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Introduction

Script training is an effective treatment approach for individuals with stroke-induced and progressive aphasia (Hubbard et al., 2020). Studies have documented the benefits of script training for functional communication (e.g., Goldberg et al., 2012), but few have examined whether script training can remediate underlying linguistic deficits.

Script training typically utilizes the repeated recitation of sentences, which may provide opportunities for structural priming (i.e., priming for syntactic forms). Several studies have shown structural priming effects in individuals with agrammatism (e.g., Cho-Reyes et al., 2016). Implicit processes are considered to drive these effects and support grammatical learning (Chang et al., 2000). Thus, the cumulative priming effects associated with repeated script practice may facilitate lasting improvement in the production of primed grammatical structures.

This study examined the effects of script training with embedded syntactic targets on the ability of participants with progressive agrammatic aphasia to accurately produce complex syntactic structures in constrained tasks and spontaneous speech.

Methods

Three participants with progressive agrammatic aphasia participated: two with nonfluent/agrammatic primary progressive aphasia (Gorno-Tempini et al., 2011) and one with behavioral variant frontotemporal dementia with agrammatism.

Six personally-relevant scripts regarding functional topics were developed. One or two target syntactic structures (i.e., subject relative clauses, passive structures, present progressive auxiliaries, and object relative clauses) were selected for each participant based on standardized grammar assessments and analyses of connected speech.

Participants underwent Video-Implemented Script Training for Aphasia (VISTA; Henry et al., 2018) for six weeks. Twice weekly treatment sessions targeted memorization and conversational usage of scripts, complemented by 30 minutes of daily unison script

production practice with a video model. Four scripts were trained, and two remained untrained. No explicit training of syntactic structures was provided.

Multiple-baseline data were collected to track performance on scripts. Twenty-six syntax production probes (adapted from Thompson et al., 2012a,b) were administered at pre- and post-treatment for each target structure. Three spontaneous speech samples were collected at each time point. Samples were transcribed and the frequency of occurrence for each target structure was calculated.

Results

Production of correct, intelligible scripted words for each trained topic improved upon initiation of treatment. All participants reached criterion performance of 90% for all trained scripts. Performance on structured syntax probes improved significantly from baseline for one of two structures for each nfvPPA participant (Figure 1). Production of target structures in spontaneous speech increased for all but one target structure (Table 1).

Conclusions

We observed increased production of targeted syntactic forms following VISTA with embedded syntactic structures, indicating that script training facilitated generalized improvement in the production of syntax in the absence of explicit training.

These findings support the notion that implicit modes of training may benefit syntactic production in agrammatic progressive aphasia, consistent with evidence of implicit learning (Schuchard & Thompson, 2014) and positive effects of implicit priming in treatment (Lee & Man, 2017) observed in stroke-induced agrammatic aphasia.

Future studies should investigate whether these findings extend to a larger group of individuals with agrammatic aphasia and examine implicit learning for a variety of syntactic structures.

References

Cho-Reyes, S., Mack, J. E., & Thompson, C. K. (2016). Grammatical encoding and learning in agrammatic aphasia: Evidence from structural priming. *Journal of Memory and Language*, *91*, 202-218.

Goldberg, S., Haley, K. L., & Jacks, A. (2012). Script training and generalization for people with aphasia. *American Journal of Speech-Language Pathology, 21*(3), 222-238.

Gorno-Tempini, M. L., Hillis, A. E., Weintraub, S., Kertesz, A., Mendez, M., Cappa, S. F., ... & Grossman, M. (2011). Classification of primary progressive aphasia and its variants. *Neurology*, *76*(11), 1006-1014.

Henry, M. L., Hubbard, H. I., Grasso, S. M., Mandelli, M. L., Wilson, S. M., Sathishkumar, M. T., ... & Gorno-Tempini, M. L. (2018). Retraining speech production and fluency in non-fluent/agrammatic primary progressive aphasia. *Brain*, *141*(6), 1799-1814.

Hubbard, H. I., Nelson, L. A., & Richardson, J. D. (2020). Can Script Training Improve Narrative and Conversation in Aphasia across Etiology? *Seminars in Speech and Language*, *41*(1), 99-124.

Lee, J., & Man, G. (2017). Language recovery in aphasia following implicit structural priming training: A case study. *Aphasiology*, *31*(12), 1441-1458.

Schuchard, J., & Thompson, C. K. (2014). Implicit and explicit learning in individuals with agrammatic aphasia. *Journal of Psycholinguistic Research*, *43*(3), 209-224.

Thompson, C. K. (2012a). Northwestern assessment of verbs and sentences (NAVS).

Thompson, C. K., Weintraub, S., & Mesulam, M. M. (2012b). Northwestern Anagram Test (NAT).

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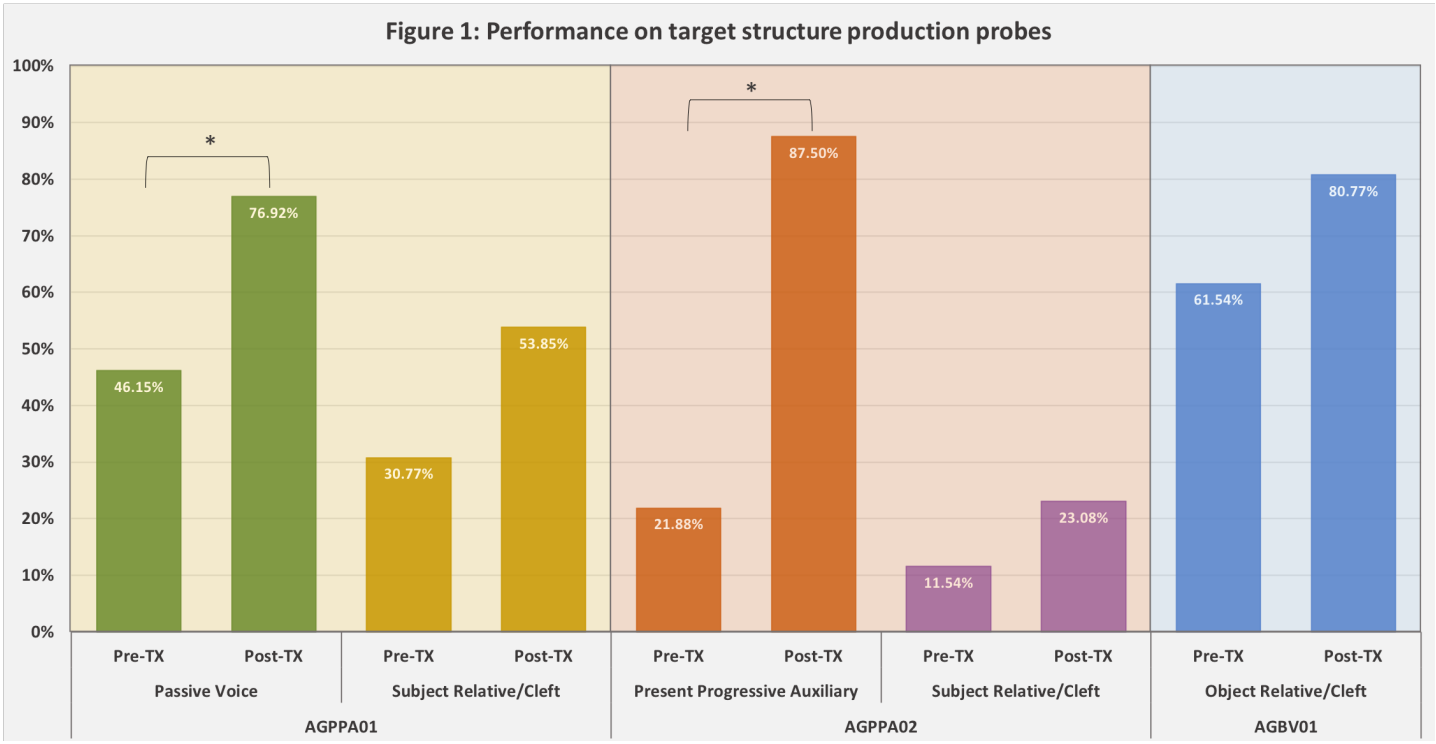

*McNemar's test, p<0.05

Table 1: Production of target structures in spontaneous speech samples

	AGPPA01				AGPPA02				AGBV01	
	Passives		**Subject Relatives**		**Present Progressive Auxiliaries**		**Subject Relatives**		**Object Relatives**	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Number of productions	0	3	1	3	6	13	0	0	0	1
Rate of productions per t-unit	0.000	0.041	0.021	0.041	0.182	0.361	0.000	0.000	0.000	0.040