Pragmatic influences on the form of head nods: Insights from a study of spoken and signed interactions

Anastasia Bauer, Anna Kuder, Marc Schulder & Job Schepens
University of Cologne, University of Cologne, University of Hamburg & University of Cologne

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HEAD nods are a common bodily signal in face-to-face communication, both spoken and signed, serving functions like affirmation, emphasis, and feedback (Cerrato, 2005). However, their phonetic properties, particularly those of addressees' nods, remain understudied due to reliance on manual annotations rather than naturalistic data.

This study examines the phonetic properties of addressees' head nods in natural dyadic signed and spoken interactions. Expanding our previous research, we analyze German Sign Language (DGS), spoken German, Russian Sign Language (RSL), and spoken Russian. We explore whether head nods with distinct pragmatic functions exhibit systematic phonetic variations, offering the first cross-linguistic and cross-modal analysis of head nod form in interaction.

We hypothesize that affirmation nods differ from feedback nods in duration, velocity, and amplitude across modalities. Affirmation refers to a positive response to a preceding question, while feedback nods signal interlocutors' perception or understanding of the ongoing conversation (Gardner, 2001). Using ELAN for manual annotation and OpenPose for body pose analysis (Cao et al., 2021), we extract head nod measurements from 2–4 hours of spontaneous dyadic interactions per language, identifying over 600 nods in each dataset.

Results indicate that affirmative nods differ from feedback nods in velocity and maximal amplitude, with this distinction holding across both spoken and signed languages. Feedback nods tend to be slower and smaller in amplitude than affirmation nods. We attribute these differences to their roles in turn-taking: feedback nods typically indicate passive recipiency, whereas affirmation nods produce a more prominent visual signal, facilitating detection and potential conversational interruptions.

Our findings suggest that pragmatic function strongly influences the physical form of non-manual gestures, aligning with previous research on manual gestures (Gerwing and Bavelas, 2005). Additionally, the lack of significant cross-modal differences in phonetic properties suggests a shared cognitive mechanism underpinning head nod use. The functional differentiation of head nods enhances communicative efficiency, supporting smooth information exchange in interaction.

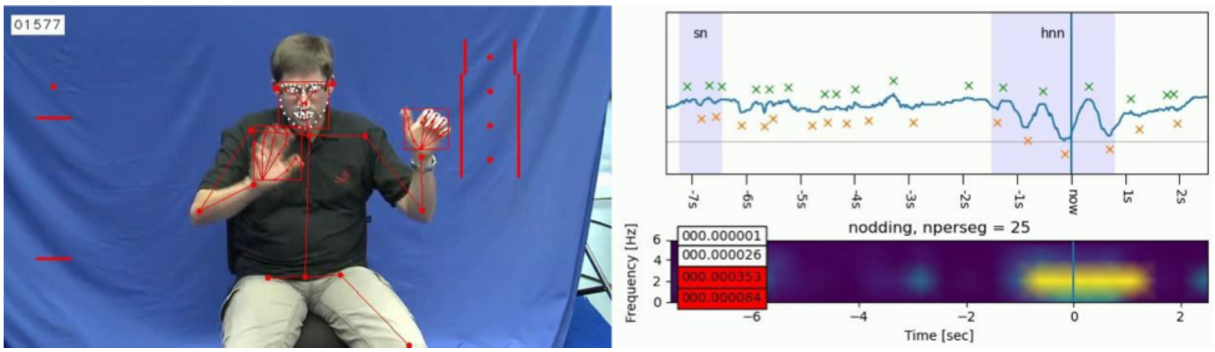

Figure 1. Head nod visualization with OpenPose body points (left). The line graph (upper right) shows vertical nose motion (blue) and OpenPose confidence (red). Light blue boxes mark labeled nods. The spectrogram (lower right) highlights vertical nose movement frequencies, with brighter areas indicating repeated nodding motions.

References

Cao, Z., Hidalgo, G., Simon, T., Wei, S.-E., & Sheikh, Y. (2021). OpenPose: Realtime Multi-Person 2D Pose Estimation Using Part Affinity Fields. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *43*(1), 172–186. https://doi.org/10.1109/TPAMI.2019.2929257

Cerrato, L. (2005). Linguistic functions of head nods. In J. Allwood, B. Dorriots, & S. Nicholson (Eds.), *Proceedings from The Second Nordic Conference on Multimodal Communication* (pp. 137–152). Göteborg University.

Gardner, R. (2001). *When Listeners Talk: Response tokens and listener stance* (Vol. 92). John Benjamins Publishing Company. https://doi.org/10.1075/pbns.92

Gerwing, J., & Bavelas, J. (2005). Linguistic influences on gesture's form. *Gesture*, *4*(2), 157–195. https://doi.org/10.1075/gest.4.2.04ger