

### Ling 325: Complements and modifiers.

So far, we've observed three types of denotations for nouns:

- individuals, e.g.,  $\llbracket \text{John} \rrbracket = \text{John}$ ;
- sets of individuals, e.g.,  $\llbracket \text{person} \rrbracket = \{x \mid x \text{ is a person}\}$ ; and
- sets of pairs of individuals, called *relations*, e.g.,  
 $\llbracket \text{description} \rrbracket = \{\langle x, y \rangle \mid x \text{ is a description of } y\}$ .

When a noun denotes a relation, we say that it is *transitive*.

A transitive noun must occur syntactically with a phrase that serves as its semantic argument. For example, in (1), *of Hans* serves as the semantic argument of *description*: it denotes the individual that is described.

- (1) Every description of Hans was interesting.

Every transitive noun, it seems, has an intransitive counterpart. For example, *description* occurs without an argument in (2):

- (2) Every description was interesting.

When intransitive, *description* denotes a set of individuals, i.e.,  $\llbracket \text{description} \rrbracket = \{x \mid x \text{ is a description}\}$ . We can distinguish the transitive and intransitive uses of *description* by positing two different lexical entries:

- (3)  $\llbracket \text{description}_1 \rrbracket = \{\langle x, y \rangle \mid x \text{ is a description of } y\}$  (transitive)  
(4)  $\llbracket \text{description}_2 \rrbracket = \{x \mid x \text{ is a description}\}$  (intransitive)

We also observed that there are two types of PPs that may occur inside an NP:

- (5) a. Every description [<sub>PP</sub> of Hans] [<sub>PP</sub> near Hans] was interesting.  
b. No governor [<sub>PP</sub> of California] [<sub>PP</sub> from Austria] called.

We looked at several pieces of evidence that these two types of PPs differ both semantically and syntactically. Some terminology: The first type of PP is called a *complement*, or *argument*. The second type of PP is called an *adjunct*, or *modifier*.

Semantically, complements and modifiers differ in that complements denote individuals, while modifiers denote sets. For example, *of Hans* denotes an individual, viz., Hans, while *near Hans* denotes a set, viz.,  $\{x \mid x \text{ is near Hans}\}$ .

Similarly, *of California* denotes an individual, viz., California, while *from Austria* denotes a set, viz.,  $\{x \mid x \text{ is from Austria}\}$ .

Syntactically, complements and modifiers differ in that they occur in different positions within a tree. Complements are sisters to N (the *head* of NP), while modifiers are sisters to N'. This is reflected in our syntactic rules for NP: the rule in (6) is for modifier PPs, while the rule in (7) is for complement PPs.

- (6)  $N' \rightarrow N' \text{ PP}$  (7)  $N' \rightarrow N \text{ (PP)}$ .

A few things follow from these two syntactic rules:

1. Ordering. Complements are closer to the head than modifiers, and as a result, must precede modifiers. This seems right:

- (8) a. \*Every description near Hans of Hans was interesting.  
b. \*No governor from Austria of California called.

This ordering restriction makes sense semantically as well: A complement PP combines with a transitive N to form a set of individuals (by our rule for transitives). For example,  $\llbracket \text{of Hans} \rrbracket$  combines with  $\llbracket \text{description}_2 \rrbracket$  to form the set  $\{x \mid x \text{ is a description of Hans}\}$ . This set may then intersect with  $\llbracket \text{near Hans} \rrbracket$ . We don't, however, have a way of first combining  $\llbracket \text{near Hans} \rrbracket$  with  $\llbracket \text{description}_2 \rrbracket$ , since the former is a set of individuals, and the latter is a set of ordered pairs.

2. Iterativity. Modifiers occur in a recursive rule, and thus can combine iteratively, or *stack*. Complements may not occur iteratively or stack.

- (9) \*The governor of California of New Hampshire.  
(10) The governor of California from Austria in Chicago with Maria near Michael.

This also follows from our semantics, since the transitive rule can apply only once (by virtue of its definition) while intersection may occur indefinitely.

3. Dependence. Finally, the presence of a complement PP depends on whether the head N is transitive, while the presence of a modifier PP does not. E.g., *student* is transitive, but *person* is not, so only the former may occur with the complement of *physics*; both, however, may occur with the modifier PP *in bed*:

- (11) every student of physics, \*every person of physics  
(12) every student in bed, every person in bed