

## Integrating the spatial semantics of verbs and prepositions during sentence processing

Psycholinguistic studies of semantic processing often focus on how semantics influences syntactic processing, but we know little about how comprehenders construct a componential semantic representation in real time. Several recent studies have addressed this question by examining enriched semantic composition, a process in which the meaning of a word is coerced to meet the semantic restrictions of other words in the sentence (e.g., McElree et al., 2001; Piñango et al., 1999). We built on that work by examining how spatial information from verbs and prepositions is integrated, enriched, and interpreted in real time. We focused specifically on how one source of spatial information, directionality, determines spatial interpretation.

In English, two main classes of locative PPs can be distinguished: PATH PPs, which provide directional meaning by specifying a path along which an event unfolds, and PLACE PPs, which simply specify a location. Similarly, motion VPs can either be directional, requiring a PATH to be specified, or non-directional, without that requirement. In a self-paced reading experiment, we examined how spatial information is integrated by manipulating VP and PP directionality.

### (1) Directional VPs:

- a. PATH PP: To protect her nest, the bird darted to the hunter just now.
- b. PLACE PP: To protect her nest, the bird darted at the hunter just now.

### (2) Non-directional VPs:

- a. PATH PP: Because he woke up early, the child wandered to the school last Tuesday.
- b. PLACE PP: Because he woke up early, the child wandered at the school last Tuesday.

Of particular interest is what happens when the spatial type of the PP and VP mismatch, as in 1b and 2a. For example, "at" is typically non-directional, specifying a PLACE. However, in the phrase "darted at," the VP is inherently directional and specifies a PATH. On one account, "darted" coerces the meaning of "at" into specifying a bounded path along which the agent traveled. An alternative is that "at" is ambiguous and can accommodate either interpretation easily.

We found significantly longer RTs at the preposition for both mismatch conditions. We ruled out a number of frequency-based explanations of our data leaving semantic coercion (e.g., Jackendoff, 1997; Pustejovsky, 1995) as the only explanation for the RT increase. The fact

that a mismatch in directionality causes semantic coercion suggests that in cases of mismatch directionality always wins, supporting the idea that directionality is built from simpler spatial representations.