Exceptive Constructions (1)

(1) Some student complained about the noise. It was not John.
→ Some student <u>other than</u> John complained about the noise.

(2) (For once,) some student complained about the noise other than John.

(3) a. Every student other than John complained about the noise.
b. No student other than John complained about the noise.

c. Every student complained about the noise other than John.
d. No student complained about the noise other than John.

(4) a. Other than John, every/no student complained about the noise.
b. (#)Other than John, some student complained about the noise.

(5) The students who complained were: John, Peter, Paul, Mary, and Jane.
→ Four students other than John complained about the noise.
→ Four students <u>besides</u> John complained about the noise.

(6) a. Every student besides John complained about the noise.
b. No student besides John complained about the noise.

c. Besides John, every/no student complained about the noise.
d. #Besides John, some student complained about the noise.

(7) a. Besides John, Peter also complained.
b. Besides John, two students complained.

ambiguous: John and two other students complained.
John (not a student) and two students complained.

(8) connected exceptives

a. Every student <u>but John</u> complained about the noise.
b. Every student <u>except</u> John complained about the noise.

free exceptives

c. <u>Except for John</u>, every student complained about the noise.
d. <u>With the exception of John</u>, every student complained about the noise.

(9) a. #Some student but/except John complained about the noise.
b. #Four students but/except John complained about the noise.

(10) a. #Most students but/except John complained about the noise.

b. Most students complained about the noise. The (only) exception was John.
c. Most students complained about the noise, with the exception of John.
d. Most students complained about the noise, except for John.
e. Except for John, most students complained about the noise.

(11) <u>Unless it rains</u>, we will play soccer on Sunday.

Focus:
- semantics of *but*-phrases
- correct truth-conditions
- explanation of co-occurrence restrictions
- syntactic structure of quantified nominals with exceptives
- → Danny on extraposition and exceptives (based on Reinhart)

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The Meaning of Quantified Statements with Exceptives

(12) Every student but John complained.

→ John is a student.
→ John did not complain.
→ Every student who is not John complained.

➔ John is the one and only student who did not complain.

(13) No student but John complained.

→ John is a student.
→ John complained.
→ No student who is not John complained.

➔ John is the one and only student who complained.

Tests for Presuppositions/Implicatures

(14) I just noticed that even Bill likes Mary.

(15) I just noticed that every student but John attended the meeting.

(16) Q: Is every student but John straight?
A: No, John is not a student. (Hoeksema)
A': No, every student is straight. John is not a student. (Partee, pc)

(17) Well, except for Dr. Samuels everybody has an alibi, inspector.
Let's go see Dr. Samuels to find out if he's got one too. (Hoeksema)

(18) Well, everybody but Dr. Samuels has an alibi, inspector.
??Let's go see Dr. Samuels to find out if he's got one too.

(19) a. John has three children. In fact, he has at least five.
b. Except for John, everybody showed up. #In fact, John did too.
c. Everybody but John showed up. #In fact, John did too.

(20) $\left\{\begin{array}{c}\text{Except for Dr. Samuels, everybody}\\ \text{Everybody but Dr. Samuels}\end{array}\right\}$ definitely has an alibi.
Let's go see Dr. Samuels to find out if he's got one too.

(21) Mary knows that $\left\{\begin{array}{c}\text{except for Dr. Samuels, everybody}\\ \text{everybody but Dr. Samuels}\end{array}\right\}$ has an alibi.
#And she has doubts about Dr. Samuels.

First Step: Set Subtraction

(22) $[\![\text{students but John}]\!] = [\![\text{students}]\!] - \{j\}$

(23) $\left[D\ (A)\ \textit{but}\ C\right](B) = D\ (A - C)\ (B)$

Add: Restrictiveness

(24) $\left[D\ (A)\ \textit{but}\ C\right](B) = D\ (A - C)\ (B)\ \&\ \neg\ D\ (A)\ (B)$

Add: Cardinal Minimality

(25) $\left[D\ (A)\ \textit{but}\ C\right](B) = D\ (A - C)\ (B)\ \&\ \forall S\!: \left[D\ (A - S)\ (B) \rightarrow |C| \leq |S|\right]$

Add: Unique Minimality

(26) $\left[D\ (A)\ \textit{but}\ C\right](B) = D\ (A - C)\ (B)\ \&\ \forall S\!: \left[D\ (A - S)\ (B) \rightarrow C \subseteq S\right]$

(27) Truth-conditions of *every + but:*

$$
\begin{aligned}
&(\text{every A but C})\ \text{B} \\
&\Leftrightarrow\ A - C \subseteq B \ \&\ \forall S: (A - S \subseteq B) \rightarrow (C \subseteq S) \\
&\Leftrightarrow\ A \cap \bar{B} \subseteq C \ \&\ \forall S: (A \cap \bar{B} \subseteq S) \rightarrow (C \subseteq S) \\
&\Leftrightarrow\ A \cap \bar{B} \subseteq C \ \&\ C \subseteq A \cap \bar{B} \\
&\Leftrightarrow\ A \cap \bar{B} = C
\end{aligned}
$$

(28) Truth-conditions of *no + but*:

$$
\begin{aligned}
&(\text{no A but C})\ \text{B} \\
&\Leftrightarrow\ (A - C) \cap B = \varnothing \ \&\ \forall S: ((A - S) \cap B = \varnothing) \rightarrow (C \subseteq S) \\
&\Leftrightarrow\ A \cap B \subseteq C \ \&\ \forall S: (A \cap B \subseteq S) \rightarrow (C \subseteq S) \\
&\Leftrightarrow\ A \cap B \subseteq C \ \&\ C \subseteq A \cap B \\
&\Leftrightarrow\ A \cap B = C
\end{aligned}
$$

Exceptive Constructions (2)

<u>Semantics for *but* in von Fintel (1993)</u>

(1) $\left[D\left(A\right) \textit{ but } C\right]\left(B\right) = D\left(A - C\right)\left(B\right) \;\&\; \forall S: \left[D\left(A - S\right)\left(B\right) \rightarrow C \subseteq S\right]$

<u>Co-Occurrence Restrictions</u>

(2) ↑mon determiners: always false

(3) *exactly 4, at most 4*: always false (?)

(4) *most*: almost always false

limiting case: two students (John, Harry), John didn't complain

Most students but John complained.

Can we say that *most* is infelicitous with a singleton argument?

<u>Compositionality Issues</u>

(5) *but*-phrases as modifiers of determiners
(type of *but*: <et,<<et,ett>,<et,ett>>>):

(every … but John) student
(no … but John) student

$[\![\text{but}]\!] = \lambda C_{\langle e,t\rangle}.\ \lambda D_{\langle et,ett\rangle}.\ \lambda A_{\langle e,t\rangle}.\ \lambda B_{\langle e,t\rangle}.$
$D\left(A - C\right)\left(B\right) \;\&\; \forall S_{\langle e,t\rangle}: \left[D\left(A - S\right)\left(B\right) \rightarrow C \subseteq S\right]$

(6) *but*-phrases as creating higher type common noun phrase
(type of *but*: <et,<et,<<et,ett>,ett>>>):

$[\![\text{but}]\!] = \lambda C_{\langle e,t\rangle}.\ \lambda A_{\langle e,t\rangle}.\ \lambda D_{\langle et,ett\rangle}.\ \lambda B_{\langle e,t\rangle}.$
$D\left(A - C\right)\left(B\right) \;\&\; \forall S_{\langle e,t\rangle}: \left[D\left(A - S\right)\left(B\right) \rightarrow C \subseteq S\right]$

<u>The status of the exception set C</u>

(7) Every student but John/No student but John

John → type e: j the individual John

We could give *but* an type e argument and let it shift that into a set it can manipulate.

Lifting individuals to sets: for any individual x → {x}, $\lambda y.y=x$

(8) Every student but John and Mary/No student but John and Mary

(9) <u>Boolean Conjunction</u>

Proper names as quantifiers

John → type <et,t>: $\lambda P.P(j)=1$ the set of properties true of John,
$\{X: j \in X\}$ the set of sets containing John

John and Mary: $\lambda P.P(j)=1 \cap \lambda P.P(m)=1 = \lambda P.P(j)=1\ \&\ P(m)=1$
$\{X: j \in X\} \cap \{X: m \in X\} = \{X: \{j.m\} \subseteq X\}$

the set of those sets that contain (possibly among others) both John and Mary

(10) Quantifier Raising to alleviate type mismatch in the argument of *but*?
Wrong meaning – in fact contradictory
(Each of John and Mary is the unique exception).

(11) <u>The generator set of a principal ultrafilter</u>

Q → $\cap$**Q**, $\lambda x.\ \forall P \in$ **Q**: P(x)=1

$\cap$(**John and Mary**) = $\cap\{X: \{j.m\} \subseteq X\} = \{j.m\}$

(12) <u>Minimal sets in a quantifier</u>

min(**Q**) = {X$\in$**Q**: $\neg\exists$Y (Y$\subset$X & Y$\in$**Q**)}

Examples …

(13) *Every A but C* → true of any B such that there is a set D in min(C) which is …

(14) <u>Non-Boolean Conjunction</u>

John and Mary → the plural individual j+m

If the underlying theory of plurality is of the right sort, we can retrieve the atomic individuals that are part of a plurality.

(15) a. All the students but <u>five law students</u> complained.
b. #All the students but <u>at least five law students</u> complained.

(16) QR again obviously wrong approach.

(17) Choice-function indefinites?

$\exists$f: all (students but f(five law students)) complained

five law students → the set of pluralities made up of five law students

There is a way of choosing a plurality of five law students such that the chosen plurality corresponds to the unique exception set for the claim that all the students complained.

(18) a. All the students but <u>at most five law students</u> complained.
b. #All the students but <u>less than five law students</u> complained.

(19) Reference to witness sets?

$$[\![\text{but}]\!] = \lambda Q_{\langle et,t\rangle}.\ \lambda D_{\langle et,ett\rangle}.\ \lambda A_{\langle e,t\rangle}.\ \lambda B_{\langle e,t\rangle}.$$
$$\exists C{:}\ C \in W(Q)\ \&\ D\left(A - C\right)\left(B\right)\ \&\ \forall S_{\langle e,t\rangle}{:}\ \left[D\left(A - S\right)\left(B\right) \rightarrow C \subseteq S\right]$$

(20) The “lives on” relation

A generalized quantifier Q <u>lives on</u> a set A iff for all B: $B \in Q \leftrightarrow A \cap B \in Q$.

(21) Conservativity

A determiner D is <u>conservative</u> iff for all sets A, D(A) is a quantifier that lives on A.

(22) All natural language determiners are conservative.

(23) All generalized quantifiers expressible in natural language have a smallest set that they live on. We’ll write SL(Q) for this set.

[Proposition 1 in Johnsen, Lars. 1987. *There*-Sentences and Generalized Quantifiers. In *Generalized Quantifiers: Linguistic and Logical Approaches*, ed. Peter Gärdenfors, 93-107. Dordrecht: Reidel.]

(24) For permutation-invariant determiners D, we can prove that for any set A the smallest set that D(A) lives on is A itself.

[Proposition 2 in Johnsen 1987.]

(25) Witness Sets (Barwise & Cooper)

A set C is a witness set for a generalized quantifier D(A) living on A iff (i) $C \subseteq A$, and (ii) $C \in Q$.

(26) Moltmann Witness Sets

A set C is a Moltmann witness set for a generalized quantifier Q iff (i) C □ SL(Q) and (ii) C □ Q.

We write W(Q) for the set of Moltmann witness sets for Q.

(27) Examples of witness sets

every man → the set of all men
most men → any set of men containing more than half of the men
(at least) three men → any set of men containing at least three men
at most three men → any set of men containing at most three men (including ∅)
no man → the empty set is the only witness set
John and Mary → the set containing John and Mary is the only witness set
John or Mary → {John}, {Mary}, {John, Mary} are the witness sets

Much more on witness sets in Szabolcsi, Anna ed. 1995. *Ways of Scope Taking*. Kluwer.

(28) (D A *but* Q) (B) is true iff there is a (non-empty?) Moltmann witness set of Q which is the unique smallest set of exceptions C such that D (A-C) (B) is true.

(29) Every student but no law student complained.

(30) All the students but five law students complained.

(31) a. Every student except/#but <u>John or Mary</u> complained.
b. Every student except/#but <u>possibly John</u> complained.

(32) With the possible exception of John, every student complained.

(33) My old footnote:

Another twist in the initially straightforward meaning of exceptive sentences may come from an expression very familiar from the idiolect of logicians.

(i) a coincides with b everywhere except possibly at c.

The adverb *possibly* in (i) has a very strange effect. The closest paraphrase is disjunctive as in (ii).

(ii) a coincides with b everywhere or a coincides with b everywhere except at b.

Something similar would have to be said about (i):

(iii) a. John and possibly Mary will be here.
b. John or (John and Mary) will be here.

Here, I will ignore this issue.

(34) Szabolcsi's observation (cited by Moltmann in a footnote):

The constraints on what kind of NPs can be the complement of *but* "appear to be the same as the constraints on the NPs that may be modified by *only*(or *at most*):

$$\text{only}\left\{\begin{array}{c}\text{John}\\ \text{John or Bill}\\ \text{two students}\\ \text{at most two students}\\ \text{the students}\\ \text{\#every student}\\ \text{\#at least two students}\\ \text{\#less than two students}\end{array}\right\}\text{came}$$

(35) Only John and possibly Mary came.

<u>Reasons to prefer a treatment of *but*-phrases as DP-modifiers</u>

(36) Everybody but John complained.
Nobody but John complained.

(37) Every man and every woman but Adam and Eve were born in sin.

Exceptive Constructions (3)

1. More on *at most five students*

2. NP-modifier analysis

Reminder

(1) $\big[D\,(A)\ \textit{but}\ C\big]\,(B) = D\,(A - C)\,(B)\ \&\ \forall S\!: \big[D\,(A - S)\,(B) \rightarrow C \subseteq S\big]$

(2) Every student except/but at most five (students) complained about the noise.

Methods for Retrieving a Set from a Quantifier

(3) <u>The generator set of a principal ultrafilter</u>

$\mathbf{Q} \rightarrow \cap\mathbf{Q}$, $\lambda x.\ \forall P \in \mathbf{Q}$: $P(x)=1$

$\cap$(**John and Mary**) = $\cap\{X\!: \{j.m\} \subseteq X\} = \{j.m\}$
$\cap$(**every student**) = $\cap\{X\!: \text{Students} \subseteq X\} = \text{Students}$
$\cap$(**exactly five students**) = $\cap\{X\!: |X \cap \text{Students}| = 5\} = \varnothing$ (if $|\text{Students}| > 5$)

$\cap$(**John or Mary**) = $\cap\{X\!: \{j,m\} \cap X \neq \varnothing\} = \varnothing$
$\cap$(**at most five students**) = $\cap\{X\!: |X \cap \text{Students}| \leq 5\} = \varnothing$

(4) *Every A but C* → true of any B such that $\cap$C is the unique exception set …

(5) <u>Minimal sets in a quantifier</u>

$\min(\mathbf{Q}) = \{X \in \mathbf{Q}\!: \neg\exists Y\ (Y \subset X\ \&\ Y \in \mathbf{Q})\}$

min(**John and Mary**) = $\min\{X\!: \{j.m\} \subseteq X\} = \{\{j.m\}\}$
min(**every student**) = $\min\{X\!: \text{Students} \subseteq X\} = \{\text{Students}\}$
min(**exactly five students**) = $\min\{X\!: |X \cap \text{Students}| = 5\} = \{X\!: |X \cap \text{Students}| = 5\}$

min(**John or Mary**) = $\min\{X\!: \{j,m\} \cap X \neq \varnothing\} = \{\{j\},\{m\}\}$
min(**at most five students**) = $\min\{X\!: |X \cap \text{Students}| \leq 5\} = \{\varnothing\}$

(6) *Every A but C* → true of any B such that there is a set D in min(C) which is …

(7) Choice-function indefinites

$\exists$f: all (students but f(five law students)) complained

five law students → the set of pluralities made up of five law students

There is a way of choosing a plurality of five law students such that the chosen plurality corresponds to the unique exception set for the claim that all the students complained.

But *at most five students* is not one of those indefinites that otherwise show pseudo-scope behavior.

If three relatives of mine die, I will inherit this house.
If at most three relatives of mine die, I will inherit this house.

(8) Witness Sets

Every A but C → true of any B such that there is a witness set D of C which is …

(9) The "lives on" relation

A generalized quantifier Q lives on a set A iff for all B: $B \in Q \Leftrightarrow A \cap B \in Q$.

(10) Conservativity

A determiner D is conservative iff for all sets A, D(A) is a quantifier that lives on A.

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A set C is a Moltmann witness set for a generalized quantifier Q iff (i) $C \subseteq SL(Q)$ and (ii) $C \in Q$.

We write W(Q) for the set of Moltmann witness sets for Q.

(16) Examples of witness sets

W(**John and Mary**) = {{j.m}}
W(**every student**) = {Students}
W(**exactly five students**) = $\{X: |X \cap \text{Students}| = 5\}$

W(**John or Mary**) = {{j},{m},{j.m}}
W(**at most five students**) = {∅, [all singleton sets of students], [all sets containing two students], …, [all sets containing five students]}

Much more on witness sets in Szabolcsi, Anna ed. 1995. *Ways of Scope Taking*. Kluwer.

(17) (D A *but* Q) (B) is true iff there is a (non-empty?) Moltmann witness set of Q which is the unique smallest set of exceptions C such that D (A-C) (B) is true.

(18) Every student but no law student complained.

(19) All the students but five law students complained.

(20) a. Every student except/#but <u>John or Mary</u> complained.
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Another twist in the initially straightforward meaning of exceptive sentences may come from an expression very familiar from the idiolect of logicians.

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The adverb *possibly* in (i) has a very strange effect. The closest paraphrase is disjunctive as in (ii).

(ii) a coincides with b everywhere or a coincides with b everywhere except at b.

Something similar would have to be said about (i):

(iii) a. John and possibly Mary will be here.
b. John or (John and Mary) will be here.

Here, I will ignore this issue.

(23) Szabolcsi’s observation (cited by Moltmann in a footnote):

The constraints on what kind of NPs can be the complement of *but* “appear to be the same as the constraints on the NPs that may be modified by *only*(or *at most*):

$$\text{only} \left\{ \begin{array}{c} \text{John} \\ \text{John or Bill} \\ \text{two students} \\ \text{at most two students} \\ \text{the students} \\ \text{\#every student} \\ \text{\#at least two students} \\ \text{\#less than two students} \end{array} \right\} \text{came}$$

(24) Only John and possibly Mary came.

<u>QR?</u>

(25) John and Mary λx. every student but x complained

Distributive reading: contradiction!
Collective reading: OK

(26) John or Mary λx. every student but x complained

correctly derives that disjunction is read exclusively here

(27) At most five students λx. every student but x complained

(28) Usual distributive reading

There are at most five students x such that x is the unique exception …

true if the *every*-claim is true without exception	(OK?)
true if there is a single exception	(OK)
true if there are two exceptions	(OK)
true if there are six exceptions	(not OK)

in fact, this reading is a tautology! (so, perhaps that's why we don't perceive it)

(29) Usual collective reading

There is no group of students X that has more than 5 members and that is the unique exception set …

(30) Every student but at most five foreign students complained.

predicted to be true if the exceptions are two American students.

(31) A different collective reading

There is a group of students X that has at most 5 members and that is the unique exception set …

correctly predicts (30) to be false

(32) But that's not what we normally want!

John saw at most five students ≠ There is a group of students X that has at most 5 members and that John saw. [The latter is verified by the empty set or by any small set of students']

For such normal occurrences, (28) or (29) are what we thought we want.

(33) Another alternative

There is a group X containing at most five members which is the maximal group of students such that …

correct for both kind of examples

(34) Maximality

no group that this one is part of has the property

or

no group that is bigger than this one has the property

(35) At most five people fit in this elevator.

---

2. Moltmann, Lappin, and the NP-level Analysis

(36) Evidence given for an NP-level analysis (Hoeksema, Moltmann, Lappin)

a. every man and every woman except the parents of John
b. the wife of every president except Hilary Clinton
c. ?neither John nor Bill nor Mary nor Sue except the oldest

(37) Moltmann's Proposal

- does not decompose NP-meaning into its ingredients
- figures out indirectly whether *every* or *no* was involved
- does one of two things to the quantifier denoted by the NP

(38) Moltmann's Homogeneity Condition

A quantifier Q is homogeneous wrt a set C iff
(i) either $C \subseteq X$, for all $X \in Q$, or (ii) $C \cap X = \emptyset$, for all $X \in Q$

(39) $[\![NP_1 \textit{ except } NP_2]\!]$ is defined only if $[\![NP_1]\!]$ is homogeneous wrt $[\![NP_2]\!]$

(40) If defined,

$$[\![NP_1 \textit{ except } NP_2]\!] = \begin{cases} \{V - [\![NP_2]\!] : V \in [\![NP_1]\!]\}, \text{ if } \forall V \in [\![NP_1]\!] : [\![NP_2]\!] \subseteq V \\ \{V \cup [\![NP_2]\!] : V \in [\![NP_1]\!]\}, \text{ if } \forall V \in [\![NP_1]\!] : [\![NP_2]\!] \cap V = \varnothing \end{cases}$$

(41) Problem: in a world w (or a model M) where there are ten boys,

$[\![\textit{ten boys}]\!] = [\![\textit{every boy}]\!]$

(42) Moltmann: Homogeneity Condition has to hold in all appropriate extensions of M

A model M' is an appropriate extension of model M for NP_1 *except* NP_2 iff

(i) $[\![NP_2]\!]^{M} = [\![NP_2]\!]^{M'}$
“for an EP-complement such as the president or the boys, one should not consider models in which there is not exactly one president or there are no boys. Rather, in the relevant models, the denotation of the EP-complement should be defined whenever it is defined in the intended model”

(ii) “the denotations of predicates in M’ should be the same when restricted to the domain of M” (?)

(iii) “however, the presuppositions of the EP-associate should not have to be satisfied in the relevant models. The reason is that quantifiers such as *all ten students* or *all of the ten students* accept EPs, but their presupposition, namely that there are exactly ten students, would not be satisfied in any extension of the intended model in which more students have been added. The Homogeneity Condition certainly should be checked in extensions that contain more students than the intended model. It should therefore not be required that the presuppositions of the EP-associate be satisfied in the relevant extensions. This means that *all ten students* will be evaluated simply like *all students* in those extensions, with its presupposition that there are exactly ten students being suspended.”

(43) $[\![NP_1 \textit{ except } NP_2]\!]^{M}$ is defined only if
$[\![NP_1]\!]^{M'}$ is homogeneous wrt $[\![NP_2]\!]^{M'}$, for all appropriate extensions M' of M

(44)
$$[\![NP_1 \textit{ except } NP_2]\!]^{M} = \begin{cases} \{V - [\![NP_2]\!]^{M} : V \in [\![NP_1]\!]^{M}\}, \text{ if in every appropriate extension M' of M,} \\ \qquad \forall V \in [\![NP_1]\!]^{M'} : [\![NP_2]\!]^{M'} \subseteq \\ \{V \cup [\![NP_2]\!]^{M} : V \in [\![NP_1]\!]^{M}\}, \text{ if in every appropriate extension M' of M,} \\ \qquad \forall V \in [\![NP_1]\!]^{M'} : [\![NP_2]\!]^{M'} \cap V = \end{cases}$$

(45) Last amendment: reference to witness sets to make space for quantifiers in complement of *except*.

(46) Lappin's Proposal

R is total iff (i) R = □, or (ii) for any two sets A,B: R(A,B) iff A ∩ B = ∅.

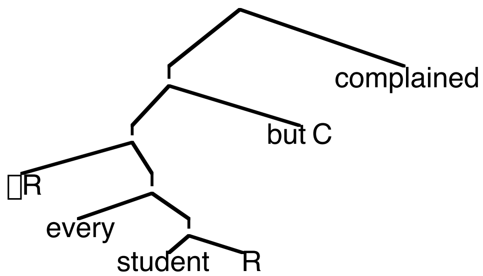
$$[\![NP_1 \textit{ except } NP_2]\!] = \begin{cases} \left\{ \begin{array}{l} X\text{: } R(A^{rem}, X)\text{, where } [\![NP_1]\!] = \{X\text{: } R(A,X)\}\text{, and} \\ \qquad \square S \left(S \subseteq W([\![NP_2]\!]) \;\&\; S \subseteq A \;\&\; A^{rem} = A - S \;\&\; R(S, \overline{X})\right) \end{array} \right\}, \\ \qquad \text{if } A \neq \varnothing \text{ and R is total in every model M s.t. } [\![NP_1]\!] \text{ is defined in M} \\ \text{undefined otherwise} \end{cases}$$

An Alternative?

(47) At least three men and at least four women other than John and Mary complained.

(48) At most three men and at most four women other than John and Mary complained.

(49) An NP-level analysis based on von Fintel (1993)



$[\![\text{but}]\!]\,(C)\,(\mathcal{Q}_{<et,\,ett>})\,(P) = \mathcal{Q}(\overline{C})(P) \;\&\; \forall S\,[\mathcal{Q}(\overline{S})(P) \rightarrow C \subseteq S]$

$[\![\text{other than}]\!]\,(C)\,(\mathcal{Q}_{<et,\,ett>})\,(P) = \mathcal{Q}\,(\overline{C})(P)$

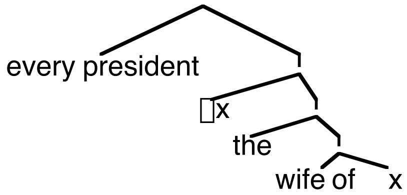
(50) $\left[\text{but John and Mary } (\lambda R.\text{ every man R and every woman R})\right] (\text{complained})$

(51) every president's wife except Hilary Clinton

(52) Moltmann's denotation for *every president's wife*

$\{P\text{: } \forall x\,(x \in \text{Presidents} \rightarrow \exists y\,(\text{y wife of x}) \in P)\}$

(53) Compositional derivation: [Re-read Section 8.6 in Heim & Kratzer !!]



the wife of x ~~> {P: the wife of x ∈ P}

every president ~~> λ$f_{<e,ett>}$. {P: for every president x, P ∈ f(x)}

(54)