



Dynamic
Evaluation *of*
Motor
Speech
Skill

DEMSS

MANUAL

Edythe A. Strand
Rebecca J. McCauley

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Dynamic Evaluation of Motor Speech Skill (DEMSS) Manual

by

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Overview of the Dynamic Evaluation of Motor Speech Skill (DEMSS)

INTRODUCTION

This chapter provides potential users of the Dynamic Evaluation of Motor Speech Skill (DEMSS) with the rationale for its development and information regarding its intended purpose. Descriptions of the target population, content, and administration times expected for its use are also provided. Finally, this chapter discusses the qualifications and training requirements expected for clinicians using the DEMSS and provides an overview of how the test is administered and interpreted. Administration and interpretation will be discussed in detail in Chapters 2 and 3, respectively. Chapter 4 describes the development of and the research on the DEMSS, which are critical in helping clinicians decide whether and how to use this test with a particular child.

Assessment is undertaken for many purposes, including screening, comparing performance with a normative sample, and differential diagnosis and treatment planning. Clinicians must take several important steps when assessment is focused toward differential diagnosis (see Figure 1.1).

Clinicians must be careful in choosing only those assessment tools most likely to test specific, pertinent clinical hypotheses for any individual child because of significant time constraints in the clinical setting. This chapter helps clinicians decide if the DEMSS is an appropriate tool for use in testing clinical hypotheses related to a motor speech impairment, especially childhood apraxia of speech (CAS) as contributing to the child's speech sound disorder (SSD) or delay in speech acquisition.

Childhood Apraxia of Speech

Childhood apraxia of speech (CAS) is a label for a subtype of speech sound disorder (SSD) that is due to inefficiencies in neural processing involved in the programming of movement for speech (i.e., speech praxis; see the following text box). A number of characteristics can be seen in children with CAS, but they are also

seen in many SSD types, including limited consonant and vowel repertoires, use of simple syllable shapes, frequent omission of sounds, and poor intelligibility. These are not discriminative of CAS because children with all types of SSDs may exhibit them. Those characteristics more discriminative of CAS include difficulty moving accurately from one articulatory configuration to another, vowel and consonant distortions, groping or trial and error behavior (typically seen in elicited rather than spontaneous speech), inconsistent voicing errors, intrusive schwa, and prosodic errors such as segmentation or equal stress. Movements may be awkward or clumsy as the child attempts the continuous movement across the syllable.

CAS occurs as a congenital disorder and is often idiopathic (i.e., without a known cause), or it may be acquired (e.g., due to head injury, stroke). This SSD can occur alone, but it most often occurs in combination with other types of children's SSDs, such as phonological disorders or developmental dysarthria. A number of genetic or complex neurodevelopment disorders (e.g., Down syndrome, 22q deletion, galactosemia) have a higher incidence of CAS than the general population.

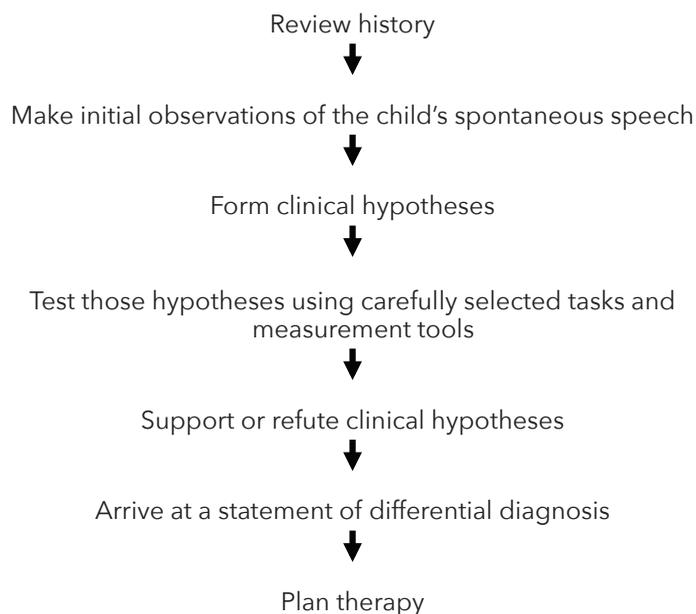


Figure 1.1. Steps taken by the clinician in reaching a differential diagnosis.

INTENDED PURPOSE OF THE DEMSS

The primary purpose of the DEMSS is to aid clinicians in differential diagnosis of SSDs in children 3 years of age and older who may be quite impaired in their speech production. It is not intended for children under 3 years of age because its reliability and validity were not examined for children that young. Our goal was to design a test that could be used even for those children who have little or no functional verbal communication but who can at least attempt imitation.

The DEMSS provides a criterion-referenced measure that enables clinicians to look for evidence of difficulties in praxis, or motor planning and programming, for speech. Identification of those difficulties can prove crucial to effective intervention planning because such difficulties are thought to require special intervention strategies.

Praxis is the term often used to denote planning and programming of intended movement and is defined as the conception and planning of a motor act in response to an environmental demand (Stedman, 2005).

Sensorimotor planning involves establishing spatial and acoustic goals. *Motor programming* refers to the actual specification of movement parameters (i.e., instructions for the timing of muscle contraction so that specific structures move in the right direction, at the right time, with the right speed and force to reach a specific articulatory configuration).

The DEMSS was designed to be standardized, although not normed. An assessment tool can be considered standardized when the materials and methods associated with its administration, scoring, and interpretation have been carefully detailed and explained, allowing anyone who administers the test to do so in the same way (McCauley, 2001). Many standardized measures are norm referenced, meaning they are designed to compare a child's speech performance with children who are typically developing. The DEMSS is criterion referenced because it is used to examine the behavior of a child and yields a score that represents his or her performance with respect to that behavior. Like classroom tests, which are criterion referenced rather than norm referenced, the purpose of the DEMSS is to determine the degree to which the test taker has learned the skills being tested, rather than to rank students relative to one another. Criterion-referenced tests are used when a comparison with a large normative sample is not the important question. For example, children with severe SSDs are known to perform differently than the normative sample; thus, we do not need to rank their performances relative to the performances of children with typical development. Clinicians, however, may want specific information about how a child's performance varies to aid differential diagnosis and treatment planning. Clinicians who use the DEMSS are able to assess the child's performance in terms of movement accuracy and any change in movement accuracy that results from different types of cueing. Thus, the DEMSS facilitates decisions regarding the contribution of deficits in motor planning and programming (differential diagnosis) as well as decisions regarding severity and prognosis.

RATIONALE

The DEMSS was motivated by the need for

- A criterion-referenced tool for children who are young and/or severely speech impaired
- A tool to facilitate differential diagnosis of SSDs in children

- A dynamic tool to facilitate judgments of severity and prognosis
- A tool that would better facilitate treatment planning and stimulus selection

Several existing measures to examine aspects of oral-motor and motor speech skill in children had been developed when formal development of the DEMSS began (e.g., Verbal Motor Production Assessment for Children [Hayden & Square, 1999], Kaufman Speech Praxis Test for Children [Kaufman, 1995]). None were able to address the full range of purposes established for the DEMSS, however, nor to meet all fundamental psychometric standards related to reliability and validity (McCauley & Strand, 2008). Therefore, development of the DEMSS was undertaken with the goal of improving psychometric characteristics and providing a dynamic assessment tool that would facilitate evaluation of children with severe motor speech problems.

THE ROLE OF THE DEMSS IN DIFFERENTIAL DIAGNOSIS

Determining to what degree motor speech impairment contributes to the child's SSD is one of the most significant challenges in differential diagnosis of SSDs. The term *motor speech impairment* denotes that at least some of the child's difficulty in speech acquisition is due to deficits in planning and programming movement for speech, deficits in the execution of speech movement due to weakness or incoordination, or both. The DEMSS was designed to assist in determining whether deficits in praxis (difficulty in the planning and programming of specific movement parameters for speech production) contribute to the child's SSD. CAS is the label for the communicative disorder commonly used to denote those children whose difficulty with speech acquisition is due at least in part to deficits in praxis.

The DEMSS was designed to measure performance on those parameters that have been posited as most indicative of and perhaps discriminative of the CAS phenotype and may be used to identify SSDs related to praxis versus those associated with different etiologies (American Speech-Language-Hearing Association [ASHA], 2007; Campbell, 2003; Strand, 2003). These behavior characteristics include impairment in the precision and consistency of movements underlying speech, lengthened and disrupted coarticulatory transitions among sounds and syllables, vowel distortions, error inconsistency, and prosodic errors (i.e., inappropriate segmentation, lexical stress errors). The DEMSS was designed to emphasize judgments of performance on each of these parameters to better identify those children for whom the label of CAS may be most appropriate.

THE ROLE OF THE DEMSS IN A COMPREHENSIVE ASSESSMENT BATTERY

The DEMSS focuses on the movements involved in speech rather than on the child's entire speech and language system. Therefore, the DEMSS is only one part of a more comprehensive battery of assessment tasks that are needed because many children with SSDs also exhibit impairment in receptive or expressive language, or both. Because speech and language processes are interactive (Goffman, 2004; Kent, 2004; Strand, 1992), it is often difficult to identify deficits in the ability to plan and program movement transitions to achieve continuously changing articulatory postures for volitional speech in children with SSDs. Furthermore, motor speech

deficits often occur along with deficits in phonology. Therefore, symptomatology may reflect a combination of linguistic (phonologic) and motor speech deficits (Crary, 1993; Rvachew, Hodge, & Ohberg, 2005; Smith & Goffman, 2004; Strand, 1992). Motor speech skill must be evaluated in the context of varying linguistic demands, and interpretation of speech data (e.g., phonemic inventories, articulation tests, DEMSS responses) must consider both the linguistic and motoric context in which they occur. Table 1.1 lists several strategies frequently used in the clinical assessment of SSDs. Additional discussion of the role of the DEMSS as one part of a comprehensive diagnostic battery can be found in Chapter 3.

BENEFITS OF DYNAMIC ASSESSMENT

The title of this assessment tool was devised to highlight the fact that the DEMSS employs dynamic assessment (Bain, 1994; Glaspey & Stoel-Gammon, 2007; Lidz & Peña, 1996). The clinician who uses this type of evaluation provides systematic cueing as the child makes repeated attempts to produce an utterance. Scoring is then undertaken during a subsequent non-cued imitation and therefore reflects the child's change in performance as a result of cueing, thereby revealing emerging skills. This sequence of clinician cues and child responses contrasts with static assessment, typical of most standardized tests, in which the child's performance is measured after a single response with no assistance from the examiner. Static assessment is a method that documents well-established skills (Glaspey, 2012; Glaspey & McLeod, 2010; Lidz & Peña, 1996). A dynamic approach offers particular advantages in the differentiation of motor speech impairment in children with severe SSDs, especially with respect to observation of particular speech characteristics, judgments of severity, and treatment planning. It has also been documented as helpful in the avoidance of bias when children from linguistically or culturally diverse backgrounds are being assessed (Gutiérrez-Clellen, & Peña, 2001).

Table 1.1. Typical assessment components for speech sound disorders

Task	Appropriate for
History	All children
Language sample	All children (include a description of nonverbal communication attempts)
Phonetic and phonemic inventories	All children
Receptive and expressive language testing (informal and standardized measures)	All children with choice of specific measures based on developmental and language level
Articulation tests or measures of phonologic performance	Children who have at least a rudimentary speech sound inventory and can name pictures
Structural-functional examination	All children
Examine oral nonverbal praxis	Children who can attempt direct imitation of volitional nonspeech oral movement tasks
Motor speech examination (e.g., the Dynamic Evaluation of Motor Speech Skill)	Children who can attempt direct imitation of at least simple (consonant-vowel [CV]) words or phrases and for whom there is a question of deficits beyond simple speech delay or consistent phonologic processes

Observations of Speech Characteristics

Dynamic assessment allows observation of behaviors that might not be seen in spontaneous speech. In spontaneous speech, children will often produce utterances they can say correctly or those they have habituated with errors, which limits observations of behaviors that may occur when children try something novel. Providing support may elicit observations important to differential diagnosis or classification of subtypes of SSDs. Even when simple cues are offered (e.g., “watch me;” or a gestural cue, such as a hand gesture to close the mouth more), a child may more actively attempt the correct movement, allowing observation of groping, segmentation, timing errors, or other characteristics associated with CAS that may occur infrequently or not at all in spontaneous utterances or non-cued repetitions.

Severity and Prognosis

The potential to better judge severity and prognosis is one important benefit of using dynamic assessment (Peña et al., 2006). Parents of children who are nonverbal or have severe speech impairments frequently ask if their child has the potential to be a verbal communicator or how long it will take for their child to talk. It is difficult to answer these questions without watching the child’s responses to cueing. Observing a child who is frequently able to produce accurate movements for an utterance with little or only moderate cueing, however, provides evidence that he or she is likely to benefit fairly quickly from therapy. Yet, observing a child who needs a great deal of cueing to correctly produce an utterance or who fails to improve production even with cueing provides evidence that his or her speech disorder is more severe, leading to a more guarded prognosis for rapid improvement (Peña et al., 2006).

Treatment Planning

The DEMSS supports treatment planning in several ways. First, the types of cues that help a child improve his or her performance during the DEMSS will likely facilitate performance improvements in ongoing treatment. Second, choices of early stimulus sets can be aided by reviewing errors on specific vowels and across syllable shapes. Third, severity of the child’s impairment affects how the principles of motor learning are applied to clinical decision making in treatment planning. For example, the clinician would devise a smaller stimulus set for children with more severe difficulties with speech praxis (Strand, Stoeckel, & Baas, 2006). Frequency and type of feedback are also influenced by the age of the patient and the severity of the impairment (Maas, Butalla, & Farinella, 2012; Sullivan, Kantak, & Burtner, 2008; Wulf, Horger, & Shea, 1999). These and other issues related to treatment planning are discussed more fully in Chapter 3.