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Abstract: 58

Main text: 998

References: 515

Entire text: 1649

Why space is not one-dimensional: Location may be categorical *and* imagistic

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Abstract (60 words)

In our commentary, we raise concerns with the idea that location should be considered a gestural component of sign languages. We argue that psycholinguistic studies provide evidence for location as a "categorical" element of signs. More generally, we propose that the use of space in sign languages comes in many flavours and may be both categorical *and* imagistic.

Main text (1000 words)

In their target article, Goldin-Meadow and Brentari (2015) discuss several observations suggesting that the use of space is imagistic and may not form part of the categorical properties of sign languages. Specifically, they point out that 1) the number of locations toward which agreeing verbs can be directed is not part of a discrete set, 2) event descriptions by users of different sign languages and hearing non-signers exhibit marked similarities in the use of space, and 3) location as a phonological parameter is not categorically perceived by native signers. It should be noted that the authors acknowledge that categorical properties of location and movement may simply not have been captured yet because the proper investigative tools are not yet readily available.

Here, we argue that there already is compelling evidence from psycholinguistic studies demonstrating that the location parameter of lexical signs, like handshape, plays an important role in lexical processing and therefore should not be considered a gestural element of signs. For example, Carreiras, Gutiérrez-Sigut, Baquero and Corina (2008) showed that pairs of signs that share the same place of articulation yielded inhibition effects in a phonological priming experiment (see also Corina & Emmorey, 1993; Corina & Hildebrandt, 2002). Critically, inhibition was only observed for signs and not for non-signs, suggesting that the inhibition effects were driven by *lexical* competition processes, similar to what has been found for spoken and visual word recognition (for related electrophysiological evidence, see Gutiérrez, Müller, Baus, & Carreiras, 2012). Thus, location seems to play an important role in the activation and subsequent selection of lexical representations in the mental sign lexicon, whereby signs that are less familiar and that reside in larger phonological neighborhoods are more sensitive to lexical competition effects.

Moreover, although the findings are slightly more mixed, the location parameter in signs not only impacts sign recognition, but also production processes. For example, using the sign-picture interference paradigm, Baus, Gutiérrez-Sigut, Quer, and Carreiras (2008) found inhibition effects for distractor signs that shared the same location as the target sign, whereas Baus, Gutiérrez-Sigut, and Carreiras (2014) found facilitation effects for distractor signs that shared both location and movement (cf. Corina & Knapp, 2006), and argued that the combination of these two phonological parameters form an important functional unit in lexical access in sign production.

More generally, these psycholinguistic studies provide clear evidence that location forms an important component of the phonological-lexical organization of sign-based forms in the mental lexicon (further support, for example, comes from studies of 'slips of the hands' and 'tip of the fingers' experiences, e.g., Thompson, Emmorey, and Gollan (2005) and Vinson et al. (2010)). The empirical finding that this parameter is not categorically perceived by signers may be analogous to the situation for vowels in spoken languages, which are more continuously represented and are not categorically perceived to the same degree as consonants (e.g., Fry, Abramson, Eimas, & Liberman, 1962; Stevens, Liberman, Studdert-Kennedy, & Ohman, 1969), but are not considered a gestural component of spoken languages. Furthermore, even dynamic handshape contrasts appear to be less categorically perceived than consonant *or* vowel contrasts (see e.g., Best, Mathur, Miranda, & Lillo-Martin, 2010, for discussion), suggesting that categorical perception paradigms have limited applicability in the study of sign perception.

We thus strongly believe that there is abundant evidence from psycholinguistic studies that location forms an integral part of the lexical organization of signs. At the same time, however, we would like to warn against viewing all uses of space in sign languages through the same lens. Location as a phonological parameter of signs is both conceptually and empirically different from the use of space beyond the lexicon. For example, the use of referential locations in signing space or of classifier constructions may be either categorical (as the expression of linguistic features) or imagistic (in the form of isomorphic mappings). More importantly, both types of spatial exploitation frequently co-occur and we need to work towards a better understanding of how categorical and imagistic uses of space interact. Both the pronominal system and verbal

agreement rely upon the association between a referent and a location in the signing space. Fundamentally, this association is an expression of referential identity that may be best captured in terms of features (Kuhn, 2015; Costello, 2016). Additionally, space may be divided to encode semantic notions, such as specificity (Barberà, 2014). This categorical use of locations in space does not exclude less categorical uses of space, such as the use of metaphoric schemes ("high is powerful, low is weak") or discursive functions such as contrast (Engberg-Pedersen, 1993), or even clearly imagistic uses of space, evidenced by the isomorphic mappings of spatial descriptions and classifier constructions. The fact that these different uses of space can occur simultaneously, as in Liddell's (2000) notorious examples of the type "I asked a (tall) man" (in which the location associated with the referent is visually motivated by the referent's height), does not detract from the fact that some uses of space are indeed categorical.

These observations lead us to believe that there is a more general conceptual problem with the distinction between categorical and imagistic (i.e., gestural) components of language that the authors posit in the target article. In particular, we question its underlying assumptions that each element of an utterance can be clearly categorized as belong to either of these two categories, and that the linguistic functions of categorical and gestural elements in signed construction can always be clearly separated. In conclusion, we therefore advocate that the distinction between categorical and gestural uses of space in sign languages itself should not be perceived categorically. Instead, spatial exploitation by sign languages is better captured by a continuum between linguistic structures with more categorical-like properties on one end (e.g., location as a phonological parameter) and more imagistic-like properties on the other end (e.g., classifier constructions in event descriptions). In between, there are many structures

with both types of properties but without a clear boundary between them (e.g.,

referential locations in verb agreement).

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