Quantifiers in NatLg

1. Quantificational Noun Phrases (QuNPs).

- Some NPs do not denote objects of type e (= a particular individual or “entity”). The ones in (2a-b) don’t. If the ones in (3) did, we would not expect the ambiguities in (5).

(1) Type e:
   b. Definite descriptions: the person next to me, my older sister (=”the older sister of mine”).

(2) Not type e:
   a. [[No man]]^w = ???
   b. [[Only Susan]]^w ≠ Susan, since [[(2c)]] ≠ [[(2d)]].
   c. Only Susan came.
   c. Susan came.

(3) Type e?:
   a. [[Every woman]]^w =? [[the women]]^w = the group or plural individual of all women.
   b. [[Exactly three women]]^w =? A particular group of women that includes exactly three women (e.g., the group formed by Stephanie, Emily and Sue).
   c. [[More than three women]]^w =? A particular group of women that includes more than three women (e.g., the group formed by Sue, Jana, Eva and Kate).

(4) a. Stephanie, Emily and Sue saw Erwin and Matts.
   b. Stephanie, Emily and Sue are such that they saw Erwin and Matts.
   a. Erwin and Matts are such that Stephanie, Emily and Sue saw them.

(5) a. Exactly three women saw every man.
   b. Exactly three women are such that they saw every man.
   c. Every man is such that exactly three women saw him.

- Those problematic NPs do not denote sets of individuals either.

QUESTION: To see this, tentatively consider the denotations in (6). What semantic rule would we need to combine the NPs everything with the VP disappeared in (7)? Spell out the rule in (8). What would this rule predict for (9)?

(6) a. [[everything]]^w = \{x: x ∈ U in w\}
   b. [[nothing]]^w = ∅
(7) Everything disappeared.

(8) \[ S_w = \]

\[
\begin{array}{ll}
\text{QuNP} & \text{VP} \\
\text{every} & \text{a} \\
\end{array}
\]

(9) Nothing disappeared.

The solution: quantifiers like every and no denote relations between sets of individuals. Notation: X and Y are variables over sets of individuals, i.e., \( X \subseteq U \) and \( Y \subseteq U \).

(10) \[ S_e = \]

\[
\begin{array}{ll}
\text{QuNP} & \text{VP} \\
\text{every} & \text{i} \\
\end{array}
\]

\[
\text{city \; smells}
\]

\[
\text{No}
\]

(11) \[ [[\text{Every}]]^w = \{ <X,Y>: X \subseteq Y \} \]

(12) \[ [[\text{No}]]^w = \{ <X,Y>: X \cap Y = \emptyset \} \]

QUESTION: Spell out the meaning of everything and nothing based on (11)-(12). Define the semantic rules in (15) and (16) to run the semantic computation of (17) and (10).

(13) \[ [[\text{Everything}]]^w = \]

(14) \[ [[\text{Nothing}]]^w = \]

(15) \[ S_w = \]

\[
\begin{array}{ll}
\text{QuNP} & \text{VP} \\
\text{every} & \text{i} \\
\end{array}
\]

(16) \[ \text{QuNP}_w = \]

\[
\begin{array}{ll}
\text{u} & \text{r} \\
\text{Qu} & \text{N'} \\
\end{array}
\]

(17) \[ \text{IP} = \]

\[
\begin{array}{ll}
\text{DP} & \text{VP} \\
\text{everything} & \text{g} \\
\text{Nothing} & \text{g} \\
\end{array}
\]

\[
\text{smells}
\]
### RELATIONAL THEORY OF QUANTIFIERS: quantifiers denote relations between sets.

(18)

<table>
<thead>
<tr>
<th>QUANTIFIERS</th>
<th>VENN’S DIAGRAMS</th>
<th>AS RELATIONS B/W SETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every $A$ (is) $B$</td>
<td></td>
<td>$&lt;A,B&gt; \in R_{\text{every}}$ iff $A \subseteq B$</td>
</tr>
<tr>
<td>No $A$ (is) $B$</td>
<td></td>
<td>$&lt;A,B&gt; \in R_{\text{no}}$ iff $A \cap B = \emptyset$</td>
</tr>
<tr>
<td>Some $A$ (is) $B$</td>
<td></td>
<td>$&lt;A,B&gt; \in R_{\text{some}}$ iff $A \cap B \neq \emptyset$</td>
</tr>
<tr>
<td>Exactly two $A$ (are) $B$</td>
<td></td>
<td>$&lt;A,B&gt; \in R_{\text{exactly2}}$ iff</td>
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<tr>
<td>At least four $A$ (are) $B$</td>
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<td>A third of $A$ (are) $B$</td>
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<td>Most $A$ (are) $B$</td>
<td></td>
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<tr>
<td>All but two $A$ (are) $B$</td>
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