

Clinical Exchange

A Letter to the Parent(s) of a Child With Developmental Apraxia of Speech

Part II: The Nature and Causes of DAS

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Dear Parent(s):

In the previous letter, the speech symptoms associated with developmental apraxia of speech (DAS) were described, perhaps confirming that some of the speech behaviors you observed in your child are, indeed, part of this disorder. I suspect that now you may have other questions concerning DAS, such as just what *is* this speech problem? What is going on when my child makes the speech errors that are symptoms of DAS? And, what causes DAS?

Before we talk about the nature and causes of DAS, we need to understand the concept of “speech.” “Speech” refers to the process of producing the sounds necessary for verbal communication. DAS, then, is a disorder in which children have difficulties *voluntarily* making the movements needed to produce the speech sounds (e.g. “k,” “th,” “s,” etc.) or series of speech sounds or series of syllables they want to make when they want to make them. This inability to produce the desired speech sound occurs even though those children may be able to make the same movements

with their mouths when they are not thinking about it. Children with DAS have no obvious weakness in the muscles of the face, tongue, or lips.

Within the field of speech-language pathology, the diagnosis of DAS has been controversial. However, there now seems to be a general agreement among practicing clinicians that DAS exists. This is important because we need to identify what we think the problem is before therapy can begin.

So, what is the nature of DAS? There are several different ideas regarding the nature of DAS that are at the heart of the controversies surrounding the disorder. A summary is presented in Table 1.

One explanation is that DAS is a disorder related to the overall development of the child’s language, which is a system of symbols and rules that lets us understand what is said to us, lets us express ourselves verbally, and lets us read and write. There are a number of aspects involved in language, including vocabulary, grammar, how we organize information, and the way we use language in relating with

ABSTRACT: In a previous letter to the parent(s) of children with developmental apraxia of speech (DAS), the speech characteristics often exhibited as part of the disorder were described. In this second letter, the issues involved in current thinking about the nature of the disorder are explored. Also shared is information concerning what is thought to be known about the causes of the disorder. An appendix of publications exploring these issues appears at the end of the letter.

KEY WORDS: developmental apraxia of speech, motor programming skills, child language disorder

Table 1. Explanations of the nature of developmental apraxia of speech.

- The speech disorder is related to the overall development of the child’s language, with difficulty learning and using the system of “rules” that govern how speech sounds are ordered and used.
- The speech disorder is a problem with the “motor-programming” system for speech.
- The speech disorder is due to the inability to develop the appropriate motor plans to move between sound and grammar “frames” within the language system.
- The speech disorder may have several different forms.

other people, as well as how we use “rules” to put speech sounds together to form words when we talk. In this view, the combination of individual speech sounds (e.g., “p,” “k,” “f,” etc.) in order to produce words is considered to be part of the much bigger system of language. With this orientation, DAS is thought to be a difficulty in learning and using the system of “rules” that govern how the speech sounds are ordered and used within syllables and words. DAS is considered only one part of a single disorder involving not only speech, but all aspects of learning and using language.

Another explanation for the disorder is that DAS is a problem of the “motor-programming” system for speech. Speech is accomplished by intricate movements of the lips, tongue, jaw, soft palate and larynx, or voice box. Motor activities or movements, such as walking, writing, and talking, involve use of “programs” within the nervous system. These programs allow a person to make the movements easily, skillfully, and “automatically,” without consciously thinking about each part of the movement that needs to be made. In a motor-programming explanation for DAS, the child cannot always make his or her mouth perform the movements associated with producing the sound, or sounds he or she wishes to make. It is as if something goes wrong between the brain’s sending the signal to the muscles to make the speech movements and the actual making of the movements themselves. For instance, your child may well intend to make the “b” sounds in the word “baby.” Yet, because of problems with motor-programming for speech, the “p” is produced instead. It is much like having a “bug” in a computer program that does not allow the program to perform the way it is supposed to run. Just as the program “bug” frustrates computer users, problems in correctly producing the intended speech sounds are often very frustrating to children with DAS—and to their speech-language pathologists and parents as well.

One researcher suggests that DAS may be due to a combination of both the motor-programming and language explanations. Children with DAS are thought to have difficulties organizing and “bridging,” or moving, between the grammar and sound “elements” involved in language production. These elements of the language and speech system consist of organized “frames” where syllables provide a frame or a structure for the speech sounds, and where grammar provides a frame or structure for words in sentences. Children with DAS may have problems making and using these frames within their language system and thus be unable to develop the appropriate motor plans to produce them.

Several researchers have yet other perspectives. For example, there may be several different forms of motor speech disorders, including apraxia, in children. Although these different forms of the disorder are not yet defined, the possibility compounds the difficulty of the diagnosis and treatment of the speech problem.

Another confusing issue is that this speech disorder goes by a number of different names, all of which are often used interchangeably (see Table 2). In addition to “developmental apraxia of speech” or “DAS,” the disorder is also

Table 2. Examples of the numerous names for the disorder.

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- Developmental apraxia of speech (DAS)
 - Developmental verbal apraxia (DVA)
 - Developmental verbal dyspraxia (DVD)
 - Developmental dyspraxia
 - Articulatory apraxia
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currently called “developmental verbal apraxia” (“DVA”), “developmental verbal dyspraxia” (DVD), “developmental dyspraxia,” and “articulatory apraxia.” The choice of name for the disorder sometimes reveals how the professional views the problem. Generally, those who include the term “verbal” in the name view the disorder as one related to the child’s development of language skills. The lack of the term “verbal” may reflect a motor-programming view of the disorder. Use of the prefix “dys-“ underlines the developmental aspect of the problem, one that has been present since birth, or certainly since early speech and language development—not one that has been acquired after a period of normal speech and language development.

Perhaps you have known other children with speech problems, and are wondering how these problems differ from DAS. DAS is certainly different than several other types of speech problems seen in children; each requires different approaches to therapy. (Please refer to Table 3.) One is a type of motor speech disorder, known as “dysarthria,” which refers to problems with the strength and control of the muscles the child uses for speech. Another type of childhood speech disorder is a “phonological disorder” in which a youngster has difficulty learning the language “rules” about speech sounds and where these sounds need to go within words. An example of one of these “rules” is the need to include the last consonant sound in words such as “cat,” “tub,” and “book” when the child has been inappropriately applying the phonological process of “final consonant deletion.” A third group of children, for no apparent reason, have difficulties learning how to make *specific* speech sounds, such as the “l,” “s,” or “r.” These children are often described as having “functional” speech problems. It is also the case that some children have combinations of these different kinds of speech problems. For instance, some children with DAS may also have dysarthric speech problems. Other children with DAS may appear to have problems learning phonological rules.

Table 3. Various types of childhood speech disorders.

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- Developmental apraxia of speech—a speech disorder involving difficulties voluntarily making the movements needed to produce speech sounds
 - Dysarthria—a motor speech disorder involving problems with strength and control of the speech musculature
 - Phonological disorder—a disorder in learning the “rules” about where speech sounds are placed within words
 - Functional speech disorder—a disorder of learning how to make *specific* speech sounds
 - Combinations of the above types of problems
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However, further assessment may indicate that the difficulty is one of learning the appropriate motor programming skills to actually produce the speech sounds needed in order to apply the appropriate phonological rules.

So, what causes DAS? Although it might seem that the motor-programming problems many think are at the basis of DAS are neurological in origin, this has not been documented. Children with DAS have undergone various types of neurological evaluations with no brain lesions or consistent differences in brain structure being identified. Children with DAS are often reported to have family members who also have communication disorders or learning disabilities. However, any specific genetic factor explaining how these problems might be inherited is not known at this time. So, the actual “cause(s)” of, or reasons for, DAS are still unknown.

As this letter shares, there is much yet to learn about DAS.

Sincerely,

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APPENDIX

If you would like to further explore the issues of the nature and possible causes of DAS, the following references may be of help.

Aram, D. M., & Nation, J. E. (1982). Language to speech processing. In D. M. Aram & J. E. Nation (Eds.), *Child language disorders* (pp. 144–249). St. Louis, MO: C.V. Mosby.

A review of neurologic and familial trends with children exhibiting DAS is included in this chapter. Also included is an argument for the language-based nature of the disorder.

Crary, M. A. (1993). *Developmental motor speech disorders*. San Diego, CA: Singular.

This book presents the development and application of a model for children’s motor speech disorders. The author applies the model as a continuum of difficulties, rather than as discrete diagnoses.

Hall, P. K. (1992). At the center of controversy: Developmental apraxia. *American Journal of Speech-Language Pathology*, 1(3), 23–25.

The issues of the existence and nature of DAS are explored from opposing points of view.

Hall, P. K., Jordan, L. S., & Robin, D. A. (1993). Familial and genetic factors associated with children exhibiting DAS. In P. K. Hall, L. S. Jordan, and D. A. Robin, *Developmental apraxia of speech: Theory and clinical practice* (pp. 87–98). Austin, TX: PRO-ED.

The family histories, comparisons of boys and girls with DAS, and presence of DAS in syndromes, as reported in the literature, are reviewed.

Hall, P. K., Jordan, L. S., & Robin, D. A. (1993). Neurologic and psychologic factors: Co-occurring characteristics of children exhibiting DAS. In P. K. Hall, L. S. Jordan, and D. A. Robin, *Developmental apraxia of speech: Theory and clinical practice* (pp. 99–120). Austin, TX: PRO-ED.

Reports from the literature are summarized with respect to findings of neurological assessments and observations in children with DAS.

Hall, P. K., Jordan, L. S., & Robin, D. A. (1993). Theories of motor control: Descriptions, issues, and potential for explaining DAS. In P. K. Hall, L. S. Jordan, and D. A. Robin, *Developmental apraxia of speech: Theory and clinical practice* (pp. 49–66). Austin, TX: PRO-ED.

This chapter explores underlying theories for DAS being a motor-programming disorder.

Horwitz, S. J. (1984). Neurological findings in developmental verbal apraxia. In D. M. Aram (Ed.), *Assessment and treatment of developmental apraxia, Seminars in Speech and Language*, 5(2), (pp. 111–118). New York: Thieme-Stratton.

The neurological findings of 10 children with DVA are reported.

Jaffe, M. B. (1984). Neurological impairment of speech production: Assessment and treatment. In J. M. Costello (Ed.), *Speech disorders in children* (pp. 155–186). San Diego, CA: College-Hill Press.

The controversies surrounding DAS are summarized within this chapter.

Love, R. J. (1992). Developmental verbal dyspraxia. In R. J. Love, *Childhood motor speech disability* (pp. 94–111). New York: Macmillan.

A number of controversial issues involving the causes and symptoms of developmental verbal dyspraxia are explored in this chapter.

Robin, D. A. (1992). Developmental apraxia of speech: Just another motor problem. *American Journal of Speech-Language Pathology*, 1(3), 19–22.

DAS as a motor-learning disorder is explored.

Velleman, S. L., & Strand, K. (1994). Developmental verbal dyspraxia. In J. E. Bernthal & N. W. Bankson (Eds.), *Child phonology: Characteristics, assessment and intervention with special populations* (pp. 110–139). New York: Thieme Medical.

This chapter discusses the problems associated with defining the etiology of DVD and provides an explanation of the “frame organization” theoretical model for the disorder.