Treatment outcomes and generalization effects following semantic-feature based naming therapy for bilingual aphasia

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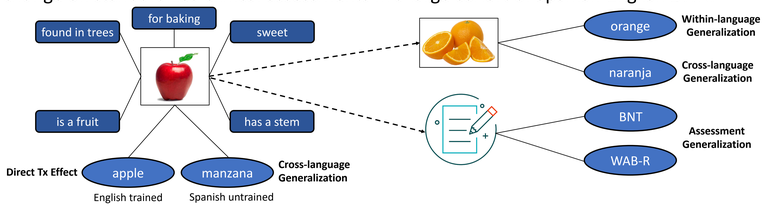
Introduction

Bilinguals with aphasia (BWA) may experience word retrieval impairments in one or both of their languages following stroke[1]. Semantic-feature based treatments (SFTs) have emerged as effective word retrieval therapies for BWA[2,3,4], resulting in improvement on trained items and various levels of generalization to untrained items. However, most current evidence for the efficacy of SFT is based on studies with small sample sizes[5,6].

Aim of the study. To examine the generalizability of bilingual SFT by investigating patterns of within-language improvement, cross-language generalization, and post-treatment change on standardized clinical assessments in a large cohort of Spanish-English BWA.



The PROCoM Clinical Trial

Data for this project were collected as part of the Predicting Rehabilitation Outcomes in bilingual aphasia using Computational Modeling (PROCoM) clinical trial[7] whose goal is to determine whether a computational model of lexical access can predict treatment outcomes for 48 Spanish-English BWA.

Pre-treatment Assessment → Computational Modeling → Group Randomization → Treatment → Post-treatment Assessment

Clinical Trial Workflow

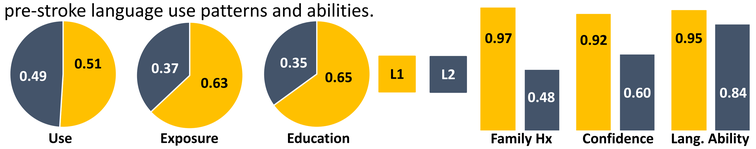
Participants

Participants were 34 Spanish-English BWA who completed the PROCoM clinical trial. A variety of demographic and clinical characteristics are reported below including overall aphasia severity[9,10] and naming impairment[11,12] scores.

N=34	Demographic and Clinical Characteristics							Treated Lang		Untreated Lang	
	Sex	Age	MPO	Edu	L1	L2 AoA	Tx Lang	BNT	WAB-R	BNT	WAB-R
	F=15 M=19	52.07 (16.47)	59.17 (95.47)	13.82 (2.95)	S=28 E=6	11.85 (9.17)	S=15 E=19	0.41 (0.24)	64.49 (24.80)	0.25 (0.26)	55.01 (24.42)

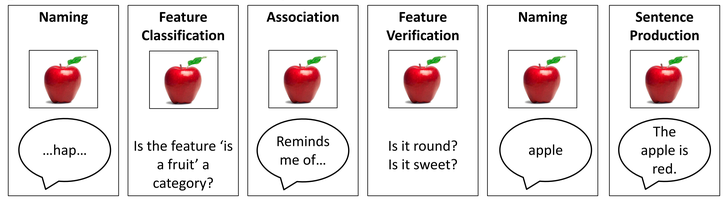
Note: Mean (SD) reported; S = Spanish, E = English

Language history. Participants also completed a Language Use Questionnaire[8] to characterize pre-stroke language use patterns and abilities.



Methods and Materials

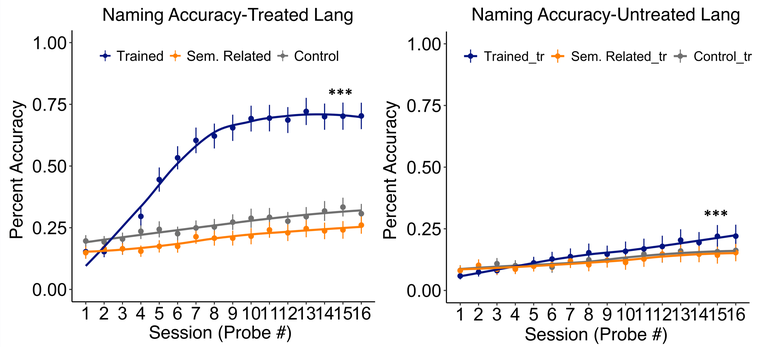
All participants received 40 hours of computerized SFT[7] (2 hours/20 sessions) in Spanish or English. Treatment-induced recovery was assessed via two sets of outcomes.



Semantic-feature based treatment steps

Outcome Level	Specific Measure	Analysis Method
Primary Outcomes	Accuracy on Naming Probes	Logistic Mixed Effects Regression
Secondary Outcomes	Post-Pre Change on WAB-R & BNT	Paired Sample t-Tests

Results–Primary Outcomes



Relative to control items:

a) **Trained items** improved significantly over time (*b*=0.25, *SE*=0.01, *p*<.001)
b) **Semantically-related items** did not improve (*b*=-0.01, *SE*=0.01, *p*=.36).

Relative to control translations:

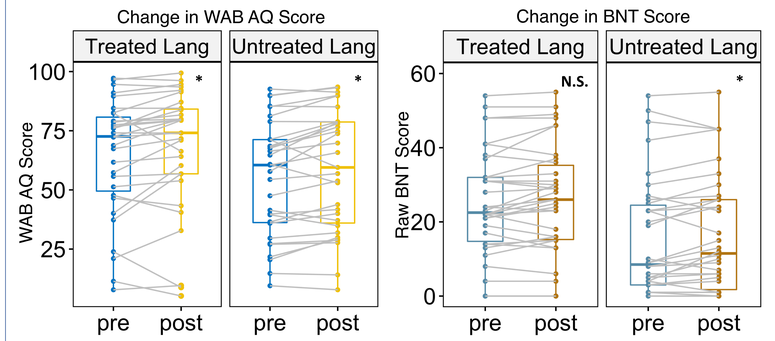
a) **Trained translations** improved significantly over time (*b*=0.07, *SE*=0.01, *p*<.001)
b) **Semantically-related translations** did not improve (*b*=-0.004, *SE*=0.01, *p*=.78)

Does Tx in L1/L2 Influence Accuracy on Naming Probes?

Contrast	Est.	SE	*p*	Interpretation
Trained: L1-L2	0.15	0.05	<.01	L1 > L2
Control: L1-L2	0.07	0.05	0.204	No Difference

Contrast	Est.	SE	p	Interpretation
Trained Trans.: L1-L2	-0.02	0.05	0.609	No Difference
Control Trans.: L1-L2	-0.07	0.05	0.137	No Difference

Results—Secondary Outcomes

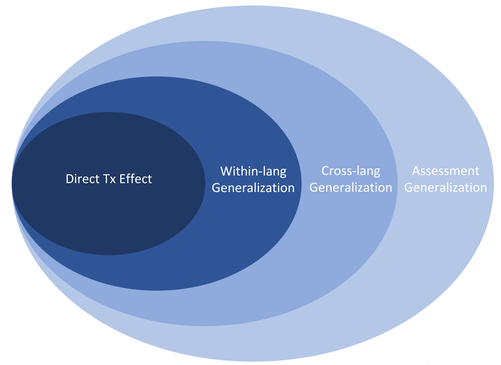


WAB Condition	Avg. Pre	Avg. Post	*p*	Interpretation
Treated	65.05	68.36	**<.05**	**Sig. Change**
Untreated	55.63	58.79	**<.05**	**Sig. Change**

BNT Condition	Avg. Pre	Avg. Post	*p*	Interpretation
Treated	24.8	25.8	.05	No Change
Untreated	15.3	16.4	**<.05**	**Sig. Change**

Discussion

- Bilingual SFT resulted in direct naming improvement and multiple levels of generalization for Spanish-English BWA who presented with various degrees of post-stroke impairment and language backgrounds



- Although these group-level analyses support generalizability of bilingual SFT, improvement was not observed for all outcome measures and individual participant patterns of improvement were highly variable
- Future work should consider incorporating a) error analyses as a way to further examine within and cross-language generalization patterns and b) follow-up analyses of participant-level factors (e.g., bilingual background) which may influence outcomes

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