

The effects of having a robot as a task partner on lexical retrieval

Olga Wudarczyk¹, Anna Kuhlen¹, Murat Kirtay², Doris Pischedda³, Verena V. Hafner², John-Dylan Haynes³, Rasha Abdel Rahman¹

¹Department of Psychology, Humboldt-Universität zu Berlin, Berlin, Germany

²Adaptive Systems Group, Department of Computer Science, Humboldt-Universität zu Berlin, Berlin, Germany

³Bernstein Center for Computational Neuroscience and Berlin Center for Advanced Neuroimaging and Clinic for Neurology, Charité Universitätsmedizin, corporate member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Berlin, Germany.

Correspondence: Olga Wudarczyk: wudarczo@hu-berlin.de

Previous research suggests that a task partner's speaking affects own language production. In single-subject settings, naming latencies for semantically related objects increase with each additional semantic category member (cumulative semantic interference effect, Howard et al., (2006)). In dual-subject settings, in which two partners take turns naming pictures, naming latencies for semantically related objects also increase by semantic category members named by the partner, suggesting a simulation of lexicalization processes on behalf of the task partner (Kuhlen & Abdel Rahman, 2017). In the current experiment we investigate whether this partner-elicited semantic interference extends to a joint task setting with a humanoid robot (Pepper, SoftBank Robotics) as partner, assessing the role of partner identity on lexical simulation.

Thirty-six participants (preregistered at AsPredicted.Org, 2019), name semantically related objects (e.g. different types of birds) either by themselves (control condition), or by taking turns with a humanoid robot– Pepper. We assess the degree of cumulative semantic interference experienced when previous semantically related pictures are named by the robot (Joint Naming) as compared to when they are presented visually only (Single Naming). Additionally, we assess whether differences in robot perception, attitudes to technology, and individual differences in personality and social competence affect the degree of partner-elicited semantic interference when interacting with a robot. Naming latencies for the trials in which participants name the picture are modelled using linear mixed models as a function of the predictors: Naming Condition (Joint Naming vs. Single Naming), Ordinal Position (ordinal position 1 to 5), and Experimental Block (1 to 2).

If the robot is conceived similar to a human task partner we expect participants' naming latencies to increase not only in response to the number of semantically related pictures participants previously named themselves, but also additionally, in response to semantically related pictures named by the robot. If the robot is not conceived similar to a human task partner, we do not expect to find an additional slowing of naming latencies as a result of the robot naming the semantically related pictures (i.e. no significant Naming Condition x Ordinal Position interaction). The data collection for the project resumed after the pause due to COVID-19 lockdown. Currently 27 participants completed the experiment.

The results of this study will contribute novel insights to our understanding whether having a robot as a task partner affects one's own language production. Further, the results will shed light on the role of the task partner's identity on simulating their lexicalization processes.

References:

Howard, D., Nickels, L., Coltheart, M., & Cole-Virtue, J. (2006). Cumulative semantic inhibition in picture naming: Experimental and computational studies. *Cognition*, 100(3), 464-482.

Kuhlen, A. K., & Abdel Rahman, R. (2017). Having a task partner affects lexical retrieval: Spoken word production in shared task settings. *Cognition*, 166, 94-106.

Acknowledgment:

Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy - EXC 2002/1 "Science of Intelligence" - project number 390523135.