The speech motor learning approach to treating apraxia of speech

Rationale and methods

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Background: Four approaches to the treatment of acquired apraxia of speech (AOS) exist. These are articulatory-kinematic approaches, rate and/or rhythm treatments, alternative and augmentative communication treatments and intersystemic reorganization. Articulatory-kinematic treatment was the only approach that was “recommended” by a working committee of the ANCDS (Wambaugh, Duffy, McNeil, Robin, Rogers, 2005). However, the underlying pathophysiology of AOS as depicted in the definition of McNeil, Robin, and Schmidt (2009) and the surface signs of AOS do not appear to be in accord with the way in which articulatory-kinematic treatment addresses the disorder. Current treatment practices do not comprehensively address the underlying inability to plan and program sequential speech movements.

Aims: The purpose of this paper is to describe and justify the speech motor learning (SML) approach to treatment of apraxia of speech and also to compare it to other approaches. The comparison is summarized in table format. In SML treatment the underlying problems and surface signs of AOS are targeted by addressing accurate production of sequential speech movements in series of nonwords, and sequential movement adaptation to systematically controlled and increasing amounts of phonetic variation in these series. Treatment commences with sounds with the greatest ease of production to render accurate production of sequential speech movements more readily achievable. More difficult sounds are gradually incorporated into the treatment stimuli. While treatment stimuli are initially less complex, the learning environment is complex from the start and involves high contextual interference. Stimuli are rehearsed repeatedly to enhance automatic production and fluency. During rehearsal speech rate is gradually increased to reach normal rate and imitated production of stimuli converted to self-initiated production. Mental practice and internal predictive control are facilitated during response delay periods and the client is encouraged to self-correct errors. The rationale and methods of the SML approach are described and a summary of the treatment is provided in table format.
Rationale and methods:

- Treatment stimuli consist of CVCV nonwords during the first stages. Rationale: The reduplicated open syllables of CVCV occur in early words of all languages. Infants and speakers with apraxia find this structure the easiest to produce.

- Treatment commences with the easiest 3 – 5 consonants and 3 to 5 vowels (rate all sounds first before making the decision – see summary in table): The rationale is that speakers with apraxia cannot produce these easy sounds in all phonetic contexts and also not in long utterances which require consecutive recall of motor plans of different speech sounds. Series of nonwords containing these sounds, gives the opportunity for this type of speech rehearsal.

- The sound repertoire is gradually expanded. Once the first target set has been rehearsed on all 5 levels of variation another one or two consonants are added and now the expanded target set are rehearsed on all 5 levels of variation.

- Rationale: Rehearsal of each sound in different phonetic contexts facilitates plasticity in the motor plan of each sound as each motor plan must continuously be adapted to a change in the phonetic environment. The motor learning principle of “variability in practice” is applied during this rehearsal of all sounds in different phonetic contexts/environments.

- Rationale for rehearsing each nonword and then a series of nonwords: The motor learning principles of blocked and random practice are applied. Random practice facilitates learning.

- A series of nonwords also focus attention on an upcoming nonword. Motor planning of upcoming speech is facilitated.

- Real words are identified from the start and these are practiced in short phrases. As more sounds are added to the repertoire, more and more words, which can be produced correctly, can be imbedded in the speech of the client.

- Focus on self-initiation of speech rehearses independent recall of motor plans.

- Response delay-periods facilitate internal feedback, memory, and planning.

- Series of nonwords should also be produced rhythmically as rhythm is facilitatory for correct speech production in a person with brain injury.