

# **Treatment Methods for Childhood Dyspraxia of Speech:**

Presented by  
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*Treatment Methods: Childhood Verbal Dyspraxia*  
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*Presented to the conference on Oral and Verbal Dyspraxia; Oslo, Norway, May 15, 2007*

## **Treatment Methods for Childhood Verbal Dyspraxia**

Treatment approaches for children with motor planning deficits vary significantly from treatment approaches for children with more linguistically based speech disorders.

- 1) They need frequent treatment sessions
  - 2) They need practice with speech motor skill
- ◆ Historically, approaches to “articulation” disorders viewed the processes of phonologic development as chiefly one of motor learning
  - ◆ These approaches generally emphasized the use of drill practice or drill play.
  - ◆ With the rise of phonologically oriented approaches to treatment, higher level cognitive and linguistic bases for sound system disorders have been emphasized. These are based on the assumption that the child’s main task in phonologic development is to learn the adult phonologic system.
    - Focus has moved from intense practice of individual sound patterns and movements, to meaningful communication interactions in which movement is only indirectly addressed.
    - For many children with phonologic impairment, these approaches are successful.
  - ◆ For children with Childhood verbal dyspraxia (CVD) or children with phonological impairment who also have subtle motor deficits, one needs to more explicitly address the treatment of movement gestures.
  - ◆ We do this in a few ways:
    - We use drill type therapy (listen to me, watch me)
    - We use different rationales for choosing stimuli
    - We incorporate the principles of motor learning

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## **Principles of Motor Learning (PML)**

### **What is motor learning?**

Motor learning is a process of acquiring the capability for producing skilled action (*Schmidt, Motor Control and Learning, Human Kinetics Publ., 1988*).

### **How does motor learning happen?**

It occurs as a result of experience and practice, and is influenced by a variety of factors. A number of those factors are especially relevant to the treatment of a motor speech disorder. These include precursors to motor learning; conditions of practice, and knowledge of results.

### **Conditions of Practice Especially Important in Treating CVD**

1. Frequent sessions
2. Maximizing the number of practice trials per session
3. Making careful decisions about random vs. blocked practice to improve accuracy while facilitating motor learning
4. Use specific types and schedules of feedback
5. Be careful of varying rate

### **Principles most often suggested to be important to the treatment of verbal dyspraxia .**

1. Use of intensive paired auditory and visual stimuli.
2. Production of sound combinations versus isolated phoneme training.
3. Focus on movement performance drill.
4. Use of repetitive production and intensive systematic drill.
5. Careful construction of hierarchies of stimuli.
6. Use of decreased rate, with proprioceptive monitoring.
7. Use of carrier phrases.
8. Use of pairing movement sequences with suprasegmental facilitators such as stress, intonation and rhythm.
9. Establishment of a core vocabulary (especially for the non verbal child).

Notes:

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## Examples of techniques that are facilitative in treating verbal dyspraxia.

1. Integral Stimulation - Auditory/Visual Stimulation
  - a) Visual stimulation (watch me).
  - b) Verbal stimulation (listen to me).
  - c) Use of simultaneous verbal stimulation with the client's attempt at response.
  - d) May choose to use other visual stimuli to facilitate motor gestures (i.e., sound symbols; signs).
  - e) May incorporate tactile stimulation (encourage the client to "feel" the movement).
  
2. Phonetic Derivation
  - a) Involves the use of an intact non-speech or speech gesture to elicit production of a target sound (or sound combination).
  - b) Familiar to therapists by the term "progressive approximation."
  
3. Phonetic Placement
  - a) The clinician actually manipulates the articulators (or uses any other technique) to help the client achieve a particular articulatory configuration.
  - b) Can include description, explanation and pictures.
  
4. Intersystemic Facilitation
  - a) Involves the use of non-speech activities to facilitate the production of the oral-motor gestures.
  - b) Examples include rhythm, limb gestures.

## Examples of Different Perspectives in Treatment

- Many of the traditional approaches to DAS employ a "bottom up" approach similar to that used in treatment for articulation and phonological disorders
  - Integral stimulation – listen to me; watch me; do what I do”
  - start with easier sound combinations, moving to harder
  
- Other methods emphasize tactile or gestural components. (Prompt is a good example)
  
- Methods based on prosodic cueing such as Melodic Intonation (usually used for less severe apraxia; or for work with prosody after the child has improved articulatory skill)

Remember -

**The use of a particular treatment program still requires that the clinician make the best possible decisions regarding stimuli; temporal relationship between stimulus and response; facilitators; criteria for change; etc.**

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Most treatment involves a combination of the above perspectives. The following treatment approach, **Dynamic Temporal and Tactile Cueing for Speech Motor Learning (DTTC)** is based on integral stimulation, but utilizes tactile, gestural and visual cueing.

1. Integral to the method is the use of a specific hierarchy of temporal delay (i.e. simultaneous production, immediate repetition, repetition after delay, etc.).
2. This principle is applicable for children with apraxia, as it allows opportunity for the child to take increasing responsibility for assembling and retrieving motor plans with progressively less cueing.
3. In addition to the repeated attempts of repetitive (or simultaneous or delayed repetitive) production, techniques such as phonetic placement, tactile cueing, prosodic cueing, etc., can be incorporated as needed or appropriate.
4. It is most applicable to younger children, or children with severe impairment

**This technique:**

- ◆ Allows high levels of success
- ◆ Emphasizes extensive practice (many repetitions)
- ◆ Uses meaningful and useful utterances to provide the child motivation and functional communication.
- ◆ Maximizes proprioceptive input

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**Dynamic Temporal and Tactile Cueing for Speech Motor Learning (DTTC)**

1. Therapist says the utterance while child watches the clinician's face - child repeats
  - a) If the child is unsuccessful, move to simultaneous production (therapist with client), varying rate and adding tactile or gestural cues as necessary
  - b) Maintain both auditory and visual stimuli
  - c) Continue productions until the child can easily produce the utterance with the therapist; then slowly fade the simultaneous cue by reducing volume, to the point where there is a simultaneous mime only)
  
2. Move to immediate repetition
  - a) Therapist provides auditory model (again making sure the child is watching the therapist's face
  - b) Child repeats, (therapist mouth the gesture during the response if additional support is needed; then fade)
  
3. Addition of delay
  - a) Therapist says target utterance
  - b) Insert a delay (one to three seconds) before imitative response
  - c) After the child is successful at repeating the utterance after a 2 or 3 second delay, have the child repeat the target several times without intervening stimuli
  
4. Work to elicit the utterance spontaneously

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**No matter what type of treatment is chosen by the SLP, they still have a number of decisions to make regarding:**

- Number of sessions per week
- Length of sessions
- Number of stimuli with which to work
- How practice on those stimuli will be organized
- What type and how much feedback will be given.
- At what rate the practice will be done?

When working with children who have apraxia, all these decisions are best guided by the **Principles of Motor Learning.**

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## PRINCIPLES OF MOTOR LEARNING

Motor learning is a process of acquiring the capability for producing skilled action (*Schmidt, Motor Control and Learning, Human Kinetics Publ., 1988*). It occurs as a result of experience and practice, and is influenced by a variety of factors. Three of those factors are especially relevant to the treatment of a motor speech disorder: prepractice; conditions of practice, knowledge of results and effects of rate. Please see the following texts for additional information on motor learning:

Magill, R. A. (1998) Motor learning: Concepts and applications. 5<sup>th</sup> edition. Boston: McGraw-Hill

Rose, D. J., (1997). A multilevel approach to the study of motor control and learning. Boston: Allyn & Bacon.

Schmidt, R. A.. (1991) Motor learning and practice: Champaign, IL. Human Kinetics Books.

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## **Principles of Motor Learning: What we will discuss**

Precursors to Motor Learning  
Conditions of Practice  
    Repetitive motor drill  
    Mass vs. Distributed Practice  
    Feedback

### **A. Precursors to Motor Learning**

1. Motivation
2. Focused attention
3. Prepractice

### **B. Conditions of Practice**

There are many issues pertinent to conditions of practice: these include the precursors to motor learning (motivation, goal setting, instructions, and modeling). Two issues especially relevant to treatment of motor speech disorders are the use of repetitive practice, and the concepts of mass vs. distributed practice.

#### **1. Repetitive motor drill**

- a) Need enough trials per session in order to allow motor learning to occur and become habituated toward more automatic processing.
- b) This involves using reinforcements that do not take time, and developing activities that facilitate repeated opportunities for production of target utterance.
- c) Quality of practice - (focused attention; scheduling; feedback)

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**2. Mass vs. distributed practice:**

- a) Decisions need to be made regarding number of sessions, and the **frequency** of sessions
- b) Choices need to be made about how many targets to include in treatment
- c) **Random versus Blocked trials**

*Decisions depend on:*

- 1] severity and type of the motor speech disorder
- 2] immediate goal: (*e.g. mass yields quick development of the skill, but poor generalization for incorporating in into other motor skill; distributed takes longer, but get better motor learning .*)

<p><b>Motor Performance -</b></p> <p><b>versus:</b></p> <p><b>Motor Learning –</b></p>
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**C. Knowledge of results** -- Important to give client frequent information about movement performance as well as movement results.

- 1. Intrinsic feedback – sensory information
- 2. Extrinsic feedback - generated outside the learner
  - a) outcome accuracy (knowledge of results)
  - b) movement accuracy – knowledge of performance

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Notes:

***Extrinsic feedback is most important to learning in those cases where available sensory feedback may be inadequate – as in AOS.***

\* Extrinsic - more important early; later in treatment, too much reliance on extrinsic feedback may lead to decreased motor learning (while still facilitating motor performance)

\* Precision of feedback should decrease as the magnitude of errors decreases

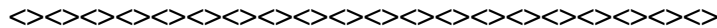
**Knowledge of Results -  
vs.  
Knowledge of Performance –**

3. Timing and Frequency of this feedback - and schedules of this feedback are important to consider
- \* immediate - use early in treatment
  - \* pay attention to intervals



**D. Influence of rate**

1. There is a trade off between rate and accuracy; slowing rate will increase accuracy (*up to a point*).
2. Varying rate can be an effective tool to vary during repetitive practice of targeted utterances, in order to allow habituation of articulatory movement accuracy while working toward natural rate and prosody.



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**Principles of motor learning important to incorporate in planning and executing treatment:**

(1) Increase the child's awareness of the goal here, which is to improve movement so that they can produce the sounds of their language. The motor learning literature frequently points to the importance of the child's need to have the intent to improve movement; therefore, nonspeech oral motor activities might be appropriate to begin the session where the child would move the jaw, lips, and tongue while the therapist encourages the child to feel the movement, and the therapist may even describe the movement as they are doing it. However, these warm-up oral motor drills should be focused specifically toward improving the child's attention and effort toward the movement and are not necessarily facilitative to improvement in speech production. Therefore, I would recommend keeping these only to the first few minutes of the session.

(2) Frequency of practice. The cognitive motor learning literature presents a great deal of evidence to show that in order to learn motor skill, one must practice the movement. Therefore, I would recommend frequent sessions (4-5 times a week on an individual basis for 20-30 minutes of continual practice), for severely apraxic children, during which the number of practice trials is maximized. This is frequently done through the use of reinforcers that take very little time, using creative novel ways to keep their interest without taking them away from the task, etc.

(3) Modifying the use of rate: I would encourage the child to produce the movements for the utterances very slowly at first (perhaps even in unison with the therapist) and then gradually increasing rate with continued practice trials until they are producing the movement accurately, at normal rate, and with normal prosody. I would also have the child stay in the initial articulatory configuration for a second or two before actually starting the movement gesture. This use of slower rate and staying in the initial configuration may also help the child make better use of proprioceptive feedback.

(4) Knowledge of results and knowledge of performance. It is important, at first, to maximize the child's success, that feedback be frequent and focused on performance as well as outcome. For example, helping the child know what was wrong about the movement rather than just whether their production was right or wrong (e.g., make your tongue a little tighter; close your jaw a little bit). At first, feedback should be quite frequent, even after every response. However, as the child becomes more accurate with the movement, feedback should become more random in order to improve motor learning (generalization).

(5) The cognitive motor learning literature has also shown that the way one practices stimulus items throughout the session does make a difference with respect to establishing good motor performance and also ensuring motor learning. The research points out that blocked practice (practicing one stimulus item for a certain period of time and then putting it away for the day) may facilitate motor performance (the ability to do the movement gesture during the practice session) but actually inhibits motor learning (generalization). On the other hand, random practice, while good for motor learning, inhibits early accuracy and motor performance. In order to ensure fairly rapid accuracy in terms of motor performance and yet still facilitate motor learning, it is helpful to choose two or three items out of an initial stimulus set for more frequent

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blocked practice, bringing in other practice items for shorter blocks in order to improve motor learning. For example, for a severe child who has an initial utterance set of only five, it may be helpful to pick two that will get more practice throughout a 30-minute session. One could practice utterance number one for 20-50 trials, then move to utterance number two for 20-50 trials, then back to number one, then to utterance number three for say 20 trials, then back to number 1 for 20-50 trials, then back to stimulus item number four, then back to number one, then utterance number five for 20 trials, and then back to number one, etc. If you are choosing two items, it would be a similar procedure where you would practice utterance one, then two, then three, then one, then two, then four, then one, then two, then five, etc. By choosing one or two of the stimulus items for more practice within a session, that item will likely achieve criteria sooner and give the child a better sense of making progress. Although it can be very helpful to target one or two of the items for more frequent practice, it is important to bring in short blocks of practice on the other items in order to provide some random practice and thereby facilitate motor learning.

(6) Children with apraxia of speech need to maintain coarticulation between as well as within syllables. It is important to avoid pausing in voicing or movement gestures within syllables so that the child has the opportunity to practice the complete movement gestures in the correct coarticulatory context. For example, separating the phonemes in the word "boy" to /b...oy/, and then having them try to blend movement gestures is very difficult for children with apraxia of speech. While this is often an appropriate technique for some children with phonologic impairment, it actually increases the difficulty for children who have difficulty with planning movement gestures and should not be included as a strategy in therapy for children with apraxia of speech.

(7) It is very important for children with apraxia of speech to begin to work on prosody very early when working on the core functional vocabulary. As the child becomes more accurate, the therapist is able to gradually increase rate toward normal, with repeated practice trials. It is also important to work on establishing good prosodic contours within words, achieving correct lexical as well as phrasal stress. Varying the prosody is also important early on in therapy, to help the child establish some flexibility in their motor planning and programming.

(8) It is important to note that for children with apraxia of speech, early treatment is often very slow. For severe children, it can take weeks to master just a few words or phrases. It is important to note that one uses the core functional vocabulary, however, as a vehicle to practice the planning and programming of movement gestures for speech production (the neurologic processing that is less efficient). As children continue in therapy, they improve their overall ability to plan and program movement gestures for speech, and progress becomes much faster.

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