Integrating the Spatial Semantics of Verbs and Prepositions during Sentence Processing

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Spatial Meaning in Language
- The spatial information in a clause is typically determined by the meaning of the verb plus locative expressions. In English, locatives are primarily PPs.
- Two main classes (e.g., Jackendoff, 1983): PATH PPs characterize a bounded path along which an event unfolds, as in (1), whereas PLACE PPs simply name the place or location that an event unfolds, as in (2).
1) John drove from Denver to L.A.
2) John exercised inside the house

This classification is not always clear, as PLACE PPs, such as inside in (2), can combine with directional motion verbs to give a PATH reading, as in (3).
3) Similarly, motion verbs can be either directional, requiring a specified PATH, or non-directional, without a PATH (i.e., the utterance “John stormed” needs a path and an object or a goal).

As with the flexibility in the locative interpretation, verb directionality can be determined by the preposition. In (4a), wandered combines with a PLACE PP for a non-directional reading, but in (4b) the PATH PP seems to force a directional reading.
4a) The boy wandered at school
4b) The boy wandered to school

The purpose of the current study is to contrast two possible accounts of how spatial information is integrated during online sentence processing.

Two Accounts of Integration

Ambiguity: Verbs and prepositions could be ambiguous, their core semantics including both PATH and PLACE interpretations. On this account, both meanings are initially active (e.g., Pustejovsky, 1995) is a likely mechanism, type-shifting one semantic representation to another.

Semantic Coercion: PATH meanings can be built from more simple PLACE ones (Jackendoff, 1983). Semantic coercion (e.g., Pustejovsky, 1995) is a likely mechanism, type-shifting one semantic representation to another. McElree et al. (2001) and others have shown this for eventive coercion: phrases like John began the book take longer to process than ones like John read the book, presumable because began needs an event as an argument.

Coercion would result in longer RTs at the preposition when the spatial information conflicts, because the non-directional/PLACE meaning would need to be coerced into a directional/PATH one.

Self-Paced Reading
- 20 participants, 24 items
- Two variables:
  - Verb type (directional vs. non-directional)
  - Preposition type (PLACE vs. PATH)

Sample Item

**DIRECTIONAL PREAMBLES**
+ PATH PP:
  To protect her nest, the bird 
  darted to
  the hunter just now.
+ PLACE PP:
  To protect her nest, the bird 
  darted at
  the hunter just now.

**NON-DIRECTIONAL PREAMBLES**
+ PATH PP:
  Because he woke up early, the child
  wandered to
  the school last Tuesday.
+ PLACE PP:
  Because he woke up early, the child
  wandered at
  the school last Tuesday.

Results
- At preposition, 2-way interaction: PATH Ps were faster in the directional condition and PLACE Ps were faster with non-directionals, supporting coercion account.

Alternative Accounts
- Possible that the RT effects at the preposition were due to frequency differences. We examined this issue with several different measures:
  - **Word frequency**: no differences between conditions (ps > .75 for Brown or Lund & Burgess, 1996)
  - **Verb + prep co-occurrence**: from Google, no correlation, r² = 0.0041
  - **RTs to preps in isolation**: No differences between conditions for naming or LDT (Bailota et al., 2002); Argues against ambiguity because ambiguous words have longer RTs (Borowsky & Masson, 1996)

In sum, neither simple or contingent frequencies account for the effects, neither do any of the factors that affect naming or lexical decision.

Conclusions
- Coercion is a likely mechanism for building spatial meaning, similar to the findings for eventive coercion (e.g., McElree et al., 2001), suggesting a broader role for coercion in semantic processing and integration.

References


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