See the Sound/Visual Phonics: Effect on Facilitation of Sound Production in Acquired Apraxia of Speech

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Abstract

The use of See the Sound/Visual Phonics (STS/VP) with traditional apraxia therapy for an individual with Broca’s aphasia and acquired apraxia of speech was investigated. An alternating treatment design was used to target two phonemes for phoneme and word production. Both treatments improved phoneme acquisition, although preliminary evidence appeared to show a benefit of STS/VP to the acquisition rate of the phoneme in the experimental condition.

Introduction

Apraxia of speech is a disorder of motor planning in the absence of impaired muscle control that affects voluntary positioning and sequencing of muscle movements for speech.

While observing individuals communicating on a daily basis, it is apparent that all humans use some form of gestures during speech. Gestures can serve to supplement, emphasize, or reinforce the information people are trying to convey. Therefore, coupling gestures with auditory information that is being stored and learned can serve as a strategic tool for more efficient learning and memory.

Apraxia of speech can make carrying out a specific purposeful motor movement for speech (or a set or sequence of related motor movements) very difficult. An important therapeutic technique for individuals with apraxia involves following a more kinesthetic and tactile model of support to increase motor learning. Providing visual (or augmented) feedback for individuals as part of intervention for apraxia of speech is important, because it helps give a model for correct placement and coordination of movement during speech production. One way that visual feedback and a tactile/kinesthetic therapy model can be incorporated at the same time is through the use of a gestural system called See the Sound/Visual Phonics.

See the Sound/Visual Phonics is a multi-sensory cueing system that includes visual hand shape cues that represent the sounds of English phonemes and their articulatory movements during speech.

See the Sound/Visual Phonics (STS/VP) has been utilized in conjunction with apraxia of speech therapy in past studies. Traditional apraxia of speech therapy incorporates verbal cues (i.e., an explanation of where the sound is produced) and a model of phoneme production (i.e., a model exaggerating phoneme production). Populations who have benefited from using STS/VP include children with difficulties in articulation and apraxia of speech. These studies encouraged participants to use the hand shapes as a self-cueing strategy to aid in phoneme acquisition.
Purpose
Since gestures and gestural systems have been successful in the facilitation of sound production, it is possible that introducing a gestural system specific to articulatory movement may improve phoneme acquisition at a faster rate than traditional apraxia therapy alone.

Hypothesis. It was hypothesized that pairing See the Sound/Visual Phonics (STS/VP) with traditional apraxia therapy would facilitate speech sound production more efficiently than the use of traditional apraxia therapy alone.

Method

Subject Selection
Evidence compiled from
- Clinical judgment
- Freed Motor Speech Examination
- Boston Diagnostic Aphasia Examination
- Moving Across Syllables: Training Articulatory Sound Sequences

Diagnostic features consistent with apraxia of speech
- Articulatory struggle, particularly on initial consonants
- High speech error variability
- Reduced and dysrhythmic diadochokinetic rate
- Shorter sustained /a/ duration
- Delayed speech initiation
- Unsuccessful attempts at self correction

Participant
- 66 year old male
- Suffered from a cerebrovascular accident
- Diagnosed with apraxia of speech and Broca's aphasia
- Moving Across Syllable: Training Articulatory Sound Sequences revealed /f/ and /tʃ/ consistently produced in error
- /f/ and /tʃ/ were chosen as the study’s stimuli

Alternating ABC Design
Phase A – Baseline
Phase B – Traditional apraxia therapy
Phase C – See the Sound/Visual Phonics coupled with traditional apraxia therapy
- Implemented over 6-weeks
- Treatment occurred two days a week, for 50 minutes each session
- One target phoneme was selected for each treatment phase
  - Based on data from Moving Across Syllables: Training Articulatory Sound Sequences.
Results of the post-treatment probe showed an increase in the raw score for all sound sequence subtests and one and three syllable level word productions. No change in the raw score was found for the two-syllable word level productions. Production results from the eight generalization probes gradually increased from 20% to 80% accuracy. Results of Phase B showed an increase in sound production accuracy from 33% to 100% accuracy, a decrease in highest phoneme production attempts from 3 to 1, and a decrease in cueing from maximum cueing to no cueing needed. Results of Phase C showed an increase in sound production accuracy from 30% to 100% accuracy, a decrease in highest phoneme production attempts from 8 to 1, and a decrease in cueing from maximum cueing to no cueing needed.

Conclusions

Results showed that both the treatment and control conditions helped to improve sound production. However, data showed that /tʃ/ required a larger number of attempts to be produced correctly from the start of treatment, and the attempt rate of /tʃ/ decreased more quickly than production of /f/. It is also important to note that production of /tʃ/ at an independent level was achieved one week sooner in Phase C than during Phase B, possibly indicating that the pairing of the STS/VP hand shape with the description of the articulatory features of /tʃ/ was an effective cueing strategy in achieving more efficient acquisition of the target phoneme.

One limitation of the study was the short time frame allotted for the treatment, which decreased the number of possible treatment sessions. More treatment sessions may have provided additional data on which to determine the potential use and benefit of See the Sound/Visual Phonics. Sample size was another limitation, as the nature of a single subject research design does not support generalization to a broader population. Further research is needed to investigate See the Sound/Visual Phonics as a beneficial cueing strategy for sound production. One consideration for future research would be the use of a different treatment design to facilitate focus on one therapy approach at a time in order to promote better acquisition of the target skills. A second variation would be to use participants who only have apraxia of speech in addition to those who have Broca’s aphasia as an additional factor. Future research should also investigate the effectiveness of gesture use outside of therapy to supplement and enhance communication during everyday life experiences.