

Gestures evoke large, but not small, plural set sizes

Madeline M. Nicol and Nikole D. Patson (Ohio State University)

Patson.3@osu.edu

When plurals are introduced into the discourse, a number of information gaps exist. For example, when a speaker utters the sentence, *There are flowers on the table*, it is unclear how many flowers exist and how those flowers might be spatially distributed on the table (e.g., bunched vs. scattered; Patson, 2014). Given that comprehenders often create detailed conceptual representations of linguistic content (e.g., Zwaan et al., 2002), comprehenders may incorporate other sources of information, such as gestures, into their representations to fill those gaps. Representational gestures have been shown to influence listeners' comprehension, especially when those gestures convey abstract and spatial information (Hostetter, 2011). Because plural representations are abstract and include spatial dimensions, gestures may influence them.

The current study focuses on the paucal (i.e., a few) versus non-paucal (i.e., a lot) distinction of the plural. Although referent size can be conveyed via gesture (Beattie & Shovelton, 2006), it is unknown whether plural set sizes are similarly evoked via gesture. If gestures evoke plural set size similarly to singular referent size, small gestures may evoke paucal representations of the plural while large gestures may evoke non-paucal representations of the plural (*spatial information hypothesis*).

However, an alternative hypothesis comes from evidence that there are separate number systems for dealing with small versus large numbers (Dehaene, 1997). Evidence suggests that during language comprehension non-paucals are represented more abstractly than paucals, perhaps because paucals are processed via the precise number system while non-paucals are processed by the approximate number system (Patson, 2016). Because gestures are more informative for abstract information, they may be more likely to evoke non-paucal readings than paucal readings (*separate number systems hypothesis*).

Method. 40 participants viewed videos of a speaker uttering sentences like "These cupcakes are for the party" while performing either a large or small gesture on the plural. The videos were rated as equally natural by 20 participants who did not participate in the current study. After watching the video, participants saw two pictures, which depicted either a small or large number of objects described in the sentence (e.g., cupcakes). Participants' task was to select the picture that best represented the speaker's intended meaning. There were a total of 52 items, counter-balanced across two lists. All participants saw the same 52 fillers.

Predictions. Under the *spatial information hypothesis*, comprehenders should prefer small pictures after small gestures and large pictures after large gestures. Under the *separate number systems hypothesis*, comprehenders should show no picture preference after small gestures, and prefer large pictures after large gestures.

Results. The proportion of trials in which participants chose the picture consistent with the size of the gesture was computed. A logit regression confirmed that the large gesture led to more large picture selections ($M=0.61$) and the small gesture did not impact picture preference ($M=0.49$, $p < .05$).

Discussion. These results are consistent with the *separate number systems hypothesis* and suggest that gestures performed during the processing of plurals can evoke non-paucal sets, but not paucal sets. These data are consistent with work in language processing showing that large set sizes are conceptually more abstract than small set sizes and work on number processing showing that small and large numbers are processed via different systems.

References. Beattie & Shovelton. (2006). Gesture. Degen & Tanenhaus (2016). Cog. Sci. Dehaene. (1997). *The Number Sense*. Hostetter (2011). Psych Bulletin. Patson (2014). Lang. & Ling. Compass. Patson (2016). JEP:LMC Zwaan, Stanfield, & Yaxley. (2002). Psych Sci.