EasyChair Preprint

№ 6441

Effects of Emotional Stimuli on Word Retrieval in People with Aphasia

Deena Schwen Blackett, Stacy M. Harnish, Joan C. Borod, Shari R. Speer and Xueliang Pan

August 27, 2021

Effects of Emotional Stimuli on Word Retrieval in People with Aphasia

Deena Schwen Blackett[1]*, Stacy M. Harnish[2], Joan C. Borod[3], Shari R. Speer[4], and Xueliang Pan[5]

[1] Neurology, Medical University of South Carolina, Charleston, (SC), USA
[2] Speech and Hearing Science, The Ohio State University, Columbus, (OH), USA
[3] Psychology, Queens College, City University of New York, Flushing, (NY), USA
[4] Linguistics, The Ohio State University, Columbus, (OH), USA
[5] Biomedical Informatics, The Ohio State University, Columbus, (OH), USA

***corresponding author, blackett.3@osu.edu**

Introduction

Characteristics of stimuli (e.g., word frequency) influence the ease of word retrieval and, thus, influence language assessment and treatment design. Stimulus emotionality may also impact word retrieval in neurotypical adults (Schwen Blackett et al., 2017), having important clinical implications for people with aphasia (PWA). Some data support a performance-enhancing effect of emotional vs. nonemotional stimuli in PWA for comprehension (Reuterskiöld, 1991), pragmatics (Borod et al., 2000), repetition (Ramsberger, 1996), reading and writing (Landis et al., 1982), and word recognition (Newton et al., 2020). However, this performance-enhancing effect of emotion is not universally reported (Wallace & Canter, 1985), and it is unknown how emotional stimuli may affect word retrieval in PWA.

Methods

Thirteen people with chronic anomia, based on the Boston Naming Test Short-Form (del Toro et al., 2011) and 13 age-matched, neurotypical controls participated in tasks presenting positive, negative, and neutral stimuli, taken from the International Affective Picture System (Lang et al., 2008) and Affective Norms for Emotional Words database (Bradley & Lang, 1999). Tasks included object picture-naming (60 items), action picture-naming (60 items), category-member generation (39 items), and verb generation (60 items). The three valence sets within each task had an equal number of items and were balanced for word frequency, concreteness, imageability, age of acquisition, visual complexity (picture-naming tasks), and number of phonemes, syllables, and living vs. nonliving items. Task, valence block, and item order were randomized across participants. Accuracy and reaction time (RT) were measured for each trial. Generalized logistic and linear mixed-effects models were used to evaluate differences in accuracy and RT between participant groups and among tasks and valence.

Results

All planned fixed effects were included in the final model (group, task, valence, task*valence, and task*valence*group). Participants were included as a random effect. Table 1 shows statistical significance for accuracy and RT models. As expected, across task and valence conditions, PWA were significantly less accurate (59.86%) than controls (95.61%) and were 2.54 seconds slower than controls, on average. PWA showed the

lowest accuracy for negative trials, followed by positive and then neutral trials across tasks (Figure 1). Controls showed this same pattern for all tasks except object picture-naming. RT data showed that PWA and controls were slower for emotional than neutral trials, with negative trials tending to be slower than positive trials.

Conclusions

Emotional stimuli, especially negative items, produced worse naming performance than nonemotional stimuli, as measured by accuracy and RT in PWA and controls. This replicates findings of a performance-interference effect of emotion on word retrieval in neurotypical controls (Burbridge et al., 2005; Schwen Blacket et al., 2017). This effect appears to be robust across naming tasks that differed by word class (nouns vs. verbs) and stimulus type (pictures vs. words). Negative stimuli resulted in worse naming performance than positive stimuli, and, in few cases, participants performed better for positive compared to neutral stimuli. Results suggest that emotionality of stimuli is an important variable in word retrieval research and could, perhaps, impact clinical assessment and intervention of word retrieval deficits in PWA.

References

Borod, J. C., Rorie, K. D., Pick, L. H., Bloom, R. L., Andelman, F., Campbell, A. L., Obler, L. K., Tweedy, J. R., Welkowitz, J., & Sliwinski, M. (2000). Verbal pragmatics following unilateral stroke: Emotional content and valence. Neuropsychology, 14(1), 112–124.

Bradley, M.M., & Lang, P.J. (1999). Affective norms for English words (ANEW): Stimuli, instruction manual and affective ratings. (Technical report C-1). Gainesville, FL: University of Florida.

Burbridge, J. A., Larsen, R. J., & Barch, D. M. (2005). Affective reactivity in language: The role of psychophysiological arousal. Emotion, 5(2), 145–153.

del Toro, C. M., Bislick, L. P., Comer, M., Velozo, C., Romero, S., Gonzalez Rothi, L. J., & Kendall, D. L. (2011). Development of a short form of the Boston naming test for individuals with aphasia. Journal of Speech, Language, and Hearing Research, 54(4), 1089–1100.

Landis, T., Graves, R., & Goodglass, H. (1982). Aphasic reading and writing: Possible evidence for right hemisphere participation. Cortex: A Journal Devoted to the Study of the Nervous System and Behavior, 18(1), 105–112.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2008). International affective picture system (IAPS): Affective ratings of pictures and instruction manual. (Technical Report A-8). University of Florida, Gainesville, FL.

Newton, C., Thornley, H., & Bruce, C. (2020). The influence of emotional valence on word recognition in people with aphasia. Language, Cognition and Neuroscience, 35(8), 1064-1072.

Ramsberger, G. (1996). Repetition of emotional and nonemotional words in aphasia. Journal of Medical Speech-Language Pathology, 4(1), 1–12.

Reuterskiöld, C. (1991). The effects of emotionality on auditory comprehension in aphasia. Cortex: A Journal Devoted to the Study of the Nervous System and Behavior, 27(4), 595–604.

Schwen Blackett, D., Harnish, S. M., Lundine, J. P., Zezinka, A., & Healy, E. W. (2017). The effect of stimulus valence on lexical retrieval in younger and older adults. Journal of Speech, Language, and Hearing Research, 60(7), 2081-2089.

Wallace, G. L., & Canter, G. J. (1985). Comprehension of neutral, melodically intoned, and affectively toned sentences by adults with aphasia. Journal of Communication Disorders, 18(5), 321–327.

Acknowledgments

This research was supported by the National Institute on Deafness and Other Communication Disorders of the National Institutes of Health under award number F31DC017367. We would like to acknowledge Maura Busemeyer, Jackie Marchi, Maya Silva, Bailey Wills, Audrey Hall, Victoria Diedrichs, Jennifer Brello, and Dr. Jennifer Lundine for their assistance in data processing and analysis. We thank Dr. Adam Jacks for advice on RT measurement, Dr. Robert Fox for programming and technical assistance, and Dr. Christina Roup for her input regarding hearing screening. Most importantly, we would like to acknowledge all the participants with aphasia and their support people for the time and effort they dedicated to this project.

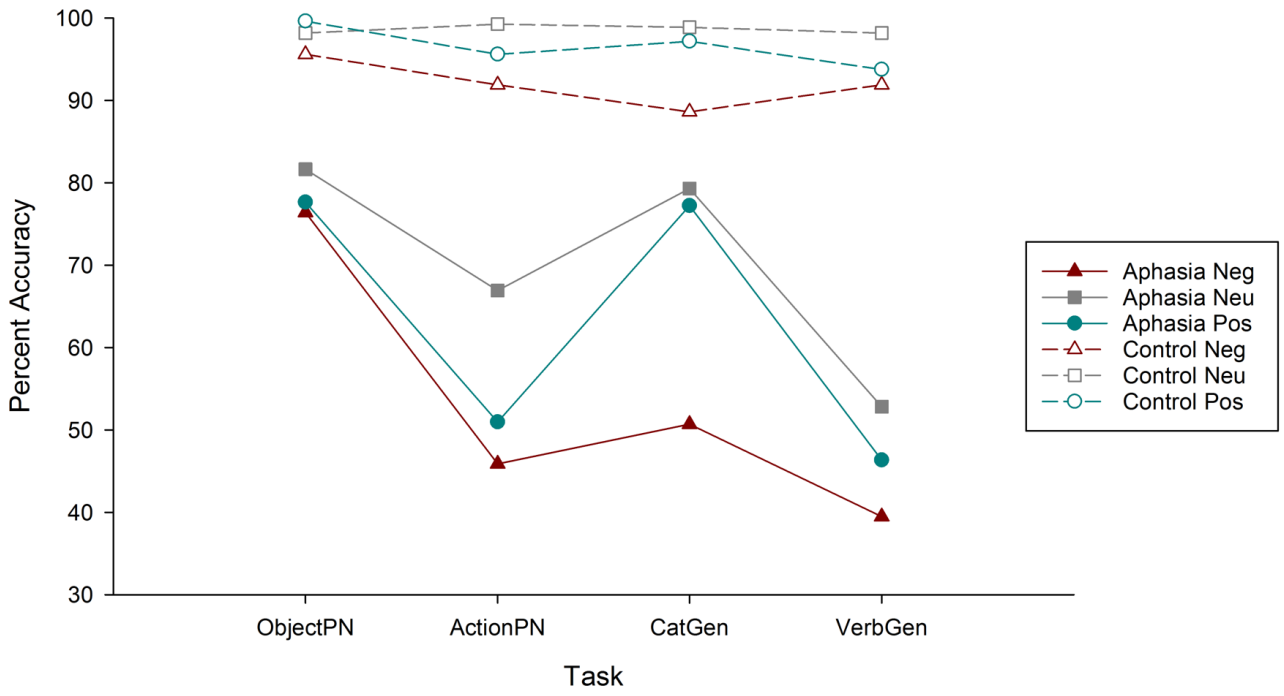

Figure 1. Least square means of percent accuracy by task

Table 1. Type III fixed effects for accuracy and reaction time mixed-effects models

Effect	Accuracy		Reaction Time	
	F statistic	*p* value	*F* statistic	*p* value
Group	$F(1, 21.83) = 70.20$	< .0001	$F(1, 14.5) = 116.99$	< .0001
Task	$F(3, 5631) = 13.49$	< .0001	$F(3, 4359) = 136.98$	< .0001
Valence	$F(2, 5631) = 35.80$	< .0001	$F(2, 4356) = 48.14$	< .0001
Task*Valence	$F(6, 5631) = 3.39$	.002	$F(6, 4356) = 3.88$	.0007
Group*Task*Valence	$F(11, 5631) = 2.47$	.005	$F(11, 4357) = 27.29$	< .0001