Submission for part of ISGS 2016 panel: Gesture Gesture: Tracking gestures across retellings

Using different gesture rate metrics when studying gesture production in repeated references.

Marieke Hoetjes, Emiel Krahmer, Marc Swerts
Tilburg University.

Repeated references are often reduced, both acoustically (Bard, et al., 2000) and lexically (Clark & Wilkes-Gibbs, 1986). Some studies have found that gesture rate in repeated references can also be reduced (Galati & Brennan, 2014; So, Kita, & Goldin-Meadow, 2009), although other studies did not support this finding (de Ruiter, Bangerter, & Dings, 2012), or found an increase in gesture rate (Holler, Tutton, & Wilkin, 2011). These different findings with regard to gesture production may at first sight seem contradictory, but could be caused by differences between studies in experimental setup and gesture rate metrics.

Gesture rate metrics generally relate gesture to speech, for example by relating the number of gestures to the number of words. However, one could also relate the number of gestures to the number of semantic attributes in speech. Practically, it takes more time and effort to analyse semantic attributes than to count the number of words. Theoretically, which metric to use may also depend on whether the researcher considers speech and gesture to be related at the word level, or at the semantic level of the speech production model.

In new analyses of data collected by Hoetjes, et al. (2015), and Hoetjes, Krahmer and Swerts (2015), we compared two different gesture rate metrics in contexts in which repeated references were either successful or not. We compared gesture rate across repeated references in number of gestures per 100 words with the number of gestures per semantic attribute. Participants had to repeatedly describe objects to a listener, either because an object happened to reoccur in the course of the experiment (successful communication), or because the listener could not identify the correct object (unsuccessful communication).

When communication was successful, the number of gestures per 100 words stayed the same across repeated references. That is, we found reduction in repeated references to the same extent for the number of words and the number of gestures. For the number of gestures per attribute there was a lower rate in second references than in initial and third references, caused by an increase in number of attributes in second references. When communication was not successful, the number of gestures per 100 words increased in repeated references, due to reduction in number of words, but not in number of gestures. There was also an increase in repeated references in number of gestures per attribute, caused by a reduction in number of attributes, but not in number of gestures.

The results show that it can be informative to study both types of gesture rate, since these suggest that in repeated references, the communicative context may influence not only the relationship between words and semantic attributes, but also between speech and gesture.

References

Bard, E. G., Anderson, A. H., Sotillo, C., Aylett, M., Doherty-Sneddon, G., & Newlands, A. (2000). Controlling the intelligibility of referring expressions in dialogue. *Journal of Memory and Language, 42*, 1-22.

Clark, H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. *Cognition, 22*, 1-39.

de Ruiter, J. P., Bangerter, A., & Dings, P. (2012). The interplay between gesture and speech in the production of referring expressions: Investigating the trade-off hypothesis. *Topics in Cognitive Science, 4*(2), 232–248.

Galati, A., & Brennan, S. (2014). Speakers adapt gestures to addressees' knowledge: implications for models of co-speech gesture. *Language, Cognition and Neuroscience, 29*(4), 435-451.

Hoetjes, M., Koolen, R., Goudbeek, M., Krahmer, E., & Swerts, M. (2015). Reduction in gesture during the production of repeated references. *Journal of Memory and Language, 79-80*, 1-17.

Hoetjes, M., Krahmer, E., & Swerts, M. (2015). On what happens in gesture when communication is unsuccessful. *Speech Communication, 72*, 160-175.

Holler, J., Tutton, M., & Wilkin, K. (2011). Co-speech gestures in the process of meaning coordination *Proceedings of the 2nd GESPIN - Gesture & Speech in Interaction Conference*. Bielefeld.

So, W. C., Kita, S., & Goldin-Meadow, S. (2009). Using the hands to identify who does what to whom: gesture and speech go hand-in-hand. *Cognitive Science, 33*, 115-125.