

Critical Review:

In bilingual adults with aphasia, does providing treatment in the second language (L2) lead to cross-linguistic generalization to the first and untreated language (L1)?

Michelle Mercier

M.Cl.Sc (SLP) Candidate

University of Western Ontario: School of Communication Sciences and Disorders

This critical review examined the evidence since 2010, with regards to cross-linguistic treatment generalization from the second (L2) to first language (L1) in individuals with bilingual aphasia. A literature search using computerized databases yielded six articles that met the inclusion criteria. Study designs included a systematic review, a single-subject multiple baseline design and case studies. Overall, the evidence gathered for this review remains suggestive and inconclusive. Recommendations regarding future research and implications for clinical practice are provided.

Introduction

The most effective rehabilitative treatment method for bilingual adults with aphasia remains unclear. More specifically, concerning whether the intervention should be provided in the patient's first language (L1), second language (L2) or all languages (Radman, Spierer, Laganaro, Annoni, & Colombo, 2016).

Ansaldi & Saidi (2014), reported that there is a large and continually growing bilingual population throughout the world. For the purposes of this review, bilingualism will refer to the use of two or more languages consistently in an individual's everyday life (Grosjean, 1994).

Aphasia is an acquired language disorder that results from damage to the brain through a variety of conditions, although most commonly stroke. The prevalence of aphasia is increasing due to lower stroke mortality rates and an aging population (Code & Petheram, 2011). With a growing bilingual population and with the increasing prevalence of aphasia, there is a rising number of bilingual adults with aphasia (Roberts & Kiran, 2007).

An important consideration in the treatment of bilingual aphasia is in regards to cross-linguistic generalization (CLG). CLG or cross-linguistic transfer (CLT) refers to occasions when the provision of treatment in one of the languages of a bilingual individual appears to benefit not only the treated language but also the non-treated language(s) (Koumanidi Knoph, 2013). CLT remains scarcely researched and needs to be further explored (Ansaldi, Marcotte, Scherer, & Raboyeau, 2008), to determine in which direction (from L1 to L2 or L2 to L1) and under what conditions it occurs (Koumanidi Knoph, 2013).

Clinically, there is an increased importance and need to address bilingual aphasia intervention, however, currently there are no transparent guidelines (Kiran,

Sandberg, Gray, Ascenso, & Kester, 2013). Speech-language pathologists (SLPs) will often not be able to provide bilingual therapy and must depend on the resources available to them (Ansaldi et al., 2008). For many bilingual individuals living in their L2 environment, it is likely that the provision of treatment by SLPs will only be available in the client's L2 (Goral, Levy & Kastl, 2010). It is essential to determine whether there are beneficial outcomes to an individual's L1 following the provision of therapy in L2 (Goral, Levy, & Kastl, 2010).

Objectives

The primary objective of this paper is to critically analyze the existing literature, regarding cross-linguistic generalization following treatment provided in the second language of bilingual adults with aphasia.

Methods

Search Strategy

Online databases including the Western University library database and Google Scholar were searched using the following search terms:

((Bilingual Aphasia) OR (Biling* Aphasia))
AND ((L2 Therapy) OR (Unilingual Therapy)
OR (Therapy) OR (Cross-linguistic Transfer)
OR (Cross-linguistic Generalization)).

Reference lists of the articles selected were also searched for relevant articles.

Selection Criteria

Studies selected for inclusion were required to investigate the occurrence of cross-linguistic generalization following the implementation of any type of treatment in the L2 of individuals with bilingual aphasia.

Articles must also have been published after the year 2010.

Data Collection

The results of the literature search yielded six articles congruent with the selection criteria. The articles included a systematic review, one single-subject multiple baseline design and four case studies. Notably, one case study (Goral, Levy, & Kastl, 2010), is an alternate report of a case included in the systematic review, but was included here because it was a separate publication.

Results

Systematic Review

A systematic review is a method of study that synthesizes the available literature pertaining to a specific research question. They intend to provide an honest evaluation of the question by implementing rigorous methodology (Kitchenham, 2004). Based on the evidence gathered, it can provide more reliable conclusions to be drawn as compared to those provided by individual studies. Systematic bias is a risk when conducting systematic reviews due to potential publication bias of the individual studies (Kitchenham, 2004).

Faroqi-Shah, Frymark, Mullen, and Wang (2010) examined eight different questions. Of relevance to the current paper were two questions examining CLT to untreated L1. The review included well-defined inclusion criteria and a comprehensive search strategy. An appropriate appraisal was completed by two differing authors, with good inter-rater reliability demonstrated for the instrument. Appropriate statistical analyses compared individual study results.

Results indicated receptive language improvement in both L2 and untrained L1 for three of five studies. For expressive language skills, CLT from L2 to L1 was observed in five of eleven studies. Authors acknowledged interpretive limitations due to the small sample size of included studies. Another limitation included the lack of meta-analytic analyses across studies.

Overall, this study provides highly suggestive evidence that CLT from L2 to L1 can occur, but is not found consistently.

Case Study Designs

Case studies are in-depth investigations of a single individual or group. They are a common design employed in the research for bilingual aphasia and can be helpful in determining future research. However, due to their small sample sizes, case studies are not typically generalizable.

Koumanidi Knoph (2013) examined whether treatment of verb production in the weaker L2 would lead to improvement in both languages. The participant was a 64-year old Arabic (L1) and English (L2) speaking male with chronic moderate to severe non-fluent receptive and expressive aphasia. The author provided a clear and suitable rationale for the study. Thorough case details regarding the participant and his language history were outlined, however, participant eligibility and selection criteria was not specified. Appropriate language measures were completed in both languages pre- and post-treatment. Therapy was provided in the participant's L2 for two 1.5- hour sessions a week for ten weeks.

Appropriate statistical analyses demonstrated significant gains in the overall scores in both languages. For sub scores, however, only the semantic domain in L1 showed a significant improvement. Effect sizes were also reported; however, their calculation was unclear. The author acknowledged interpretive limitations of a single case.

Overall, this study provides a suggestive level of evidence which lends support for cross-linguistic generalization to the untreated L1 in bilingual adults with aphasia.

Miller Amberber (2012) investigated whether providing treatment in English (L2), to a late, proficient French-English bilingual, five years post stroke would improve both languages. The participant was a 59-year old woman who suffered a left temporo-parietal cerebrovascular accident (CVA), which initially presented as Global aphasia but resolved to moderate-severe Broca's aphasia. Participant eligibility criteria for this study was adequate for the design. Sufficient participant details and language history were reported for both L1 and L2. She received intervention of moderate intensity over a 16-week period, four times per week for 45 minute sessions. Both languages were assessed pre- and post-treatment using an appropriate measure.

Post-treatment results indicated that the participant made significant improvements in spoken expression and comprehension in L2 but not in L1. Notably, the post-treatment improvements in L2 did not surpass the pre-treatment scores in L1. Appropriate statistical analysis was conducted. Validity of the results and the conclusion regarding cross-linguistic generalization are questioned since the participant reached ceiling in many tasks in L1, prior to treatment. The author acknowledged the participant's previous intervention in L1, as a variable that may have also impacted results. The study would have been strengthened if multiple baselines and probes were used throughout treatment to determine changes between sessions.

This study provides suggestive evidence for the lack of cross-linguistic generalization to the first language following treatment in L2.

Goral, Levy, and Kastl (2010) aimed to investigate whether providing treatment in the participant's L2, English, resulted in cross-linguistic generalization. The participant was a 49-year old trilingual (Hebrew, English, French) speaker with chronic mild nonfluent aphasia due to a left middle cerebral artery (MCA) CVA that resulted in a fronto-temporal parietal lesion. There were no selection criteria identified for the participant. However, case details and language history were adequately explained.

Measurements were collected in all three languages pre- and post-treatment blocks using appropriate measures. This study was enhanced by the collection of these measurements to confirm stability in performance for several tasks. However, the present paper only reported data from one task. Stimulus was repeatedly used between languages which may have had practice effects. The participant received two three-week blocks of treatment via telepractice. Which consisted of nine one-hour sessions with a three week break between blocks. The first block focused on morphosyntactic skills and the second, on language production rate. Appropriate analysis was conducted, with good inter-rater reliability. However, no information was provided regarding the type of treatment or improvements made during the participant's therapy prior to the study.

The results demonstrated improvements in the participant's production of morphosyntactic elements and speech rate in the treated language (L2) and L3, French, but no changes were observed in L1, Hebrew. A limitation of the study included the small effect sizes.

Overall, this study provides suggestive evidence against cross-linguistic generalization to the untreated (L1) language, due to the design, small sample size and methodology.

Radman, Spierer, Laganaro, Annoni, and Colombo (2016) examined whether the provision of treatment in a patient's L2, French, would cause behavioural and electrophysiological cross-linguistic generalization to L1 (Persian) word production. The patient was a 52-year old Persian-French bilingual woman, who experienced a left fronto-temporo-parietal ischemic stroke which resulted in Global aphasia and evolved to Broca's aphasia. Assessment of language performance was conducted using appropriate measures and tasks. Assessment stimuli were suitable although items were presented repeatedly which could have implications for practice effects. Electroencephalography (EEG) was also

recorded during those tasks in both languages pre- and post-treatment. Treatment consisted of intensive lexical-phonological therapy, for five sessions per week over four weeks. The patient was treated on one list of 72 words and received a total of 16-hours of therapy. Treatment protocol was clearly described and implemented as intended. Appropriate statistical measures allowed for analysis between factors.

Results post-treatment indicated that improvements were made in naming for the treated L2 items, without any CLG to L1 or the untrained L2 items. The EEGs similarly indicated a response strictly for the trained items in L2. A limitation of the study was the lack of a control condition.

This study provides suggestive evidence for the lack of cross-linguistic generalization from L2 to the untreated L1.

Single-Subject Multiple Baseline Design

Single-subject multiple baseline designs consist of a single individual who receives an intervention and from which outcomes are continually assessed over a period of time. This is an appropriate method for testing the occurrence of cross-linguistic generalization following L2 treatment as it allows for the comparison between baselines to determine treatment effects. Due to the small population within this design, results must be interpreted and generalized with caution.

Padilla and Mayer (2012) examined whether providing treatment in English, the non-dominant language (L2) of two Spanish/English bilingual adults with aphasia, would improve naming in both languages. Baseline measures and post-treatment performance were established in both Spanish and English. Confrontation naming probes were also completed during every other session. The two participants received English-only semantic naming treatment for one-hour, once per week. The first participant withdrew from the study after sixteen sessions and did not complete any post-treatment testing. The second participant, a 58-year old male who learned English as an adult, completed 20 sessions throughout 20 weeks. He had a left fronto-parietal stroke resulting in Broca's aphasia and was six months post stroke at the time of the intervention.

Results of the study indicated no significant changes in the overall test scores, with changes observed in individual subtests for participant two. Results showed highly variable performance during the probes indicating cross-linguistic generalization to the untrained, semantically related words in Spanish. They concluded that treatment for the one participant resulted in the

improvement of general naming abilities in both languages.

While strengths of the study included the use of multiple baselines, probes and appropriate statistical analysis for within treatment performance. It had many limitations given that it was reported as a conference proceedings paper. It lacked details regarding participant selection criteria and language history. Baseline measures and post-treatment performance results were displayed in graphs, with minimal description in the paper. Other limitations included the use of different standardized tests between languages and the lack of reported results in the paper.

Overall, this study showed equivocal evidence based on the nature of the paper and the analysis of the data. It would benefit from further completion and the peer-review process.

Discussion

Relatively little is known about the best practices for language therapy in bilingual aphasia (Faroqi-Shah et al., 2010). The systematic review conducted by Faroqi-Shah et al. (2010), showed that CLG occurred to L1 in a number of the studies examined. However, there remained inadequate evidence to show a true correlation. This critical review focused on research conducted after Faroqi-Shah et al.'s systematic review to determine if there is newer and further evidence to support CLG. Overall, the evidence examined was inconsistent with relevant studies differing in many variables relating to participants, languages and treatments as well as inherent limitations with study designs.

Two studies (Koumanidi Knoph, 2013; Padilla and Mayer, 2012) reported improvements in both languages following treatment, supporting the notion of CLG. However, caution is warranted given that the Padilla and Mayer study's evidence was considered equivocal. In contrast, the remaining studies (Miller Amberber, 2012; Radman et al., 2016; Goral, Levy and Kastl, 2010), concluded that treatment in the second language did not benefit the first language. These latter studies provided suggestive evidence consistently. If anything, these results suggest that treatment in L2 does not benefit L1.

One reason for the confusing results across studies could be related to the multiple potential influencing factors such as type of aphasia, language dominance and proficiency, language conceptual systems, previous treatment and types and intensity of treatment (Ansaldi et al., 2008; Faroqi-Shah et al., 2010). Notably, it would be challenging to conduct a study that controlled for all these variables.

However, a factor of interest was lexical similarity, as suggested by Goral, Levy and Kastl (2010). In this study, the authors identified that CLG from L2 to L3 was possibly due to similar linguistic origins and shared structures and representations at the lexical level between English and French. Whereas the lack of observed transfer to L1 could have been due to differential processing and representation between English and Hebrew. Similarly, Radman et al., (2016) proposed that the absence of CLG in their study may have been due to the differences in linguistic structures in the patient's two languages. This factor could explain the results of these studies, and it could have clinical implications for this population.

Another factor of interest was language dominance and proficiency prior to treatment. Koumanidi Knoph (2013) suggested the results in support of CLG could have been interpreted based on the participant's relative strength and dominance in L1 prior to therapy. In contrast, Miller Amberber (2012) and Goral, Level, and Kastl (2010) suggested another possible explanation for the lack of significant increase in the participant's L1 scores may have been related to high proficiency and ceiling performance in L1 prior to treatment. Many other factors likely impacted the conclusions of the studies, however they are beyond the scope of the current review.

Overall, the literature beyond the systematic review continues to provide insufficient compelling evidence. Therefore, no definitive conclusions can be rendered. Research is definitely lacking in this area, and there are inherent limitations to single subject case studies. Thus, further research is needed.

Recommendations

Further research considerations:

Further research should be conducted to determine a viable course of treatment for individuals with bilingual aphasia, as this population is becoming more common in clinical practice. Therefore, it is recommended that future research:

- Should utilize study designs that have stronger levels of evidence, with larger sample sizes and control conditions, when possible, to increase statistical power.
- Investigate across a range of differing language combinations to explore the issue of CLG and to determine clear treatment protocols.
- Consider the implications of factors such as language dominance, previous treatment, age of acquisition, language usage and language proficiency.

- Should follow the guidelines outlined by Faroqi-Shah et al. (2010), when conducting research in this area.

Clinical Implications

The study of bilingual aphasia and cross-linguistic generalization has several implications for SLPs working in a clinical setting with adult populations. Treatment in which there is CLG to the untreated language would allow for more flexibility in the services provided by Speech-Language Pathologists (Koumanidi Knoph, 2013). Currently, there is insufficient evidence to determine whether CLG will occur to the untreated first language of an individual with bilingual aphasia following the provision of treatment in the second language, probably due to the multiple factors influencing outcomes. Therefore, it is recommended that Speech-Language Pathologists working with bilingual individuals with aphasia be cautious and use clinical judgement when implementing the findings of these studies into clinical practice, until further research has been conducted.

References

- Ansaldò, A. I., Marcotte, K., Scherer, L., & Raboyeau, G. (2008). Language therapy and bilingual aphasia: Clinical implications of psycholinguistic and neuroimaging research. *Journal of Neurolinguistics*, 28, 539-557.
- Ansaldò, A. I., & Saidi, L. G. (2014). Aphasia therapy in the age of globalization: effects of cross-linguistic therapy effects in bilingual aphasia. *Behavioural Neurology*, 2014(3), 1-10.
- Code, C., & Petheram, B. (2011). Delivering for aphasia. *International Journal of Speech-Language Pathology*, 13(1), 3-10.
- Faroqi-Shah, Y., Frymark, T., Mullen, R., & Wang, B. (2010). Effect of treatment for bilingual individuals with aphasia: A systematic review of the evidence. *Journal of Neurolinguistics*, 23(4), 319-341.
- Goral, M., Levy, E. S., & Kastl, R. (2010). Cross-language treatment generalisation: A case of trilingual aphasia. *Aphasiology*, 24(2), 170-187.
- Grosjean, F. (1994). *Individual bilingualism: In The encyclopedia of language and linguistics*. Oxford: Pergamon Press.
- Kiran, S., Sandberg, C., Gray, T., Ascenso, E., & Kester E. (2013). Rehabilitation in bilingual aphasia: evidence for within and between-language generalization. *American Journal of Speech Language Pathology*, 22(2), 1-20.
- Kitchenham, B. (2004). Procedures for Performing Systematic Reviews. Retrieved from: <http://www.inf.ufsc.br/~aldo.vw/kitchenham.pdf>
- Koumanidi Knoph, M. I. (2013). Language intervention in Arabic-English bilingual aphasia: A case study. *Aphasiology*, 27(12), 1440-1458.
- Miller Amberber, A. M. (2012). Language intervention in French-English bilingual aphasia: Evidence of limited therapy transfer. *Journal of Neurolinguistics*, 25(6), 588-614.
- Padilla, C. T., & Mayer, J. (2012). Cross-linguistic generalization in treatment of bilingual aphasia. *Clinical Aphasiology Paper*.
- Radman, N., Spierer, L., Laganaro, M., Annoni, J. M., & Colombo, F. (2016). Language specificity of lexical-phonological therapy in bilingual aphasia: A clinical and electrophysiological study. *Neuropsychological Rehabilitation*, 26(4), 532-557.
- Roberts, P. M., & Kiran, S. (2007). Assessment and treatment of bilingual aphasia and bilingual anomia. *Speech and language disorders in bilinguals*, 109-130.