

## What can silent gestures reveal about word order?

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Some researchers have investigated the origin of word order preferences (such as Subject Object Verb/SOV) by using a “silent gesture” paradigm in which participants naïve to sign language invent gestures to communicate about events displayed on a screen (e.g., Gibson et al., 2013; Goldin-Meadow et al., 2008). The underlying logic is that the gestures could reveal inherent biases in the order in which people convey information, uncontaminated by their native language, and many studies suggest that an SOV order is basic. We investigate two related caveats. First, this view assumes that gesturers aim to convey language-like constituents such as S, O, and V. An alternative hypothesis is that gesturers maximize iconicity in their gestures, because iconicity is essential in the absence of shared reference (words; Goldin-Meadow et al., 1996). If so, gesturers should prefer highly iconic gestures even at a cost to establishing individual constituents. Second, if gesture sequences are to be informative about word order, the gesture signal unfolding over time must yield identifiable distinct constituents. These two points are related because a gesturer aiming for iconic depiction may create holistic gestures in which information fully overlaps in time. An example is in **Figure 1**, where a gesturer describes a football-throwing scene: The agent (the gesturer) the action (the arm motion) and the football (hand shape) are all co-present. Segmenting the gesturer’s behavior into distinct S, V, and O constituents is not straightforward, and when distinct gestures are identified, their order may stem more from the needs of iconic communication than from underlying word biases.

**Method.** We designed pairs of still cartoon scenes to elicit silent gestures, plus a detailed coding scheme to identify segmentable and holistic gestures. *Action scenes* depicted a characteristic action with an object (**Fig 1**), and *hold scenes* showed the agent simply holding the object (**Fig 2**). We hypothesized 1) that gesturers would use holistic gestures, leading to unsegmentable strings, and 2) gesturers will use the highly iconic holistic action gestures (Fig 1) to depict action scenes *and* inaction scenes, which are less depictable because they contain no object-characteristic action. However, if gesturers aim to convey words in SOV (or other) order 1) they should produce segmentable gestures for S, O (e.g. tracing a football shape) and V (e.g. holding) and 2) hold gestures should be more common than action gestures in hold scenes.

Undergraduates (n=20) produced gesture strings for 10 action and 10 hold scenes (random order, counterbalanced), yielding 396 gestured descriptions (4 non-attempts discarded). Blind coders (inter-coder reliability = 92%) assigned gestures to 28 gesture categories, covering individual constituents (S, V, O), multi-constituent (V+O, S+V+O, etc.) and *hold vs throw* holistic gestures. We counted the number of gesture segments per description, constituents per gesture, and hold vs throw gestures in each scene type. A subset of the data is presented here.

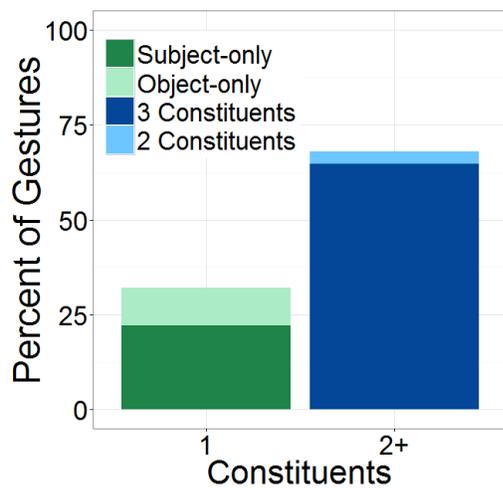
Descriptions contain a mean of 2.22 (se=.20) gesture segments, showing that some gestures can be segmented. However, of single-constituent gestures, O and V gestures were rare, and gestures with 2+ constituents were very common (**Figure 3**). Whereas S gestures were frequently segmentable, these data offer no support for segmentable O/V order in this paradigm, in contrast to claims in the prior literature. One reason for the discrepancy may be that our coding scheme aimed to avoid the comprehension biases similar to those that Hall et al. (2015) identified in assigning constituents to silent gestures.

Supporting Prediction 2, **Figure 4** shows that while both hold and action gestures are used in hold scenes, the action gestures are more common. Iconicity is central in this paradigm, to the point that gesturers resort to conveying non-occurring actions (such as football-throwing) to describe a scene. This allegiance to iconicity, in contrast to its relatively minor role in language, suggests that the silent gesture paradigm may be useful for investigating communicative pressure in language evolution. However, this same iconicity casts doubt on the claim that the silent gesture paradigm is revealing about natural language word order.

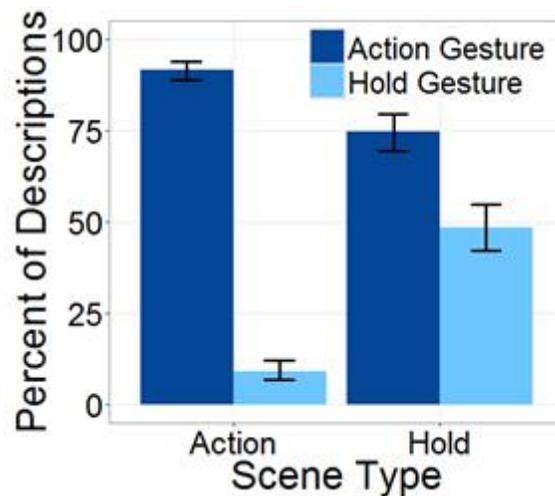


**Fig. 1.** characteristic action scene and holistic action gesture

**Fig. 2.** Hold scene and holistic hold gesture.



**Fig. 3.** Percent of gestures by number of constituents (S, V, etc.) contained in the gesture.



**Fig 4.** Percent of descriptions containing action gesture (as in Fig 1) and hold gesture (as in Fig 2) for each scene type.

### References

- Gibson, E., et al. (2013). A Noisy-Channel Account of Crosslinguistic Word-Order Variation. *Psychol. Sci.* 24, 1079–1088.
- Goldin-Meadow, S., McNeill, D., & Singleton, J. (1996). Silence is liberating: removing the handcuffs on grammatical expression in the manual modality. *Psychol. Rev.* 103, 34.
- Goldin-Meadow, S., et al. (2008). The natural order of events: How speakers of different languages represent events nonverbally. *Proc. Natl. Acad. Sci.* 105, 9163–9168.
- Hall, M.L., et al. (2015). Production and comprehension show divergent constituent order preferences: Evidence from elicited pantomime. *J. Mem. Lang.* 81, 16–33.