

Seen and Unseen: Differences in the Saliency of Topological and Projective Spatial Relations

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Marked differences amongst spatial relations have been shown both in early language development and in adult language use. For example, Johnston & Slobin (1979) found that young children begin to produce words referring to topological spatial relations (e.g., *in*, *on*) at an earlier age than words for projective spatial relations (e.g., *back*, *front*). Indeed, infants can form topological spatial categories quite young, with containment categories formed at a younger age than support categories (Casasola, 2005; Casasola, Cohen, & Chiarello, 2003). These differences are echoed in adult speakers' uses of spatial relational terms (cf., Breaux & Feist, 2010) and in their frequency: a search of the Corpus of Contemporary American English (Davies, 2008-) shows that *in* (8,384,034) is more frequent than *on* (3,144,996), which is in turn more frequent than the projective terms *left* (204,719), *right* (506,682), *front* (108,203), and *back* (569,622).

Why are there such marked differences amongst spatial relations? We pursue one possibility: that they reflect differences in salience between topological and projective relations. Concretely, we ask: when speakers communicate about a scene, (1) are they more likely to describe relations when viewing topological images as compared to projective images and (2) are they more likely to name the target relation when describing *in* images as compared to *on* images as compared to projective images?

We showed English speakers 64 photographs of simple two-object configurations that were equally divided into four target relations: *in*, *on*, *left-right*, and *front-back*. Participants described each image "in as few words as possible," and there was no mention of spatial relations in the instructions. Results showed that speakers mentioned relations more frequently when the pictures depicted topological relations ($M = .89$) than when they depicted projective relations ($M = .24$), $F(1, 56) = 740.23$, $p < .001$. Furthermore, relations were mentioned most frequently for pictures depicting *in* relations ($M = .94$), followed by those depicting *on* relations ($M = .83$), followed by *left-right* relations ($M = .28$), and least frequently for pictures depicting *front-back* relations ($M = .20$), $F(1, 56) = 731.61$, $p < .001$. To determine whether the target relations *per se* were encoded, we calculated the proportion of participants' descriptions containing a lexical item associated with the target relation for each spatial relation type. Similar to the previous analysis, we found a linear trend such that *in* relations ($M = .91$) were named most frequently, followed by *on* relations ($M = .79$), *left-right* relations ($M = .25$), and *front-back* relations ($M = .01$), $F(1, 56) = 1000.13$, $p < .001$.

The patterns found across both measures echo findings from language acquisition regarding the development of spatial and linguistic categories and findings from adult language production regarding use and frequency. We argue that the convergence of these factors suggests an account in which people find topological relations to be more salient than projective ones and containment relations to be more salient than support relations.

Keywords: spatial language; spatial relations; experimental methods; lexical semantics; salience

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