

Critical Review:

Generalization of the effects of fluency treatment between languages in bilingual individuals who stutter

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This critical review examines the evidence regarding the generalization of fluency treatment effects from a treated to an untreated language in bilinguals who stutter. Studies evaluated included three single-subject studies, one case study, and one within-groups study. Overall, study findings suggest that fluency treatment effects do generalize to the untreated language, though limitations to the studies necessitate cautious application of results. Recommendations for future research and clinical practice are discussed.

Introduction

Bilingualism is defined as the “use of two or more languages (or dialects) in everyday life” (Grosjean, 2013, p. 5). Greater than 50% of the global population is estimated to be bilingual (Van Borsel, 2011), and in Canada alone, estimates show there are over 6.8 million bilingual individuals (Statistics Canada, 2016). Perhaps surprisingly, most bilinguals are not perfectly fluent in both their languages, did not learn both languages from birth, and might even have an accent when speaking one of their languages (Grosjean, 2013).

An area of growing interest in the field concerns the overlap between developmental stuttering and bilingualism. Developmental stuttering or stammering, otherwise known as developmental speech fluency disorder, is defined by the World Health Organization as “persistent and frequent or pervasive disruption of the rhythmic flow of speech that arises during the developmental period... and results in reduced intelligibility and significantly affects communication” (2018). Some studies have found that there is a higher prevalence of stuttering in bilinguals compared to monolinguals, with theories proposing that this could be due to the extra processing demands from managing two languages, which could result in instability in the speech production system (see Van Borsel, Maes, & Foulon, 2001 for an indepth discussion of the theories). Evidence also suggests that bilinguals tend to stutter in both languages, though the severity of stuttering and pattern of stuttering may differ; it is likely they will stutter more in their non-dominant language (Lim, Lincoln, Yiong, & Onslow, 2008; Van Borsel et al., 2001).

Given the high rates of global bilingualism, and the possibility that bilinguals may experience elevated levels of developmental stuttering, speech-language pathologists (SLPs) are likely to encounter bilinguals who stutter (BWS) in their practice. However, there are currently no established guidelines on how best to treat

BWS, including whether they can be effectively treated in just one language, or whether they should be treated in both languages (Lim, Lincoln, Onslow, & Chan, 2015). Studies of bilinguals in other disorder areas, such as aphasia and speech sound disorder, have found treatment gains in both languages despite treatment being given in only one language (see Lim et al., 2015 for examples). Treating in one language would be preferred as it would minimize the need to look for an SLP proficient in the client’s specific combination of languages or the need to hire and train an interpreter if the former were not possible. Nevertheless, treatment in one language would have to be proven effective at reducing stuttering in *both* languages to be an acceptable treatment strategy; in other words, we require evidence of generalization of fluency treatment effects from the treated to the untreated language.

Objectives

The primary objective of this paper is to critically review the existing literature regarding whether fluency treatment effects in a treated language generalize to an untreated language in BWS. The secondary objective is to propose clinical implications and evidence-based recommendations for speech-language pathologists practicing in stuttering treatment.

Methods

Search Strategy

Computerized databases such as Scopus, CINAHL and PubMed, as well as online search engine Google Scholar, were searched for journal articles. The initial search terms were (bilingualism AND stuttering treatment). On Google Scholar, the additional term ‘generalization’ was added. Relevant studies were also obtained using reference lists of previously searched articles and book chapters.

Selection Criteria

Studies selected for inclusion in this review were required to measure or describe treatment outcomes in both languages spoken by bilingual individuals with developmental stuttering disorders. The treatment had to have been administered in only one language, and the article had to be written in the English language.

Data Collection

Results of the literature search yielded five articles that met the selection criteria. Three of the articles were single-subject designs (Priyanka & Maruthy, 2019; Vong, Wilson, & Lincoln, 2016; Woods & Wright, 1998), one was a case study (Lim & Lincoln, 2011), and one article was a within-groups design (Lim et al., 2015).

Results

Woods and Wright (1998) investigated whether simplifying the Regulated Breathing treatment for stuttering to one component (noncontingent diaphragmatic breathing) provided in English (the second language) over 3 treatment sessions (1 hour each; 1-2 weeks apart) would be effective in increasing fluency in Russian in a single-subject study on a 28-year old Russian-English bilingual male who stutters. Words per minute and percentage of words stuttered in English when reading a passage (source not fully described) and during a monologue were measured across two consecutive baseline sessions, three treatment sessions, and again at 1-, 3- and 6-months post-treatment. Additionally, ratings of duration of stuttering moments and of secondary behaviours were completed for 4 recordings (2 each, randomly selected from baseline and post-treatment) using a gold standard measure by 3 individuals described as experienced professionals. Acceptable reliability of the ratings was demonstrated. Visual inspection only revealed a substantial decrease in stuttering in English which was also reflected in the length of his stutters and secondary behaviours. The participant self-reported that his fluency levels in both English and Russian were similar at the start of the study, and that at the end of the study, he experienced a decrease in stuttering in Russian (about equal to the decrease in stuttering in English).

Strengths of this study include the use of commonly employed measures of stuttering, multiple raters, and acceptable reliability. Weaknesses include the lack of detail regarding procedures, use of visual inspection only in data analysis, and few data points. Most concerning, however, for the purposes of the present review was the lack of direct measurement of fluency in Russian.

Overall, this study provides equivocal evidence that fluency treatment effects in the treated language generalize to the untreated language.

Priyanka and Maruthy (2019) examined whether the effects of a fluency-shaping treatment would show generalization to untreated languages in five bilingual male adults (ages 18–29) who stutter (participants spoke two of the following languages: Kannada, Hindi, Malayalam, Tamil, and/or English), recruited from a speech diagnostic clinic in India. A modified ABA (baseline, treatment, withdrawal) single-subject design was used, with three baseline and withdrawal sessions each, and anywhere from 10 to 14 treatment sessions in the participants' first language (five days a week, one hour per session, until a specific fluency level was reached). Outcome measures included percent syllables stuttered during recordings of 200-300 syllable monologues on familiar topics in both languages completed at the beginning of each session in all phases. Two experienced, multilingual speech-language pathologists blinded to the study purposes completed analyses of session recordings with good reliability. A gold standard measure was used to assess stuttering severity and a formal test was used to determine language proficiency in both languages for each participant. Appropriate statistical analysis revealed statistically significant reductions in stuttering in both languages spoken with extremely large effect sizes.

Strengths of this study include the variety in participants' linguistic backgrounds, the ABA single-subject design, detailed procedural descriptions, use of direct objective measures for fluency in both languages, multiple raters, acceptable reliability, and use of effect sizes for data analysis. The study could be improved by including more extensive statistical analyses (e.g., between-language comparisons, as only within-language comparisons were done), as well as by counterbalancing the order in which speech samples were collected.

Overall, this study provides compelling evidence for generalization of fluency treatment effects to the untreated language.

Vong et al. (2016) investigated the effects of a well-known direct treatment program for young children who stutter, administered by trained caregivers, and whether treatment effects would generalize to untreated languages in a single-subject study on 2 Malaysian English-Mandarin bilingual children who stutter (age 3;9 and 4;9 at study outset) and their families. Treatment was administered according to the treatment program's protocol, over a period of 24–36 weeks (21–31 sessions), depending on the children's stuttering

levels. Caregivers attended coaching sessions with a speech-language pathologist in the clinic in the selected language and then delivered treatment to the children at home in the selected language only. Outcome measures included caregivers' weekly stuttering severity ratings, as well as percent syllables stuttered (%SS) and syllables per minute in 10-minute out-of-clinic recordings (in both languages) at 1 month and 1 week pre-treatment, immediately after treatment, then again at 1 month, 3 months, 6 months, and 12 months post-treatment. One speech-language pathology student and one practicing speech-language pathologist, both bilingual in English and Mandarin and blinded to the study aims, completed analyses of the recordings with good reliability. Visual inspection of the data indicated that both children substantially decreased in %SS in both languages.

Strengths of this study include the clarity of eligibility criteria for participants, a detailed description of procedures, use of direct objective measures of fluency in both languages, multiple raters, and acceptable reliability. Weaknesses in the study include the small number of participants, lack of outcome measures during the treatment phase, and use of visual inspection only for data analysis.

Overall, this study provides suggestive evidence that fluency treatment effects can generalize to the untreated language in children who are provided treatment through trained caregivers.

Lim and Lincoln (2011) investigated whether language dominance influences generalization of fluency treatment effects in a case study on two male bilingual English-Mandarin speakers (27 and 28 years old) who stutter from Singapore; one participant was English-dominant while the other was Mandarin-dominant (both had participated in a previous study by the authors; see Lim, Lincoln, Yiong, & Onslow, 2008). A formal vocabulary assessment and a validated self-report questionnaire were used to measure language proficiency in both languages, and results were used in conjunction with a validated tool to determine language dominance. Participants were treated using an intensive fluency-shaping program in English only, consisting of three 8-hour sessions on three consecutive days, followed by six follow-up sessions (to aid maintenance of gains) once per week for two hours each. Samples of conversation in both languages were taken pre-treatment, immediately after the 3-day intensive program, then at 4- and 12-weeks follow-up; of these samples, three 10-minute conversations from each time point were selected and analyzed for mean percent syllables stuttered by 2 English-Mandarin bilingual clinicians. Visual analysis of the data indicated that

fluency increased in both English and Mandarin for each participant; however, greater gains were seen in the participants' dominant language and these gains were more stable over time than in the non-dominant language.

Strengths of this study include use of direct and objective measures for stuttering in both languages, use of validated tools for measuring language proficiency and categorizing language dominance, as well as use of multiple raters. Weaknesses include the lack of detail regarding procedures and reliability scores, the use of visual inspection only for data analysis, and the case study design.

Overall, this study provides suggestive evidence that effects of fluency treatment can generalize to the untreated language.

Lim et al. (2015) examined generalization from an intensive fluency-shaping program in English to an untreated language (Mandarin) in a within-groups study of 19 English-Mandarin bilingual adolescents and adults who stutter (18 males, 1 female; 12–47 years old) from Singapore. Treatment consisted of three 8-hour sessions on three consecutive days, followed by six follow-up sessions (to aid maintenance of gains) once per week for two hours each. Conversational speech samples (approx. 10 minutes long/1025 syllables each) on familiar topics were collected inside and outside the clinic environment in both languages before treatment, immediately after the 3-day intensive program, then again at 4- and 12-weeks follow-up. Sample collection was counterbalanced such that half the participants recorded their samples in English first, while the other half recorded in Mandarin first. Two English-Mandarin bilingual speech-language pathologists who were blinded to the study goals analyzed the samples for percent syllables stuttered (%SS) and syllables per minute, with ratings for only %SS reaching acceptable reliability. Appropriate statistical analyses revealed that significant increases in fluency with very large effect sizes in %SS at all time points compared to pre-treatment levels in both languages. Sampling environment had no significant effect on %SS and factors such as age or years of formal language instruction were not significantly related to %SS. The only significant correlations were between proficiency ratings for speaking and reading English and decreases in stuttering at 4- and 12-weeks follow-up.

Strengths of this study include the large number of participants, detailed description of procedures, use of direct and objective measures of stuttering in both languages, use of counterbalancing, consideration of multiple factors potentially affecting the dependent

variable, and use of several statistical methods to effectively analyze data. The study could be improved by using a more comprehensive measure for overall stuttering severity, since %SS is only one factor contributing to severity ratings.

Overall, this study provides compelling evidence that the effects of stuttering treatment in one language can generalize to an untreated language.

Discussion

Altogether, the findings from the studies provide moderately suggestive evidence for the generalization of fluency treatment effects from the treated to the untreated language in BWS across several language combinations (including English, Mandarin, Tamil, Kannada, Malayalam, and Hindi), for several age groups (young children as well as adolescents and adults), and using two different treatment approaches (trained caregiver vs. SLP treatment administration). However, the small sample sizes, inherent weaknesses of the study designs (particularly single-subject and case study), and lack of statistical analyses among several of the studies reduce the strength of the evidence and limit the ability to confidently apply the findings to clinical practice.

Future research considerations:

It is recommended that further research be conducted to determine factors affecting generalization of fluency treatment effects, such as the language of treatment (dominant vs. non-dominant language), and to investigate long-term maintenance of gains. The following recommendations should be considered by future studies:

- a) Study designs that provide stronger levels of evidence should be employed and larger sample sizes obtained so that findings have greater generalizability and can thus be applied with greater confidence in the clinical setting.
- b) Participants from diverse language populations should be selected to determine whether findings apply to any combination of languages or whether linguistic factors may influence generalization.
- c) Statistical analyses of stuttering levels pre- and post-treatment should be conducted in both participants' languages and comparisons between languages made, to allow for interpretations surrounding statistical significance.
- d) Perceptual measures of stuttering that take into account participants' feelings towards their stuttering and its psychosocial effects should be incorporated to gauge social validity of treatment effects.
- e) Other types of fluency treatment programs apart from fluency shaping (e.g., stuttering modification) should be incorporated to determine whether type of fluency treatment program affects generalization.

Clinical Implications

While the current clinical review found that there is some evidence that fluency treatment in one language can generalize to the other language in BWS, clinicians should proceed with caution when applying these findings in practice due to the limited strength of the evidence.

It is recommended that clinicians follow guidelines for cultural and linguistic considerations when treating BWS as with any other disorder population. This may mean providing stuttering treatment in both languages (perhaps starting with the dominant/preferred language, as some studies in this review seem to suggest that this would result in the greatest generalization effects) through a colleague or an interpreter if the clinician is not bilingual, or, if that is not possible, providing stuttering treatment in the client's dominant/preferred language only while continually monitoring the client's progress in both languages (e.g., through client self-report).

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