

Therapy Highlights  
Dynamic Tactile and Temporal Cueing – DTTC  
(Strand, Stoeckel, & Baas, 2006, Yorkston et al, 2010)  
Incorporating the Principles of Motor Learning\*

Principles/Ingredients likely to contribute to speech improvements in children with CAS (Maas et al, 2014)

High amount of practice  
Relatively small set of therapy targets  
Provision of knowledge of performance vs. knowledge of results feedback  
Use of multisensory feedback modalities  
Homework component

**Consider individual needs, motivations and desires of each child when making treatment decisions**

- I. Decide on target words/phrases – optimum challenge level
  - a. Phonetic inventory from assessment, including stimulability information
  - b. Sounds that are early developing and highly visible
  - c. Syllable shapes based on assessment results – level at which motor speech is breaking down
  - d. Phonotactic complexity
  - e. Functional and motivating – list from parents/teachers
  - f. Consider movement gestures related to place, manner, voicing features
- II. Decide how many targets to put into practice
  - a. Fewer for children with severe disorders or early in treatment (4-6)
  - b. More for children with less severe disorders or later in treatment (10-15)
- III. Establish goals
  - a. Overall goal is for child to produce entire movement gesture accurately of increasingly longer and more phonetically complex targets
    - i. Not just consonant accuracy – but ALSO vowel accuracy, coarticulatory transitions between sounds and syllables (no segmenting/pausing), prosody/stress
  - b. Establish criteria in order to ensure motor learning/prevent regression – cumulative accuracy
- IV. Decide on level of service
  - a. Frequent, short sessions with a high rate of repetition to facilitate motor learning – 3-5, 30-minute sessions/week
- V. Identify activities to engage the child in during the therapy session
  - a. Motivating to that particular child
  - b. Turns are quick to facilitate lots of speech practice trials
  - c. Reinforcers, if used, are quick to facilitate lots of speech practice trials

Therapy Highlights  
Dynamic Tactile and Temporal Cueing – DTTC  
(Strand, Stoeckel, & Baas, 2006, Yorkston et al, 2010)  
Incorporating the Principles of Motor Learning\*

- VI. Decide on practice schedule
  - a. Blocked, constant, mass practice when first working on a difficult target
  - b. Random, varied, distributed practice once target is nearing mastery
- VII. Within session
  - a. Make sure child understands what is being asked of him/her and why – they need to know they are working on *movements* vs. sounds
  - b. Focus of session is on getting as many accurate practice trials of each target as possible
  - c. Clinician model
    - i. Encourage child to watch your mouth as you model the target – mirror neurons
    - ii. Slow rate of model, but not too slow (and do not segment) at first to provide support, then move to faster, more natural and varied rate once target is nearing mastery
  - d. Adjust timing of model to ensure “correct” movement gestures are maintained
    - i. Simultaneous – Direct imitation – Delayed imitation – Spontaneous: Move to simultaneous productions when needed to keep productions accurate; then fade timing of your model (withdraw supports) by moving to direct imitation – then delayed imitation – then simultaneous as child progresses in therapy
  - e. Adjust cues to facilitate motor learning
    - i. Add cues as needed to keep productions accurate
    - ii. Fade cues slowly to keep productions accurate
    - iii. Provide frequent, specific, internally-focused, movement-based cues at first (knowledge of performance) to help with acquisition
    - iv. Use less frequent, more general, outcome oriented cues later (knowledge of results) to help with retention/motor learning
- VIII. Motor learning/retention
  - a. Distribute practice across time, environments and contexts in order to facilitate motor learning
    - i. Send targets into home and classroom once they are nearing mastery within speech sessions

\*Motor-based therapy approaches have been found to produce gains in speech production abilities in children with CAS (Murray et al 2014). However, the few studies that have looked at how the principles of motor learning hold up in treatment of children with CAS have shown mixed results, and not all children respond to a given practice condition manipulation in the same way. (Maas et al, 2014).

Maas, E., Gildersleeve-Neumann, C. E., Jakielski, K. J., & Stoeckel, R. (2014) Motor-based intervention protocols in treatment of childhood apraxia of speech (CAS). *Current Developmental Disorders Reports*, 1 (3); Strand, E. A., Stoeckel, R., & Baas, B. (2006). Treatment of Severe Childhood Apraxia of Speech: A Treatment Efficacy Study. *Journal of Medical Speech-Language Pathology*, 14, (4) 297-307; Yorkston, KM, Beukelman, DR, Strand EA, Hakel, M. (2010). *Management of Motor Speech Disorders in Children and Adults – Third Edition*. Texas: Pro-Ed.