Multimodal Corpus-based Investigations of the Gesture-Speech Relationship

Yaoyao Chen and Svenja Adolphs (School of English, University of Nottingham, UK)

The meaning-making processes in human interactions are inherently multimodal and are usually mediated by more than one mode of communication (Adolphs & Carter, 2013; Knight, 2011; Seedhouse & Knight, 2016). Whereas enquiries of the speech mode, usually based on textual transcripts of utterances with a varying degree of granularity, are already a well-established strand of research in Corpus Linguistics (CL), multimodal corpus-based examination and understanding of other modes such as prosodic features and bodily movements (e.g. postures, facial expressions, head and hand-and-arm movements etc.) still remain underexplored.

Despite the affordances provided by tools and software for textual annotation, exploration and description, these methods are mostly unsuited for the detection and description of non-verbal behaviours. While multimodal alignment and annotation tools such as *ELAN* (Wittenburg, Brugman, Russel, Klassmann, & Sloetjes, 2006) have proven to be invaluable to Gesture Studies, (semi-)automatic and fine-grained gesture demarcation and pattern detection technologies are still largely unavailable. To enhance the efficiency and robustness of multimodal linguistic research, the issue of how to integrate existing mainstream corpus techniques into multimodal analysis of human communication becomes vital.

To address the theoretical and methodological issues mentioned above, the current paper will focus on demonstrating approaches and findings of a systematic multimodal corpus-based study of a recurrent group of gestures i.e. circular gestures (CGs) in relation to the speech that co-occurs with them. Expanding the recently proposed concept of 'cyclic gestures' (Ladewig, 2014; Ladewig & Bressem, 2013), the Circular Gesture (CG) refers to any continuous hand-and-arm movements that depict circles.

The relationship between CGs and speech is being examined from three aspects, i.e. temporal alignment, speech patterns and cognitive motivations. The research draws on a sub-corpus of the Nottingham Multimodal Corpus (NMMC), a collection of 8 videos (about 8 hours) of real-life postgraduate supervision meetings. In total, 570 instances of CGs have been identified and annotated in Elan. To enable and facilitate the investigation of speech patterns, all of the speech components aligned with the CGs were annotated with "CG# #", with the speech located in-between the hashtags. Using CG as a search item, all of the textual instances are then ready to be automatically searched, sorted and analysed in any corpus tool. We will demonstrate this using AntConc (http://www.laurenceanthony.net/).

Based on the Concordance list generated in AntConc, the temporal analysis between the CGs and the speech reveals that the CGs tend co-occur with multiple lexical items and distinct patterning. Searching for the most frequently occurring clusters to the left of the node "CG" for example

foregrounds a large number of instances of speech with short pauses in the middle of dysfluent utterances.

With the assistance of the alphabetically formatted concordance of the speech parts that co-occur with the CGs, the semantic and grammatical variations can be described and analysed qualitatively and quantitatively. The current paper will concentrate on the category with the largest number of instances, all of which seem to be associated with the contexts where the meaning of continuity, progress and progression of time, events, actions and thinking is indicated. This finding is consistent with research on German (Ladewig, 2011, 2014) and French corpora (Calbris, 2011), which points to the universal meaning of CGs across languages.

In terms of the cognitive motivation underlying such a gesture-speech association, we can refer to the metaphoric image schema that MIND IS A MACHINE, THINKING IS A PROCESS IN A MACHINE, and TIME IS MOTION THROUGH SPACE (Ladewig, 2011; Lakoff & Johnson, 2008). The cognitive motivation embedded in this image schema is most likely entrenched throughout repetitious real-life experiences of the physical body in prevailing phenomena such as the continuous rotation of the wheels and machines, and the constant rising and falling of the sun, etc.

Whereas the previous studies have limited their description of the functions of CGs to semantics (e.g. expressing the meaning of on-going process), cognition (e.g. retrieving words during dysfluent speech) and pragmatics (e.g. encouraging the interlocutor to take the floor), the current paper proposes a description that focuses on CGs' multiple discourse functions. These include contributions to meaning-making, segmenting utterances, emphasising noteworthy information, maintaining coherence and cohesion and enhancing inter-subjectivity.

The paper demonstrates how the combined application of multimodal annotation tools and existing corpus software can significantly enhance the efficiency and reliability of multimodal investigations of emerging patterns of gesture-speech relationships. In addition, we show how corpus technologies can be further developed in order to contribute more fully to the examination and understanding of multimodal interactions in a wide range of communicative contexts.

References

Adolphs, S., & Carter, R. (2013). *Spoken Corpus Linguistics: From Monomodal to Multimodal*. London: Routledge.

Calbris, G. (2011). *Elements of Meaning in Gesture*. Amsterdam: John Benjamins Publishing Company.

Knight, D. (2011). *Multimodality and Active Listenership: A Corpus Approach*. London: Bloomsbury.

Ladewig, S. H. (2011). Putting the cyclic gesture on a cognitive basis. *CogniTextes 6*.

Ladewig, S. H., & Bressem, J. (2013). New insights into the medium hand: Discovering recurrent structures in gestures. *Semiotica, 2013*(197), 203-231.

Ladewig. S. H. (2014). The cyclic gesture. in C. Müller, A. Cienki, E. Fricke, S. Ladewig, D. McNeil, and J. Bressem (Eds.): *Body–Language–Communication. Volume 2: An International Handbook on Multimodality in Human Interaction* (pp. 1605-1618). Berlin: De Gruyter.

Lakoff, G., & Johnson, M. (2008). *Metaphors We Live By*. Chicago: University of Chicago press.

Seedhouse, P., & Knight, D. (2016). Applying digital sensor technology: A problem-solving approach. *Applied linguistics, 37*(1), 7-32.

Wittenburg, P., Brugman, H., Russel, A., Klassmann, A., & Sloetjes, H. (2006). Elan: A professional framework for multimodality research. *Proceedings of LREC 2006, Fifth International Conference on Language Resources and Evaluation.*