
Multimodal hyperarticulation: Alignment of prosody and gesture

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Hypo- and hyperarticulation theory (H&H-theory, Lindblom 1990) in phonetics states that speakers adapt the precision and articulatory strength of sounds to convey specific levels of importance of an expression. An example are f_0 -contours in focus in Dutch, where narrowly focused constituents are marked by a steeper falling f_0 -slope than broad focus constituents (Hanssen et al. 2008). We aim to explore whether German falling accents are varied as a function of focus. Gestures and prosodic landmarks are also known to associate temporally (e.g. Loehr 2012), and to employ pragmatic functions. Therefore, we investigate whether their alignment is tighter in focus compared to background contexts, employing hyperarticulation.

This multimodal study on the German SaGA corpus (18 conversations, 204 min) investigates the temporal alignment of acoustic and gestural cues in focus and background. We annotated pitch accents, gesture apexes, focus and background, and then ran two analyses: an acoustic analysis of the slope of falling f_0 -contours and a multimodal analysis on the temporal alignment of gesture apexes and pitch accents, measuring the distance between apex and accent on the same focus constituent. Both analyses compared focus and background contexts, and information focus and contrastive focus types. We ran Bayesian lognormal models to assess the effect of focus on these two measures.

Results on the falling f_0 -contours show that steeper slopes are produced in contrastive focus (247Hz/s) than they are in background (198Hz/s) and information focus (182Hz/s), indicating a closer alignment of the f_0 -contour with the word in a contrastive context. Similarly, the distance between apexes and pitch accents is clearly smaller in focus (mean=166ms) than it is in background (mean=328ms), indicating a tighter alignment of prosody and gesture in focus. This not only indicates prosodic hyperarticulation in German focus marking, it allows to extend H&H-theory to an additional modality, interpreting the closer apex-accent alignment in focus as multimodal hyperarticulation. Acoustic and visual landmarks are produced temporally closer to highlight pragmatically relevant information, which highlights the communicative effects of prosody-gesture integration.

References: • Hanssen, J., Peters, J., & C. Gussenhoven (2008). Prosodic effects of focus in Dutch declaratives. *Proceedings of Speech Prosody* 2008, 609–612. • Lindblom, B. (1990). Explaining Phonetic Variation: A Sketch of the H&H Theory. In Hardcastle W. J. & A. Marchal (eds.), *Speech Production and Speech Modelling*, 403–439. Springer Netherlands. • Loehr, D. (2012). Temporal, structural, and pragmatic synchrony between intonation and gesture. *Laboratory Phonology*, 3(1).