

Vector-free semantics for locative PPs

A locative prepositional phrase, can be preceded by a measure expression (*five meters*) (1a) or by an adverbial (*diagonally*) (1b).

- (1) a. The eagle nest five meters under the top was empty.
- b. The store diagonally across the street ...

Assuming a syntactic analysis [five meters [under the top]], such constructions seem to defy a compositional semantics within the **relational** approaches which consider locative prepositions as relations between individuals, but also within **location-based** proposals which consider *under the top* to denote a region or a set of regions.

Zwarts (1997, 2003) and Winter (Zwarts & Winter 2000) proposed the **vector-based** approach where *under the top* denotes a set of vectors starting at the top; *five meters* denotes all vectors of a certain length; modification is considered as intersection. The proposal seems to solve the problem, but at the cost of a substantial extension to the ontology underlying the semantics. We will argue that we can get an equally good solution with a simpler ontology.

We will first consider some remaining problems for the vector-based approach. (i) Extra machinery is needed to relate the location of the target to the vectors denoted by the PP. (ii) Modification is not always simple intersection. (iii) Some occurrences are not according to the syntactic analysis: “2 pixels to the right and 2 pixels above the top-right corner”.

We will then consider how a solution can be reached within the relational approach and within the location-based approach if we assume, at least semantically, the structure [[five meters under] [the top]]. In the relational approach, *five meters* can be considered an operator mapping (the intension of) a relation to a new relation similarly to the Montagovian analysis of adjectives. In a location-based approach, a preposition like *under* can be taken to denote a relation between locations. The modifier *five meters* can also be considered a relation between locations, the locations that are five meters apart. Modification can then be taken to be intersection as in the vector-based approach.

We will discuss several possible syntactic analyses of such constructions and how these analyses together with assumptions about the syntax-semantics interface may produce the semantic grouping [[five meters under] [the top]].

Finally, we will compare the three approaches and relate this discussion to questions regarding what the task of formal semantics is and to which degree geometrical properties of space should be included in the compositional semantics of locatives. We will argue that the location-based approach achieves the same as the vector-based approach while it avoids some of the pitfalls. The choice between the relational and the location-based approaches depend on the purpose of the analysis.

References

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