

8. **Sound Card Fun** – Show children a Consonant Sound Card and have them tell you words that begin with the same sound. Give them a point or a token for each correct word.
9. **Drawing Fun** – Show children a Word Card and have them draw their own version of the photo while they practice saying the word.
10. **X-ray Vision** – Put a Word Card in an envelope or folder. Give children clues about what's in the envelope. Have them guess the photo and see if they are right.

Theory and Research

Childhood apraxia of speech (CAS) is a complex motor speech disorder. CAS is sometimes referred to as developmental verbal dyspraxia (DVD) or developmental apraxia of speech (DAS). Children with this diagnosis have difficulty planning and consistently producing sequences of speech movements using their tongue, lips, jaw, and palate. This causes children to be unable to successfully sequence and combine sounds into syllables, syllables into words, words into phrases, and phrases into sentences. Children know exactly what they want to say, but there is a disruption in the part of the brain that sends the signal to the muscles to make specific speech movements. These difficulties will limit children's abilities to express themselves fluently and intelligibly. This inability to accurately and consistently produce speech motor plans may be due to neurological impairments or developmental disabilities.

Selection of Target Words

Intelligible speech production requires both precise timing as well as accurate positioning of the lips, tongue, jaw, velum, and vocal folds (i.e., articulators). Caruso and Strand (1999) give an example of how the place of articulation for a sound can change greatly depending on the phonetic context in which that sound occurs. For example, say the nonsense words "tuki" and "tiku" focusing on where your tongue is for "k" in each word. The "k" in "tuki" is made with the back part of the tongue more forward in the mouth than the "k" in "tiku." So, even though the two words have the same alveolar sound /t/ and the same

velar sound /k/, the vowels within each word completely change their phonetic contexts, and therefore, the way the articulators must move to make the words. This example helps to explain why it is essential not to focus on specific sounds while treating apraxia, but to look at entire words. It is important to note the place of articulation (i.e., bilabial, dental, alveolar, palatal, velar, glottal) of the consonant sound(s) in each word as well as the vowel(s). So, although the cards in the kit are organized by phoneme, it is not necessarily recommended that the words chosen for treatment follow that order.

Each Consonant or Vowel Word Cards has a colorful photo of the target word on the front. This picture can help provide cuing for the child for more spontaneous productions of the target word given the tasks on the back of the card. An example of the content included on the back of each card is given below.

Learn the Definition

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A **dog** is a pet that has a furry coat and barks.

Hear and Say the Sounds

1. **dog** has three sounds in it, *d - o - g*.
2. Say *d*. Say *o*. Say *g*.
3. Say *d*. Say *og*.
4. Say *do*. Say *g*.
5. Say *dog*.

Finish the Sentence

1. Dee Dee is the name of my pet _____.
2. Say **dog** one time.

Answer the Question

1. What is a pet that has a furry coat and barks?
2. Say **dog** two times.

Complete the Rhyme

1. Log rhymes with _____.
2. Say **dog** two times.

Repeat the Phrases/Sentences

1. Pet **dog**.
2. My pet **dog**.
3. My pet **dog** is furry.

dog

A **dog** is a pet that has a furry coat and barks.

Since apraxia of speech is a disorder which affects a child's ability to successfully sequence and combine sounds into syllables, syllables into words, words into phrases, and phrases into sentences, the order of prompts on each Word Card facilitates this progression of production complexity. First, teach the child the functional target word by giving a short, simple definition. The increased familiarity with the word will help him/her to more spontaneously produce the word in the sections that follow. It is important to note that some definitions may need to be simplified based on the receptive language abilities of each child.

Hear and Say the Sounds

1. **D**og has three sounds in it, **d** – o – g.
2. Say **d**. Say o. Say g.
3. Say **d**. Say og.
4. Say **do**. Say g.
5. Say **dog**.

Increase the child's phonological awareness skills by identifying how many sounds are in the target word and producing each sound individually. The child will then imitate you producing each sound in the word as well as breaking apart the word and then putting it back together. Marquardt, Sussman, Snow and Jacks (2002) found that children with apraxia demonstrated severe deficits in segmenting syllables, identifying phonemes, and performing manipulation tasks in general. In addition, studies have shown that performing phonological awareness tasks on a target speech word may increase the specificity of the phonological representation of that word and provide a more stable motor program to direct speech production (McNeill, Gillon, & Dodd, 2009).

Finish the Sentence

1. Dee Dee is the name of my pet _____.
2. Say **dog** one time.

Answer the Question

1. What is a pet that has a furry coat and barks?
2. Say **dog** two times.

Complete the Rhyme

1. Log rhymes with _____.
2. Say **dog** two times.

The three sections above provide multiple opportunities for the child to spontaneously produce the target word by completing a sentence, answering a question, and completing a rhyme. Children practice the target word one, two, or three times after each task. Since a child with a speech delay will often

have a language delay, especially in expressive morphology (Paul & Shriberg, 1982; Rvachew, Gaines, Cloutier, & Blanchet, 2005), this section helps to work on his/her expressive language skills. Also, several studies have found that children with apraxia of speech have difficulty identifying and producing rhymes (Marion, Sussman, & Marquardt, 1993; Stackhouse & Snowling, 1992).

Repeat the Phrases/Sentences

1. *Pet **d**og.*
2. *My pet **d**og.*
3. *My pet **d**og is furry.*

Given the need for repetitive planning, programming, and production practice in motor speech disorders, clinical sources stress the need for intensive and individualized treatment of apraxia, especially for children with very little functional communication (ASHA, 2007). This is significant because speech involves complex rapid sequences of movement, and the more practiced these movements, the less conscious processing is required (Caruso & Strand, 1999), and processing capacity is limited for all of us (Kahneman, 1973), i.e., we cannot attend to and focus effort on too many things at once. The more effort a child with apraxia needs to put towards coordinating and moving his/her articulators for speech, the less intelligible his/her speech is going to be. This explains the need for providing multiple prompts for the child to produce each target word. The number of times the child is asked to say the target word varies to help increase/maintain attention and interest. However, these amounts are suggestions, and it may be appropriate to change the amount of word repetitions based on the child's current abilities.

This final task increases the complexity of the motor planning task by using the target word in a phonetic hierarchy (i.e., phrases/sentences with increasing syllables/words). In addition to addressing the child's motor-planning difficulties, these phrases/sentences also use meaningful vocabulary words in order to expand the child's functional vocabulary and to improve communicative effectiveness.

Multimodal Cues and Integral Stimulation

Another often-cited recommendation for treating children with apraxia of speech is to take advantage of other areas of strength by utilizing a multisensory approach to treatment (ASHA, 2007). This approach provides stimulation to a variety of sensory systems (e.g., visual, auditory, and tactile) at once. This can include the use of visual prompts, touch cues, and picture stimuli. These techniques can provide functional communication while at the same time supporting and enhancing verbal speech production. These cues serve as “anchors” for the child. By providing anchors through verbal and visual prompts, the child can more easily find the correct starting positions and more accurately move through sequences of sounds (Hammer, 2005).

Integral stimulation is a method that involves these multimodal cues while using a hierarchy of strategies for treatment of CAS. This hierarchy helps to determine what level of support to provide to children with apraxia of speech to achieve their goals. The following steps provide clinicians support for eliciting stimuli, with decreasing levels of support as children achieve success (Gildersleeve-Neumann, 2007):

1. The child watches and listens and simultaneously produces the stimulus with the clinician.
2. The clinician models, then the child repeats the stimulus while the clinician simultaneously mouths it.
3. The clinician models and provides cues and the child repeats.
4. The clinician models and the child repeats with no cues provided.
5. The clinician elicits the stimulus without modeling, such as by asking a question, with the child responding spontaneously.
6. The child produces stimuli in less-directed situations with clinician encouragement, such as in role-play or games.

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