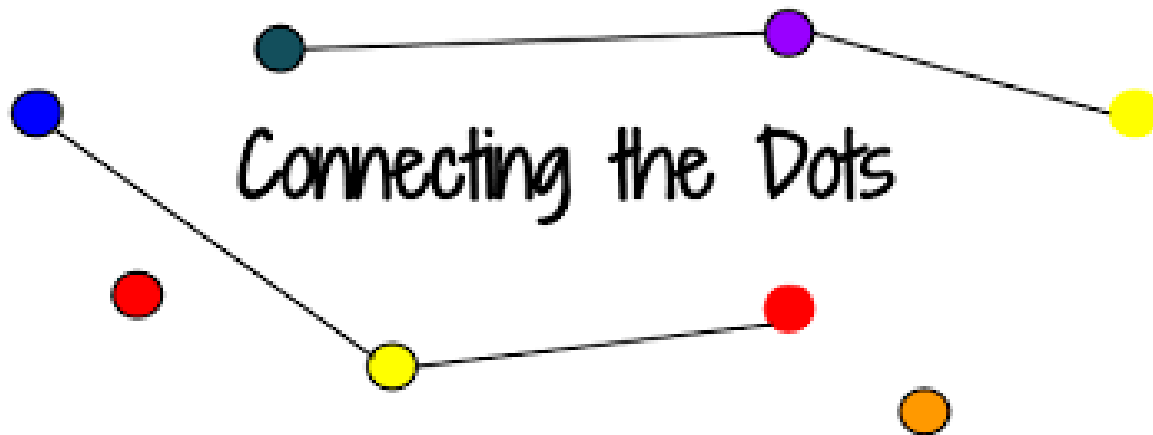


Childhood Apraxia of Speech: Identification and Next Steps



Learning Outcomes

- **Where to look**

Identify areas of analysis when a severe speech sound disorder is suspected.

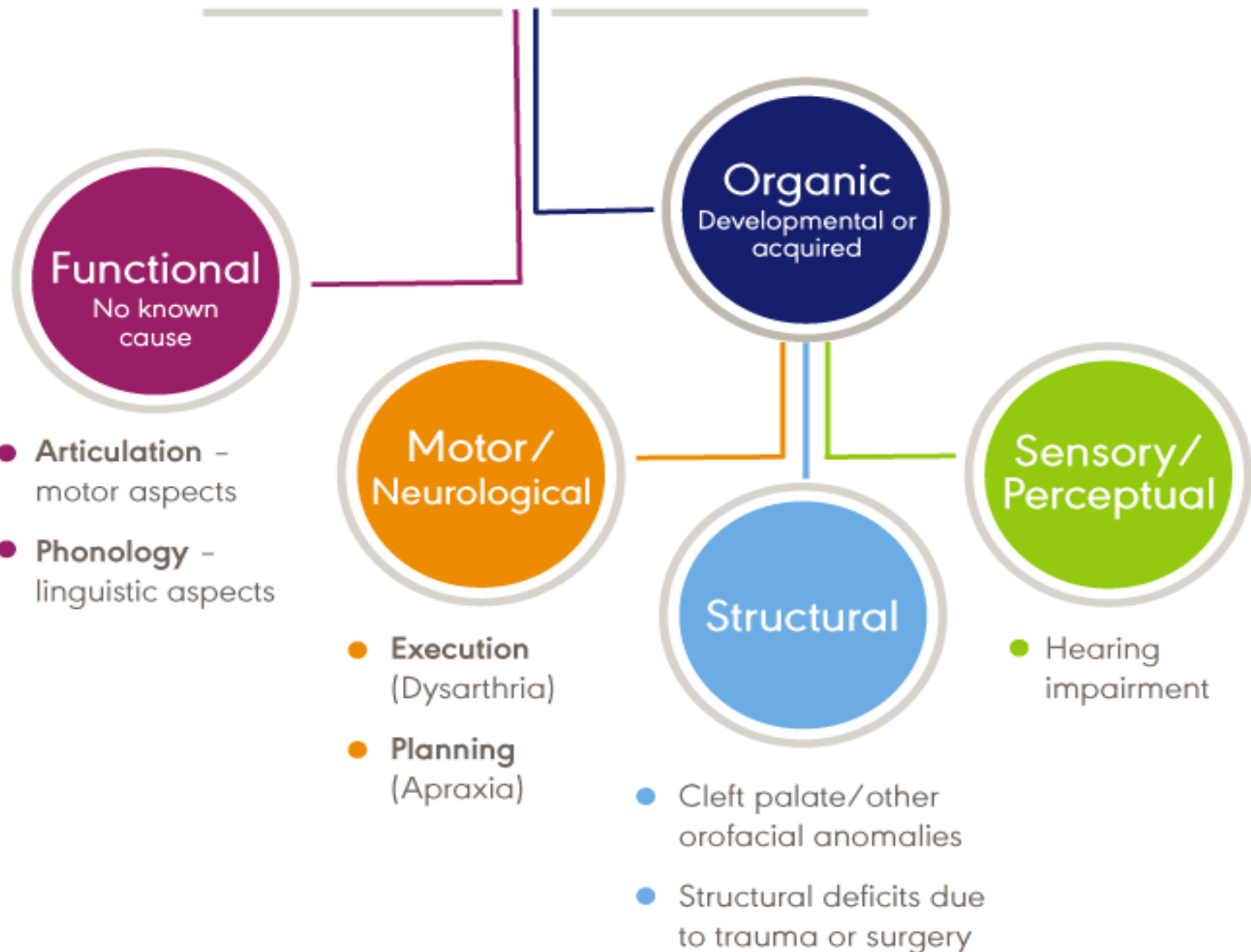
- **What to look for**

Identify characteristics for a differential diagnosis of childhood apraxia of speech.

- **Where to start**

Identify considerations for goals setting and functional therapy activities.

Speech Sound Disorders



Model of Speech Production

Cognitive level

Linguistic level

- Phonologic delay/disorder

Motor-praxis level

- Childhood apraxia of speech (CAS)

Motor-execution level

- Structural deficits
- Dysarthria
- Articulation delay/disorder

Data Collection

- Speech mechanism exam
- Speech sample:
 - spontaneous
 - imitated (sounds/syllables/words/phrases)
 - rote tasks (counting/ABC's/songs)
 - oral reading
- Standardized articulation test

Data Collection

- Additional assessments tools
 - Dynamic Evaluation of Motor Speech Skill (DEMSS) newly published, criterion referenced tool for children ≥ 3 with severe SSD (Edythe Strand; Rebecca McCauley).
Measures the ability to sequence phonetic segments in various contexts (e.g. CV, VC, CVC, multisyllabic) with and without cuing. Also assesses vowel accuracy, consistency, and prosody. Total score is plotted on a diagnostic continuum.
 - Kaufman Speech Praxis Test (Nancy Kaufman)

Analysis of Data

1. Physiologic Parameters

- Respiration
- Phonation/Voicing
- Resonance
- Fluency
- Prosody/Intonation

Analysis of Data

2. Structure and Function

	Jaw	Lips	Tongue
Oral Rest			
Feeding			
Oral Imitation			
Speech Imitation			

Analysis of Data

3. Sensory Issues

auditory

hands/feet

head/face

mouth (food aversions, stuffing, tastes, textures,
mouthing)

gag reflex

Analysis of Data

4. Speech Sample Analysis

- Vowel inventory (chart)

Front-central-back

High-mid-low

long-short

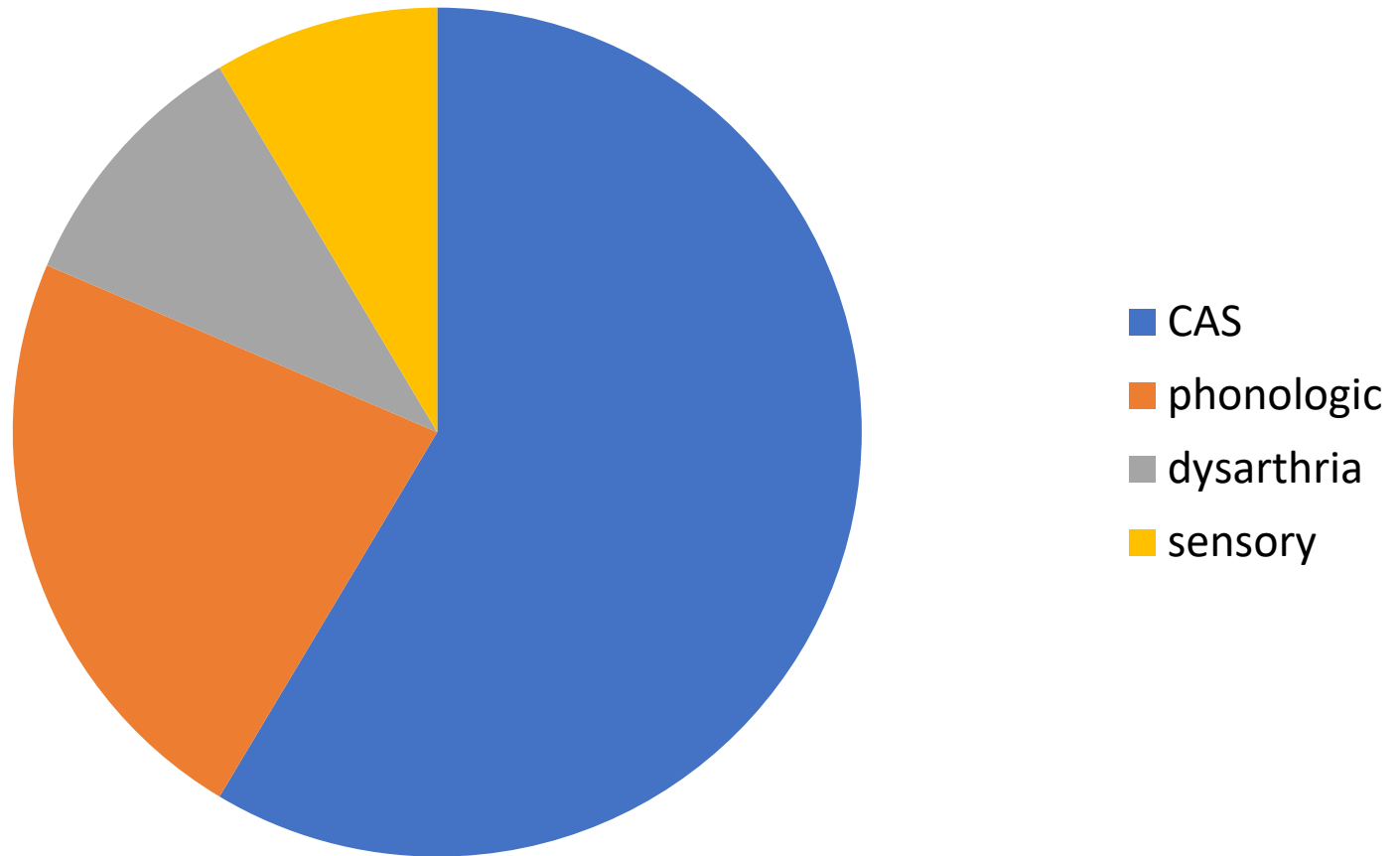
Diphthongs

Vowelized “er”

Analysis of Data

- Consonant Inventory (place & manner charts helpful)
 - Initial position
 - Medial position
 - Final position
- Syllable Shapes
- Error patterns
 - Developmental/Phonologic patterns vs Atypical
 - or
 - Omissions, Substitutions, Distortions
- Intelligibility/Comprehensibility (impact on daily life and academic success)
- Speaking rate

Pie Chart Explanation



Childhood Apraxia of Speech (CAS)

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)

Vocal to Verbal Development

- Vegetative sounds (burp/cry/laugh)
- Cooing & gooing (mushy babble)
- Canonical babbling (syllable-like) ~7 months*
 - reduplicated babbling
 - variegated babbling
- Jargon (babbling with suprasegmentals) *
- First words ~9 - 15 months

****typically not reported if CAS is present***

Features of CAS

Features that have gained the most consensus among investigators:

- Inconsistent errors (unmastered words)
- Lengthened & disrupted co-articulatory transitions
- Inappropriate prosody

- Video 1 Atypical Prosody

- Video 2 Intrusive schwa (disrupted co-articulatory transitions)

Features of CAS

Other frequently seen features

- Vowel errors
- Limited C and V repertoire
- Frequent initial and medial consonant omissions
- Increased errors with output length
- Use of only simple syllable shapes
- Difficulty with imitation (groping or refusal)
- Reduced expressive compared with receptive language skills
- Oral apraxia

- Video 5 Grouping of articulators (“w”)

- Video 6 Oral apraxia (bubble blowing)

Intervention

“Overall, the principles of motor learning theory and intensity of speech-motor practice appear to be the most often emphasized in an optimal treatment program” (ASHA Technical Report 2007)

Principles of Motor Learning

1. Precursors of motor learning

- Motivation of child and family
- Focused attention

2. Conditions of practice

- Repetitive motor drill

Mass practice (long, infrequent) vs **distributed** practice (shorter, frequent)

Blocked trials (cow, key, cup) vs **random** trials (bye, cow, moo, key)

Mass/blocked = motor performance [step 1/acquisition]

Distributed/random = motor learning [step 2/retention]

Principles of Motor Learning

3. **Variability of practice**

Practice movement sequence in different contexts and conditions to facilitate motor learning (e.g. vary prosody and loudness)

4. **Feedback**

Intrinsic feedback – sensory information

Extrinsic feedback – generated outside of the learner

outcome accuracy [knowledge of results] *right vs wrong*

movement accuracy [knowledge of performance] *very specific: too fast, too tight, too big*

“Fried Rice” Analogy

- “Rice”: Principles most often suggested
 - Frequent, intensive practice opportunities
 - Prepare the child for this type of practice by establishing trust, motivation and focused attention
 - Intentional focus on vowels
 - Paired auditory and visual stimuli
 - Explain to child how mouth moves for specific sounds (“We’re going to work on moving” vs “play time”)

More “Rice”

- Production of sound combinations vs isolated sound training (e.g. don't separate phonemes within a syllable “t..oy” or bounce “t-t-toy”)
- Use of paired movement sequences with suprasegmental facilitators such as stress, intonation and rhythm
- Monitor the type, timing and amount of feedback given
- Establishment of core vocabulary
- Incorporation of AAC as needed

More “Rice”

- Careful construction of hierarchies of stimuli based on strengths (vs developmental norms)

Work from strongest sounds

Work from strongest syllable shapes

Pick very functional target words due to reduced spontaneous carry-over

****MAP it out then MINE for targets like you’re digging for gold!****

Selecting Target Stimuli

- Example [progressed from 4 to 21 words within a few weeks]:
 - Starting vocabulary: Ma, up, bye, uhoh
 - Sound inventory: b, p, m, neutral vowels
 - Syllable/Words shape possibilities:
 - CV: boo, my, buy, moo, more, me
 - VC: um, app, I'm, help
 - VCV: open, apple, oh no, oh man, I buy
 - CVCV: boo boo

“Added Ingredients”

- Integral stimulation: auditory/visual stimulation
 - “watch listen”
 - **“watch listen say with me”**
 - “I say then you say” “hold it, feel it”
 - “I say then you say” with increasing increments of time

[Edythe Strand, DTTC]

“Added Ingredients”

- Syllable flexibility drills: target sound already in child’s repertoire by repeating CV sequences and gradually increase the phonetic difficulty by changing C or V

ex:

* baa-baa-baa-baa

* bye-baa-bye-baa

* bye-baa-bee-boo

- Video 7 Syllable Flexibility Drills

- Video 8 Word sequencing with visuals

“Added Ingredients”

- Backward chaining (backward build up)
 - banana: na + nana+ banana
 - I want more: more + want more + I want more
 - Stop: top + sssstop
- Second syllable groupings
 - key: cookie monkey
 - ny: bunny tiny sunny funny honey pony
 - ble: bubble table pebble gobble
 - “P”: happy ; “D”: potty ; “B” baby

“Added Ingredients”

- Progressive approximation: Use of an intact non-speech or speech skill to elicit a target sound/word

ex:

- shaping an “er” from a “y”
- shaping real words from sound effects
- training successive approximations of a word if needed (e.g. Kaufman program)

“Added Ingredients”

- Inter-systemic facilitation: Use of non-speech activities to facilitate the target

ex:

- whole body movements
- sign language
- spelling out words

“Added Ingredients”

- Bio-feedback

ex:

- straw to track centralized airflow across tongue
- watching a tissue move for “p”
- air across hand for “h”
- Visipitch/nasometer
- rubber tubing/straw from ear to nose

“Added Ingredients”

- Touch cue methods (published methods or your own personal techniques)
- Some I use:
 - t, d, l – tap above lip
 - n – “make your teeth buzz”
 - m – hand across lips or hum or “make your lips buzz”
 - w – circle lips
 - k, g – under chin or open mouth wide

- Video 9

Total communication (artic cues, prompting verbalizations with signs, AAC device)

Well Known “Fried Rice” Recipes

- Dynamic Temporal and Tactile Cueing (DTTC) – Edythe Strand
- Rapid Syllable Transition treatment (ReST) – D. Robin; Murray, McCabe, Ballard
- Prompts for Reconstructing Oral Muscular Phonetic Targets (PROMPT) – Deborah Hayden

Selecting Target Stimuli

Where to Start?

- Identify strongest consonants, vowels and syllable shapes
- Brainstorm potential word targets based on these strengths
- Probe potential targets using direct imitation tasks with multi-sensory cueing
- Select the stimuable & highly functional/motivating words

****MAP and MINE****

Selecting Target Stimuli

- Probe potential words and categorize into tiers:
 - Tier 1: not readily stimulable
 - Tier 2: stimulable with prompts/cues
 - Tier 3: easily elicited; ready to practice in functional tasks.

Session Organization

Therapy components based on Tier System

MOUTH TIME

- identify/label mouth parts
- review strongest sounds **Tier 2 & 3** (What parts of your mouth move the most when you say that sound?); probe **Tier 1** sounds periodically

DRILL TIME

- mass, blocked practice of **Tier 2** sounds and syllable shapes

FUNCTIONAL LANGUAGE/PLAY TIME

- distributed, random practice of **Tier 3** words and phrases during more functional activities with quickly fading cues/prompts (pretend play, book activities, etc).

Case Example - Nicholas

- 4 years old (CAS, some oral apraxia, mild OCD)
- Sound inventory: m, p, b, t, d, s, f, sh
- Objectives:
 - Tier 1 (sound in isolation): k, g, n
 - Tier 2 (stimulable in syllables): s, f, sh
 - Tier 3 (stimulable in words/phrases): initial m; medial p, b, t, d

Case Example - Nicholas

- Sample therapy session
 - Mirror time (brief)
 - Talk about mouth parts
 - Letter cards “what does this letter make your mouth do?”
 - Probe for **Tier 1** sounds “k, g, n”
 - “eieio” , “oo-ee-oo-ah-ah-ting-tang-walla-walla-bing-bang” and/or other familiar songs or rhymes

Case Example - Nicholas

- Word repetitions (ex: 3 reps per turn) using **Tier 2** sounds (s, f, sh)
 - See, so __, soccer
 - Four, five, for __, fun
- Carry-over activities using **Tier 3** sounds (initial m; medial p, b, t, d)
 - I want more
 - Maddie
 - airplane, happy, table, open, toybox

Case Example: Nicholas

- Homework
 - Notebook (“read” target pictures as tolerates)
 - Daily targets to elicit/reinforce whenever practical*
 - I want more
 - I see ___ (“in the car” game)
 - Count: one-two-three-four-five
 - Sing “Happy Birthday to you..”

* “*sticky note*” targets

Practical suggestions based on this “textbook case”

- Repeat the same lesson plan objectives over numerous sessions (just mix up the reinforcers and Tier 3 play activities as needed for motivation)
- Pick target words from a wish list developed by family, teachers, and/or curriculum vocabulary. You can provide vocabulary lists (ex: MacArthur-Bates Inventories) for people to pick from or simply have them make a list of important everyday words.

Practical suggestions based on this “textbook case”

- See the child for individual therapy at least one time a week to probe for new skills/targets. The additional session(s) each week could be provided in a small group working primarily on Tier 3 objectives. These targets can generally be easily incorporated into functional language activities.

Be very “Meta”

Importance of self-awareness and self-monitoring

- begin to teach children (as young as 2 yrs) about his/her mouth parts and how they move to make different sounds; be as concrete as possible; make it a game
- with older children, together identify “clear speech helpers” on a chart (e.g. slow pace, loud voice, don’t let “s” fall out, swallow a lot/keep chin dry)
- use the written letter (e.g. “K”) early on to teach the child a visual cue for particular sounds and where that sound is made in his/her mouth (also great for phonological awareness & preliteracy!)

- Video 10

Review of “clear speech helpers” (i.e. global intelligibility prompts)

Minimally Verbal Children

Consider Phonetic Complexity

Early Acquired Consonants & Vowels

- Consonants: p b m w t d n y
- Vowels: central and low front
- Word Shapes: CV CVCV VC VCV CVC
- C + V sequences:
 - bilabial C + central V
 - alveolar C + front V
 - velar C + back V
- Sound classes: stops nasals glides
- Sound position: voiced C in initial; voiceless C in final

Minimally Verbal Children

Vowels

Building blocks of words

Choosing vowels to target:

- 1st level: ee (eat), oo (boo), ah (Ma), oh (no), uh (up)
- 2nd level: ah-ee (bye), oh-ee (boy), ee-oo (beauty)
- 3rd level: short vowels

(adapted from P. Marsalla)

Minimally Verbal Children

Selecting Target Stimuli

- Probe potential targets using direct imitation tasks with multi-sensory cueing
- Start with most stimulable and highly functional “power” words/phrases
(e.g. *Ma, more, ball, up, down, out, eat, no, go, hey, wow, hi, bye, done, gone, me too!*)

Where to Start in Therapy

Name sound (incorporate place/manner cues)

- “n” buzzing teeth sound
- “b,p” popping sound
- “h” open mouth windy sound
- “w” sliding sound

3 starter positions

- “m” humming sound
- “oo”
- “ee”

Where to Start in Therapy

- Core Vocabulary Book (brag book)
 - Photos/pictures of “words I can say”
 - Include written label
- Word bins or boxes - 3 levels:
 - Words I can say
 - Words I can say with help
 - Words I would like to say
- Little Books for first word combinations (Boardmaker can be helpful)
- Simple motivating activities/games (object boxes)

Sample Diagnostic Statement (E. Strand)

“a 5 year old male who is exhibiting low average receptive language skills, severe impairment in expressive language, and a severe impairment in speech acquisition, due primarily to difficulty with planning and programming movement gestures for speech production (CAS). There is no frank evidence of dysarthria. He is pragmatically and socially appropriate, focuses attention well, and attempts all tasks.”

Sample Diagnostic Statement

“ a 5 year old boy, presents with the following communication disorders resulting in frequent communication breakdown:

1) Childhood apraxia of speech (CAS), a motor-based speech sound disorder. Characteristics include use of a limited variety of age-expected sounds, a limited syllable shape inventory and difficulty coordinating oral/verbal movement sequences. Developmental speech simplification patterns may be present as well but secondary to CAS characteristics at this time.

2) Expressive language delay characterized by a significantly limited vocabulary quantity and lack of use of word combinations. “

Sample goals:

Expressive Language

1a. Produce a core expressive vocabulary of >50 words as measured by vocabulary check list.

1b. Produce 2 word phrases 10x/session over 3 therapy sessions.

Articulation

2a. Produce initial / m, b, d, w, y / in the following contexts within functional words:

a. CV (e.g. me, more, baa, bee, boo, ball, doh, whoa, whee)

b. VV (e.g. uhoh, oo oo ah ah [monkey sounds])

e. CVCV duplicated (e.g. boo boo, dada, woo woo)

c. VCV (e.g. open, apple, I do, I want)

d. VC (e.g. up, eat)

f. CVCV with different V (e.g. daddy, people, bubble, puppy)

2b. Produce early developing vowels (Ee [beet], Oo [boot], Oh [boat], Ah [box], Uh [but]) in the above syllable shapes.

2c. Produce the following sounds in initial or final positions of words: /h, p, n, t, g/.

Sample goals

Expressive Language:

1a. Demonstrate age-expected vocabulary skills as measured by language sampling, vocabulary checklists and/or formal testing.

1b. Produce an age-expected mean length of utterance as measured by language sampling.

1c. Produce "I" (when pronoun is necessitated) in spontaneously conversation with 70% accuracy

1d. Produce age-expected grammar forms including present progressive "ing", copula verb "is" and negation (i.e. don't) in spontaneous conversation with 70% accuracy.

Articulation:

2a. Produce fricative sounds f, s, sh in initial/medial/final position of elicited words with 80% accuracy.

2c. Imitate velar sounds k, g in CV or VC syllables with 80% accuracy.

2d. Produce salient, multi-syllabic words containing mastered and emerging sounds with 80% accuracy.

Possible Referrals

- OT
- AAC

- PT
- Feeding Therapy
- Orthodontist
- Neurologist
- Genetics
- etc

Resources

Practice Portals at ASHA.org

- Speech Sound Disorders
- Apraxia

Edythe Strand

- course on Youtube (you pick the sections you want to watch)
- Strand, E. (2017, March). Appraising Apraxia. ASHA Leader
- “Examples of different levels of severity with CAS” Youtube
- DEMSS – Dynamic Evaluation of Motor Speech Skills

apraxia-kids.org

- Kathy Jakielski webinar “Building Speech..”

Pam Marshalla

www.pamelamarshalla.com

Margaret Fish Here’s How to Treat Apraxia

The Informed SLP (\$7/month); easy breezy lit review

Apps: Small Talk Phonemes; Speech Stickers

Presenter

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