

The Role of Parent Gesture in Children's Spatial Language Development

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Recent research shows that the spatial language parents use when talking to their children predicts their child's spatial language development (Pruden & Levine, in preparation). But parent spatial talk does not fully account for child spatial language. This study investigates whether the gestures parents produce along with spatial language have added value in predicting children's acquisition of spatial language, over and above spatial language alone.

There are several reasons to expect that this may be the case. First, with respect to language acquisition in general, children are sensitive to the gestures of others in both conversational and pedagogical situations (Goldin-Meadow, 2003). At home, parents' gestures predict children's gestures and, in turn, their vocabulary size (Rowe & Goldin-Meadow, 2009). In instructional situations, children learn more from spoken instruction if it is accompanied by gesture than if it is not (Church, Ayman-Nolley, & Mahootian, 2004; Valenzeno, Alibali, & Klatzky, 2003). Moreover, children can learn from gesture even when it conveys information that is not conveyed in speech (Singer & Goldin-Meadow, 2005). Second, gesture may be particularly good at conveying spatial information as it itself is highly spatial and thus has the potential to highlight and enhance the spatial information encoded in speech. That is, gesture may be particularly well suited to helping the child acquire spatial language because, unlike language, it easily captures the continuous nature of spatial information. For example, when talking about a "tall building," it is possible to provide cues to the meaning of the word "tall" by producing an over-the-head gesture, or by pointing to the top of the building. Finally, parents routinely produce gestures along with their spatial talk, providing children with the opportunity to learn from gesture (Levine, Ratliff, Huttenlocher, & Cannon, under review).

Using data from 52 parent-child dyads, we examined parent spatial talk, and the gestures that accompanied this talk, produced during naturalistic interactions at home recorded at 8 time points from 14-42 months of age. We focused our analysis on deictic and iconic gestures as they had the greatest potential to represent space or indicate spatial features of the environment. We also examined the child's use of spatial language during these interactions. For both parents and children, we focused on three categories of spatial talk: dimensional adjectives (e.g., *big*, *little*, *tall*, *short*), shape terms (e.g., *circle*, *square*), and spatial features (e.g., *straight*, *curved*, *bent*, *flat*). We addressed two specific

questions: (1) Do parents differ in the amount of gesture used during spatial language? (2) If so, do differences in how often parents use spatial language with gesture, compared to how often they use it without gesture, provide added value in predicting children's spatial language production?

Parents varied widely in how often they produced gestures along with their spatial utterances. On average, parents gestured with 16% of their spatial utterances, but some parents never gestured and one gestured 44% of the time. Using a multiple linear regression, we found that the number of spatial utterances parents produce accompanied by gesture significantly predicted children's spatial word types, controlling for parent spatial utterances without gesture and parent non-spatial utterances ($\beta = .65, p < .01$).

Using a multiple linear regression analysis, we found that parent spatial utterances with gesture, parent spatial utterances without gesture, and parent non-spatial utterances as predictors of children's spatial types. Model 1 showed that the total number of parent spatial utterances that were accompanied by gesture significantly predicted children's spatial types from 14 to 42 months and accounted for over 34% of the variance in children's spatial types ($\beta = .60, p < .001$). Models 2 and 3 show that parent spatial utterances with gesture remained a significant predictor of child spatial types even after we controlled for parent spatial utterances without gesture and parent non-spatial utterances.

Gesture may be even more helpful in the context of spatial words than in other contexts. Unlike spoken language, gesture is well suited to capturing the continuous information of the spatial world. For example, gesture has the potential to play a targeted role in the acquisition of spatial language by illustrating the spatial notions reflected in speech—producing a curved gesture while saying that the puzzle piece is *curved* could help the child figure out what the word *curved* means.

Our findings demonstrate that parent gesture produced in the context of spatial talk is related to children's spatial language. However, this relationship is correlational: the findings do not show that parent gesture produced along with spatial talk plays a causal role in fostering child spatial language. Our current research attempts to explore the causal role between these variables by manipulating the type of input children receive in a spatial context—puzzle play—to better identify the respective contributions of spatial language and gesture in children's acquisition of spatial language.