Ten men and women got married today

Champollion (2016)

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Contents

1 Recap

We can recast the semantics of the basic fragment we've been discussing in terms of *sets*, by exploiting the equivalence between sets and their characteristic functions.

Type E expressions are interpreted as individuals, of course.

(1) $[\![\mathbf{Josie}]\!] = j$

Type $E \to T$ expressions are interpreted as sets of individuals.

(2) $[\![\mathbf{laugh}]\!] = \{\, x \in \mathbf{Dom}_E \mid x \text{ laughs} \,\}$

On this framing, funtional applications involving characteristic functions are interpreted as set membership:

(3) $[\![\alpha_{\sigma \to T}(\beta_\sigma)]\!] = \text{true iff } [\![\alpha]\!] \in [\![\beta]\!]$

(4) $[\![\textbf{laugh}(\textbf{Josie})]\!] = \text{true iff } j \in \{\, x \in \textbf{Dom}_E \mid x \text{ laughs} \,\}$

Quantificational NPs such as *everyone* are expressions of type $(E \to T) \to T$ - they're interpreted as *sets of sets* of individuals.

(5) $[\![\textbf{everyone}]\!] = \{\, P \mid P = \textbf{Dom}_E \,\}$

(6) $[\![\textbf{everyone}(\textbf{laughed})]\!] = \text{ true iff } \{\, x \mid x \text{ laughs} \,\} = \textbf{Dom}_E$

In class, we introduced a way of *lifting* type E expressions into type $(E \to T) \to T$ expressions. An individual x can be re-interpreted as the set of Ps which are true of x. This is written as $x^{\uparrow}$.

(7) $[\![x^{\uparrow}]\!] = \{\, P \subseteq \textbf{Dom}_E \mid x \in P \,\}$

When a lifted type E expression takes a type $(E \to T)$ expression as its argument, the result is the same as applying the type $(E \to T)$ expression as the function.

(8) $$\begin{aligned}[\![\textbf{Josie}^{\uparrow}(\textbf{laugh})]\!] &= \text{true iff } \{\, x \mid x \text{ laughs} \,\} \in \{\, P \subseteq \textbf{Dom}_E \mid j \in P \,\} \\ &= \text{true iff } j \in \{\, x \mid x \text{ laughs} \,\}\end{aligned}$$

Lifting is generally harmless, then, but it will be essential for dealing with NP conjunction.

Following (Winter 2001), we've been treating *collective predicates* as type $(E \to T) \to T$ expressions, like quantificational NPs.

(9) $[\![\textbf{met}]\!] = \{\, P \subseteq \textbf{Dom}_E \mid P \text{ met} \,\}$

This predicts that collective predicates can only compose with expressions that are interpreted as sets of individuals. Putting aside the compositional details, we assume that conjoined names and definite plurals are type $E \to T$.

(10) $[\![\textbf{JohnandMary}]\!] = \{\, j, m \,\}$

(11) $[\![\textbf{met}(\textbf{JohnandMary})]\!] = \text{true iff } \{\, j, m \,\} \in \{\, P \mid P \text{ met} \,\}$

We've spent quite a lot of time discussing how to generalize boolean conjunction to in order to conjoin expressions of a boolean type.

Conjunction of expressions of type $\sigma \to T$ has quite a simple interpretation - set intersection:

(12) $[\![\alpha_{\sigma\to T} \sqcap \beta_{\sigma\to T}]\!] = [\![\alpha]\!] \cap [\![\beta]\!]$

This accounts for predicate conjunction, as well distributive readings of NP conjunction (collective readings are still out of bounds).

(13) $[\![\textbf{laugh} \sqcap \textbf{sneeze}]\!] = \{\, x \mid x \text{ laughs} \,\} \cap \{\, x \mid x \text{ sneezes} \,\}$

(14) $[\![\textbf{everyLinguist} \sqcap \textbf{somePhilosopher}]\!]$
$= \{\, P \subseteq \textbf{Dom}_E \mid \{\, x \mid x \text{ is a linguist} \subseteq P \,\} \,\} \cap \{\, P \subseteq \textbf{Dom}_E \mid P \cap \{\, x \mid x \text{ is a philosopher} \,\} \neq \emptyset \,\}$
$= \{\, P \subseteq \textbf{Dom}_E \mid \textbf{linguist} \subseteq P \text{ and } P \cap \textbf{philosopher} \neq \emptyset \,\}$

This also works for (lifted) non-quantificational NPs:

(15) $[\![\textbf{John}^{\uparrow} \wedge \textbf{Mary}^{\uparrow}]\!] = \{\, P \subseteq \textbf{Dom}_E \mid j \in P, m \in P \,\}$

Last time, we dicussed a method for deriving collective readings of conjoined names using an inventory of type-shifters:

- Lift
- Minimization
- Existential raising.

The focus of (Champollion 2016) is on a surprising related phenomenon: collective readings of *noun* (i.e., predicate) cojunction.

(16) A [man and woman] met in the park last night.

2 Conjunction and collectivity

2.1 Background

Typically, conjunction of type $E \to T$ expressions is *intersective*. This is exactly what we expect on the basis of boolean conjunction generalized to type $E \to T$ expressions.

(17) John [lies and cheats].

(18) That liar and cheat cannot be trusted.

The most salient reading of the following however isn't that someone who is both a man and a woman met in the park last night, but rather that a group consisting of a man in the woman met.

There is no obvious way of explaining this given what we know about how to conjoin type $E \to T$ expressions.

(19) A [man and woman] met in the park last night

Conjunction of nouns in fact gives rise to *ambiguities.*

(20) Every linguist and philosopher knows the Gödel thereom
  a. Everyone who is both a linguist and a philosopher knows the Gödel theorem.
  b. Every linguist knows the Godel theorem, and every philosopher knows the Gödel theorem.

Big question: how do we unify these two uses of *and*?

- Intersective theory.
- Collective theory.

(Champollion 2016) argues for the intersective (i.e., boolean) theory.

2.2 *Man and woman*

Champollion argues that *man and woman* must be able to mean, roughly, the same thing as "man woman pair" - namely, a collective predicate that is true just of pairs of individuals consisting of a man and a woman.

(21) $\{\,\{\,x, y\,\} \mid x$ is a man and y is a woman$\,\}$

Evidence for this comes from a construction discussed by (Link 1984) under the rubrik of *Hydras.*

(22) A man and woman who dated met in the park.

As a starting point, Champollion makes the uncontroversial assumption that "who dated" basically means the same thing as "dated" — namely, it is a collective predicate that is true of a set of individuals that dated.

(23) $[\![\textbf{dated}]\!] = \{\,P\textbf{Dom}_E \mid P \text{ dated}\,\}$