QUANTIFIED NP'S AND DONKEY ANAPHORA

1. SOME OBSERVATIONS

- Obs. 1: Quantified np's (*every np*, *most np*, ...) selectively quantify over the head n-referent (not unselectively over information states).

(1) *Most$_x$* ***men***^{x} *who own a^y donkey beat it$_y$.*
e.g. $\not\models_{M,\,g}$ (1)
if $[\![man]\!] = \{m_0, \ldots, m_9\}$
& m_0 owns & beats donkey $d_0, \ldots, d_9$
& m_1 owns & beats donkeys $d_{10}, \ldots, d_{19}$
& m_2 owns donkey d_{20} (only) but doesn't beat d_{20}
⋮
& m_9 owns donkey d_{90} (only) but doesn't beat d_{90}

- Obs. 2: Any indefinite in the matrix clause of a quantified np has existential force.

- Obs. 3: In most donkey sentences, indefinites in the restriction of a quantified np have universal force ('strong reading').

(2) *Most$_x$ men^x who own a^y donkey beat it$_y$ with* ***a***^{z} *stick.*
= *for most people x, for* ***every*** *donkey y owned by x,*
there is ***a*** *stick z s.t. person x beats y with z*

(3) *Most$_x$ people^x that owned* ***a***^{y} *slave also owned his$_y$ offspring.* (Heim 1990)
= *for most* ***people*** *x, for* ***every*** *slave y owned by x &* ***every*** *child z of y,*
person x *also owned z.*

- Obs. 4: In some donkey sentences, indefinites in the restriction of a quantified np have existential force ('weak reading').

(4) *Most$_x$ people^x who had* ***a***^{y} *credit card paid their bill with it.* (R. Cooper)
= *for most people x s.t. x had* ***a*** *credit card y,*
person x paid x's bill with credit card y.

(5) (*In those days*) *most$_x$ people^x that owned* ***a***^{y} *slave were considered respectable.*
= *for most people x s.t. x owned* ***a*** *slave y,*
person x was considered respectable.

- Obs. 5: When the restriction of a quantified np contains multiple indefinites it may be possible to read some of them as strong and some as weak ('mixed reading').

(6) *Most$_x$ people^x who have* ***a***^{y} *credit card and buy* ***a***^{z} *computer* (Brasoveanu 2007)
use it$_y$ to pay for it$_z$.
= *for most people x s.t. x has* ***a*** *credit card y, for* ***every*** *computer z s.t. x buys y,*
x uses one of x's credit cards to pay for z.

2. REPRESENTATION IN DPL^{Q} (df. in APPENDIX)

Notation:
all(X, Y) iff $X \subseteq Y$
most(X, Y) iff $|X \cap Y| > |X \backslash Y|$)

- Obs. 1: Quantified np's (*every np*, *most np*, …) selectively quantify over the head n-referent (not unselectively over information states).
- Obs. 2: Any indefinites in the matrix clause of a quantified np have existential force.
- Obs. 3: Most indefinites in the restriction of a quantified np have universal force ('strong reading').

(2) *Most$_x$* ***men***^{x} *who own* ***a***^{y} *donkey beat it$_y$ with* ***a***^{z} *stick.*

(2′) $g[\![\text{MOST}^{\forall}{}_x([x\,y|\ man\ x, dnk\ y, own\ xy], [z|\ stk\ z, btw\ xyz])]\!]h$
iff $g = h$
& most($\{\boldsymbol{k(x)}: h[\![[x\,y|\ man\ x, dnk\ y, own\ xy]]\!]k)\}$,
$\{\boldsymbol{k(x)}: h[\![[x\,y|\ man\ x, dnk\ y, own\ xy]]\!]k$
& $\forall \boldsymbol{j}(h[\![[x\,y|\ man\ x, dnk\ y, own\ xy]]\!]j\ \&\ j(x) = k(x) \Rightarrow \exists \boldsymbol{i}: j[\![[z|\ stk\ z, btw\ xyz]]\!]i)\}$)
iff $g = h$
& most($\{\mathbf{a} \in \boldsymbol{D}|\ a \in [\![man]\!]\ \&\ \exists b \in D(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])\}$,
$\{\mathbf{a} \in \boldsymbol{D}|\ a \in [\![man]\!]\ \&\ \exists b \in D(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])$
& $\forall \mathbf{b} \in \boldsymbol{D}(a \in [\![man]\!]\ \&\ b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]$
$\Rightarrow \exists \mathbf{c} \in \boldsymbol{D}(c \in [\![stk]\!]\ \&\ \langle a, b, c\rangle \in [\![btw]\!])\}$)
iff $g = h$
& most($\{\mathbf{a} \in \boldsymbol{D}|\ a \in [\![man]\!]\ \&\ \exists b \in D(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])\}$,
$\{\mathbf{a} \in \boldsymbol{D}|\ a \in [\![man]\!]\ \&\ \exists b \in D(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])$
& $\forall \mathbf{b} \in \boldsymbol{D}(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!] \Rightarrow \exists \mathbf{c} \in \boldsymbol{D}(c \in [\![stk]\!]\ \&\ \langle a, b, c\rangle \in [\![btw]\!])\}$)

(2″) $\models_{M, g} \text{MOST}^{\forall}{}_x([x\,y|\ man\ x, dnk\ y, own\ xy], [z|\ stk\ z, btw\ xyz])$
iff most($\{\mathbf{a} \in \boldsymbol{D}|\ a \in [\![man]\!]\ \&\ \exists b \in D(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])\}$,
$\{\mathbf{a} \in \boldsymbol{D}|\ a \in [\![man]\!]\ \&\ \exists b \in D(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])$
& $\forall \mathbf{b} \in \boldsymbol{D}(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!] \Rightarrow \exists \mathbf{c} \in \boldsymbol{D}(c \in [\![stk]\!]\ \&\ \langle a, b, c\rangle \in [\![btw]\!])\}$)

e.g. If $[\![man]\!] = \{m_0, \ldots, m_9\}$
& m_0 owns & beats donkey $d_0, \ldots, d_9$ with a stick
& m_1 owns & beats donkeys $d_{10}, \ldots, d_{19}$ with a stick
& m_2 owns donkey d_{20} (only) but doesn't beat d_{20} with any stick
⋮
& m_9 owns donkey d_{90} (only) but doesn't beat d_{90} with any stick
then $\{a|\ a \in [\![man]\!]\ \&\ \exists b(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])\}$
$= \{m_0, \ldots, m_9\}$
$\{a|\ a \in [\![man]\!]\ \&\ \exists b(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!])\}$
& $\forall b(b \in [\![dnk]\!]\ \&\ \langle a, b\rangle \in [\![own]\!] \Rightarrow \exists c(c \in [\![stk]\!]\ \&\ \langle a, b, c\rangle \in [\![btw]\!])\}$)
$= \{m_0, m_1\}$
Hence most($\{m_0, \ldots, m_9\}$, $\{m_0, m_1\}$) is ***false***,
since $|\{m_0, m_1\}| = 2 > |\{m_2, \ldots, m_9\} = 8$ if ***false***

(3) *Most*$_x$ ***people***^{x} *that owned* ***a***^{y} *slave also owned his*$_y$ *offspring.* (Heim 1990)
= *for most* ***people*** x, *for* ***every*** *slave* y *owned by* x & ***every*** *child* z *of* y,
person x *owned* z.

(3′) $g[\![\text{MOST}^{\forall}{}_x([x\ y\ z|\ prs\ x, slv\ y, own\ xy, chl\ zy], [own\ xz])]\!]h$ (local presup. accommodation)
iff $g = h$
& most($\{\boldsymbol{k(x)}: h[\![[x\ y\ z|\ prs\ x, slv\ y, own\ xy, chl\ zy]]\!]k)\}$,
$\{\boldsymbol{k(x)}: h[\![[x\ y\ z|\ prs\ x, slv\ y, own\ xy, chl\ zy]]\!]k$
& $\forall \boldsymbol{j}(h[\![[x\ y\ z|\ prs\ x, slv\ y, own\ xy, chl\ zy]]\!]j\ \&\ j(x) = k(x) \Rightarrow \exists \boldsymbol{i}: j[\![[own\ xz]]\!]i)\}$)
iff $g = h$
& most($\{a \in \boldsymbol{D}|\ a \in [\![prs]\!]\ \&\ \exists b, c \in D(b \in [\![slv]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]\ \&\ \langle c, b\rangle \in [\![chl]\!])\}$,
$\{a \in \boldsymbol{D}|\ a \in [\![prs]\!]\ \&\ \exists b, c \in D(b \in [\![slv]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]\ \&\ \langle c, b\rangle \in [\![chl]\!])$
& $\forall b, c \in D(b \in [\![slv]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]\ \&\ \langle c, b\rangle \in [\![chl]\!] \Rightarrow \langle a, c\rangle \in [\![own]\!])\}$)

(3″) $|=_{M,g}$ $\text{MOST}^{\forall}{}_x([x\ y\ z|\ prs\ x, slv\ y, own\ xy, chl\ zy], [own\ xz])$
iff most($\{a \in \boldsymbol{D}|\ a \in [\![prs]\!]\ \&\ \exists b, c \in D(b \in [\![slv]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]\ \&\ \langle c, b\rangle \in [\![chl]\!])\}$,
$\{a \in \boldsymbol{D}|\ a \in [\![prs]\!]\ \&\ \exists b, c \in D(b \in [\![slv]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]\ \&\ \langle c, b\rangle \in [\![chl]\!])$
& $\forall b, c \in D(b \in [\![slv]\!]\ \&\ \langle a, b\rangle \in [\![own]\!]\ \&\ \langle c, b\rangle \in [\![chl]\!] \Rightarrow \langle a, c\rangle \in [\![own]\!])\}$)

- Obs. 4: Some indefinites in the restriction of a quantified np have existential force ('weak reading').

(4) *Most*$_x$ *people*^{x} *who had* ***a***^{y} *credit card paid their bill with it.* (R. Cooper)
= *for most people* x *s.t.* x *had* ***a*** *credit card* y,
person x *paid* x*'s bill with credit card* y.

(4′) $g[\![\text{MOST}^{\exists}{}_x($__________________________, ____________________________$)]\!]h$
iff $g = h$
& ____

(5) (*In those days*) *most*$_x$ *people*^{x} *that owned* ***a***^{y} *slave were considered respectable.*
= *for most people* x *s.t.* x *owned* ***a*** *slave* y,
person x *was considered respectable.*

(5′) ____

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3. No Representation in DPL^Q

- Obs. 5: When the restriction of a quantified np contains multiple indefinites it may be possible to read some of them as strong and some as weak ('mixed reading').

(6) *Most*$_x$ *people*^{x} *who have* ***a***^{y} *credit card and buy* ***a***^{z} *computer* (Brasoveanu 2007)
use it$_y$ *to pay for it*$_z$.
= *for most people* x s.t. x *has* ***a*** *credit card* y, *for* ***every*** *computer* z s.t. x *buys* y,
x *uses one of* x's credit cards to pay for z.

APPENDIX: DPL$^+$ WITH QUANTIFIERS (DPL^Q, K&R 93, Brasoveanu 07)

D1.1 (DPL^Q basic expressions)

- **Var** = $\{x, y, z, \ldots, z_1, z_2, \ldots\}$
- **Con** = $\{jim, ann, \ldots\}$
  Prd^1 = $\{\text{SG}, \text{PL}\} \cup \{man, dnk, \ldots, cm, sit, \ldots\}$
  Prd^2 = $\{hsb, wife, see, spk, \ldots\}$
  Prd^3 = $\{gvt, \ldots\}$

D1.2 (DPL^Q syntax)

0.	$t \in$ **Trm**	if	$t \in$ **Con** $\cup$ **Var**	
i.	$(t_1 + t_2) \in$ **Trm**	if	$t, t_1, \ldots, t_n \in$ **Trm**	summation
ii.	$[u] \in$ **For**	if	$u \in$ **Var**	
iii.	$(\phi; \psi) \in$ **For**	if	$\phi, \psi \in$ **For**	
iv.	$\neg\phi \in$ **For**	if	$\phi \in$ **For**	
v.	$Rt_1 \ldots t_n \in$ **For**	if	$R \in$ **Prd**^{n} & $t_1, \ldots, t_n \in$ **Trm**	
vi.	$t_1 \leq t_2 \in$ **For**	if	$t_1, t_2 \in$ **Trm**	part-of
vii.	$\lvert t \rvert = n \in$ **For**	if	$t \in$ **Trm** and $n \in \{1, 2, \ldots\}$	cardinality
viii.	$t = \Sigma u.\phi \in$ **For**	if	$t \in$ **Trm**, $u \in$ **Var** and $\phi \in$ **For**	abstraction
ix.	$Q^{\forall}{}_u(\phi, \psi) \in$ **For**	if	$\phi, \psi \in$ **For**, $u \in$ **Var** and $Q \in \{\text{ALL}, \text{MOST}, \ldots\}$	selective str. qnt.
	$Q^{\exists}{}_u(\phi, \psi) \in$ **For**	if	$\phi, \psi \in$ **For**, $u \in$ **Var** and $Q \in \{\text{ALL}, \text{MOST}, \ldots\}$	selective wk. qnt.

D2.1 (DPL^Q models and assignments)

- A DPL^Q *model* is a pair $M = \langle D, [\![\cdot]\!]\rangle$ such that (i) $D = \mathcal{P}(\boldsymbol{A})\backslash\{\varnothing\}$ for some set $\boldsymbol{A} \neq \varnothing$
  (ii) $[\![\cdot]\!]$ assigns $[\![A]\!] \in \{d \in D: |d| = 1\}$ to each $A \in$ **Con**, and $[\![B]\!] \subseteq (D)^n$ to each $B \in$ **Prd**^{n}.
  (iii) $[\![\text{SG}]\!] = \{d \in D: |d| = 1\}$
  $[\![\text{PL}]\!] = \{d \in D: |d| > 1\}$
- $G := \{g |\, g: \textbf{Var} \to D\}$ is the set of all *M-assignments*
- for all $g, h \in G$: $g[u_1 \ldots u_n]h$ iff $\forall v \in \textbf{Var}\backslash\{u_1, \ldots, u_n\}$: $g(v) = h(v)$

D2.2 (DPL^Q semantics). For any DPL-model $M = \langle D, [\![\cdot]\!]\rangle$ and M-assignments g and h:

0.	$[\![t]\!]^h$	=	$[\![t]\!]$	if $t \in$ **Con**
		=	$h(t)$	if $t \in$ **Var**
i.	$[\![t_1 + t_2]\!]^h$	=	$([\![t_1]\!]^h \cup [\![t_2]\!]^h)$	
ii.	$g[\![[u]]\!]h$	iff	$g[u]h$	
iii.	$g[\![(\phi; \psi)]\!]h$	iff	$\exists k(g[\![\phi]\!]k \,\&\, k[\![\psi]\!]h)$	
iv.	$g[\![\neg\phi]\!]h$	iff	$g = h \,\&\, \neg\exists k: h[\![\phi]\!]k$	
v.	$g[\![Rt_1 \ldots t_n]\!]h$	iff	$g = h \,\&\, \langle [\![t_1]\!]^h, \ldots, [\![t_n]\!]^h\rangle \in [\![R]\!]$	
vi.	$g[\![t_1 \leq t_2]\!]h$	iff	$g = h \,\&\, [\![t_1]\!]^h \subseteq [\![t_2]\!]^h$	
vii.	$g[\![\lvert t\rvert = n]\!]h$	iff	$g = h \,\&\, \lvert[\![t]\!]^h\rvert = n$	
viii.	$g[\![t = \Sigma u.\phi]\!]h$	iff	$g = h \,\&\, [\![t]\!]^h = \cup\{k(u): h[\![\phi]\!]k\}$	
ix.	$g[\![Q^{\exists}{}_u(\phi, \psi)]\!]h$	iff	$g = h \,\&\, \mathsf{Q}(\{k(u): h[\![\phi]\!]k\}, \{k(u): \exists j(h[\![\phi]\!]j \,\&\, j[\![\psi]\!]k)\})$	
	$g[\![Q^{\forall}{}_u(\phi, \psi)]\!]h$	iff	$g = h \,\&\, \mathsf{Q}(\{k(u): h[\![\phi]\!]k\}, \{k(u): h[\![\phi]\!]k$ $\&\, \forall j(h[\![\phi]\!]j \,\&\, j(u) = k(u) \Rightarrow \exists i: j[\![\psi]\!]i)\})$	

D3 (Truth, entailment, and equivalence).

i. ϕ is *true* in M given input g, written $\models_{M,g} \phi$, iff $\exists h$: $g[\![\phi]\!]h$

ii. ϕ (DPL^{Q}-)*entails* ψ, written $\phi \models \psi$, iff $\forall M \forall g \forall h(g[\![\phi]\!]h \Rightarrow \exists k$: $h[\![\psi]\!]k)$

iii. ϕ is (DPL^{Q}-)*equivalent* to ψ, written $\phi \simeq \psi$, iff $\forall M \forall g \forall h(g[\![\phi]\!]h$ iff $g[\![\psi]\!]h)$

ABBREVIATIONS

- $\exists u\phi$:= $([u]; \phi)$
  $\forall u\phi$:= $\neg\exists u\neg\phi$
  $(\phi \to \psi)$:= $\neg(\phi; \neg\psi)$
- $[\phi]$ = ϕ if ϕ is a test (i.e. $\forall M \forall g \forall h$: $g[\![\phi]\!]h \Rightarrow g = h$)
  = undefined otherwise
  (ϕ, ψ) := $([\phi]; [\psi])$
  $[u_1 \ldots u_n | \phi]$:= $([u_1]; \ldots ([u_n]; [\phi]))$
  $(t_1 = t_2)$:= $(t_1 \leq t_2, t_2 \leq t_1)$
  $(t_1 \in t_2)$:= $(\text{SG } t_1, t_1 \leq t_2)$
  $(t_1 \varnothing t_2)$:= $\neg([x]; [x \leq t_1, x \leq t_2])$

USEFUL FACTS

F∃: $g[\![\exists u\phi]\!]h$
iff $\exists k(g[u]k \;\&\; k[\![\phi]\!]h)$

F∀: $g[\![\forall u\phi]\!]h$
iff $g = h \;\&\; \forall k(g[u]k \Rightarrow \exists i$: $k[\![\phi]\!]i)$

F→: $g[\![\phi \to \psi]\!]h$
iff $g = h \;\&\; \forall k(g[\![\phi]\!]k \Rightarrow \exists i$: $k[\![\psi]\!]i)$

F,: $g[\![(\phi, \psi)]\!]h$
iff $g = h \;\&\; h[\![\phi]\!]h \;\&\; h[\![\psi]\!]h$

F|: $g[\![[u| \phi_1, \ldots, \phi_n]]\!]h$
iff $g[u]h \;\&\; h[\![\phi_1]\!]h \;\&\; \ldots\; h[\![\phi_n]\!]h)$

$g[\![[u_1\, u_2| \phi_1, \ldots, \phi_n]]\!]h$
iff $g[u_1\, u_2]h \;\&\; h[\![\phi_1]\!]h \;\&\; \ldots\; h[\![\phi_n]\!]h)$

$g[\![[u_1\, u_2\, u_3| \phi_1, \ldots, \phi_n]]\!]h$
iff $g[u_1\, u_2\, u_3]h \;\&\; h[\![\phi_1]\!]h \;\&\; \ldots\; h[\![\phi_n]\!]h)$

F=: $g[\![(t_1 = t_2)]\!]h$
iff $g = h \;\&\; [\![t_1]\!]^h = [\![t_2]\!]^h$

F∈: $g[\![(t_1 \in t_2)]\!]h$
iff $g = h \;\&\; |[\![t_1]\!]^h| = 1 \;\&\; [\![t_1]\!]^h \subseteq [\![t_2]\!]^h$

F∅: $g[\![(t_1 \varnothing t_2)]\!]h$
iff $g = h \;\&\; [\![t_1]\!]^h \cap [\![t_2]\!]^h = \varnothing$

DISCOURSE ANAPHORA TO QUANTIFIED NP'S

1. OBSERVATIONS

- Obs. 1 (E-type anaphora) In a configuration [...*a/qnt* [...][...]]^u (*and*) ... ***ana**$_u$*, the anaphor *ana*$_u$ is usu. anaphoric to the entire set of entities that satisfy the antecedent description.

(1) [*There is a doctor in London*]^x. ?***He***$_x$ *is Welsh.* (Evans 1977)
he$_x$ = the (unique) doctor in London
≠ *There is a doctor in London who is Welsh.*

(2) [*Few/*no MPs came to the party*]^x *but* ***they***$_x$ *had a marvelous time.* (Evans 1977)
[*One/*no woman*$_x$ *drank champagne*]^y. ***She***$_y$ *got very drunk.*
they$_x$ = the (few) MPs who came to the party
≠ *There are few/no MPs that came to the party and had a marvelous time.*
she$_y$ = the (one) female MP who came to the party & drank champagne.
≠ *There was one female MP who (came to the party,) drank champagne and got very drunk.*

(3) [*Yesterday Ann*^{x} *put exactly ten balls in the bag*]^y. [*Now two of* ***them***$_y$ *are missing*]^z.
They$_z$ *are under the sofa.* (Partee, cf. (7))
them$_y$ = the (ten) balls that Ann put in the bag yesterday
they$_z$ = the (two) balls that Ann put in the bag yesterday & that are now missing

- Obs. 2: (domain set ana.). Most quantifiers license anaphora to the domain of quantification.

(4) [*Many/at least ten/most* [*MPs*]^x *came to the party*]^y. ***A few***$_x$ *preferred a quiet evening at home.*
a few$_x$ = a few of the aforementioned MPs

(5) [*Few* [*MPs*]^x *came to the party*]^y. ***Most***$_x$ *preferred a quiet evening at home.*
most$_x$ = most of the aforementioned MPs

(6) (*In this Republican district*) [*few* [*parents*]^x *agreed to let their children*^{y} *listen to Obama's speech*].
Most$_x$ *were afraid he would indoctrinate them*$_y$.
most$_x$ = most of the aforementioned parents

- Obs. 3 (complement set ana.). Most quantifiers do not support anaphora to the complement set (see #(7^3), #(8^2)), but some, e.g. *few*, do (see (8), (9)).

(7) [*Ann put exactly ten balls in the bag*]^y. [*Only eight of* ***them***$_y$ *are in the bag now*]^z.
#*They*$_{y\setminus z}$ *are under the sofa.* (Partee cf. (3))
\# *they*$_{y\setminus z}$ = the (two) balls that Ann put in the bag yesterday & that are not in the bag now

(8) [*Many/at least ten/most* [*MPs*]^x *came to the party*]^y. #***They***$_{x\setminus y}$ *preferred a quiet evening at home.*
they$_{x\setminus y}$ = the (minority of) MPs who didn't come to the party

(9) [*Few* [*MPs*]^x *came to the party*]^y. ***They***$_{x\setminus y}$ *preferred a quiet evening at home.*
they$_{x\setminus y}$ = the (majority of) MPs who didn't come to the party

(10) (*In this Republican district*) [*few* [*parents*]^x *agreed to let their children*^{y} *listen to Obama's speech*]^z.
They$_{x\setminus z}$ *were afraid he would indoctrinate them*$_y$.
they$_{x\setminus z}$ = most of the aforementioned parents

2. E-TYPE ANAPHORA IN DPL^Q

- Obs. 1 (E-type anaphora) In a configuration [...*a/qnt* [...][...]]^u (*and*) ... ***ana**$_u$*, the anaphor *ana*$_u$ is usu. anaphoric to the entire set of entities that satisfy the antecedent description.

cf. *There is a doctor in London who is Welsh.*

$g[\![$ ______________________________

iff ______________________________

(1^1) [*There is a doctor in London*]^x.

$g[\![$ ______________________________

iff ______________________________

(1^2) ?***He**$_x$ is Welsh.*

$g[\![$ ______________________________

iff ______________________________

(2^1) [*Few MPs came to the party*]^x ...

$g[\![$ ______________________________

iff ______________________________

... ***they**$_x$ had a marvelous time.*

$g[\![$ ______________________________

iff ______________________________

(2^2) [*One woman*$_x$ *drank champagne*]^y.

$g[\![$ ______________________________

iff ______________________________

(2^3) ***She**$_y$ got very drunk.*

$g[\![$ ______________________________

iff ______________________________

cf. # [*No MPs came to the party*]^x *but* ***they**$_x$ had a marvelous time.*

$g[\![$ ______________________________

iff ______________________________

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3. DOMAIN SET ANAPHORA IN DPL^{Q}

- Obs. 2: (domain set ana.). Most quantifiers license anaphora to the domain of quantification.

(4^1) [*Most* [*MPs*]^x *came to the party*]^y.

$g[\![$______________________________________

iff ______________________________________

____

(4^2) ***A few***$_x$ *preferred a quiet evening at home.*

$g[\![$______________________________________

iff ______________________________________

____

(5^1) [*Few* [*MPs*]^x *came to the party*]^y.

$g[\![$______________________________________

iff ______________________________________

____

(5^2) ***Most***$_x$ *preferred a quiet evening at home.*

$g[\![$______________________________________

iff ______________________________________

____

(6^1) *Few* [*parents*]^x *agreed to let their children*^{y} *listen to Obama's speech*.

$g[\![$______________________________________

iff ______________________________________

____

(6^2) ***Most***$_x$ *were afraid he would indoctrinate them*$_y$.

$g[\![$______________________________________

iff ______________________________________

____

4. COMPLEMENT SET ANAPHORA IN DPL^Q

- Obs. 3 (complement set ana.). Most quantifiers do not support anaphora to the complement set (see #(7^3), #(8^2)), but some, e.g. *few*, do (see (8), (9)).

(8^1) [*Most* [*MPs*]^x *came to the party*]^y.

g⟦____

iff ____

____

(9^1) [*Few* [*MPs*]^x *came to the party*]^y.

g⟦____

iff ____

____

(…^{2}) ***They***$_{x\backslash y}$ *preferred a quiet evening at home.*

g⟦____

iff ____

____

(10^1) [*Few* [*parents*]^x *agreed to let their children*^{z} *listen to Obama's speech*]^y.

g⟦____

iff ____

____

(10^2) ***They***$_{x\backslash y}$ *were afraid he would indoctrinate them*$_z$.

g⟦____

iff ____

____

APPENDIX 1: E-TYPE ANAPHORA IN DPL^{Q}

- <u>Obs. 1</u> (E-type anaphora) In a configuration [… *a/qnt* […][…]]^{u} (*and*) … ***ana$_u$***, the anaphor *ana$_u$* is usu. anaphoric to the entire set of entities that satisfy the antecedent description.

cf. *There is a doctor in London who is Welsh.*
$g⟦[x|\ doc\ x,\ in.london\ x,\ welsh\ x]⟧k$
iff $g[x]k\ \&\ k(x) \in ⟦doc⟧\ \&\ k(x) \in ⟦in.london⟧\ \&\ k(x) \in ⟦welsh⟧$

$|=_{M,g}\ [x|\ doc\ x,\ in.london\ x,\ welsh\ x]⟧h$
iff $\exists a(a \in ⟦doc⟧\ \&\ a \in ⟦in.london⟧\ \&\ a \in ⟦welsh⟧)$

(1) [*There is a doctor in London*]^{x}. ***He$_x$*** *is Welsh.*
$g⟦[x|\ doc\ x,\ in.london\ x];\ [y|\ \text{SG}\ y,\ y = \Sigma x.[x|\ doc\ x,\ in.london\ x],\ welsh\ y]⟧k$
iff $\exists h(g[x]h\ \&\ h(x) \in ⟦doc⟧\ \&\ h(x) \in ⟦in.london⟧$
$h[y]k\ \&\ |k(y)| = 1\ \&\ k(y) = \cup\{a|\ a \in ⟦doc⟧,\ a \in ⟦in.london⟧\}\ \&\ k(y) \in ⟦welsh⟧)$
iff $g[x\ y]k\ \&\ \{k(x)\} = \{a|\ a \in ⟦doc⟧\ \&\ a \in ⟦in.london⟧\}$
$\&\ |k(y)| = 1\ \&\ k(y) = k(x)\ \&\ k(y) \in ⟦welsh⟧$

$|=_{M,g}\ [x|\ doc\ x,\ in.london\ x];\ [y|\ \text{SG}\ y,\ y = \Sigma x.[x|\ doc\ x,\ in.london\ x],\ welsh\ y]⟧h$
iff $\exists a(|a| = 1\ \&\ \{a\} = \{b|\ b \in ⟦doc⟧\ \&\ b \in ⟦in.london⟧\}\ \&\ a \in ⟦welsh⟧)$

(2^1) [*Few MPs came to the party*]^{x} …
$g⟦[\text{FEW}^{\exists}{}_{x}([x|\ mp\ x],\ [cm.prt\ x])]⟧h$
iff $g = h\ \&\ \text{FEW}(\{a|\ a \in ⟦mp⟧\},\ \{a|\ a \in ⟦mp⟧\ \&\ a \in ⟦cm.prt⟧\})$

(2^2) … ***they$_x$*** *had a marvelous time.*
$g⟦[x|\ \text{PL}\ x,\ x = \Sigma x_1.[x_1|\ mp\ x_1,\ cm.prt\ x_1],\ hv.mrv.tm\ x]]⟧h$
iff $g[x]h\ \&\ |h(x)| > 1\ \&\ h(x) = \cup\{b|\ b \in ⟦mp⟧\ \&\ b \in ⟦cm.prt⟧\}\ \&\ h(x) \in ⟦hv.mrv.tm⟧$

(2^3) [*One woman$_x$ drank champagne*]^{y}.
$h⟦[\text{ONE}^{\exists}{}_{y}([y|\ wmn\ y,\ y \in x],\ [drnk.ch\ y])]⟧k$
iff $h = k\ \&\ |\{a|\ a \in ⟦wmn⟧\ \&\ |a| = 1\ \&\ a \subseteq k(x)\ \&\ a \in ⟦drnk.ch⟧\}| = 1$

(2^4) ***She$_y$*** *got very drunk.*
$h⟦[z|\ \text{SG}\ z,\ z = \Sigma y.[y|\ wmn\ y,\ y \in x,\ drnk.ch\ y],\ gt.drnk\ z]]⟧k$
iff $h[z]k\ \&\ \{k(z)\} = \{a|\ a \in ⟦wmn⟧\ \&\ |a| = 1\ \&\ a \subseteq k(x)\ \&\ a \in ⟦drnk.ch⟧\}\ \&\ k(z) \in ⟦gt.drnk⟧$

cf. # [*No MPs came to the party*]^{x} *but* ***they$_x$*** *had a marvelous time.*
$g⟦[\text{NO}^{\exists}{}_{x}([x|\ mp\ x],\ [cm.prt\ x])];\ [y|\ \text{PL}\ y,\ y = \Sigma x.[x|\ mp\ x,\ cm.prt\ x],\ hv.mrv.tm\ y]⟧h$
iff $g[y]h\ \&\ \{a|\ a \in ⟦mp⟧\ \&\ a \in ⟦cm.prt⟧\} = \emptyset$
$\&\ |h(y)| > 1\ \&\ h(y) = \cup\{a|\ a \in ⟦mp⟧\ \&\ a \in ⟦cm.prt⟧\}\ \&\ h(y) \in ⟦hv.mrv.tm⟧$
iff $g[y]h\ \&\ \{a|\ a \in ⟦mp⟧\ \&\ a \in ⟦cm.prt⟧\} = \emptyset$
$\&\ |h(y)| > 1\ \&\ \mathbf{h(y) = \emptyset}\ \&\ h(y) \in ⟦hv.mrv.tm⟧$
(i.e. no output h for any input g)

APPENDIX 2: DOMAIN SET ANAPHORA IN DPL^Q

- Obs. 2: (domain set ana.). Most quantifiers license anaphora to the domain of quantification.

(4^1) *Most [MPs]^x came to the party.*
$g[\![[\text{MOST}^{\exists}{}_x([x|\ mp\ x], [cm.prt\ x])]]\!]h$
iff $g = h$ & $\text{MOST}(\{a|\ a \in [\![mp]\!]\}, \{a|\ a \in [\![mp]\!] \ \&\ a \in [\![cm.prt]\!]\})$

(4^2) ***A few**$_x$ preferred a quiet evening at home.*
$g[\![[x\ y|\ x = \Sigma x_1.[x_1|\ mp\ x_1], y \leq x,$
$\text{FEW}^{\exists}{}_z([z|\ z \in x], [z \in y]),$
$\text{ALL}^{\exists}{}_z([z|\ z \in y], [prfr.qu\ z])]]\!]h$
iff $g[x\ y]h$
& $h(x) = \cup\{a|\ a \in [\![mp]\!]\}$ & $h(y) \subseteq h(x)$
& $\text{FEW}(\{b|\ |b| = 1 \ \&\ b \subseteq h(x)\}, \{b|\ |b| = 1 \ \&\ b \subseteq h(x) \ \&\ b \subseteq h(y)\})$
& $\text{ALL}(\{b|\ |b| = 1 \ \&\ b \subseteq h(y)\}, \{b|\ |b| = 1 \ \&\ b \subseteq h(y) \ \&\ b \in [\![prfr.qu]\!]\})$

(5^1) *Few [MPs]^x came to the party.*
$g[\![[\text{FEW}^{\exists}{}_x([x|\ mp\ x], [cm.prt\ x])]]\!]h$
iff $g = h$
& $\text{FEW}(\{a|\ a \in [\![mp]\!]\}, \{a|\ a \in [\![mp]\!] \ \&\ a \in [\![cm.prt]\!]\})$

(5^2) ***Most**$_x$ preferred a quiet evening at home.*
$g[\![[\text{MOST}^{\exists}{}_x([x|\ mp\ x], [prfr.qu\ x])]]\!]h$
iff $g = h$ & $\text{MOST}(\{b|\ b \in [\![mp]\!]\}, \{b|\ b \in [\![mp]\!] \ \&\ b \in [\![prfr.qu]\!]\})$

(6^1) *Few [parents]^x agreed to let their children^y listen to Obama's speech.*
$g[\![[z|\ z = obm, \text{FEW}^{\exists}{}_x([x\ y|\ y = \Sigma y_1.[y_1|\ prnt\ xy_1, chld\ y_1]], [agr.lstn\ xyz])]]\!]h$
iff $g[z]h$ & $h(z) = [\![obm]\!]$
& $\text{FEW}(\{a|\ \exists b \in D(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!] \ \&\ c = [\![chld]\!]\})\},$
$\{a|\ \exists b \in D(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!] \ \&\ c \in [\![chld]\!]\} \ \&\ \langle a, b, h(z)\rangle \in [\![agr.lstn]\!])\})$

(6^2) ***Most**$_x$ were afraid he would indoctrinate them$_y$.*
$h[\![[\text{MOST}^{\exists}{}_x([x\ y|\ y = \Sigma y_1.[y_1|\ prnt\ xy_1, chld\ y_1]], [afrd.ind\ xzy])]]\!]k$
iff $h = k$
& $\text{MOST}(\{a|\ \exists b \in D(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!] \ \&\ c = [\![chld]\!]\})\},$
$\{a|\ \exists b \in D(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!] \ \&\ c = [\![chld]\!]\} \ \&\ \langle a, h(z), b\rangle \in [\![afrd.ind]\!]\})\}$

APPENDIX 3: COMPLEMENT SET ANAPHORA IN DPL^Q

- Obs. 3 (complement set ana.). Most quantifiers do not support anaphora to the complement set (see #(7^3), #(8^2)), but some, e.g. *few*, do (see (8), (9)).

(8^1) [*Most* [*MPs*]^x *came to the party*]^y.

$$g[\![[\text{MOST}^{\exists}{}_x([x|\ mp\ x], [cm.prt\ x])]]\!]h$$
$$\text{iff } g = h$$
$$\&\ \text{MOST}(\{a|\ a \in [\![mp]\!]\}, \{a|\ a \in [\![mp]\!]\ \&\ a \in [\![cm.prt]\!]\})$$

(9^1) [*Few* [*MPs*]^x *came to the party*]^y.

$$g[\![[\text{FEW}^{\exists}{}_x([x|\ mp\ x], [cm.prt\ x])]]\!]h$$
$$\text{iff } g = h$$
$$\&\ \text{FEW}(\{a|\ a \in [\![mp]\!]\}, \{a|\ a \in [\![mp]\!]\ \&\ a \in [\![cm.prt]\!]\})$$

(…^{2}) ***They***$_{x\backslash y}$ *preferred a quiet evening at home.*

$$g[\![[x|\ \text{PL}\ x, x = \Sigma x_1.[x_1|\ mp\ x_1, \neg[cm.prt\ x_1]], \text{ALL}^{\exists}{}_z([z|\ z \in x], [prfr.qu\ z])]]\!]h$$
$$\text{iff } g[x]h$$
$$\&\ |h(x)| > 1\ \&\ h(x) = \cup\{a|\ a \in [\![mp]\!]\ \&\ a \notin [\![cm.prt]\!]\}$$
$$\&\ \text{ALL}(\{b|\ |b| = 1\ \&\ b \subseteq h(x)\}, \{b|\ |b| = 1\ \&\ b \subseteq h(x)\ \&\ b \in [\![prfr.qu]\!]\})$$

Problem:
No asymmetry between *few* and other quantifiers. Hence no explanation why discourse (9^1); (…^{2}) is more acceptable e.g. than the clearly infelicitous (8^1); (…^{2})

(10^1) [*Few* [*parents*]^x *agreed to let their children*^{z} *listen to Obama's speech*]^y.

$$g[\![[z|\ z = obm, \text{FEW}^{\exists}{}_x([x\ y|\ y = \Sigma y_1.[y_1|\ prnt\ xy_1, chld\ y_1]], [agr.lstn\ xyz])]]\!]h$$
$$\text{iff } g[z]h\ \&\ h(z) = [\![obm]\!]$$
$$\&\ \text{FEW}(\{a|\ \exists b \in D(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!]\ \&\ c = [\![chld]\!]\})\},$$
$$\{a|\ \exists b \in D(b = \cup\{b'|\ \langle a, c\rangle \in [\![prnt]\!]\ \&\ c \in [\![chld]\!]\}\ \&\ \langle a, b, h(z)\rangle \in [\![agr.lstn]\!])\})$$

(10^2) ***They***$_{x\backslash y}$ *were afraid he would indoctrinate them*$_z$.

$$h[\![[x|\ \text{PL}\ x, x = \Sigma x_1.[x_1\ y|\ y = \Sigma y_1.[y_1|\ prnt\ xy_1, chld\ y_1], \neg[agr.lstn\ xyz]],$$
$$\text{ALL}_{x1}{}^{\exists}([x_1\ y|\ y = \Sigma y_1.[y_1|\ prnt\ xy_1, chld\ y_1], \neg[agr.lstn\ xyz]], [afrd.ind\ xzy])]]\!]k$$
$$\text{iff } h[x]k$$
$$\&\ k(x) = \cup\{a|\ \exists b(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!]\ \&\ c = [\![chld]\!]\}\ \&\ \langle a, b, h(z)\rangle \notin [\![agr.lstn]\!])\}$$
$$\&\ \text{ALL}(\{a|\ \exists b(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!]\ \&\ c = [\![chld]\!]\}\ \&\ \langle a, b, h(z)\rangle \notin [\![agr.lstn]\!]\})\},$$
$$\{a|\ \exists b(b = \cup\{c|\ \langle a, c\rangle \in [\![prnt]\!]\ \&\ c = [\![chld]\!]\}\ \&\ \langle a, b, h(z)\rangle \notin [\![agr.lstn]\!]$$
$$\&\ \langle a, h(z), b\rangle \in [\![afrd.ind]\!])\})$$