Assessment of Childhood Apraxia of Speech

Jennie Bjorem M.A., CCC-SLP

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Disclosures

- **Financial Disclosure:** Jennie is the owner of Bjorem Speech Publications and receives pay from sales from her products on her website, TPT and Boom Learning. Jennie is the owner of Children’s Therapy Services and case studies were conducted at her place of business.

- ISHA provided my fee for this presentation.
Learning Objectives

• Participants will be able to define childhood apraxia of speech
• Participants will be able to explain differential diagnostic criteria for CAS
• Participants will be able to conduct an informal motor speech assessment
• Participants will choose functional targets and write goals to support a motor planning approach for CAS.
Apraxia of speech is a SPEECH LABEL for difficulty with planning and programming movement for speech. Our brains plan and program the movements needed for speech including the tongue, lips, jaw, palate, vocal cords, and diaphragm. Our brains also must judge when to move, at what speed, in what direction and distance for the movement, with how much muscle contraction... all at the same time. CAS is when there is a disconnect in the ability to plan out and program these movements, impacting movement for speech production and prosody.
Causes of CAS

- Complex Neuro developmental disorders - Secondary characteristics of other disorders such as ASD, Down syndrome or genetic differences.
- Neurological Impairment due to infection, illness or injury
- Idiopathic Speech Disorders - unknown origin
KEY CHARACTERISTICS:
According to the ASHA Position Statement

• Inconsistencies in production of consonants and vowels over multiple attempts of syllables or words
• Longer transitions or disrupted movements between sounds and syllables and difficulty with initial articulatory configurations
• Prosody differences - robot sounding, difficulty with intonation, rhythm, lack of variation in vocal pitch, ability to control or decipher loudness (lexical and stress errors)
Key Characteristics according to the Mayo 10 +1
(ASHA, 2007; Davis, Jacks & Marquardt, 2005; Iuzzuni-Siegel et al, 2015; Shriberg and Strand, 2014)

Increased difficulty with multisyllabic words

Voicing Errors

Difficulty with Initial articulatory configuration or gesture and transitional movement gestures - wrong movement wrong place wrong time.

Inconsistent errors on repeated trials

Intrusive Schwa

Vowel Errors

Slow Rate

Groping - silent searching behavior for a movement for speech

Consonant Distortions/Substitutions - non-developmental distortions due to inaccurate articulatory placement (Overby et al., 2019)

Disrupted Movement between sounds and syllables, inappropriate pausing or segmenting

Equal or Inappropriate Stress - Prosody
CAS Characteristics Identification Practice

- Go to page 1 in your supplemental packet
- Watch and listen to client videos
- Mark all the characteristics you observe
<table>
<thead>
<tr>
<th>Inconsistent errors on repeated trials</th>
<th>Vowel Errors</th>
<th>Distorted Substitution</th>
<th>Difficulty with initial articulatory configuration</th>
<th>Equal or inappropriate stress</th>
<th>Groping</th>
<th>Slow Rate of speech</th>
<th>Increased difficulty with multisyllabic words</th>
<th>Disrupted movement between sounds or syllables, segmented</th>
<th>Intrusive Schwa</th>
<th>Voicing Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child 1</td>
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<td>Child 2</td>
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</tr>
</tbody>
</table>
• Intrusive Schwa
• Groping
• Difficulty with Initial Articulatory Configuration

• Consonant Distortions
• Vowel Errors
• Inconsistent Errors
• Increased difficulty with multisyllabic words

• Vowel Distortions
• Groping
• Prosody - vocal control/stress
• Inconsistent Errors
• Segmenting
• Segmenting
• Equal Stress - Prosody
• Difficulty with Initial Articulatory Configuration

• Segmenting
• Vowel Distortion
• Groping
• Prosody - vocal control
• Difficulty with Initial Articulatory Configuration
Early Characteristics

- Decreased, lack of babbling
- Groping, lack of flexibility when imitating speech
- Delayed onset of first words - beyond 12 months
- Limited Intonation
- GHOST WORDS – Words Appear and disappear
- Simple Syllable Shapes and Vowel Errors
- Difficulty attaining and maintaining articulatory postures
• First Consonant after 12 months
• 3 or fewer consonants by 16 months
• 5 or fewer consonants between 17-24 months
• Lack of velars or posterior sounds in first 24 months
• Dependency on bilabials, alveolars, stops, and nasals in first 24 months
• Limited syllable structure
Who Can Diagnosis CAS?

According to the ASHA Position Statement, speech-language pathologists trained in diagnosis of apraxia of speech are the professionals responsible for making the primary diagnosis of CAS.
DIFFERENTIAL DIAGNOSIS of CAS

- CASE HISTORY
- ORAL MOTOR EXAM - NSOME
- RETROSPECTIVE VIDEO ANALYSIS
- MOTOR SPEECH EXAM - minimum of 3 speech tasks
- SOUND INVENTORY - spontaneous, imitated and stimulable
- CORE WORD INVENTORY
- CUE ASSESSMENT
- VIDEO MOTOR SPEECH - you will need to refer back
Non-Speech Oral Motor Exam

Children with non-speech oral apraxia are more likely to have apraxia of speech, however it is not required to give a diagnosis of CAS. We do a NSOME because it provides us with more information regarding oral apraxia and can help us rule out dysarthria and help complete the puzzle of diagnosing CAS. I recommend Amy Graham’s Oral Motor Assessment.
DEMSS – Dynamic Evaluation of Motor Speech Skill

- Standardized, criterion-referenced assessment for ages 3 and up or severely speech impaired, even children considered minimally or non-verbal.
- Focus – movements for speech
- Guide the clinician in observations of speech characteristics
- Help with judgments of severity and prognosis
- Tool for facilitating treatment planning and target selection
- Overall articulatory accuracy, vowel accuracy, prosodic accuracy and consistency are scored.
The DEMSS allows observations of speech production across targets that vary in length and phonetic complexity that are organized in a syllabic hierarchy.

- Imitation of utterances with child watching the administrator.
- Clinician elicits additional attempts using various cueing.
- Cueing is used to improve accuracy over repeated trials.
Informal Evaluation - definitions

• **Speech Task/Probe**: the task that assesses the child’s skill -
  - articulation test, speech sample, DEMSS-Dynamic Evaluation of Motor Speech Skills, Challenging Word Task, Park Play Scene, 1-Syllable, 2-syllable, multisyllabic

• **Sign/Characteristic**: a sign is a feature of CAS and is only counted as a sign when it is seen **at least twice** within a speech task.

• **CUES**: note cues used to help the child with accurate productions - our goal during assessment is to get a correct production.
Definitions continued

• **Dynamic**: the clinician uses cueing to help the child with a correct production over repeated attempts. Scoring is taken on subsequent non-cued imitation. *seek to identify skills as well as learning potential* (Strand et al., 2013; Strand & McCauley, 2019).

• **Static**: child’s performance is measured after a single response with no cueing from the clinician.
Informal Motor Speech Exam

Assess a minimum of 3 speech tasks - these may include:

- Articulation Test - dynamic assessment
- Speech Sample
- Dynamic assessment of syllable shapes
  - CV, VC, CVCV, CVC .... multisyllabic words
  - CV examples: up, on, in, out, off, eat, aim

GOAL - is to cue and practice 5 times to help the child get the target production correct. Take note of cues that helped and if the child was able to get the correct production.
Informal Motor Speech Exam...continued

• Score vowel on the 1st production - correct or incorrect

• Must see a characteristic 2 times in order to count it as a sign within a speech task. *e.g., you should see “groping” 2 times when assessing CV in order to check it as a sign.*

• For a CAS+ you should be able to observe 4 of the same characteristics over a minimum of 3 speech tasks. *e.g., you should see “groping”, “inconsistent errors on repeated trials”, “vowel distortions” and “segmenting” consistently in an articulation test, speech sample, and multisyllabic words.*
### Definitions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood Apraxia of Speech</td>
<td>Apraxia of speech is a speech label for difficulty with planning and programming movement for speech. Our brains plan and program the movements needed for speech including the tongue, lips, jaw, palate, vocal cords, and diaphragm. Our brains also must judge when to move, at what speed, in what direction, the distance for the movement, with how much muscle contraction... all at the same time. CAS is when there is a disconnect in the ability to plan out and program these movements impacting the movement for speech production and prosody. - Jen Bjorem</td>
</tr>
<tr>
<td>Segmenting</td>
<td>Inappropriate pausing between sounds or syllables - robot sounding</td>
</tr>
<tr>
<td>Voicing Errors</td>
<td>Child uses voiced consonants in place of voiceless or vice versa - e.g., do for two</td>
</tr>
<tr>
<td>Vowel Distortion or Substitution</td>
<td>Slight or significant differences in vowel production, something sounds wrong ... listen closely it takes a trained ear</td>
</tr>
<tr>
<td>Groping</td>
<td>Silent searching behavior for a movement for speech</td>
</tr>
<tr>
<td>Intrusive Schwa</td>
<td>Inappropriate addition of schwa e.g., gulue (glue), nohu (no), bedu (bed), ephenthesis</td>
</tr>
<tr>
<td>Inconsistent Errors</td>
<td>Noted differences in production on repeated trials e.g., beby, baby, debi, beddi</td>
</tr>
<tr>
<td>Difficulty with initial articulatory configuration and transitional movement gestures</td>
<td>Lengthened or disrupted movements between sounds and syllables, wrong movement wrong place wrong time, difficulty establishing initial articulatory gesture</td>
</tr>
<tr>
<td>Equal or inappropriate stress or prosody errors</td>
<td>e.g., money (no stress) vs. MOney OR MOney vs. moNEY (wrong stress), Limited vocal range, difficulty with volume, may sound monotone</td>
</tr>
<tr>
<td>Slow Speech</td>
<td>Slow rate of speech</td>
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<tr>
<td>Increased Errors in Multisyllabic words</td>
<td>Increased errors on multisyllabic words</td>
</tr>
<tr>
<td>Consonant Distortions</td>
<td>Non-developmental distortions due to inaccurate articulatory placement (Overby et al., 2019)</td>
</tr>
</tbody>
</table>

INFORMAL MOTOR SPEECH ASSESSMENT - CV & VC

**Directions:** Video the assessment for your reference. Ask the child to repeat target words as you model. Assess each target at least twice, mark + if correct and consistent, if incorrect use cues (simultaneous production, slowing rate, visual cues, backward/forward chaining, etc.). To try to get the correct production, try 5 times then score CC (correct with cues) or O (incorrect) and note cues that helped with correct production. In notes document features of CAS using the abbreviations at the bottom of each page. Vowels should be scored + or O on first production. Circle incorrect stress if noted.

<table>
<thead>
<tr>
<th>TARGET</th>
<th>Transcription</th>
<th>Production (+, CC, O)</th>
<th>Vowel (+, O)</th>
<th>Stress</th>
<th>Features Noted</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV</td>
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<td>boo</td>
<td>/bu/</td>
<td>b*n puc cc</td>
<td>O</td>
<td>+</td>
<td>+VD, IE, V</td>
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<td>me</td>
<td>/mi/</td>
<td>mi +</td>
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<td>no</td>
<td>/nou/</td>
<td>nO dnm O</td>
<td>O</td>
<td></td>
<td>VD, IE, IS, G, S, C</td>
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<td>pay</td>
<td>/pet/</td>
<td>be bem O</td>
<td>O</td>
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<td>VD, IE, V</td>
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<td>key</td>
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<td>S, IE, G</td>
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<td>tie</td>
<td>/tai/</td>
<td>di di + (whisper)</td>
<td>O</td>
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<td>VC</td>
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<td>VD, IE, G, V</td>
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<td>up</td>
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<td>up up +</td>
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<td>IS, C, IE, VD</td>
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<td>off</td>
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<td>eat eat +</td>
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</tbody>
</table>

CHILD NAME: C.O. DOB: 05/29/2017
DATE: 05/29/2020

IE - inconsistent errors  VD - vowel distortion  TG - transitional gestures  P - prosody errors
G - grouping  SS - slow rate  M - difficulty with multisyllabic words  S - segmenting
IS - intrusive schwa  V - voicing errors  C - consonant distortion
# CAS Decision Guide

**Child Name:** C.D.  
**DOB:** 05/29/2017  
**Date:** 05/29/2020  
**Therapist:** Jami Gieger

<table>
<thead>
<tr>
<th>Speech Probe</th>
<th>Inconsistent errors</th>
<th>Vowel Distortion or Substitution</th>
<th>Transitional Gestures/Initial Auditory Configuration</th>
<th>Inappropriate Prosody or Stress Errors</th>
<th>Gropping</th>
<th>Slow Speech Rate</th>
<th>Difficulty with multisyllabic words</th>
<th>Inappropriate pausing or segmenting</th>
<th>Intensive Schwa</th>
<th>Voicing Errors</th>
<th>Consonant Distortions</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 1 Syllable - CV</td>
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<td>#2 2 Syllable - VC</td>
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<td>#3 3 Syllable - CVC</td>
<td>X</td>
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<td>#4 4 Syllable</td>
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<td>#5 Articulation Test</td>
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<td>#6 Speech Sample</td>
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</tbody>
</table>

Check pink box if each feature is observed in 3 or more speech probes.

<table>
<thead>
<tr>
<th>Scores</th>
<th></th>
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</thead>
<tbody>
<tr>
<td># of speech probes given (minimum 3)</td>
<td>3 ≥3</td>
</tr>
<tr>
<td># features observed (add up X in pink boxes)</td>
<td>4 ≥4</td>
</tr>
<tr>
<td>≥4 features and ≥3 speech probes = CAS+</td>
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</tr>
</tbody>
</table>


A diagnostic marker to discriminate childhood apraxia of speech from Speech Delay. Diagnosis of CAS was confirmed using a version of the pediatric adaptation of the Mayo Clinic assessment for motor speech disorders ("Mayo10") (Shriberg and Strand, 2014; Shriberg, Potter, & Strand, 2011; Shriberg, Lofthede, Strand, & Jakobsen, 2012).