CROSSLINGUISTIC GENERALIZATION OF SEMANTIC TREATMENT IN APHASIA: EVIDENCE FROM THE INDIAN CONTEXT

Introduction

The last two decades witnessed several novel treatment approaches to aphasia therapy. Semantic feature-based therapy is one of such treatment approaches that gained considerable research attention (Boyle & Coelho, 1995). More importantly, this treatment approach has been found effective in bilingual persons with aphasia. For instance, Edmonds and Kiran (2006) administered semantic feature based therapy in Spanish-English bilingual persons with aphasia and reported of crosslinguistic generalization of treatment effect to untreated language. This promising research, however, needs to be replicated and extended to novel language pairs.

Research on crosslinguistic generalization of treatment effects is of paramount importance to multilingual countries like India. For instance, with several hundreds of languages and dialects spoken across India and with the pervasive use of English as second language, speech language pathologists (SLPs) in the country are often baffled on the selection of language for treatment in bilingual persons with aphasia. Empirical evidence from Indian languages would add confidence to the SLPs while selecting language for treatment in person with aphasia. In this context, the current study aimed to replicate and extend the earlier findings on crosslinguistic generalization of treatment effects in bilingual persons with aphasia to the Indian context.

Methods

This investigation was carried out in Karnataka, a southern state in India, where the primary spoken language is Kannada. We recruited three bilingual (Kannada-English) persons with aphasia for the current study. Their premorbid proficiency was calculated with a rating scale rated either by the participants or with the help of an intimate family member. While participant 1 (P1) was equally proficient in both languages, P2 and P3 were more proficient in Kannada. Table 1 provides the demographic data as well as language proficiency of the three participants. Prior to as well as following the administration of semantic feature-based treatment, the language skills of the participants were assessed with Western Aphasia Battery (Chengappa & Kumar, 2008), Bilingual Aphasia Test (Paradis & Rangamani, 1989), and Boston Naming Test (Shanthala, 1997) (see Table 2) in Kannada and English.

Table 1 about here

Table 2 about here

We employed the methods of Edmonds and Kiran (2006) for preparing treatment probes as well as administering treatment in our participants. From an initial set of 300 pictures that were administered on each participant, 50 unsuccessfully named pictures were selected for the training purpose. The names of these pictures were neither cognates nor had 50% or more phonetic similarity in both languages. The selected items for each participant varied from that of other participants as the final items (n = 50) were selected

based on the individual naming failures. All items belonged to various semantic categories like animals, fruits, household articles etc.

For each participant, six sets of stimuli were developed with 10 items in each set, except in control set, which had only 5 stimuli. The stimuli were categorized into: a) English Set 1 (e.g., *cat*: N = 10); b) Kannada set 1 (translation equivalent of English set 1: e.g., /*bekku*/: N = 10); c) English set 2 (semantically related to items in set 1: e.g., *dog*: N = 10); d) Kannada set 2 (translation equivalent of English set 2: e.g., /*na:ji*/: N = 10); e) English set 3 (control: semantically unrelated: e.g., *stone*: N = 5); f) Kannada set 3 (control: translation equivalent of English set 3: e.g., /*kallu*/: N = 5).

For each participant, two sessions of therapy, each lasting for 2 hours, were provided on a weekly basis. Unlike in Edmonds and Kiran (2006), the participants were assessed only twice (i.e., before & after therapy) in the current study.

Results

Participant P1, equally proficient in both languages, was trained using English set 1. Performance improved on both English set 1 (from 0 - 90%; X^2 = 9; *df* = 1; *p* = 0.0027) as well as on English set 2 (from 0 - 80%; X^2 = 8; *df* = 1; *p* = 0.0046). Further, crosslinguistic generalization to both translation equivalents (i.e., to Kannada set 1: 0 - 70%; X^2 = 7; *df* = 1; *p* = 0.0081) and semantically related items (Kannada set 2: 0 - 60%; X^2 = 6; *df* = 1; *p* = 0.01431) was also noticed. The control sets, however, did not show any significant improvement following therapy.

Participant P2, who was more proficient in Kannada, received treatment in the same language using Kannada set 1. Both trained set (from 0 - 80%; X^2 = 8; *df* = 1; *p* = 0.0046) and semantically related untrained (i.e., Kannada set 2: 10 - 60%; X^2 = 6; *df* = 1; *p* = 0.014) showed significant improvement. However, neither English set 1 nor English set 2 showed improvement, indicating poor crosslinguistic generalization. Subsequently, the treatment was provided in English using English set 2. Though the trained set showed improvements (from 10 - 90%; X^2 = 8; *df* = 1; *p* = 0.0046), it failed to generalize to English set 1. However, interestingly, with treatment initiated in English, P2 showed crosslinguistic generalization to both translation equivalents (i.e., Kannada set2: 60 - 80%) as well as to the semantic related items (i.e., Kannada set 1: 80 – 100%). Neither Kannada (0%-20%; *p* - ns) nor English (0%-0%; *p* - ns) control sets showed any notable changes following the training.

Participant P3, who was more proficient in Kannada like P2, received treatment in English using English set 1 and crosslinguistic generalization was monitored for Kannada set 1 and set 2. Scores on the trained set improved from 0 to 80% (X^2 = 8; *df* = 1; *p* = 0.0046). Within language generalization was observed on semantically related untrained items (i.e., English set 2) as the scores improved from 0 to 40% (X^2 = 4; *df* = 1; *p* = 0.045) and there was crosslinguistic generalization to Kannada set1 (from 10 to 70%; X^2 = 6; *df* = 1; *p* = 0.014) and to Kannada set2 (from 0 to 60%; X^2 = 6; *df* =1; *p* = 0.014). Both control sets (0 - 0%; *p* - ns) did not show any change after the provision of training.

Discussion

The results of this investigation are, in general, on par with earlier similar investigations (e.g., Edmonds & Kiran, 2006). In their study, these authors observed improvements in both languages subsequent to the provision of treatment in L2 in balanced (i.e., equally proficient) bilinguals. However, in dominant bilinguals, where there exists a difference in proficiency level between the languages, provision of treatment in weaker language resulted in crosslinguistic generalization and the results of this study

corroborated their findings. This in turn, supports the Revised Hierarchical Model (Kroll & Stewart, 1994) of bilingual language system. Additionally, it may be noted that the pre- and post-therapy evaluations revealed overall improvement in languages skills of all three participants in the current study. Though unexpected, this observation warrants further exploration of the generalized effects of strengthening the semantic system on the overall language skills.

Conclusion

The current study replicated and extended the previous evidence on crosslinguistic generalization of semantic therapy to the Indian context. The outcomes from the current study provide empirical evidence for selecting language of treatment in bilingual persons with aphasia in the pervasively bi-/multilingual Indian context.

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References

Boyle, M., & Coelho, C. A. (1995). Application of semantic feature analysis as a treatment for aphasic dysnomia. *American Journal of Speech Language Pathology, 4*, 94-98.

Chengappa, S. K., & Kumar, R. (2008). Normative and Clinical data on the Kannada version of Western Aphasia Battery (WAB-K). Online Journal www.languageinindia.com, Vol. 8(6).

Edmonds, L. A., & Kiran, S. (2006). Effect of semantic naming treatment on crosslinguistic generalization in bilingual aphasia. *Journal of Speech Language and Hearing Research, 49*, 729-748.

Kroll, J. F., & Stewart, E. (1994). Category interference in translation and picture naming: evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language, 33*(2), 149-174.

Paradis, M. & Rangamani, G.N. (1989) *Bilingual Aphasia Test* (English-Kannada version) Hillsdale, NJ: Lawrence Erlbaum, 12pp.

Shanthala. M. S. (1997). Naming deficits in Aphasics. Unpublished dissertation submitted to the University of Mysore, Mysore.

Table 1: Demographic and linguistic proficiency data of the participants

Participant	Gender	Age (years)	Education	Etiology	MPO	Self-ratings: Premorbid proficiency in English/Kannada (1-least proficient; 7-most proficient)	Bilingual proficiency rating
P1	Male	60	Graduate	CVA	15	Speech:7/7 Comp: 7/7 Reading:7/7 Writing:6/7	1.00
P2	Male	58	Graduate	CVA	11	Speech:5/7 Comp:7/7 Reading:6/7 Writing:5/7	1.16
P3	Male	24	Graduate	CVA	13	Speech:5/7 Comp:6/7 Reading:6/7 Writing:5/7	1.27

Table 2: Performance of participants on various test of language in Kannada and English

	Participant 1				**Participant 2**				**Participant 3**			
Western Aphasia Battery (Scores in %)	**English**		**Kannada**		**English**		**Kannada**		**English**		**Kannada**	
	PRE	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***
Spontaneous speech	70	*80*	65	*70*	60	*75*	55	*60*	30	*45*	35	*55*
Auditory comprehension	75	*80*	75	*80*	60	*70*	65	*75*	36.6	*50*	40	*50*
Repetition	68	*76*	73	*81*	64	*73*	60	*80*	30	*47*	34	*46*
Naming	65	*75*	60	*70*	45	*60*	40	*55*	26.6	*45*	28.3	*48.3*
Auditory word recognition	66.7	*71.6*	61.6	*68.3*	53.3	*61.6*	58.3	*65*	35	*46.6*	31.6	*51.6*
Sequential commands	72.5	*78.75*	55	*62.5*	55	*63.7*	55	*66.2*	31.2	*42.5*	28.7	*48.7*
Word fluency	40	*50*	40	*55*	35	*50*	40	*55*	25	*40*	30	*45*
Sentence completion	80	*80*	60	*80*	40	*60*	60	*60*	40	*60*	40	*60*
Responsive speech	80	*80*	80	*80*	40	*60*	40	*50*	50	*60*	40	*60*
Reading	70	*80*	75	*80*	37.5	*52.5*	45	*60*	30	*45*	37.5	*52.5*
Reading commands	60	*65*	70	*75*	50	*70*	55	*70*	30	*45*	35	*50*
Written word stimulus - object choice matching	100	*100*	83.3	*100*	66.6	*66.6*	66.6	*83.3*	66.6	*83.3*	66.6	*66.6*
Written word stimulus- picture choice matching	100	*100*	83.3	*100*	66.6	*83.3*	50	*83.3*	66.6	*83.3*	50	*83.3*
Picture stimulus written word choice matching	100	*100*	100	*100*	50	*66.6*	66.6	*66.6*	50	*83.3*	50	*66.6*
Spoken words written word choice matching	100	*100*	100	*100*	50	*50*	50	*75*	50	*66.6*	50	*66.6*
Spelled word recognition	66.6	*66.6*	83.3	*83.3*	83.3	*100*	83.3	*83.3*	50	*66.6*	66.6	*83.3*
Spelling	50	*66.6*	66.6	*66.6*	83.3	*83.3*	66.6	*66.6*	66.6	*83.3*	66.6	*83.3*
Bilingual Aphasia Test	**English**		**Kannada**		**English**		**Kannada**		**English**		***Kannada***	
	PRE	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***
Pointing	100	*100*	100	*100*	80	*100*	70	*90*	40	*80*	30	*70*
Semicomplex commands	90	*100*	80	*90*	60	*70*	60	*80*	30	*50*	30	*60*
Verbal auditory discrimination	72.2	*77.7*	77.7	*83.3*	72.2	*83.3*	66.6	*72.2*	27.7	*44.4*	33.3	*55.5*
Judgment of words/non words	86.6	*93.3*	76.6	*90*	63.3	*70*	73.3	*80*	33.3	*56.6*	23.3	*53.3*

Naming	70	*80*	65	*70*	60	*75*	65	*75*	20	*55*	15	*45*
Word repetition	100	*100*	96.6	*100*	70	*86.6*	80	*86.6*	63.3	*76.6*	66.6	*80*
Semantic categories	80	*80*	80	*80*	60	*80*	60	*60*	40	*60*	60	*80*
Semantic opposites	70	*80*	60	*70*	60	*60*	50	*60*	20	*60*	30	*50*
Semantic acceptability	80	*90*	100	*100*	70	*80*	70	*90*	60	*70*	50	*70*
Synonyms	60	*80*	80	*80*	40	*60*	60	*80*	40	*80*	40	*80*
Antonyms	60	*80*	80	*100*	40	*40*	40	*60*	40	*60*	20	*60*
Antonyms 2	80	*80*	40	*60*	60	*80*	60	*60*	20	*40*	40	*60*
Reading words	90	*100*	100	*100*	50	*70*	70	*80*	20	*50*	30	*50*
Reading sentences	60	*70*	80	*80*	40	*50*	50	*50*	20	*40*	20	*50*
Boston Naming Test	**English**		**Kannada**		**English**		**Kannada**		**English**		**Kannada**	
	PRE	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***	**PRE**	***POST***
	53.3	*61*	47	*54.3*	35	*53.7*	33.3	*48*	21.7	*53*	27.3	*46.7*