The two senses of *and* in the coordination of nouns

Lucas Champollion  
New York University  
champollion@nyu.edu

Workshop on conjunction and disjunction from a typological perspective  
University of Vienna, December 19th, 2016

1 Introduction

- The word *and* has intersective (“boolean”) and collective (“nonboolean”) uses.

1. **Introduction**

   a. John *lies* and cheat.
   b. That liar and cheat can not be trusted.

2. a. John and Mary met in the park.
   b. A man and woman who dated met in the park.

- Analytical options:

  1. Posit lexical ambiguity (e.g., Link, 1984).
  2. Unify based on collective use (e.g. Heycock and Zamparelli, 2005; Schmitt, 2013).
  3. **This talk**: Unify based on intersective use (e.g. Winter, 2001; Champollion, 2016).

- Analyzing the intersective behavior is easy:

  \[
  \llbracket \text{liar and cheat} \rrbracket = \lambda x. \text{liar}(x) \land \text{cheat}(x)
  \]

- What about the collective behavior? In a nutshell: *and* interacts with type shifters.

\[
\llbracket [N\text{-} \text{man and woman}] \rrbracket = \llbracket [\text{DP some man and some woman}] \rrbracket
\]

2 Analysis: Intersective *And* plus Type Shifters

2.1 The Intersective Assumption in Winter (2001)

- Basic meaning of *and* (e.g., Gazdar, 1980; Winter, 2001) is intersection

\[
\llbracket \text{and}_{int} \rrbracket = \cap_{(\tau, \tau)} \begin{cases} 
\land_{(t, t)} & \text{if } \tau = t \\
\lambda X_\tau \lambda Y_\tau \lambda Z_\sigma : X(Z) \cap_{(\sigma_2, \sigma_2)} Y(Z) & \text{if } \tau = \sigma_1 \sigma_2
\end{cases}
\]

1
Winter’s idea: “distill” generalized quantifiers into (collective) individuals:

\[ \min = \text{def} \lambda Q_{rt}, \lambda A_{rt}. A \in Q \land \forall B \in Q. [B \subseteq A \rightarrow B = A] \]

For example:

\[ a. \operatorname{[[John]]} = \{ P \mid j \in P \} \]
\[ b. \operatorname{[[Mary]]} = \{ P \mid m \in P \} \]
\[ c. \operatorname{[[John and\_int Mary]]} = \{ P \mid j \in P \} \cap \{ P \mid m \in P \} \]
\[ d. \operatorname{[[min(John and\_int Mary)]]} = \{ \{ j, m \} \} \]

Collective predicates are predicates of sets of individuals:

\[ \operatorname{[[met (in the park)]]} = \{ P_{el} \mid P \in \text{met} \} \]

Existential raising acts in this case as a silent determiner:

\[ a. \textit{Existential raising: } ER = \text{def} \lambda P_{rt}, \lambda Q_{rt}. P \cap Q \neq \emptyset \]
\[ b. \operatorname{[[ER(min(\lambda P.P(john) \cap \lambda P.P(mary)))]]} = \lambda C_{(el, t)} \cdot \{ j, m \} \in C \]

## 2.2 Application to Noun Coordination

Basic idea: same operators as before, but in different order.

Assume that ER may apply to nouns and nominals:

\[ a. \operatorname{[[N\_ER(man) and\_int ER(woman)]]} \]
\[ = \operatorname{[[DP a man and\_int a woman]]} \]
\[ = \lambda P_{el} \exists x \exists y. \text{man}(x) \land \text{woman}(y) \land P(x) \land P(y) \]

We need to “distill” this before further use:

\[ a. \operatorname{[[min(ER(man) and\_int ER(woman))]]} \]
\[ = \lambda P_{el} \exists x \exists y. \text{man}(x) \land \text{woman}(y) \land P = \{ x \} \cup \{ y \} \]

Abbreviate this predicate as \textit{mw-pair}.

My LF for sentence (2b) is:

\[ a. \operatorname{[[a(min(ER(man) and ER(woman)) who dated)(met))]} \]
\[ = \operatorname{[[a\\MW\_pair \cap date)(\text{met})]} \]
\[ b. = \operatorname{[[a\\lambda P. \exists x \exists y[\text{man}(x) \land \text{woman}(y) \land P = \{ x, y \} \land date(\{ x, y \})]\\text{meet}]} \]
\[ c. = \exists P \exists x \exists y[\text{man}(x) \land \text{woman}(y) \land P = \{ x, y \} \land date(\{ x, y \}) \land meet(\{ x, y \})] \]
\[ d. = \exists x \exists y[\text{man}(x) \land \text{woman}(y) \land date(\{ x, y \}) \land meet(\{ x, y \})] \]

## 3 Comparison to Previous Work

Improvement on Link (1984): no lexical ambiguity, hence no redundancy.

Generalizes to S, VP, DP coordination since our conjunction is intersective.
3.1 Heycock and Zamparelli (2005)

Heycock and Zamparelli (2005): only one entry for *and*, forms collective entities

\[(\text{and}_{coll}) = \lambda Q_{(\tau,t)} \lambda Q'_{(\tau,t)} \lambda P_{\tau t} \exists A_{\tau t} \exists B_{\tau t}. Q(A) \land Q'(B) \land P = A \cup B\]

- Nouns and VPs denote sets of singletons.

\[
\begin{align*}
\text{man and woman} &= \lambda P_{et} \exists A_{et} \exists B_{et}. |A| = 1 \land A \subseteq \text{man} \land |B| = 1 \land B \subseteq \text{woman} \land P = A \cup B \\
&= \lambda P_{et} \exists x \exists y. \text{man}(x) \land \text{woman}(y) \land P = \{x\} \cup \{y\}
\end{align*}
\]

- The hardest nut to crack for the collective theory:

\[(\text{No man and no woman smiled.})\]

\[(\text{No man}) \land (\text{No woman}) \land (\text{man} \cup \text{woman}) = \lambda P_{et} \exists A_{et} \exists B_{et}. P_{et} \exists x \exists y. \text{man}(x) \land \text{woman}(y) \land P = \{x\} \cup \{y\}\]

\[\text{No man in (15a)} \text{ holds of the set } A = \{\{m\}\}, \text{ since } A \text{ contains no man.}\]

\[\text{No woman in (15b)} \text{ holds of the set } B = \{\{j\}\}, \text{ since } B \text{ contains no woman.}\]

- Suppose a man (John) and a woman (Mary) smile, and nobody else smiles.

\[\text{No man and no woman}\]

\[\text{false but it turns out to be predicted true:}\]

\[(\text{No man}) \land (\text{No woman}) \land (\text{man} \cup \text{woman}) = \lambda P_{et} \exists A_{et} \exists B_{et}. P_{et} \exists x \exists y. \text{man}(x) \land \text{woman}(y) \land P = \{x\} \cup \{y\}\]

\[\text{But this set is precisely the denotation of smiled. So (13) comes out as true!}\]

4 And vs. Or

- I assume Gazdar (1980)’s entry for *or*:

\[
\begin{align*}
\text{or}_{int} &= \cup_{(\tau,\tau)} = \begin{cases} \\
\lambda X_{\tau} \lambda Y_{\tau} \lambda Z_{\sigma_1} \lambda Z_{\sigma_2} X(Z) \cup (A \land B) & \text{if } \tau = t \\
\lambda X_{\tau} \lambda Y_{\sigma_1} \lambda Z_{\sigma_2} X(Z) & \text{if } \tau = \sigma_1, \sigma_2
\end{cases}
\end{align*}
\]

- Bergmann (1982): Why is (17a) equivalent but not (17b)?

\[\text{Every cat and dog is licensed.} \iff \text{Every cat or dog is licensed.}\]

\[\text{A cat and dog came running in.} \iff \text{A cat or dog came running in.}\]

- Some background on determiner fitting *dfit*:

\[\text{dfit} = \lambda D_{(et, (et, t))} \lambda A_{(et, t)} \lambda B_{(et, t)} D(\cup A)(\cup (A \cap B))\]
• Winter motivates this operator by sentences like (19):

(19) No students met.

• Assume that students denotes the set of all nonempty sets of students.
• The dfit operator allows us to combine the GQ with the collective predicate:

(20) a. \[[\text{dfit}(\text{no})(\text{students})(\text{met})]\]
    b. = [\text{no}][(\bigcup \text{students})(\bigcup (\text{students} \cap [\text{met}]))]
    c. = [\text{no}][\text{students}](\bigcup \{P \in \text{met} : P \subseteq \text{student}\})
    d. = \neg \exists x. [\text{student}(x) \land \exists P. P(x) \land \text{meet}(P) \land \forall y. P(y) \rightarrow \text{student}(y)]
    e. “No student is a member of a set of students that met”.

• My answer to Bergmann: Two equivalent LFs for the sentences in (17a):

(21) a. \text{dfit}(\text{every})(\text{min}(\text{ER}(\text{cat}) \text{ and } \text{int}\text{ ER}(\text{dog})))\text{(dist(\text{be}_{\text{licensed}}))}
    b. \bigcup \{x, y\} | \text{cat}(x) \land \text{dog}(y) \} \subseteq \bigcup \{x, y\} | \text{cat}(x) \land \text{dog}(y) \land \{x, y\} \subseteq \text{be}_{\text{licensed}}

(22) a. every(\text{cat or}_{\text{int}} \text{ dog})(\text{be}_{\text{licensed}})
    b. \text{cat} \cup \text{dog} \subseteq \text{be}_{\text{licensed}}

• My account generates only nonequivalent LFs for the sentences in (17b):

(23) a. \text{dfit(a)}(\text{min}(\text{ER}(\text{cat}) \text{ and } \text{int}\text{ ER}(\text{dog})))\text{(dist(\text{come}_{\text{running in}}))}
    b. \exists x \exists y. \text{cat}(x) \land \text{dog}(y) \land \{x, y\} \subseteq \text{come}_{\text{running in}}

(24) a. a(\text{cat or}_{\text{int}} \text{ dog})(\text{come}_{\text{running in}})
    b. \exists x. (\text{cat}(x) \lor \text{dog}(x)) \land \text{come}_{\text{running in}}(x)

5 The Non-Ambiguity of Or

• English uses one word for intersective and collective conjunction, another for disjunction.
• How typical is this? We don’t know until the Vienna project has concluded. But:

  – Many languages use the same marker to represent conjunction of noun phrases and clausal conjunction.
  – This is the only type of language found in Europe and Mesoamerica, and it is also well represented in the rest of the world (Haspelmath, 2013).
  – Typically, languages represent conjunction and disjunction with different markers, as in English (exceptions: Ohori 2004; Davidson 2013; Bowler 2014).

• Extrapolating from these patterns requires us to ignore the fact that not all noun phrase conjunctions are collective.
• It seems though that intersective and collective conjunction are more closely related to each other than either one of them is related to disjunction.
The ambiguity theory does not lead us to expect this connection: why are there no languages where collective and is pronounced “or”? (Winter, 2001)

My answer for noun coordination:

N1 and N2 can be “N1 and(N2)” or “min(ER(N1) and int ER(N2))”. These structures lead to different readings, as we have seen.

N1 or N2 can be “N1 or(N2)” or “min(ER(N1) or int ER(N2))”. These two structures evaluate to almost the same thing, and determiner fitting obliterates the remaining difference:

(25) Every cat or dog was licensed.
(26) a. dfit(every)(min(ER(cat)) or min(ER(dog)))(dist(be_licensed))
   b. = dfit(every)(min({P | P ∩ cat ≠ ∅ ∨ P ∩ dog ≠ ∅}))
   ((P | P ≠ ∅ ∧ P ⊆ be_licensed))
   c. = (∪{ {x} | x ∈ (cat ∪ dog)} ⊆
       (∪({ {x} | x ∈ (cat ∪ dog)} ∩ {P | P ≠ ∅ ∧ P ⊆ be_licensed})) )
   d. = (cat ∪ dog) ⊆ ((cat ∪ dog) ∩ be_licensed)
   e. = (cat ∪ dog) ⊆ be_licensed

6 More topics: see Champollion (2016)

- Overlapping sets: A doctor and lawyer met
- Hydras: the man and women who dated met in the park
- Plurals: ten men and women got married today

7 Conclusion and Open Issues

- The intersective option is arguably the only unproblematic one outside the DP.
- I have shown that it is also preferrable within the DP.
- Open issues:
  - Choice functions vs. novelty conditions.
  - Constraining the scope of choice functions.
  - Agreement: see King and Dalrymple (2004)
  - Crosslinguistic (and interspeaker) differences: ibid.

  (27) a. This soldier and sailor are often together.
  b. *Ce marin et soldat sont souvent ensemble.

- Restricting the distribution of silent operators syntactically: see Winter (2001)

- Sudo (2015): Japanese conjunction only has the collective reading
Sudo (2015) concludes:

To save the analysis [by Winter and Champollion], one could stipulate that -to is marked in the lexicon as always requiring the additional mechanisms that derive the [collective] reading. However, this essentially amounts to the same view as [the ambiguity theory], which postulates two types of conjunction in the lexicon.

References


