Conceptualizing gesture form: Introducing a set of gesture form principles tested through 3D motion capture data analyses

Julius Hassemer, Matthias Priesters, & Irene Mittelberg
RWTH Aachen University

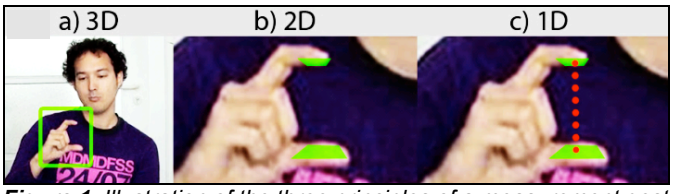
Assuming that co-speech gesture is an integral part of language (McNeill 1985, Kendon 2004), this paper proposes a set of 'gesture form principles' underlying iconic gestures. In Gesture Studies, hands are often described in terms of parameters such as location, configuration, and motion (Stokoe 2005). The present approach understands these physical parameters pertaining to the hands – held still or in motion – as 'articulator form'. By contrast, 'gesture form' also involves the conceptualization of articulator form.

One of our basic assumptions is that the variety of gestures that might be called iconic is not conceptualized uniformly (Streeck 2008:287), but relies on different cognitive and semiotic strategies, (Mandel 1977; Mittelberg & Waugh 2009; Müller 1998; Streeck 2008).

Here, such strategies are broken down into a set of specific cognitive principles that operate on a given articulator form. For instance, if a speaker holds his right hand up in his central gesture space, index and thumb held parallel to each other with the remaining fingers curled in (Figure 1), gesture form results from the operation of the following three gesture form principles (Hassemer et al. 2011):

a) *Articulator Profiling*: profiling index finger and thumb as the active articulators, a 3D portion of the 3D body.
b) *Shape Profiling*: profiling one form aspect of the 3D articulator (here, the inner 2D surface of index and thumb).
c) *Enclosure*: partially enclosing an imagined object, conveying one axis of its size.

To investigate how these principles are involved in building gesture form, 27 participants were recorded describing nine differently shaped physical objects. Immediately afterwards, they were shown a mute video of their own gestures and were asked to report the type of curvature conveyed by their hands.
This paper focuses on analyses of two groups of recurring iconic gestures, in which index and thumb are profiled in different ways (Figure 1 and 2, Sowa 2006:199). They are similar in articulator form, but are conceptualized as markedly distinct gesture forms and hence fulfill distinct functions: measuring the distance between the two finger pads (Figure 1) versus enclosing a round shape with the entire index and thumb (Figure 2).



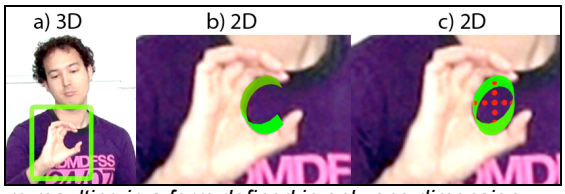


***Figure 1**: Illustration of the three principles of a measurement gesture resulting in a form defined in only one dimension.*
***Figure 2**: Illustration of the three principles of a shape gesture resulting in a form defined in two dimensions.*

The study tested whether these two kinds of iconic gestures can be distinguished systematically on the ground of participant reports and motion capture angle and curvature measurements, as qualitative analyses and non-representative quantitative results suggest. The overall goal of this approach is to establish a flexible typology of gesture form that spans all kinds of gestures.

References

Hassemer, J., G. Joue, K. Willmes, & I.Mittelberg (2011). Dimensions and mechanisms of form constitution: Towards a formal description of gestures. *Proceedings of 2nd Conference of Gesture and Speech in Interaction, GESPIN 2011*. September 5-7, Bielefeld.

Kendon, A. (2004). *Gesture: Visible Action as Utterance.* Cambridge: Cambridge University Press.

Mandel, M. A. (1977). Iconic devices in American Sign Language. In L. A. Friedman (Ed.), *On the other hand: New perspectives on American Sign Language* (pp. 57–107). New York: Academic Press.

McNeill, D. (1985). So you think gestures are nonverbal? *Psychological Review, 92*(3), 350–371.

Mittelberg, I., & Waugh, L. R. (2009). Metonymy first, metaphor second: A cognitive-semiotic approach to multimodal figures of thought in co-speech gesture. In E. Forceville, C., Urios-Aparisi (Eds.), *Multimodal Metaphor* (pp. 329–356). Berlin/New York: Mouton de Gruyter.

Müller, C. (1998). *Redebegleitende Gesten. Kulturgeschichte – Theorie – Sprachvergleich*. Berlin: Arno Spitz.

Sowa, T. (2006). *Understanding Coverbal Iconic Gestures in Shape Descriptions*. Ph.D. Dissertation, Universität Bielefeld.

Stokoe, W. C. (2005). Sign language structure: an outline of the visual communication systems of the American deaf. *Journal of Deaf Studies and Deaf Education*, 10(1), 3-37.

Streeck, J. (2008). Depicting by gesture. *Gesture, 8*(3), 285-301.