Critical Review:
Effectiveness of EMA in improving articulatory accuracy in adults with AOS

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This critical review examined the effects of electromagnetic articulography (EMA) on articulatory

Selection Criteria

Studies included in this critical review were required to examine the effects of

that the results of this study lend support for the efficacy of kinematic visual feedback in remediating place-of-articulation difficulties in individuals with co-morbid AOS and aphasia.

Single-subject n-of-1 multiple baseline design studies
A number of single-subject n-of-1 multiple baseline design studies also provide support for kinematic biofeedback in improving speech in AOS (Katz, Garst, Carter, McNeil, Fossett, Doyle & Szuminsky, 2007; Katz, McNeil & Garst, 2010; McNeil et al., 2007). Katz et al. (2007) conducted a single subject n-of-1 multiple baseline design study (Level 1 evidence) to examine the effects of short-term EMA treatment on consonants produced by a male adult with Broca's aphasia and moderate-severe AOS. The participant used visual feedback of tongue tip movements to direct his tongue toward the "target zone"

observed were due to treatment as opposed to other potential sources. Maintenance effects were also observed for each of the targets and generalization effects were observed for 27 untreated probes. At one-month follow up, two of the untreated words dropped below the achieved level at the end of treatment. The authors reported that the participant's treatment resulted in positive acquisition effects with generalization and high maintenance effects using kinematic accuracy plus auditory perceptual feedback.

Using a similar methodology, McNeil, Katz, Fossett, Garst, Szuminsky, Carter and Lim (2010) carried out single subject n-of-1 multiple baseline design studies of two adults with AOS to examine the effects of EMA on articulatory accuracy. Both online visual kinematic knowledge of performance (i.e., visible movement traces of the tongue-tip) and the examiner's online judgments of perceptual accuracy were provided as feedback. For both participants, visual inspection judgments and effect size calculations yielded positive acquisition effects (d = 1.05 to 7.17, x = 3.28 for participant 1 (P1); d = 0.56 to 1.80, x = 1.18 for participant 2 (P2)) and generalization to speech motor targets with similar phonetic structure (d = 0.45 to 6.08, x = 2.07 for P1; d = 1.37 to 1.47, x = 1.42 for P2) and to untreated probes (d = 0.41 to 3.10, x = 1.24 for P1; d = -0.5 to 2.37, x = 1.07 for P2). One-month post therapy, long-term maintenance of learned (d = 0.94 to 9.02, x = 3.45) and generalized effects (d = 0.73 to 12.17, x = 4.5 for similar speech motor targets; d = 0.65 to 2.93, x = 1.57 for dissimilar speech motor targets) were found for P1, but not for P2 due to attrition. The authors concluded that the results support the use of augmented movement feedback to treat speech movements in order to increase the perceptual accuracy of speech production.

The authors of the studies reviewed above provided suggestive evidence that EMA is an effective technique in improving articulatory accuraf asn000 0 0 0.(c) -7 3961 cm BT 500 166.4415 296.776cm BT 41 0 0 41 0 0 Tm /

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