Effect of Chinese Verb Network Strengthening Treatment in

Mandarin-English Bilinguals with Aphasia

Introduction

Bilingual aphasia is the loss of one or both languages in bilingual people with aphasia (BPWA). Although Chinese is the third most widely spoken language in the U.S. (Ryan, 2011), many studies on bilingual aphasia focus on Indo-European languages, and it remains unclear whether training one language generalizes to the other language (Fabbro, 2001). Given that there are no published studies on treatment options for Mandarin-speaking patients with aphasia, this work is important both from a clinical and scientific standpoint.

Verb retrieval deficit is universally present in patients with aphasia (Faroqi-Shah & Waked, 2010). Edmonds et al. (2009) developed the *Verb Network Strengthening Treatment* (VNeST), which has shown positive treatment effects in trained and untrained verbs. Therefore, the current study aims to adopt VNeST in Chinese to treat Mandarin-English BPWA who have verb retrieval deficit.

Aims

The study examined whether treatment in Chinese VNeST improved lexical retrieval of trained verbs and their thematic roles in sentences, and if it generalized to semantically-related untrained verbs and their thematic roles. Additionally, we investigated if Chinese VNeST showed cross-language generalization from the trained to the untrained language, and if it further generalized to lexical retrieval to broader language tasks.

Method

Two Mandarin-English speaking participants (P1 = 73yr, P2 = 71yr) with chronic aphasia (Months Post Onset: P1 = 86, P2 = 140) due to stroke participated in this study. Mandarin was their first language and English was their second (Age of Acquisition: P1 = 16yr, P2 = 10yr). Thirty-six verb stimuli in Chinese (*e.g., weigh*) were divided into two sets. One set was used for treatment, and the other set included semantically related items. A third, control set consisted of ten adjective words (*e.g., on*). A multiple baseline approach across participants (Connell & Thompson, 1986) included four phases: 1) baseline (n = 3 for Chinese, n = 3 for English), 2) treatment (probe testing; n = 10), 3) post-treatment (probe testing; n = 3), and 4) 1-month maintenance (n = 1). Additionally, language outcomes were measured before and after treatment. Each participant was trained in Chinese VNeST twice per week for two hours for a total of 20 sessions over 10 weeks. They were probed for the trained, semantically-related untrained items, and control items in sentence production in both languages. Treatment protocol closely followed the original VNeST steps (Edmonds, 2014). Treatment reliability and probe scoring were conducted for 25% of all the sessions.

A generalized linear mixed-effects model was conducted for each language separately across both participants. Effect sizes for trained and untrained items in both languages were calculated using *Cohen's d* (Cohen, 1988) from pre- to post-treatment, and from pre-treatment to maintenance.

Results

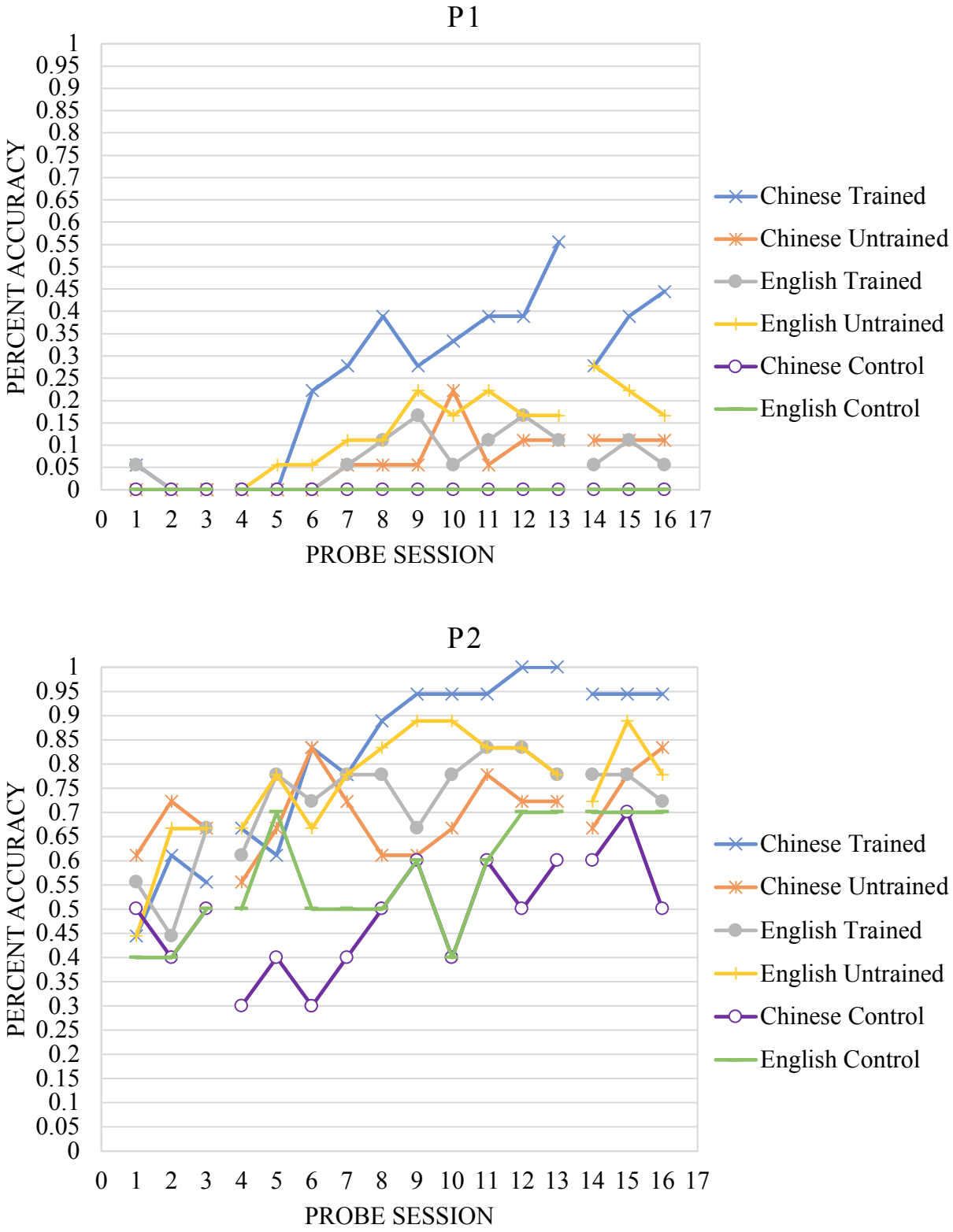
Results were illustrated in Figure 1. A significant main effect of the Chinese trained items (β = 4.40, SE = 1.03, |z| = 4.27, $p < 0.01$) indicated both patients improved on the Chinese trained set, and a significant trained by session interaction effect (β = 0.36, SE = 0.11, |z| = 3.20, $p < 0.01$) suggested that changes on the trained set were higher than the control set over time. A

significant main effect of the English trained items (β = 2.31, SE = 0.92, |z| = 2.50, $p < 0.05$) indicated both patients had higher accuracy on the English trained items compared to the English control items, but the lack of an interaction effect indicated this change was not significant over time. There was a large effect size for P1 for the Chinese trained set (d = 10.97), Chinese untrained set (d = 4.90), and English untrained set (d = 9.80) from pre- to post-treatment, and there was no change for control items. For P2, there was a medium effect size for trained (d = 4.80) and untrained (d = 1.67) sets in Chinese, and a small effect size for trained (d = 1.83) and untrained (d = 1.59) sets in English from pre- to post-treatment. There was also a medium effect size for control set in Chinese (d = 2.3) and a large effect size for control set in English (d = 4.6). Improvements were also observed in a variety of language measurements.

Discussion

This study provides evidence suggesting that treatment in Chinese VNeST can improve verb retrieval in sentences for Mandarin-English BPWA. The effect sizes further suggested a within-language generalization and a between-language generalization for P1, possibly due to this patient's more severe deficit in language at the baseline, compared to P2. These results are interpreted in the context of bilingualism and aphasia.

Figure 1. Treatment data of P1 and P2.



References

Cohen J. (1988). Statistical Power Analysis for the Behavioural Science (2nd Edition). In *Statistical Power Anaylsis for the Behavioural Science (2nd Edition)*.

Edmonds, L. A. (2014). Tutorial for Verb Network Strengthening Treatment (VNeST): Detailed description of the treatment protocol with corresponding theoretical rationale. *Perspectives on Neurophysiology and Neurogenic Speech and Language Disorders*, *24*(3), 78-88. http://doi.org/10.1044/nnsld24.3.78

Edmonds, L. A., Nadeau, S. E., & Kiran, S. (2009). Effect of Verb Network Strengthening Treatment (VNeST) on lexical retrieval of content words in sentences in persons with aphasia. *Aphasiology*, *23*(3), 402–424. http://doi.org/10.1080/02687030802291339

Fabbro, F. (2001). The bilingual brain: Bilingual aphasia. *Brain and Language*. http://doi.org/10.1006/brln.2001.2480

Faroqi-Shah, Y., & Waked, A. N. (2010). Grammatical category dissociation in multilingual aphasia. *Cognitive Neuropsychology*, *27*(2), 181–203. http://doi.org/10.1080/02643294.2010.509340

Ryan, C. (2011). Language use in the United States: 2011. *American Community Survey Reports, US Census Bureau*, (August), 16. http://doi.org/ACS-22