{B})$

(5) a. $\neg\,[\exists d.(\mathbf{donk}\,d) \wedge ((\mathbf{eats}\,d) \wedge \neg(\mathbf{sleeps}\,d))]$
b. $\forall d.\neg\,[(\mathbf{donk}\,d) \wedge ((\mathbf{eats}\,d) \wedge \neg(\mathbf{sleeps}\,d))]$

(6) a. Most men who own a car wash it on Sundays.
b. Every man who owns a donkey beats it.

Evans (1977:117) provides an influential assessment:

> If the sentence is to express the intended restrictions upon the major quantifier—that of being a car- or donkey-owner—it would appear that the second quantifier must be given a scope which does not extend beyond the relative clause, and this rules out a bound variable interpretation of the later pronouns.

Once again, appearances are deceiving:

(7) a. Every farmer who owns a donkey beats it.
b. $\neg\exists x\exists y.\mathbf{donk}\,y \wedge ((\mathbf{farmer}\,x \wedge \mathbf{owns}\,y\,x) \wedge \neg(\mathbf{beats}\,y\,x))$

1.3. Supporting evidence: donkey weak crossover

(8) If a bishop$_i$ meets a bishop$_j$, he$_i$ blesses him$_j$.

(9) If a farmer owns a donkey or a goat, he beats it. [Stone]

(10) a. A woman$_i$ arrived and she$_i$ spoke.
b. *She$_i$ arrived and a woman$_i$ spoke.

(11) a. Most women who have a son$_i$ love his$_i$ father.
b. *His$_i$ father loves most women who have a son$_i$.

(12) a. If a farmer owns a donkey, he beats it. (same as (2b))
b.*If he owns it, a farmer beats a donkey.

(13) a. A farmer beats a donkey if he owns it.
b.*He beats it if a farmer owns a donkey.

2. Fragment

2.1. The tower notation: taking scope

(14)

$$\begin{array}{cc} \mathrm{DP} & \text{syntactic category} \\ \textit{John} & \text{expression} \\ \mathbf{j} & \text{semantic value} \end{array}$$

(15)

$$\left(\begin{array}{c} \mathrm{DP} \\ \textit{John} \\ \mathbf{j} \end{array} \quad \begin{array}{c} \mathrm{DP\backslash S} \\ \textit{left} \\ \mathbf{left} \end{array} \right) = \begin{array}{c} \mathrm{S} \\ \textit{John left} \\ \mathbf{left}\,\mathbf{j} \end{array}$$

(16)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{everyone} \\ \forall y[\ ] \\ \hline y \end{array}$$

(17)

$$\frac{\mathrm{S} \mid \mathrm{S}}{\mathrm{DP}} \quad \text{means} \quad \frac{\ldots\text{to form an S.} \mid \ \text{and takes scope at an S}\ldots}{\text{the expression functions in local syntax as a DP,}}$$

(18)

$$\left(\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{everyone} \\ \forall y[\ ] \\ \hline y \end{array} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP\backslash S} \\ \textit{left} \\ [\ ] \\ \hline \mathbf{left} \end{array} \right) = \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{S} \\ \textit{everyone left} \\ \forall y[\ ] \\ \hline \mathbf{left}\,y \end{array}$$

(19)

$$\left(\begin{array}{c} \mathrm{C} \mid \mathbf{D} \\ \hline \mathrm{A}/\mathbf{B} \\ \textit{left-exp} \\ g[\ ] \\ \hline f \end{array} \quad \begin{array}{c} \mathbf{D} \mid \mathrm{E} \\ \hline \mathbf{B} \\ \textit{right-exp} \\ h[\ ] \\ \hline x \end{array} \right) = \begin{array}{c} \mathrm{C} \mid \mathrm{E} \\ \hline \mathrm{A} \\ \textit{left-exp right-exp} \\ g[h[\ ]] \\ \hline f(x) \end{array}$$

Type shifter 1 of 3: Lift (Partee & Rooth, many others)
(20)

$$\begin{array}{c} \mathrm{DP\backslash S} \\ \textit{left} \\ \mathbf{left} \end{array} \quad \overset{\text{Lift}}{\Rightarrow} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP\backslash S} \\ \textit{left} \\ [\ ] \\ \hline \mathbf{left} \end{array}$$

(21)

$$\boxed{\begin{array}{c} \mathrm{A} \\ \textit{expression} \\ x \end{array} \quad \overset{\text{Lift}}{\Rightarrow} \quad \begin{array}{c} \alpha \mid \alpha \\ \hline \mathrm{A} \\ \textit{expression} \\ [\ ] \\ \hline x \end{array}}$$

Type shifter 2 of 3: Lower (Chierchia 1995, p. 85; typical of continuations)
(22)

$$\boxed{\begin{array}{c} \alpha \mid \mathrm{S} \\ \hline \mathrm{S} \\ \textit{expression} \\ f[\ ] \\ \hline x \end{array} \quad \overset{\text{Lower}}{\Rightarrow} \quad \begin{array}{c} \alpha \\ \textit{expression} \\ f[x] \end{array}}$$

(23)

$$\begin{array}{c} \mathrm{S}\,|\,\mathrm{S} \\ \hline \mathrm{S} \\ \textit{everyone left} \\ \forall y[\;] \\ \hline \textbf{left}\, y \end{array} \;\overset{\text{Lower}}{\Rightarrow}\; \begin{array}{c} \mathrm{S} \\ \textit{everyone left} \\ \forall y.\textbf{left}\, y \end{array}$$

(24)

$$\begin{array}{c} \mathrm{S}\,|\,\mathrm{S} \\ \hline \mathrm{DP} \\ \textit{someone} \\ \exists x[\;] \\ \hline x \end{array} \left(\begin{array}{c} \mathrm{S}\,|\quad \mathrm{S} \\ \hline (\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP} \\ \textit{loves} \\ [\;] \\ \hline \textbf{loves} \end{array} \qquad \begin{array}{c} \mathrm{S}\,|\,\mathrm{S} \\ \hline \mathrm{DP} \\ \textit{everyone} \\ \forall y[\;] \\ \hline y \end{array} \right)$$

$$= \begin{array}{c} \mathrm{S}\,|\,\mathrm{S} \\ \hline \mathrm{S} \\ \textit{Someone loves everyone} \\ \exists x[\forall y[\;]] \\ \hline \textbf{loves}\, y\, x \end{array} \;\overset{\text{Lower}}{\Rightarrow}\; \begin{array}{c} \mathrm{S} \\ \textit{Someone loves everyone} \\ \exists x[\forall y[\textbf{loves}\, y\, x]] \end{array}$$

2.2. Multiple layers and inverse scope.

Also important for handling multiple donkey pronouns.

(25)

$$\begin{array}{c} \mathrm{S}\,|\,\mathrm{S} \\ \hline \mathrm{DP} \\ \textit{someone} \\ \exists x[\;] \\ \hline x \end{array} \;\overset{\text{Lift}}{\Rightarrow}\; \begin{array}{c|c} \mathrm{S}_L & \mathrm{S}_L \\ \hline \mathrm{S} & \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{DP}} \\ \multicolumn{2}{c}{\textit{someone}} \\ \multicolumn{2}{c}{[\;]} \\ \hline \multicolumn{2}{c}{\exists x[\;]} \\ \hline \multicolumn{2}{c}{x} \end{array}$$

(26)

$$\begin{array}{c} \mathrm{S}\,|\,\mathrm{S} \\ \hline \mathrm{DP} \\ \textit{someone} \\ \exists x[\;] \\ \hline x \end{array} \;\overset{\text{Lift}}{\Rightarrow}\; \begin{array}{c|c} \mathrm{S} & \mathrm{S} \\ \hline \mathrm{S}_L & \mathrm{S}_L \\ \hline \multicolumn{2}{c}{\mathrm{DP}} \\ \multicolumn{2}{c}{\textit{someone}} \\ \multicolumn{2}{c}{\exists x[\;]} \\ \hline \multicolumn{2}{c}{[\;]} \\ \hline \multicolumn{2}{c}{x} \end{array}$$

(27)

$$\begin{array}{c|c} \mathrm{S}_L & \mathrm{S}_L \\ \hline \mathrm{S} & \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{DP}} \\ \multicolumn{2}{c}{\text{someone}} \end{array} \left(\begin{array}{c} \phantom{\mathrm{S}} \\ \hline \phantom{\mathrm{S}} \\ \hline (\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP} \\ \text{loves} \end{array} \quad \begin{array}{c|c} \mathrm{S} & \mathrm{S} \\ \hline \mathrm{S}_L & \mathrm{S}_L \\ \hline \multicolumn{2}{c}{\mathrm{DP}} \\ \multicolumn{2}{c}{\text{everyone}} \end{array} \right) = \begin{array}{c|c} \mathrm{S} & \mathrm{S} \\ \hline \mathrm{S} & \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{S}} \\ \multicolumn{2}{c}{\text{someone loves everyone}} \end{array}$$

(28)

$$\begin{array}{c} \\ \hline \exists x[\;] \\ \hline x \end{array} \left(\begin{array}{c} \\ \hline \\ \hline \textbf{loves} \end{array} \quad \begin{array}{c} \forall y[\;] \\ \hline \\ \hline y \end{array} \right) = \begin{array}{c} \forall y[\;] \\ \hline \exists x[\;] \\ \hline \textbf{loves}\, y\, x \end{array} \;\overset{\substack{\text{Lower} \\ \text{(twice)}}}{\Rightarrow}\; \forall y(\exists x(\textbf{loves}\, y\, x))$$

(29)

$$\left(\begin{array}{c|c} \mathrm{A} & \mathrm{B} \\ \hline \mathrm{C} & \mathrm{D} \\ \hline \multicolumn{2}{c}{\mathrm{E}} \\ \multicolumn{2}{c}{\textit{left-exp}} \\ \multicolumn{2}{c}{g[\;]} \\ \hline \multicolumn{2}{c}{i[\;]} \\ \hline \multicolumn{2}{c}{\mathrm{x}} \end{array} \qquad \begin{array}{c|c} \mathrm{B} & \mathrm{F} \\ \hline \mathrm{D} & \mathrm{G} \\ \hline \multicolumn{2}{c}{\mathrm{E}\backslash\mathrm{H}} \\ \multicolumn{2}{c}{\textit{right-exp}} \\ \multicolumn{2}{c}{h[\;]} \\ \hline \multicolumn{2}{c}{j[\;]} \\ \hline \multicolumn{2}{c}{\mathrm{f}} \end{array} \right) = \begin{array}{c|c} \mathrm{A} & \mathrm{F} \\ \hline \mathrm{C} & \mathrm{G} \\ \hline \multicolumn{2}{c}{\mathrm{H}} \\ \multicolumn{2}{c}{\textit{left-exp right-exp}} \\ \multicolumn{2}{c}{g[h[\;]]} \\ \hline \multicolumn{2}{c}{i[j[\;]]} \\ \hline \multicolumn{2}{c}{\mathrm{f(x)}} \end{array}$$

2.3. Binding

- the pronoun must create a need to be bound
- the binder must satisfy that need

(30)

$$\begin{array}{c} \mathrm{DP} \rhd \alpha \mid \alpha \\ \hline \mathrm{DP} \\ \textit{he} \\ \lambda y[\,] \\ \hline y \end{array}$$

(31)

$$\left(\begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{he} \\ \lambda y[\,] \\ \hline y \end{array} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP}\backslash\mathrm{S} \\ \textit{left} \\ [\,] \\ \hline \textbf{left} \end{array} \right) = \begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{S} \\ \textit{He left} \\ \lambda y[\,] \\ \hline \textbf{left}\, y \end{array} \quad \overset{\text{Lower}}{\Rightarrow} \quad \begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \\ \textit{He left} \\ \lambda y.\textbf{left}\, y \end{array}$$

Type shifter 3 of 3: Binding (coindexation)

(32)

$$\boxed{\begin{array}{c} \alpha \mid \beta \\ \hline \mathrm{DP} \\ \textit{expression} \\ f[\,] \\ \hline x \end{array} \quad \overset{\text{Bind}}{\Rightarrow} \quad \begin{array}{c} \alpha \mid \mathrm{DP} \rhd \beta \\ \hline \mathrm{DP} \\ \textit{expression} \\ f[[\,]x] \\ \hline x \end{array}}$$

(33)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{everyone} \\ \forall x.[\,] \\ \hline x \end{array} \quad \overset{\text{Bind}}{\Rightarrow} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{everyone} \\ \forall x.([\,]x) \\ \hline x \end{array}$$

(34)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{everyone} \\ \forall x.([\,]x) \\ \hline x \end{array} \left(\begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline (\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP} \\ \textit{loves} \\ \\ \hline \textbf{loves} \end{array} \left(\begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{his} \\ \lambda y[\,] \\ \hline y \end{array} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP}\backslash\mathrm{DP} \\ \textit{mother} \\ \\ \hline \textbf{mom} \end{array} \right) \right)$$

$$= \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{S} \\ \textit{Everyone loves his mom} \\ \forall x.([\lambda y.[\,]]x) \\ \hline \textbf{loves}(\textbf{mom}\, y)\, x \end{array} \quad \overset{\text{Lower}}{\Rightarrow} \quad \begin{array}{c} \mathrm{S} \\ \textit{Everyone loves his mom} \\ \forall x.([\lambda y.[\textbf{loves}(\textbf{mom}\, y)\, x]]x) \end{array}$$

2.4. Binding without c-command; the dynamics of weak crossover

It is perfectly possible to have binding without c-command:

(35)

$$\left(\begin{array}{c} \mathrm{S} \mid \mathrm{DP}\rhd\mathrm{S} \\ \hline \mathrm{DP} \\ \text{everyone's} \end{array} \quad \begin{array}{c} \\ \hline \mathrm{DP}\backslash\mathrm{DP} \\ \text{mother} \end{array} \right) \left(\begin{array}{c} \\ \hline (\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP} \\ \text{loves} \end{array} \quad \begin{array}{c} \mathrm{DP}\rhd\mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \text{him} \end{array} \right)$$

Final interpretation: $\forall y.\textbf{loves}\, y(\textbf{mom}\, y)$.

(36)

$$\left(\begin{array}{c} \mathrm{DP}\rhd\mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \text{his} \end{array} \quad \begin{array}{c} \\ \hline \mathrm{DP}\backslash\mathrm{DP} \\ \text{mother} \end{array} \right) \left(\begin{array}{c} \\ \hline (\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP} \\ \text{loves} \end{array} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{DP}\rhd\mathrm{S} \\ \hline \mathrm{DP} \\ \text{everyone} \end{array} \right) = \begin{array}{c} \mathrm{DP}\rhd\mathrm{S} \mid \mathrm{DP}\rhd\mathrm{S} \\ \hline \mathrm{S} \\ \text{Hml}\forall \end{array}$$

3. Donkey anaphora in conditionals

(37)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline (\mathrm{S}/\mathrm{S})/\mathrm{S} \\ \textit{if} \\ \neg[\,] \\ \hline \lambda p \lambda q.p \wedge \neg q \end{array}$$

(38)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline (\mathrm{S}/\mathrm{S})/\mathrm{S} \\ \textit{if} \\ \neg[\,] \\ \hline \lambda p \lambda q.p \wedge \neg q \end{array} \left(\begin{array}{c} \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{someone} \\ \exists y.([\,]\, y) \\ \hline y \end{array} \quad \begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline \mathrm{DP}\backslash\mathrm{S} \\ \textit{knocked} \\ [\,] \\ \hline \textbf{knocked} \end{array} \right) \left(\begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP} \\ \textit{she} \\ \lambda x.[\,] \\ \hline x \end{array} \quad \begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{DP}\backslash\mathrm{S} \\ \textit{left} \\ [\,] \\ \hline \textbf{left} \end{array} \right)$$

(39)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \mathrm{S} \\ \neg(\exists y.((\lambda x.[\,])\,y)) \\ \hline (\textbf{knocked}\,y) \wedge \neg(\textbf{left}\,x) \end{array} \overset{\text{Lower}}{\Rightarrow} \begin{array}{c} \mathrm{S} \\ \neg(\exists y.(\textbf{knocked}\,y) \wedge \neg(\textbf{left}\,y)) \end{array}$$

Apart from the lexical entry for *if*, all of the mechanisms for scope and binding were developed entirely independently of any concerns for handling donkey anaphora.

3.1. Multiple indefinites

(40)

$$\begin{array}{c} \dfrac{\mathrm{S} \mid \mathrm{S}}{\mathrm{DP}}/\mathrm{N} \\ \mathrm{a} \\ \lambda P.\dfrac{\exists x.Px \wedge [\,]}{x} \end{array}$$

(41)

$$\begin{array}{c} \dfrac{\mathrm{S} \mid \mathrm{S}}{\mathrm{DP}}/\mathrm{N} \\ \mathrm{a} \\ \lambda P.\dfrac{\exists x.Px \wedge [\,]}{x} \end{array} \begin{array}{c} \mathrm{N} \\ \mathrm{farmer} \\ \textbf{far} \end{array} = \begin{array}{c} \dfrac{\mathrm{S} \mid \mathrm{S}}{\mathrm{DP}} \\ \text{a farmer} \\ \dfrac{\exists x.(\textbf{far}\,x) \wedge [\,]}{x} \end{array} \overset{\text{Bind}}{\Rightarrow} \begin{array}{c} \dfrac{\mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S}}{\mathrm{DP}} \\ \text{a farmer} \\ \dfrac{\exists x.(\textbf{far}\,x) \wedge ([\,]x)}{x} \end{array} \overset{\text{Lift}}{\Rightarrow} \begin{array}{c} \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline \dfrac{}{\mathrm{DP}} \\ \text{a farmer} \\ \exists x.(\textbf{far}\,x) \wedge ([\,]x) \\ \hline \dfrac{}{x} \end{array}$$

(42)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S} \\ \hline \dfrac{}{\mathrm{DP}} \\ \textit{a farmer} \\ \exists x.(\textbf{far}\,x) \wedge ([\,]x) \\ \hline \dfrac{}{x} \end{array} \begin{array}{c} \hline \dfrac{}{(\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP}} \\ \textit{owns} \\ \hline \dfrac{}{\textbf{owns}} \end{array} \begin{array}{c} \hline \dfrac{\mathrm{S} \mid \mathrm{DP} \rhd \mathrm{S}}{\mathrm{DP}} \\ \textit{a donkey} \\ \hline \dfrac{\exists y.(\textbf{donk}\,y) \wedge ([\,]y)}{y} \end{array} = \begin{array}{c|c} \mathrm{S} & \mathrm{DP} \rhd \mathrm{S} \\ \hline \mathrm{S} & \mathrm{DP} \rhd \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{S}} \\ \multicolumn{2}{c}{\textit{a farmer owns a donkey}} \\ \multicolumn{2}{c}{\exists x.(\textbf{far}\,x) \wedge ([\,]x)} \\ \hline \multicolumn{2}{c}{\exists y.(\textbf{donk}\,y) \wedge ([\,]y)} \\ \hline \multicolumn{2}{c}{\textbf{owns}\,y\,x} \end{array}$$

(43)

$$\begin{array}{c} \mathrm{DP} \rhd \mathrm{S} \mid \mathrm{S} \\ \hline \dfrac{}{\mathrm{DP}} \\ \textit{he} \\ \lambda z.[\,] \\ \hline \dfrac{}{z} \end{array} \begin{array}{c} \hline \dfrac{}{(\mathrm{DP}\backslash\mathrm{S})/\mathrm{DP}} \\ \textit{beats} \\ \hline \dfrac{}{\textbf{beats}} \end{array} \begin{array}{c} \hline \dfrac{\mathrm{DP} \rhd \mathrm{S} \mid \mathrm{S}}{\mathrm{DP}} \\ \textit{it} \\ \hline \dfrac{\lambda w.[\,]}{w} \end{array} = \begin{array}{c|c} \mathrm{DP} \rhd \mathrm{S} & \mathrm{S} \\ \hline \mathrm{DP} \rhd \mathrm{S} & \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{S}} \\ \multicolumn{2}{c}{\textit{he beats it}} \\ \multicolumn{2}{c}{\lambda z.[\,]} \\ \hline \multicolumn{2}{c}{\lambda w.[\,]} \\ \hline \multicolumn{2}{c}{\textbf{beats}\,w\,z} \end{array}$$

(44)

$$\begin{array}{c} \mathrm{S} \mid \mathrm{S} \\ \hline \dfrac{}{(\mathrm{S}/\mathrm{S})/\mathrm{S}} \\ \textit{if} \\ \neg[\,] \\ \hline \dfrac{}{\lambda pq.p \wedge \neg q} \end{array} \begin{array}{c|c} \mathrm{S} & \mathrm{DP} \rhd \mathrm{S} \\ \hline \mathrm{S} & \mathrm{DP} \rhd \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{S}} \\ \multicolumn{2}{c}{\textit{a farmer owns a donkey}} \\ \multicolumn{2}{c}{\exists x.(\textbf{far}\,x) \wedge ([\,]x)} \\ \hline \multicolumn{2}{c}{\exists y.(\textbf{donk}\,y) \wedge ([\,]y)} \\ \hline \multicolumn{2}{c}{\textbf{owns}\,y\,x} \end{array} \begin{array}{c|c} \mathrm{DP} \rhd \mathrm{S} & \mathrm{S} \\ \hline \mathrm{DP} \rhd \mathrm{S} & \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{S}} \\ \multicolumn{2}{c}{\textit{he beats it}} \\ \multicolumn{2}{c}{\lambda z.[\,]} \\ \hline \multicolumn{2}{c}{\lambda w.[\,]} \\ \hline \multicolumn{2}{c}{\textbf{beats}\,w\,z} \end{array} = \begin{array}{c|c} \mathrm{S} & \mathrm{S} \\ \hline \mathrm{S} & \mathrm{S} \\ \hline \multicolumn{2}{c}{\mathrm{S}} \\ \multicolumn{2}{c}{\textit{If a farmer owns a donkey he beats it}} \\ \multicolumn{2}{c}{\neg\exists x.(\textbf{far}\,x) \wedge ([\lambda z.[\,]]x)} \\ \hline \multicolumn{2}{c}{\exists y.(\textbf{donk}\,y) \wedge ([\lambda w.[\,]]y)} \\ \hline \multicolumn{2}{c}{(\textbf{owns}\,y\,x) \wedge \neg(\textbf{beats}\,w\,z)} \end{array}$$

(45) If a farmer owns a donkey, he beats it.
$\neg\exists x.(\textbf{far}\,x) \wedge [\exists y.(\textbf{donk}\,y) \wedge [(\textbf{owns}\,y\,x) \wedge \neg(\textbf{beats}\,y\,x)]]$

Weak readings? Barker (1996), Schein (2002)...

3.2. Unwanted uniqueness implications don't arise

(46) If a bishop meets a bishop, he blesses him.
$\neg\exists x.(\textbf{bish}\,x) \wedge [\exists y.(\textbf{bish}\,y) \wedge [(\textbf{meets}\,y\,x) \wedge \neg(\textbf{blesses}\,y\,x)]]$

Thus bishop sentences pose no special difficulties on our account.

3.3. Extending the account to modal treatments of conditionals

$$\frac{\lambda w \lambda w'.\neg[\,]}{\lambda p \lambda q.(w' \in \max(g(w))(\cap(f(w)+p))) \wedge \neg(w' \in q)}$$

3.4. *Why does* every *disrupt donkey anaphora?*

(47) If everyone owns a donkey, it brays.

The scope of *every* is generally limited to its minimal clause.

(48)

$$\dfrac{\dfrac{\mathrm{S}\mid\mathrm{S}}{\mathrm{S}}}{\dfrac{\genfrac{}{}{0pt}{}{\textit{Everyone owns a donkey}}{\forall x.[\exists y.(\mathbf{donk}\,y)\wedge[\,]]}}{\mathbf{owns}\,y\,x}} \quad \overset{\text{Lower}}{\Rightarrow} \quad \genfrac{}{}{0pt}{}{\mathrm{S}}{\genfrac{}{}{0pt}{}{\textit{Everyone owns a donkey}}{\forall x.[\exists y.(\mathbf{donk}\,y)\wedge[\mathbf{owns}\,y\,x]]}}$$

4. Donkey anaphora from relative clauses

(49) a. Every farmer who owns a donkey beats it.
b. $\neg\exists x\exists y.\mathbf{donk}\,y\wedge((\mathbf{far}\,x\wedge\mathbf{owns}\,y\,x)\wedge\neg(\mathbf{beats}\,y\,x))$

5. Coordination and donkey anaphora

(50) If a farmer owns a donkey or a goat, he beats it. Stone (1992)

(51)

$$\genfrac{}{}{0pt}{}{\left(\alpha\backslash\dfrac{\mathrm{S}\mid\mathrm{S}}{\alpha}\right)/\alpha}{\genfrac{}{}{0pt}{}{\textit{or}}{\lambda R\lambda L.\dfrac{(\lambda\kappa.(\kappa L)\vee(\kappa R))(\lambda x.[\,])}{x}}}$$

Choose $\alpha=\mathrm{DP}$:

(52)

$$\left(\genfrac{}{}{0pt}{}{\mathrm{DP}}{\textit{John}}\quad\genfrac{}{}{0pt}{}{\left(\mathrm{DP}\backslash\dfrac{\mathrm{S}\mid\mathrm{S}}{\mathrm{DP}}\right)/\mathrm{DP}}{\textit{or}}\quad\genfrac{}{}{0pt}{}{\mathrm{DP}}{\textit{Bill}}\right)\left(\genfrac{}{}{0pt}{}{\dfrac{\mathrm{DP}\rhd\mathrm{S}\mid\mathrm{S}}{\mathrm{DP}\backslash\mathrm{S}}}{\textit{called his mother}}\right)$$

(53)

$$\overset{\text{Bind}}{\Rightarrow}\left(\genfrac{}{}{0pt}{}{\dfrac{\mathrm{S}\mid\mathrm{DP}\rhd\mathrm{S}}{\mathrm{DP}}}{\textit{John or Bill}}\right)\left(\genfrac{}{}{0pt}{}{\dfrac{\mathrm{DP}\rhd\mathrm{S}\mid\mathrm{S}}{\mathrm{DP}\backslash\mathrm{S}}}{\textit{called his mother}}\right)$$

(54)

$$(\mathbf{called}(\mathbf{mom}\,\mathbf{j})\mathbf{j})\vee(\mathbf{called}(\mathbf{mom}\,\mathbf{b})\mathbf{b})$$

(55) If a bishop and a bishop meet, he blesses him.

(56) If a woman and a man meet, she asks him for his number.

(57) a. If John and Bill meet, he falls asleep.
b. If a butcher and a baker meet, he pays him.
c. If a man walking a dog and a woman walking a dog meet, it barks at it.

6. Donkey weak crossover

(58) a. Everyone$_i$'s mother loves his$_i$ father.
b. *His$_i$ father loves everyone$_i$'s mother. WCO

(59) a. If a farmer owns a donkey, he beats it.
b. *If he owns it, a farmer beats a donkey. DONKEY WCO

(60) a. A farmer beats a donkey if he owns it.
b. *He beats it if a farmer owns a donkey.

7. Conclusions

- indefinites can take scope over more than one clause
- c-command is not a requirement for binding
- quantifiers must be evaluated before the pns that they bind
- this explains weak crossover and donkey weak crossover
- Direct compositional, variable-free: no QR, assignment fns
- three independently-needed shifters: Lift, Lower, and Bind
- innovative lexical entry for *if*