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Do as I say, not as I do: A lexical distributional account of English locative verb class acquisition



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ABSTRACT

Children overgeneralise verbs to ungrammatical structures early in acquisition, but retreat from these overgeneralisations as they learn semantic verb classes. In a large corpus of English locative utterances (e.g., *the woman sprayed water onto the wall/wall with water*), we found structural biases which changed over development and which could explain overgeneralisation behaviour. Children and adults had similar verb classes and a correspondence analysis suggested that lexical distributional regularities in the adult input could help to explain the acquisition of these classes. A connectionist model provided an explicit account of how structural biases could be learned over development and how these biases could be reduced by learning verb classes from distributional regularities.

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1. Introduction

To learn a language, children must learn how to link verbs to abstract grammatical structures. For example, they must learn that the locative verb *fill* can occur in sentence structures such as *I filled the salt shaker with salt*. However, young children also overgeneralise verbs to structures in which they are ungrammatical (e.g., E(5;0) **Can I fill some salt into the bear* [bear-shaped salt shaker], Bowerman, 1982; see also Ambridge, Pine, & Rowland, 2012; Pinker, 1989). These overgeneralisations show that children understand something about verb meanings and sentence structures but have not fully

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learned the appropriate pairing of verbs and structures. Over time, children learn to constrain their choice of structure and begin to “retreat” from overgeneralisation (Ambridge, Pine, Rowland, Jones, & Clark, 2009; Pinker, 1989). This paper examines the nature of the mechanisms that support this retreat in the context of the acquisition of the English locative.

The English locative alternation consists of two structures: the location-theme structure (LT structure, e.g., *the woman sprayed the wall with water*), and the theme-location structure (TL structure, e.g., *the woman sprayed water onto the wall*). These structures provide alternative ways of conveying a meaning involving the thematic roles AGENT (e.g., *woman*), LOCATION (usually a surface or a location, e.g., *wall*) and THEME (usually a liquid or an object, e.g., *water*). The difference between the two structures arises from the mapping of roles to structural positions: the LT structure places the LOCATION noun in object position after the verb, followed by the THEME noun in a prepositional phrase, while the TL structure places the THEME noun in object position, followed by the LOCATION noun in a prepositional phrase.

Work on the locative alternation has been shaped by Pinker's (1989) broad/narrow range rule account of overgeneralisation and retreat. He argued that children's early understanding of how locative verbs map to these structures involves innate “broad range” linking rules (Gropen, Pinker, Hollander, & Goldberg, 1991a). On this account, the broad range rule for the locative alternation links the two possible construals of a locative action as in (1) and (2).

- (1) X causes Y to change state by means of moving Z to Y.
- (2) X causes Y to move into/onto Z.

In these construals, X encodes the animate entity which carries out the action, Y labels the most affected entity and Z labels the remaining entity. Children must learn that the English LT structure – which focuses on the LOCATION (Y) change of state – maps to construal (1) (e.g., *the man sprayed the wall with water*) and that the TL structure – which focuses on the motion of the THEME (Y) – maps to construal (2) (e.g., *the man sprayed the water onto the wall*). The fact that these construals are linked by innate linking rules in Pinker's theory explains why children generalise verbs heard in one structure to the other structure early in development (Gropen, Pinker, Hollander, Goldberg, & Wilson, 1989), producing overgeneralisation errors in which children use verbs in structures that are not licensed by the adult language. For example, **I'm going to cover a screen over me* (E(4;5); Bowerman, 1982) is ungrammatical in adult speech, and results from the overgeneralisation of an LT-biased verb into the TL structure.

As they become more experienced language users, children learn to constrain such errors. Pinker (1989) links this retreat from overgeneralisation to the acquisition of “narrow range” rules, which link semantic verb classes (derived from classes developed by Levin, 1985, 1993) to particular structures. For example, *cover* and *coat* both refer to an action where a LOCATION is obscured by a THEME. Verbs in this class appear only in the LT structure (e.g. *the woman coated the car with paint* vs. **the woman coated paint onto the car*). Other verbs like *pour* and *spill* involve actions where the THEME is a liquid that flows into some LOCATION in a certain manner. Verbs in this class appear only in the TL structure (e.g., *the woman spilled water onto the floor* vs. **the woman spilled the floor with water*). Finally, other verbs like *spray* and *squirt* involve actions where the THEME is a liquid which both moves in a certain manner and affects the LOCATION in a certain way. Verbs in these “alternating” classes can appear in either structure (e.g., *the woman sprayed the wall with water*; *the woman sprayed water onto the wall*). As narrow range rules specify the correct structural properties of these verbs, their acquisition supports the retreat from overgeneralisation and the development of adult-like verb-structure mappings.

Pinker's theory introduced the idea that different kinds of semantics explain changes in the locative alternation across development, and specifically that the retreat from overgeneralisation involves the acquisition of semantic verb classes. In this paper, we contrast two accounts of how these verb classes are acquired, which we call *situational* and *distributional* accounts. The following paragraphs describe the nature of the semantics assumed by each account, and the different cues that signal syntactic distinctions. Because we define the problem of learning the locative alternation in different semantic and syntactic terms from previous theories of language acquisition, we conclude this introduction with a discussion of how our account relates to these existing theories.

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