The Graduate Review

Volume 7 Article 17

2022

Comparison of Maintenance Gains From Two Treatment Approaches for Patients Diagnosed with Apraxia of Speech and Broca's Aphasia: A Critically Appraised Topic

Kalli B. Whiting
Bridgewater State University

Comparison of Maintenance Gains From Two Treatment Approaches for Patients Diagnosed with Apraxia of Speech and Broca's Aphasia: A Critically Appraised Topic

KALLI B. WHITING
Bridgewater State University

Clinical Background

There is a firm understanding that apraxia of speech (AOS) involves disruptions in the spatial and temporal planning and/or programming of speech production movements (Ballard et al., 2015); however, the evidence-based support for treatment remains limited in both quantity and quality. Compared to other approaches, the articulatory-kinematic approach has been researched most extensively. There is a broad array of interventions within the category of articulatory-kinematic treatment approaches; however, there is a lack of knowledge regarding which approach yields stronger maintenance gains, post-treatment. This critically appraised topic (CAT) compares sound-production treatment, the most frequently studied approach, to the speech-motor learning approach, a newer but advancing treatment. The purpose of this CAT is to evaluate the best available evidence to date regarding maintenance of articulatory accuracy as a result of intervention for acquired apraxia of speech concomitant with Broca's Aphasia, a form of aphasia in which a person knows what they want to say but is unable to produce the words or sentence.

The two treatment approaches vary according to their clinical focus. The speech-production treatment approach focuses on minimal contrast practice of sounds at the word, phrase, and/or sentence level, produced incorrectly during pretreatment testing (Wambaugh et al., 2013). The speech-motor learning approach emphasizes and targets the initial phonological plan of an utterance and incorporates three motor phases, including motor planning of speech, motor programming, and execution (van der Merwe, 2011). As it is vital to ensure treatment is maximizing clients' time and abilities, there is a need to specify the most beneficial approaches for the specific population.

Clinical Bottom Line

Three peer-reviewed research articles demonstrated benefits in using the articulatory-kinematic approaches of sound-production treatment (SPT) and speech motor learning (SML) for intervention of patients, over the age of 50, diagnosed with apraxia of speech (AOS), concomitant with aphasia. This CAT was intended to review and compare the treatment maintenance between the two approaches, using a specific search question; however, there was limited evidence for the specified population in that question. Although both approaches warranted positive outcomes, the SML approach may demonstrate a stronger linkage to the underlying features of apraxia of speech, based on the method's rationale. Through the approach, the individual is expected to generalize the rules for planning by relearning the centralized motor plans for speech-motor movements (Wambaugh et al., 2013). Also differing from SPT, the SML approach involves the individual learning to internally predict controls of movements to independently generate speech.

The SML approach demonstrated greater maintenance gains using traditional treatments compared to the SPT that was reviewed using both intensive and traditional treatments (van der Merwe, 2011; Wambaugh et al., 2013). Although the SML approach was implemented for more sessions than the SPT, it was only greater by one session. This may lead to the assumption that the SML approach demonstrates greater gains due to the less intensive practice schedule, yielding stronger maintenance compared to the more intensive SPT schedule.

Focused Clinical Question

Is a motor or phonological approach more beneficial to maintaining improved articulatory precision and accuracy post-treatment for clients with acquired chronic apraxia of speech and Broca's aphasia?

Literature Search

Search Strategy

APA Psyc Info (via Maxwell Library) and ResearchGate databases were searched in June 2021. The search strategies and initial search were developed with guidance from an experienced professor.

Inclusion and Exclusion Criteria

Due to the limited available evidence pertaining to the specified targeted population, some of the expected inclusion criteria had to be modified. The inclusion criteria required research articles published after 2010 and discussed the implications of either treatment approach of SPT or SML. The articles also included participants over 50 years of age, who were diagnosed with acquired apraxia of speech, concomitant with Broca's aphasia, who spoke English as their first language, and who lived at home.

Multiple articles were excluded that included participants below the age of 50, did not include Broca's aphasia in the diagnosis, or did not focus on the participants' articulatory accuracy outcomes. Other exclusionary criteria included if the article was not peer-reviewed or was dated earlier than 2010. These criteria not met for one article, discussing the speech motor learning approach's clinical implications and treatment outcomes. Although the participant was diagnosed with pure AOS, a radiologist found small

lesions around Broca's area (van der Merwe, 2011), which were deemed appropriate and acceptable, given it being the best available evidence for this CAT. In addition, the participant's first language was Afrikaans; however, the treatment outcomes carried over not only to his first language but also to his second language of English, making it applicable to this CAT.

Results of the Search

The search strategy identified numerous titles based on the key words found in the title and abstract and varied between databases. The initial search terms used under APA PsycInfo database via Maxwell library yielded 57 results, and the second search yielded only 13. Although the ResearchGate database did not specify the quantity of results based on the search terms, there were numerous references to determine the level of value and relevancy.

CAT Findings

Individual findings

Wambaugh et al. (2013) conducted a multiple-baseline-designed, empirical study to determine the treatment outcomes of using a speech production approach to intervention, while considering treatment intensity and practice schedule. The study focused on the effects of different treatment applications (e.g., intensive-blocked, intensive-random, traditional-blocked, traditional-random) based on articulatory accuracy for both treated and nontreated words for four speakers with chronic apraxia of speech and aphasia. Although the aim of the study was focused on the efficacy of the different treatment applications, the overall outcome measures were related to the developed research question. The study revealed a lack of maintenance during the 1-, 2-, and 4-week post-treatment follow-ups compared to the maximum levels achieved during treatment, with a lack of generalization to untrained words (Wambaugh et al., 2013).

Van der Merwe (2015) conducted a multiple-baseline, single-participant-designed case study to evaluate different treatment outcomes about the speech-motor learning approach for treating individuals diagnosed with apraxia of speech. Although the participant was diagnosed with pure AOS, and his first language was Afrikaans, this article was included for the research question as determined by being the best available evidence. A radiologist found small lesions near Broca's area, similar to the targeted population of the research question, and the treatment outcomes and improvements in articulatory accuracy carried over not only in the participant's first language of Afrikaans but also to his second language of English. The results of this study reported generalization to untreated nonwords and real words, with maintained performance scores two years post-treatment.

Ballard et al. (2015) conducted a systematic search to review intervention research newly updated by the Academy of Neurological Communication Disorders and Sciences for treatment of apraxia of speech. The study evaluated intervention approaches to determine their strength in guiding clinical practice based on their scientific adequacy, participant descriptions and confidence in diagnosis, treatment description, and measurement of treatment effects. The speech-motor learning and speech-production treatment studies included in the review concluded positive treatment, outcome, and generalization effects for all

aspects measured. It is important to note that of the two speech-motor learning approaches implemented, only one of the studies reported maintenance and generalization effects.

Synthesized Findings

The research articles provide insight into the benefits of implementing both the speech motor learning and sound-production approaches to treat apraxia of speech. Although van der Merwe (2011) had stated that speech-production treatment was the best-researched approach for apraxia of speech, the more recently developed approach of speech-motor learning was made to address the less treated, underlying features of apraxia of speech. Unlike the speech-production approach that focuses primarily on the articulatory disorder of AOS, the speech-motor learning approach focuses on the consistent recall of core motor plans and programs, temporal flow of speech, and the initiation of production of speech-motor targets (van der Merwe, 2011). Based on the rationale for implementation, the speech-motor learning treatment appears to target more areas of concern for patients diagnosed with AOS.

Based on the treatment amounts, SML demonstrates greater maintenance gains compared to the SPT in the empirical study. Speech-production treatment was indicated to have similar outcome measures of articulatory accuracy, and a lack of maintenance gains regardless of intensive or traditional treatments being implemented (Wambaugh et al., 2013). The speech-motor learning treatment not only had greater maintenance gains with similar treatment amounts but also was able to maintain performance to treated and nontreated words for a longer period of time compared to the sound-production treatment research. Although the SPT demonstrated reduced gains in maintenance compared to SML, there may be probable causes that, if the treatment amount were changed, this may yield different results. Due to neural plasticity being experience-dependent, it may be assumed that the maintenance gains would have increased if practice was maintained at a higher and more intense level (Wambaugh et al., 2013).

It is difficult to deem one intervention approach more beneficial for treating AOS when the participants differed, and the treatment amount and intensity also varied. However, based on the literature, the SML approach was developed to more closely target the key features of AOS in a more intensive style to intervention, while promoting greater gains in maintenance overall. The empirical paper discussing SPT described the maintenance results being dissimilar to previous SPT research, indicating a need for future research with more intensive practice schedules and a higher accuracy criterion (Wambaugh et al., 2013). Although the case study lost the element of experimental control, the overall outcome of maintenance gains remained significantly larger than the empirical study on the speech-production treatment (van der Merwe, 2011). The systematic review demonstrated maintenance gains for both types of articulatory-kinematic approaches, yielding for further research of the treatment approaches that are more comparable and specific (Ballard et al., 2015).

Discussion

This CAT illustrates the lack of comparative research regarding the post-treatment maintenance of

improved articulatory accuracy and precision for individuals over the age of 50 diagnosed with AOS and concomitant with Broca's aphasia. The speech-motor learning approach uses concepts from motor learning that have recently been developed for speech. With the linkage of this approach being more specific to not only the articulatory disorder of apraxia of speech but also the underlying components of programming prior to speech production, the approach shows promise for treatment. While considering the entire client, including their abilities and level of fatigue, it may be of interest for this approach to be implemented in therapy, if the client can withstand more intensive sessions and practice amounts. There is a need for more research to be conducted regarding intervention outcomes for this population that administers post-treatment transfer tests to determine the maintenance and generalization gains. The findings of SML, demonstrating greater gains in a similar amount of time as the intensive treatment of SPT, are noteworthy for speech-language pathologists, insurers, and clients.

Recommendations for Research and Practice

The included studies do not all meet the inclusion criteria of the research question as written. The evidence-based practice on this topic is limited due to the lack of replication that remains in the field of treatment for apraxia of speech. Furthermore, evidence-based practice indicates the need to consider the levels of evidence (ASHA, n.d.), leading to inconsistent conclusions and low levels of evidence. Therefore, there is minimal evidence to confirm one intervention approach over another because of the lack of comparative studies (Ballard et al., 2015). Despite the slight variances, this CAT provides the best available evidence at this time and may help to guide future clinical practice for AOS. Based on the data reflecting maintenance gains by the speech-motor treatment approach, it may be of interest for clinicians to implement it during treatment of patients with AOS and Broca's aphasia. If clinicians prefer to continue implementing the speech-production treatment, as it has been researched most intensely, it may also be of interest to increase the intensity of training and carry-over activities at home to improve generalization and maintenance gains.

The International Classification of Functioning, Disability, and Health (ICF) is a framework that helps to measure health-related domains for an individual or population (World Health Organization, 2001). With regard to the topics discussed in this CAT, the relevant domains of the ICF include body functions and structures and environmental and personal factors. Based on the research question, the desired outcome for participants receiving either treatment approach to intervention was to demonstrate post-treatment maintenance of improved articulatory precision and accuracy. Therefore, the ICF domain of body functions and structures is relevant due to the expected improvement in speech production and intelligibility. In addition, the domain of activities and participation was indirectly targeted by the participants, likely improving their confidence due to their improved speech production. Although this was not explicitly stated throughout the articles, it may be assumed to be a likely treatment outcome.

The inconclusive results of this CAT may also help to guide clinical research. If plausible, future research should involve the same participants receiving both approaches to treatment to more accurately deter-

mine each of the treatment effects. If unable to include the same participants, the treatment amount should at least be controlled and identical in both interventions to more accurately compare the two. In addition, post-treatment gains should be evaluated at similar points to compare outcomes of maintenance and generalization more accurately, based on the participants' reported amount of practice. It may be of interest to continue researching the use of the principles of motor learning to determine if they are significant toward outcome results for either of these approaches. Neither approach utilized feedback on correct responses, and it is of question whether performance may have improved or remained constant if feedback were implemented.

References

American Speech-Language-Hearing Association (ASHA). (n.d.). *Evidence-based practice (ebp)*. https://www.asha.org/research/ebp/.

Ballard, K. J., Wambaugh, J. L., Duffy, J. R., Layfield, C., Maas, E., Mauszycki, S., & McNeil, M. R. (2015). Treatment for acquired apraxia of speech: A systematic review of intervention research between 2004 and 2012. *American Journal of Speech-Language Pathology, 24*(2), 316–337. https://doi.org/10.1044/2015_ajslp-14-0118

van der Merwe, A. (2011). A speech motor learning approach to treating apraxia of speech: Rationale and effects of intervention with an adult with acquired apraxia of speech. *Aphasiology, 25*(10), 1174–1206. http://dx.doi.org/10.1080/02687038.2011.582246

Wambaugh, J. L., Nessler, C., Cameron, R., & Mauszycki, S. C. (2013). Treatment for acquired apraxia of speech: Examination of treatment intensity and practice schedule. *American Journal of Speech-Language Pathology, 22*(1), 84–102. https://doi.org/10.1044/1058-0360(2012/12-0025)

World Health Organization.(2001) *International classification of functioning, disability and health: ICF.* World Health Organization. https://apps.who.int/iris/handle/10665/42407

About the Author

Kalli Whiting is pursuing her Master of Science in Speech and Language Pathology at Bridgewater State University. Her research project was completed in summer 2021 under the mentorship of Dr. Karen Aicher. Kalli plans to pursue her clinical fellowship year in a medical placement as a speech-language pathologist starting in summer of 2022.