Session 7 – Type Shift

1. The Problem: Type Mismatch with ObjectQPs

• *Conceptual Motivation for Type Shift (May 1985, Fox 2000):*

QPs are expressions of type <et,t> and as such (their meaning) cannot directly combine with (the meaning of) transitive verbs by functional application:

(1)

VP <e,t> VQP admires every woman <e, <e,t>> <<e,t>,t>

 \rightarrow The structure is interpretable if the QP moves at LF, leaving behind a trace of type <e>:

(2) $\underline{S} \ll$

every woman 1 <e,t>



- → Since short QR to a position outside vP is required for (semantic) convergence, it is not blocked by economy consideration (Fox 2000).
- NB: Montague's PTQ-system does not require the application of QR for these cases, as it allows for the in situ interpretation of transitive verbs (IV/T) and Terms (which are all of type <<e,t>,t> in Montague) by means of the rules S5/T5.
- → The local in situ-interpretation of V and QP in (1) can be achieved by assigning the transitive verb a different semantic type:
- (3) $TYPE_{SHIFT}(V_{TRANS}) = <<<e,t>,<e,t>>$ (see also Partee & Rooth 1983, ex. (18))
- \rightarrow Alternatively, the semantic type of the QP itself could be shifted, see below.
- 2. Type Shifting: Independent Evidence (Partee & Rooth 1983, Partee 1987)
- The assumption of type shift is independently motivated for the nominal domain by the following data:
- i. Evidence for shift from <e> to <et,t>: Coordination of proper names (typically <e>) and QPs (<et,t>) (Partee & Rooth 1983):
- (4) [John and every woman] passed the examination with distinction.
- → On the plausible assumption that conjunction can only combine elements of the same semantic type, (4) would be problematic unless the semantic type of *John* was lifted to <<e,t>,t> by a general type-shifting operation *lift*.
- (5) $[[John]] = \lambda P \in D_{\langle e,t \rangle}$. P(j) (in PTQ, this is the only reading of *John*)
- ii. Evidence for shift from <et,t> to <e>: The ability to function as an antecedent for discourse anaphoric processes: (Partee 1987)

(6) a. John / the man/ a man walked in. He looked tired.

b. #Every man / no man / more than one man walked in. He looked tired.

- \rightarrow Unlike expressions of type <e>, proper QPs, i.e. expressions that can only be of type <et,t> (or higher), do not qualify as antecedents for discourse anaphora.
- \rightarrow the definite expression *the man* and the indefinite expression *a man* cannot be of type <et,t> in (6a).
- \rightarrow type lowering of indefinite and definite NPs to <e>.
- iii. *Evidence for shift from <et,t> to <et>: Predicative NPs* (Partee 1987)
- \rightarrow indefinite and definite NPs can occur in predicative position of copular *be* and other verbs that take predicates as complements.
- (7) a. Lemmy is an authority / the authority on Heavy Metal.

b. Peter considers Lemmy an authority on Heavy Metal.

- → Indefinite NPs can also be conjoined with adjectives (type: <e,t>) in predicative position:
- (8) Mary considers John competent in linguistics and an authority on unicorns.
- → The type shift affects the NP denotation itself, rather than being triggered by a special semantic entry for copular and other predicative verbs.
- *Partee's triangle (1987):*



- → THE/A/BE are natural (universal?) type shifting operations, which may be lexicalized (e.g. in form of special determiners), but which are often not manifested in form of lexical expressions, but in form of structural configurations, e.g. predicative constructions.
- Other examples for type-shifting operations:
 - i. Bare plurals: set (<et>) or kind name (<e>) (Link, Chierchia)
- (9) *Fireman* are available.
 - ii. Mass nouns: predicate over quantities of matter or kinds
- (10) a. The puddle on the floor is wine.
 - b. Red wine is wine.

iii. Count nouns \rightarrow the universal grinder (Lewis)

(11) There is apple in the salad.

iv. Transitive \rightarrow intransitive verbs (Dowty 1981)

- (12) a. Peter ate the apple. Type(eat_{TRA}): <e, <e,t>>
 - b. Peter ate and slept. Type(eat_{ITR}): <e,t>
- Conclusion:

The principal possibility of type shift seems sufficiently supported by the available evidence.

3. Resolving the Type Mismatch through Type Shift

- Two options for type shift in (1):
 - i. type shifting the verb (e.g. Montague 1973)

ii. type shifting the QP (e.g. Heim & Kratzer 1998)

- *Type shifting the verb:*
- (13) a. admires_{<eet>} \rightarrow admires_{<ett,et>}
 - b. [[admires_{<ett,et>}]] = $\lambda Q \in D_{<ett>}$. $\lambda x \in D$. $Q(\lambda y \in D$. [x admires y])
- (14) a. $[[admires_{ett,et>} every woman]] =$
 - b. $[\lambda Q \in D_{\langle ett \rangle}, \lambda x \in D, Q(\lambda y \in D, [x admires y])]$ ($\lambda f \in D_{\langle et \rangle}$. For all z, such that z a woman, f(z) = 1) =
 - c. $\lambda x \in D$. [$\lambda f \in D_{\text{cet>}}$. For all z, such that z a woman, f(z) = 1] ($\lambda y \in D$. [x admires y])=
 - d. $\lambda x \in D$. [For all z, such that z a woman, ($\lambda y \in D$. [x admires y]) (z) = 1] =

e. $\lambda x \in D$. [For all z, such that z a woman, x admires z]

- *Type shifting the QP:*
- (15) a. every woman_{<ett>} \rightarrow every woman_{<eet, et>} =
 - b. [[every woman_{eet,et>}]] = $\lambda f \in D_{eet>}$. [$\lambda x \in D$. for all z, such that z a woman, f(z)(x) =1]
- (16) a. [[admires every woman_{eet,et>}]] =
 - b. $[\lambda f \in D_{\text{ceet}}]$. $[\lambda x \in D$. for all z, such that z a woman, f(z)(x) = 1]] ($\lambda u \cdot \lambda v \cdot v$ admires u) =
 - c. $\lambda x \in D$. for all z, such that z a woman, $[\lambda u \cdot \lambda v \cdot v \text{ admires } u](z)(x) = 1]] =$
 - d. $\lambda x \in D$. for all z, such that z a woman, x admires z

=(14e)

• Conclusion:

Both kinds of type shift derive the VP-denotation correctly.

- 4. Choosing between QR and Type Shift (H&K 1998: ch. 7.5, pp.193-204)
- → Heim & Kratzer (1998) present three arguments in favour of quantifier raising over flexible types:
 - i. The analysis of antecedent-contained deletion
- (17) Peter read every book that Mary did.
 - ii. The availability of bound-variable readings between QPs and anaphors:
- (18) Every boy introduced himself.

iii. The availability of inverse scope readings:

(19) a. Some man loves every woman.

b. One apple in every basket is rotten.

→ All three arguments are arguments to the effect that QR is required independently (but above, we have seen that there is also independent evidence for flexible types, albeit of different kinds).

5. Flexible Types and Wide Scope of Object-QPs

- Assuming yet another semantic type for transitive verbs, one can also derive wide scope readings for object QPs in situ.
- (19) a. Some man loves every woman.
- \rightarrow On this analysis, the verb will denote a relation between quantifiers
- Deriving the inverse scope readings for the object QP in (19a):
- (20) a. [[loves]] = $\lambda x \cdot \lambda y \cdot y$ loves x

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- b. [[loves]] = $\lambda V \lambda W$. V(λx . W (λy . y loves x)) TYPE: <ett, <ett, t>>
- c. [[loves every woman]]
 - = $[\lambda V \lambda W. V(\lambda x. W (\lambda y. y \text{ loves } x))](\lambda Q. \forall v [woman(v) \rightarrow Q(v)])$
 - = λW . $\forall v [woman'(v) \rightarrow W (\lambda y. y loves v)]$
- d. [[some man loves every woman]]
 - = $[\lambda W. \forall v [woman'(v) \rightarrow W (\lambda y. y loves v)]] (\lambda P. \exists z [man'(z) \land P(z)])$
 - = 1 iff $\forall v \text{ [woman' (v) } \Rightarrow [\lambda P. \exists z \text{ [man'(z) } \land P(z)]] (\lambda y. y \text{ loves } v)]$
 - = 1 iff $\forall v [woman'(v) \rightarrow \exists z [man'(z) \land z loves v]]$
- → The relevant scopal information is already specified in the meaning of the verb: In (19b), the variable V, which is to be replaced with the denotation of the object QP, takes wide scope over the variable W, which stands in for the meaning of the subject QP.
- A problem for flexible type approaches:

The semantic mechanisms behind type shift are of a quite general nature, so we would expect inverse scope readings to be freely available, contrary to fact.

FA: VP(Subject-QP)

Q(v)])

FA: Verb(Object-QP)

- → One would have to find additional **semantic** principles that would block type lifting of the verb in the appropriate way, except in the presence of distributive quantifiers.
- → How can the type shifting rules operating on the verb meaning have access to the kind of QP involved?
- \rightarrow Lifting of QP-meaning with distributive quantifiers only?
- (21) TYPE(every woman) = <eet, <ett, t>>