Integral Stimulation Treatment for Children with Childhood Apraxia of Speech (CAS)

By: Janet Baker & Brianne Nyquist
ASHA defines CAS as a “neurological childhood (pediatric) speech sound disorder in which the precision and consistency of movements underlying speech are impaired in the absence of neuromuscular deficits” (2007).
According to ASHA it is recognized that CAS is neurologic in origin, regardless of differing beliefs of which structures and circuits are affected.

Typically in the Left hemisphere, depending on handedness.
Prevalence

1 – 2 per 1,000

- Shriberg, Aram, and Kwiatkowski, 1997

Mayo Clinic Data (1987-2001) state the most common disorders in clinical practice is dysarthrias and AOS making up 58% of diagnosis.

- 10,444 patients

- Andrianopoulos, M. V. (2008)
3 Segmental and Suprasegmental Features Consistent with CAS:

- A variety of articulation errors affecting consonants and vowels in the production of syllables or words.
  - These errors vary across productions

- Difficulties producing sounds which are affected by co-articulation at the sound and syllable levels.

- Inappropriate prosody.

According to ASHA there is no definitive list of concomitant features which affect individuals with CAS.
Speech and Non-Speech Characteristics

**Speech**
- Limited phonetic inventory
- Frequent and inconsistent errors on vowels and consonants
- Varying suprasegmental features
- Increased errors during longer and more complex utterances
- Small steps toward progress during treatment

**Non-Speech**
- Decreased AMRs
- Fine and gross motor skills are impaired
- Typically developing receptive language
- Expressive language deficits

-Duffy 2005
Treatment Guidelines for CAS

- Individualized and intensive
- Provide numerous opportunities
- Provide visual stimuli
- Provide functional activities designed to facilitate production of targeted sounds.
- Utilize activities supported by evidence based practice
- Avoid oral motor exercises of non-speech origin (i.e. blowing bubbles, whistles).
Integral Stimulation Method

- Is based on cognitive motor learning with emphasis on cognitive-motor programming necessary for speech production.
- Involves “bottom-up” approach
- Often referred to as the “watch me, listen, do as I do” approach.
- Focuses on the use of varies modalities of presentation, but stress auditory and visual modes.

-Gildersleeve-Neumann 2007
The term Integral stimulation was introduced in 1954 by Milisen, who utilized it as a program for treating articulatory disorders.

In the 70’s Rosenbek suggested use of integral stimulation to treat dysarthria and acquired AOS.

More recently, integral stimulation methods were then applied by Strand to children with CAS (or developmental apraxia of speech).
Rationale for Integral Stimulation

Methods

- Establish a motor plan and engrain neuralpathways necessary for producing speech sounds.

- Strand 1999
Application of Integral Stimulation

**Treatment Planning**
- Determine prognosis for the child’s functional expressive communication

**Setting Goals**
- Improve the child’s ability to plan and execute sequential movements for the production of speech.
  - Using repeated opportunities
  - First with maximal cueing then systematically withdrawing support so the child takes on increasing responsibilities for his/her motor planning and movements.

-Strand 1999
Sessions

- **Frequency**
  - Should be frequent

- **Length**
  - Long enough to allow many repetitions of practice

- **Type of treatment**
  - Meaningful and relevant to the child’s needs

- **Stimuli**
  - Decide on size of stimuli set for each session
  - Phonetic context for stimuli set
Procedures

- Repetitive Practice
  - Need repeated opportunities to learn motor skill/movement.

- Distributing Practice of Targets
  - Mass vs. Distributed

- Shaping

- Feedback
  - Extrinsic
    - Knowledge of results
    - Knowledge of performance
  - Intrinsic
    - Tactile and proprioceptive

- Strand 1999
Treatment efficacy research is minimal in the area of CAS therapy.

Strand and Debertine (2000) used the integral stimulation approach on a 5 yr old female with CAS to evaluate the effectiveness of this particular approach.
Results of Efficacy study

- Baseline performance was at zero before treatment.
- Rapid change began following the implementation of treatment.
- The child was able to consistently exhibit improved articulation over 134 sessions.
Strand and Debertine support that the integral stimulation approach has efficacy due to the fact that the child had previous therapy (with a different approach) and had no consistent intelligible utterances.
Application of Integral Stimulation

C was a 5 year 9 month female referred to Edythe Strand.

Used 3 to 5 word utterances with 10% intelligibility to an unfamiliar listening partner.

Grammatical development and language comprehension were age appropriate.

Displayed difficulties shifting from nasal to non-nasal sounds.

Had no sibilants or velars.

Vowels were inconsistently distorted.
Case of C continued....

Motor speech examine revealed

– She was able to simultaneously produce vowels with little distortion (but did so with extreme effort)

– All imitated CV were in error

– Was able to independently produce some CV and CVC; however, placed in longer utterances resulted in articulatory errors.
Case of C continued....

- Treatment plan was devised by C’s mother, School SLP and a private SLP.
- Important to everyone that C establish core utterances that all communication partners could understand (because she was entering kindergarten)
- Decided on a core list of utterances and integral stimulation therapy was then implemented.
C’s Therapy

- Four ½ hour sessions a week
  - 2 private practice
  - 2 at school
- 20 functional phrases were set
  - 5 of which were identified for intensive work
- Varied temporal relationship between stimulus and response.
- Rate started slow and progressed to normal as she improved motor planning.
C’s Progress

4 months in to therapy
- Vowels were consistently more accurate
- Targeted phrases were being mastered
- Nasality decreased

2 years after initial session
- Intelligibility estimated to be 50% to an unfamiliar communication partner
- Stimulus increased to 9
- Allowed say in therapy

-Caruso & Strand (1999).
Conclusion

Integral stimulation case studies have shown significant gains in the motor planning and programming abilities of individuals with CAS.

Further research
References