

**Only the Strong: Restricting Situation Variables**

**Problem and Previous Data** Recent work has shown that although world/time variables must be represented explicitly in syntax (Cresswell 1990, Percus 2000, Kusumoto 2005), the possible uses of these variables are constrained to an extent not predicted by current theories.

- (1) Mary thinks my brother is Canadian.
- (2) Many fugitives are in jail. / #There are many fugitives in jail.
- (3) Mary thinks someone in this room is outside. / #Mary thinks there’s someone in this room who’s outside.

Percus (2000) shows that a VP must be interpreted de dicto: for instance, (1) cannot have the meaning that there is some Canadian whom Mary thinks is my brother. Musan (1997) shows only strong DPs may be evaluated at a time different from their main predicate. So, *many fugitives* as a strong DP in (2) can be evaluated at a different time than its main predicate *in jail*; but the same phrase as a weak DP (forced by the existential there construction) must be at the same time as *in jail*, yielding a contradiction. Musan’s generalization also extends to possible worlds: In (3), the first, strong DP version of *someone in this room* may be interpreted de re, but not the weak DP version.

**New Data and Unified Generalization** I present data suggesting that an NP and its sisters in the same DP may not be evaluated at different times or worlds:

- (4) a. # Mary thinks everyone in this room who’s outside ...
- b. # Mary thinks every fugitive who’s in jail ...

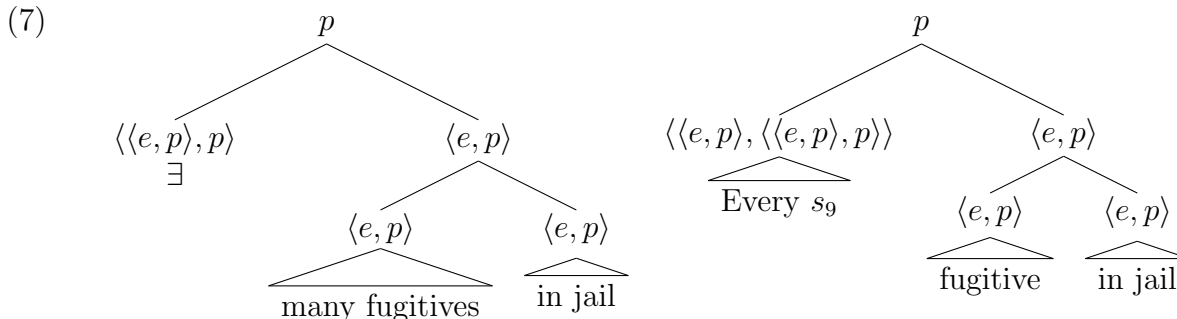
The DPs in (4) are out because no one can be in a room and outside or be a fugitive and in jail at the same world and time. Therefore, I propose one unified generalization:

- (5) Only strong DPs may be interpreted de re (i.e., at a non-local world or time); VPs, weak DPs, and DP constituents are always de dicto (at the local world and time).

(5) subsumes the generalizations above: Percus’s facts are that VPs are evaluated at the local world/time of the CP. Musan’s facts are that weak DPs are at the same time as VPs (hence local), but strong DPs can be independent (i.e., non-local). My new facts are that NPs and modifiers inside DPs are evaluated locally (i.e., at the world/time of the DP).

**Proposal** I derive (5) from a change in the semantic type system such that nothing denotes a truth value; instead a new simple type *p* signifies propositions, represented as sets of situations in the meta-language (Cresswell 1973, Kratzer 1991). Structures for the weak and strong DPs are as follows:

- (6) Simple types: *e*, *s*, *p*; Derived types:  $\langle \alpha, \beta \rangle$  where  $\alpha$  and  $\beta$  are types.



I argue that weak quantifiers are of type  $\langle e, p \rangle$ . They combine with their main predicates via predicate modification before existential closure applies (Milsark 1974, Heim 1982, Diesing 1992). Although it has been suggested (von Stechow 1980) that negative, and other non-upward-monotone quantifiers cannot be captured in such a system, I argue that all such quantifiers can be decomposed so that the non-upward-monotone portion scopes above the existential closure (cf. Jacobs 1980, Heim 2001).

In this system, there is simply no way to add an explicit situation variable to a weak quantifier or its predicate, since items of type  $p$  are sets and not functions and hence take no arguments. This derives Musan’s generalization that these two items occur at the same time and world. Similarly, the NP and its modifier inside the strong DP also combine via predicate modification and also cannot support an explicit situation variable. Last, the VP itself also cannot take a situation variable argument, deriving Percus’s generalization above since the embedded clause must get its situation argument directly from its embedding verb.

On the other hand, I propose that strong determiners are of type  $\langle s, \langle \langle e, p \rangle, \langle \langle e, p \rangle, p \rangle \rangle \rangle$ . They therefore do take a situation variable, which gets applied to their restrictive clause via the type-shifting operators  $\cup$ , which converts a proposition from a set of situations to the characteristic function of that set, and  $\cap$ , which converts a function from situations to truth values to a proposition – i.e., a set of situations (cf. Chierchia 1984). These operators are only available in the meta-language and are tied to the definitions of a limited number of lexical items, such as strong determiners and the binder prefix below.

$$(8) \text{ For any } P \in D_p (= \mathcal{P}(D_s)), \cup P \leftrightarrow [\lambda s . s \in P].$$

$$\text{For any } f \in D_s^{D_t}, \cap f \leftrightarrow \{s : f(s) = 1\}.$$

$$(9) \text{ [every]} = \lambda s . \lambda P_{\langle e, p \rangle} . \lambda Q_{\langle e, p \rangle} . \cap [\lambda s' . \forall x . \cup [P(x)](s) \rightarrow \cup [Q(x)](s')]$$

I argue that a strong determiner’s situation variable argument may be bound by a situation binder prefix (Büring 2005, Schueler 2007), which binds coindexed variables to the same argument as the open argument slot of its sister:

$$(10) \text{ } [\beta_i \mathbf{X}]^g = \cap [\lambda s . \cup [\mathbf{X}]^{g[i \rightarrow s]}(s)]$$

$$\text{a. de re: } \beta_2 \text{ Mary thinks } [\text{every } s_2 \text{ boy is outside}].$$

$$\text{b. de dicto: } \text{Mary thinks } \beta_2 [\text{every } s_2 \text{ boy is outside}].$$

When this variable is bound non-locally, the restrictive clause is interpreted at a non-local world/time, yielding the observed de re interpretations of strong DPs.

**Advantages** Percus’s concerns only arise because each of his predicates has a situation variable. My analysis explains both Percus’s facts and Musan’s by limiting such variables; but it retains one advantage of Percus’s system over Musan’s: the ability to bind situation variables. Beyond de re and de dicto, this binding also explains intermediate readings:

$$(11) \text{ Mary thinks her husband believes someone in this room has a crush on their daughter.}$$

(11) has a reading where *someone in this room* is in Mary’s belief worlds, but not in her husband’s or in the real world. This would be hard to capture under Musan’s proposal, which does not have explicit situation variables to be bound.

**Some References** Milark: 1974, *Existential Sentences in English*, MIT. Musan: 1997, *On the temporal interpretation of noun phrases*, Garland. Percus: 2000, Constraints on Some Other Variables in Syntax, *NLS* 8(3). Schueler: 2007, World Variable Binding and Beta-Binding, *NELS* 38.