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September 23, 2021

On the relation of semantic context effects in picture naming and semantic categorization: Evidence from aphasia

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Introduction

The continuous picture-naming paradigm requires naming of several members of different semantic categories (e.g., clothes: blouse, skirt, glove, hat, shoe) in a seemingly random order, separated by 2 to 8 unrelated objects (e.g., Howard et al., 2006). Naming latencies increase in a linear fashion with each additional category member. This effect is assumed to be located at the lexical level of language production (e.g., Howard et al., 2006; Oppenheim et al., 2010). A cumulative context effect can also be found in a semantic categorization task but here facilitation is observed, suggesting a common conceptual-semantic origin of both effects (Belke, 2013). To date, cumulative semantic facilitation in participants with aphasia (PWA) has not been investigated and data on cumulative interference in PWA is sparse (Harvey et al., 2019; Riès et al., 2015). In our study, PWA completed a picture-naming task and a categorization task with identical materials. We tested whether the pattern observed in unimpaired adult speakers can be replicated in PWA. Furthermore, we tested whether and in which way the two effects are related, that is, whether cumulative interference in picture naming can be predicted by cumulative facilitation in the categorization task.

Methods

Eighteen participants with aphasia (PWA) were included. All participants suffered from mild word-finding difficulties, resulting from a deficit of lexical access, while conceptual- and lexical-semantic processing were largely preserved. Mainly vascular etiologies were involved leading to a circumscribed chronic and non-progressive lesion in the left hemisphere. Participants first completed a picture-naming task and after around one week they completed a picture-categorization task in which they indicated via button-press whether depicted objects were man-made or natural entities. The stimulus set consisted of 130 pictures of objects, including 90 experimental targets, 30 fillers and 10 practice items. All targets were monomorphemic nouns, which belonged to 18 different semantic categories (e.g., clothes, animals) with five members, each. For both tasks, response accuracies and reaction times were measured. All picture-naming responses were recorded and transcribed, and speech onset latencies were determined using “Praat” (Boersma & Weenink, 2021).

Results

Response accuracies were relatively high (proportion, naming errors: 13.7 %, range: 1.1 - 35.6 %; proportion, categorization errors: 12.7 %, range: 2.2 - 46.7 %; for mean reaction times, see Figure 1).

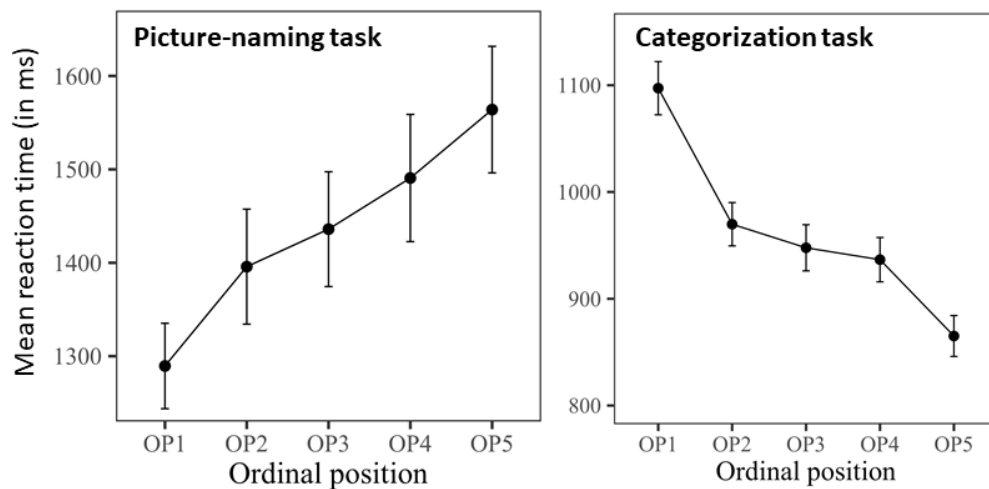


Figure 1: Mean reaction times (in ms) as a function of ordinal position in the picture-naming task (on the left) and the categorization task (on the right). Ordinal position refers to the sequence of the five category members.

On average, picture-naming latencies within semantic categories increased by 69 ms from one ordinal position to the next, reflecting cumulative semantic interference ($t = 3.504$, $p = 0.001$). In the categorization task, participants' response latencies systematically decreased within categories (on average by 58 ms between category members), revealing cumulative facilitation ($t = -8.395$, $p < 0.001$).

Conclusions

PWA who suffer from post-semantic deficits of lexical access show strong cumulative semantic interference. How their conceptual-semantic processing influences this effect is currently analyzed. Analyses of cerebral lesion patterns in relation to the individual performance are currently performed. Theoretical and clinical implications will be discussed.

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Acknowledgments

We thank all participants of this study. Thank you also to Frank Regenbrecht and the speech pathology team in Leipzig who helped in recruiting participants and to Anna-Maria Kulke who assisted in testing. The study was funded by the German Research Council (LO 2182/1-2).