Childhood Apraxia of Speech Assessment Guideline

Childhood apraxia of speech (CAS) is a neurological pediatric speech sound disorder in which the precision and consistency of movements underlying speech are impaired in the absence of neuromuscular deficits (e.g., abnormal reflexes, abnormal tone). CAS may occur as a result of known neurological impairment, in association with complex neurobehavioral disorders of known or unknown origin, or as an idiopathic neurogenic speech sound disorder. The core impairment in planning and/or programming spatiotemporal parameters of movement sequences results in errors in speech sound production and prosody (Ad Hoc Committee on Apraxia of Speech in Children, 2007). The purpose of this document is to provide an assessment guideline that can help a speech-language pathologist (SLP) in making a differential diagnosis of CAS. Much of the information contained in this document was attained from several sources, which are listed at the end of the document.

Differentiate

There may be multiple contributing factors influencing a student’s speech production challenges. If your student has one or more of the following disorders, a diagnosis of CAS may not be appropriate or it may be a mixed diagnosis as some children have mixed phonological, articulation and apraxic features.

Is this an articulation/phonological disorder?
- errors in CAS should not follow conventional error patterns or processes (e.g. predictable errors, no significant breakdown in speech precision as word or utterance complexity increases). This evaluation can be completed using a formal measure (GTA-2, HAP3-3, etc.) or from a speech sample.

Is this a dysarthria?
- errors are mainly distortions and omissions. Distortions are the most common type of error in dysarthria.
- errors are consistent and predictable.
- no islands of clear speech (“pop-out” words vs. on demand).
- regardless of the speaking task or materials used, the student will exhibit the same amount and types of errors.
- other indicators of muscle weakness are observed such as feeding difficulties, drooling, etc.

Is the student non-verbal or confounding?
- The student does not talk very much so I am going to call it CAS.
- I can’t really figure out what this is, so I am going to call it CAS.
The following information can be collected by interviewing the student’s caregiver(s) and/or teacher or reviewing an individual’s history and background information. This is not an exhaustive list of interview questions.

**Limited early babbling or sound play is a critical feature in diagnosing CAS.** Did your child make lots of sounds as an infant and if so, were they typical babbling sounds like “mamama”, “dadada”, and “bababa”?

Was your child a late talker?

Is your child’s speech inconsistent so that he/she might say things different ways each time?

Does your child have more problems with sentence clarity than when producing single words?

Does you child seem to say words much better when imitating you than when trying to say words on his/her own?

Does your child demonstrate signs of frustration regarding his/her speech? (although important, frustration does not differentiate apraxia well from other speech sound disorders)

Did/does your child have any problems eating? (possible uncoordinated feeding patterns; possible drooling)
The following features can be observed while taking a spontaneous language sample or can be elicited by direct probes and/or oral examination.

**CONSENSUS FEATURES:**

1. *Inconsistent errors on consonants and vowels in repeated productions of syllables or words.* This feature refers to token-to-token variability, or variations in the way a specific word is produced. For example, within the same session, a child may produce *banana* as “babana,” “bana,” and “nana.” Play a game that involves lots of repetition of specific vocabulary. Ask student to repeat test items multiple times. Consider the level at which the breakdown occurs (i.e., CVC words, two-word phrases, etc.) and probe more at this level.

2. *Lengthened and disrupted coarticulatory transitions between sounds and syllables.* Children with CAS may demonstrate prolonged pauses between phonemes, syllables, and words resulting from challenges making smooth articulatory transitions from phoneme-to-phoneme or syllable-to-syllable. The pauses and breaks between phonemes may give the child’s speech a staccato quality. When coarticulatory transitions are disrupted, the child also may exhibit articulatory productions that negatively impact speech intelligibility (e.g., frequent phoneme and syllable omissions, vowel errors, voicing errors, resonance differences, and difficulties producing increasingly complex phoneme sequences).

3. *Inappropriate prosody, especially in the realization of lexical or phrasal stress.* Children with CAS make a number of prosodic errors including (a) applying stress to the wrong syllable of a word (e.g., “pony” instead of “pony”); (b) using excessive equal stress by applying stress equally to each syllable of a word (e.g., “ba-na-na”) giving speech a robotic quality; (c) using excessive equal stress on all or most words of a sentence (e.g., “I want that one.”), which gives speech a monotone or staccato quality; or (d) applying stress to an inappropriate lexical item within a sentence. Prosody can impact both speech intelligibility and the listener’s impression of the speech.

**CRITICAL FEATURES:**

1. *Word/sentence complexity breakdown.* Take a word the student says and ask for an expansion to an –*ing* form, add a syllable or two, try nonsense words, etc.. Imitative productions do not provide enough evidence on their own. Try to elicit spontaneous productions of test items that have already been imitated whenever possible. For example, introduce a nonsense word or phrase and have student imitate at first. Play a game where the student must produce this word or phrase spontaneously to complete the activity. Note difference between imitative and spontaneous productions.
2. **Sound inventory restrictions**

3. **Vowel distortions/centralization**

4. **Voiced/voiceless sound errors**

5. **Groping behaviours**

**OTHER CONSIDERATIONS:**

1. **Oral examination and diadochokinetic (DDK) rates and coordination.**
   - Structure, size and symmetry of jaw, cheeks, lips, tongue, palate, velum and teeth. Typical oral resting posture.
   - *Smile, open your mouth, blow, whistle, puff out your cheeks, bite your lower lip, touch your nose with the tip of your tongue, alternately pucker and smile.* Inability to imitate single oral/facial movements may indicate oral apraxia. Oral apraxia would usually mean comorbid speech apraxia.
   - Slow DDK rates or poor DDK rhythmicity or coordination alone would never lead to a diagnosis of CAS. However, when challenges on DDK tasks are observed as part of an overall profile of speech planning and programming challenges, the information can be used to support the diagnosis of CAS.
   - Note whether the child’s habitual speaking rate is slow, fast or normal.
   - Describe the vocal quality and achieved loudness of vocalizations; differences may be indicative of dysarthria.

2. **Language assessment.** Typically a discrepancy between receptive and expressive language, with receptive being significantly higher than expressive. Although CAS does not cause delayed or disordered language, it may contribute to a child’s reduced expressive vocabulary, reduced sentence length, or increased morphosyntactic errors. Children with CAS also are at high risk for word retrieval struggles as their “storehouses” for word recall have not been firmly established for years like children with typical development.

3. **No articulation/phonology therapy effect.** You will likely see minimal progress in therapy if intervention is not designed to target motor planning.

4. **Speech intelligibility rating.** Several options, including language sample (PIW), unfamiliar listener transcription, unfamiliar listener rating, etc.

5. **Effectiveness of communication**

6. **Stimulability and response to cueing.**
Diagnose

An SLP should be able to provide an accurate diagnosis of CAS by age 4 (with all else intact, such as cognitive abilities). In some cases, it may not be possible to arrive at a confident diagnosis due to the child’s age, level of cooperation, understanding of the task instructions, current imitative abilities, extreme limitations in speech-sound repertoire or other co-occurring conditions. When the information received from formal testing is inadequate to make a definite diagnosis, a provisional diagnosis of CAS may need to be made and either confirmed or rejected after a period of diagnostic therapy when the child’s response to the intervention is documented. We can use the terms "suspected apraxia" or "working diagnosis" as supported by the Ad Hoc committee document. We need to approach younger children with strategies that reflect our suspicion of this diagnosis so it behooves us to make it sooner if we have enough features to support it.

SAMPLE DIAGNOSTIC STATEMENTS

The following statements were provided by David Hammer, MA, CCC–SLP:

______ presents with features that support a working diagnosis of childhood apraxia of speech which include...

The features that ____________ currently demonstrates support a diagnosis of (severity level) childhood apraxia of speech. These include...

___________ presents with mixed speech sound production features including phonological error patterns, articulation deficits, and childhood apraxia of speech. These include...

___________ presents with features that reflect possible speech motor planning/programming deficits, however, a limited sample was able to be obtained during this assessment. Therefore a diagnosis such as childhood apraxia of speech cannot be ruled out or confirmed at this time. At least 6 months of intensive therapy is needed before a more definitive diagnosis can be made.


A. Parent interview

1. Did your child make lots of sounds as an infant and if so, were they typical babbling sounds like “mamama”, “dadada”, and “bababa”?

2. Was your child a late talker?

3. Does your child say things different ways each time (inconsistent)?

4. Does your child have more problems in sentences than when producing single words?

5. Does your child seem to say words much better when imitating you than when trying to say words on his/her own?

6. Does your child demonstrate signs of frustration regarding his/her speech?

7. Did/does your child have any problems eating? (possible uncoordinated feeding patterns; possible drooling)
B. Evaluation

1. Inconsistent errors on phonemes in repeated productions of syllables or words

2. Lengthened and disrupted coarticulatory transitions between sounds and syllables

3. Inappropriate prosody, especially in the realization of lexical or phrasal stress

4. Word/sentence complexity breakdown

5. Sound inventory restrictions

6. Vowel distortions/centralization

7. Voiced/voiceless sound errors

8. Groping behaviours

9. Structure, size and symmetry of jaw, cheeks, lips, tongue, palate, velum and teeth
10. Oral apraxia

11. Diadochokinetic rates and coordination

12. Habitual speaking rate

13. Vocal quality and loudness

14. Language assessment

15. Characteristics of dysarthria

16. Articulation/phonology assessment

17. Speech intelligibility rating

18. Effectiveness of communication

19. Stimulability and response to cueing
### C. Checklist

<table>
<thead>
<tr>
<th>Feature</th>
<th>Yes / No</th>
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<tbody>
<tr>
<td>Limited early babbling/sound play</td>
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<tr>
<td>Late talker</td>
<td></td>
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<tr>
<td>Eating problems</td>
<td></td>
</tr>
<tr>
<td>Inconsistent errors</td>
<td></td>
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<tr>
<td>Lengthened and disrupted coarticulatory transitions</td>
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<tr>
<td>Inappropriate prosody</td>
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<td>Sound inventory restrictions</td>
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<tr>
<td>Word/sentence complexity breakdown</td>
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<tr>
<td>Vowel distortion</td>
<td></td>
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<tr>
<td>Vowel centralization</td>
<td></td>
</tr>
<tr>
<td>Voiced/voiceless errors</td>
<td></td>
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<tr>
<td>Groping</td>
<td></td>
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<tr>
<td>Normal</td>
<td></td>
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<tr>
<td>Normal oral structures</td>
<td></td>
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<td>Normal vocal quality</td>
<td></td>
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<tr>
<td>Normal loudness</td>
<td></td>
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<tr>
<td>Reduced intelligibility</td>
<td></td>
</tr>
<tr>
<td>Overall rate of speech</td>
<td>Slow / Fast / Normal</td>
</tr>
</tbody>
</table>

_____ Student presents with the features that support a diagnosis of _______ childhood apraxia of speech.

_____ Student presents with some features of childhood apraxia of speech, supporting a provisional diagnosis.

_____ Student presents with the features to support further evaluation of articulation / phonology / dysarthria. [circle one or more areas]

_____ Student does not present with the features to support a diagnosis of childhood apraxia of speech at the time of this assessment.

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Comparison of Childhood Apraxia of Speech, Dysarthria and Severe Phonological Disorder

(Some or all of these characteristics may be present. Consult with a Speech-Language Pathologist who is experienced in the diagnosis of motor speech disorders for a definitive differential diagnosis)

<table>
<thead>
<tr>
<th>Verbal Apraxia</th>
<th>Dysarthria</th>
<th>Severe Phonological Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>No weakness, incoordination or paralysis of speech musculature</td>
<td>Decreased strength and coordination of speech musculature that leads to imprecise speech production, slurring and distortions</td>
<td>No weakness, incoordination or paralysis of speech musculature</td>
</tr>
<tr>
<td>No difficulty with involuntary motor control for chewing, swallowing, etc. unless there is also an oral apraxia</td>
<td>Difficulty with involuntary motor control for chewing, swallowing, etc. due to muscle weakness and incoordination</td>
<td>No difficulty with involuntary motor control for chewing and swallowing</td>
</tr>
<tr>
<td>Inconsistencies in articulation performance--the same word may be produced several different ways</td>
<td>Articulation may be noticeably “different” due to imprecision, but errors generally consistent</td>
<td>Consistent errors that can usually be grouped into categories (fronting, stopping, etc.)</td>
</tr>
<tr>
<td>Errors include substitutions, omissions, additions and repetitions, frequently includes simplification of word forms. Tendency for omissions in initial position. Tendency to centralize vowels to a “schwa”</td>
<td>Errors are generally distortions</td>
<td>Errors may include substitutions, omissions, distortions, etc. Omissions in final position more likely than initial position. Vowel distortions not as common.</td>
</tr>
<tr>
<td>Number of errors increases as length of word/phrase increases</td>
<td>May be less precise in connected speech than in single words</td>
<td>Errors are generally consistent as length of words/phrases increases</td>
</tr>
<tr>
<td>Well rehearsed, “automatic” speech is easiest to produce, “on demand” speech most difficult</td>
<td>No difference in how easily speech is produced based on situation</td>
<td>No difference in how easily speech is produced based on situation</td>
</tr>
<tr>
<td>Receptive language skills are usually significantly better than expressive skills</td>
<td>Typically no significant discrepancy between receptive and expressive language skills</td>
<td>Sometimes differences between receptive and expressive language skills</td>
</tr>
<tr>
<td>Rate, rhythm and stress of speech are disrupted, some groping for placement may be noted</td>
<td>Rate, rhythm and stress are disrupted in ways specifically related to the type of dysarthria (spastic, flaccid, etc.)</td>
<td>Typically no disruption of rate, rhythm or stress</td>
</tr>
<tr>
<td>Generally good control of pitch and loudness, may have limited inflectional range for speaking</td>
<td>Monotone voice, difficulty controlling pitch and loudness</td>
<td>Good control of pitch and loudness, not limited in inflectional range for speaking</td>
</tr>
<tr>
<td>Age-appropriate voice quality</td>
<td>Voice quality may be hoarse, harsh, hypernasal, etc. depending on type of dysarthria</td>
<td>Age-appropriate voice quality</td>
</tr>
</tbody>
</table>

Compiled by Ruth Stoeckel, M.A., CCC-SLP and David Hammer, M.A., CCC-SLP

Childhood Apraxia of Speech- David W. Hammer, M.A., CCC-SLP
THE BIG BOOK OF EXCLAMATIONS
1st and 2nd Editions
(2nd Edition entitled “Talk With Me”)
by Teri Peterson, M.S. CCC-SLP

- The author designed this book to shape speech motor skills.
- Unlike most books, it does not have a story to read.
- Along the bottom of each page there are prompts that teach parents/caregivers how to act out the illustrations and interact using gestures, sounds, and words.
- Each illustration is filled with opportunities for:
  1. Practicing speech in conjunction with movement.
  2. Using sound effects with both short and long sounds.
  3. Using words with distinctive pitch patterns.
  4. Using words with strong emotions.
  5. Using words with early consonants.

- Once children develop foundational vocalizations, speech pathologists can then use the book to show parents how to expand on sounds and syllable structure.
- Each spread has an active “mama, dada, papa, baby, kitty, and puppy.” This helps SLP’s easily explain and model syllable expansion for parents as they watch and learn.
- Since the illustrations depict routine, daily activities (bedroom, kitchen, living room, park, & bathroom scenes), parents can generalize the sounds and syllables they are working on from the book to their everyday life.

Order “The Big Book of Exclamations” through CASANA’s apraxia-kids.org website or find it at http://thebigbookofexclamations.com.
<table>
<thead>
<tr>
<th>CONSONANTS</th>
<th>NAME OF SOUND</th>
<th>VERBAL CUE</th>
<th>OTHER CUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>“p” sound</td>
<td>Popping sound</td>
<td>“Where’s your pop?” “You forgot your pop.”</td>
<td>Fill cheeks up with air and blow out with the sound, feeling wind on hand</td>
</tr>
<tr>
<td>“b” sound</td>
<td>Popping sound</td>
<td>“Where’s your pop?” “You forgot your pop.”</td>
<td>Fill cheeks up with air and blow out with the sound</td>
</tr>
<tr>
<td>“m” sound</td>
<td>Humming sound</td>
<td>“Close you mouth and hummmm;”</td>
<td>Lips together and hum Touch to feel vibration</td>
</tr>
<tr>
<td>“n” sound</td>
<td>Buzzing teeth sound</td>
<td>“Teeth together and buzz.”</td>
<td>Finger on clenched teeth to feel vibration</td>
</tr>
<tr>
<td>“t” sound</td>
<td>Tippy sound</td>
<td>“Use your tippy.”</td>
<td>Index finger to center of spot above upper lip</td>
</tr>
<tr>
<td>“d” sound</td>
<td>Tippy sound</td>
<td>“Use your tippy.”</td>
<td>Index finger to center of spot above upper lip</td>
</tr>
<tr>
<td>“h” sound</td>
<td>Open mouth windy sound</td>
<td>“Where’s your wind?” “I didn’t feel your wind.”</td>
<td>Open palm of hand up just in front of your mouth to feel wind</td>
</tr>
<tr>
<td>“k” sound</td>
<td>Throaty sound</td>
<td>“Where’s your throaty?”</td>
<td>Index finger pointed to throat</td>
</tr>
<tr>
<td>“g” sound</td>
<td>Throaty sound</td>
<td>“Where’s your throaty?”</td>
<td>Index finger pointed to throat</td>
</tr>
<tr>
<td>“f” sound</td>
<td>Biting lip windy sound</td>
<td>“You forgot to bite your lip.” “You forgot your wind.”</td>
<td>Bite lower lip with upper teeth and blow wind</td>
</tr>
<tr>
<td>“v” sound</td>
<td>Biting lip windy sound</td>
<td>“You forgot to bite your lip.” “You forgot your wind.”</td>
<td>Bite lower lip with upper teeth and blow wind</td>
</tr>
<tr>
<td>Initial “s” sound</td>
<td>Smiley windy sound</td>
<td>“Smile and make some wind.” “Keep those teeth together.”</td>
<td>Smile with teeth together and blow wind</td>
</tr>
<tr>
<td>Final sounds</td>
<td>Sticky sounds</td>
<td>“Where’s your sticky?”</td>
<td>Same as above for most but for “s” move forearm form left to right starting with an open hand and moving to a closed hand</td>
</tr>
<tr>
<td>“z” sound</td>
<td>Buzzing windy sound</td>
<td>“Use your buzz.”</td>
<td>Teeth together and blow wind</td>
</tr>
<tr>
<td>“sh” sound</td>
<td>Fat and fluffy sound</td>
<td>“Make it fat and fluffy.”</td>
<td>Lips out and puckered while blowing out</td>
</tr>
<tr>
<td>Sound</td>
<td>Description</td>
<td>Action</td>
<td>Notes</td>
</tr>
<tr>
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</tr>
<tr>
<td>“ch” sound</td>
<td>Chomping sound</td>
<td>“I didn’t see those lips moving.” “Work your lips.”</td>
<td>Lips protruded while making chomp sound</td>
</tr>
<tr>
<td>“j” sound</td>
<td>Chomping sound</td>
<td>“I didn’t see those lips moving.” “Work your lips.”</td>
<td>Lips protruded while making chomp sound</td>
</tr>
<tr>
<td>“T” sound</td>
<td>Lifty sound or Tongue sound</td>
<td>“Open your mouth – tongue up.” “Touch the spot and drop.”</td>
<td>Mouth open, tongue up behind upper teeth, then lowered</td>
</tr>
<tr>
<td>“r” sound</td>
<td>Butterfly sound</td>
<td>“Push up on the sides and move back with your tongue.”</td>
<td>Demonstrate pushing up on sides of tongue in butterfly position</td>
</tr>
<tr>
<td>“w” sound</td>
<td>Sliding sound</td>
<td>“ooo to eee sliding”</td>
<td>Start out in the ooo position with lips puckered then move to the eee sound</td>
</tr>
<tr>
<td>“y” sound</td>
<td>Sliding sound</td>
<td>“eee to ooo sliding”</td>
<td>Start out in the eee position with lips spread then move to the ooo sound</td>
</tr>
<tr>
<td>“sp, st, sk, sn, sl” sounds and other consonant clusters</td>
<td>Friendly sounds</td>
<td>“You forgot your friend.”</td>
<td>With a straight index finger on table start moving finger from L to R while saying the /s/ sound then end by tapping finger on table when the “friendly” sound is added. Or move forearm with open hand form L to R while saying /s/ sound and point to other sound positions as indicated above</td>
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</table>
## PARENT FILL-IN FOR SOUND NAMES

<table>
<thead>
<tr>
<th>CONSONANTS</th>
<th>NAME OF SOUND</th>
<th>VERBAL CUES</th>
<th>OTHER CUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The “p” sound</td>
<td>popping sound</td>
<td>“Where’s your pop?”</td>
<td>Fill cheeks up</td>
</tr>
<tr>
<td>The “b” sound</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>The “m” sound</td>
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<tr>
<td>The “n” sound</td>
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<tr>
<td>The “t” sound</td>
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<tr>
<td>The “d” sound</td>
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<td></td>
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<tr>
<td>The ”h” sound</td>
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<td></td>
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<tr>
<td>The “w” sound</td>
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<tr>
<td>The “y” sound</td>
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<tr>
<td>The “k” sound</td>
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<td>The “g” sound</td>
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<td>The “f” sound</td>
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<tr>
<td>The “v” sound</td>
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<tr>
<td>The “s” sound</td>
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<tr>
<td>The “z” sound</td>
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<tr>
<td>The “sh” sound</td>
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<tr>
<td>The “ch” sound</td>
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<tr>
<td>The “j” sound</td>
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<tr>
<td>The “l” sound</td>
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<td></td>
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<tr>
<td>The “r” sound</td>
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David W Hammer, MA CCC-SLP
SONGS, TOYS AND GAMES FOR SUPRASEGMENTALS
(Pitch, Stress, Rate and Loudness)
(With thanks to Dr. Kathy Jakielski and Megan Young, Augustana College)

Songs (ages 3-6):

- Ten Little Indians [Pitch]
  - Time To Sing www.apraxia-kids.org
- Monkey Song [Pitch]
  - https://www.youtube.com/watch?v=Illy7-rSVN8
  - Also great for vowel facilitation!
- I’m a Little Teapot [Pitch]
  - Time to Sing www.apraxia-kids.org
- Skidamarink [Pitch]
  - https://www.youtube.com/watch?v=GEzzIdOLqMM&list=PL9FDA79DC8AB4A032
- Alice the Camel has Five Humps [Stress]
  - https://www.youtube.com/watch?v=GpogvrTLc8M&list=PL53361B2D31F6929E
  - Put stress on number of Alice’s humps.
- Head, Shoulder, Knees and Toes [Rate]
  - Time To Sing www.apraxia-kids.org (Head and Tummy)
- John Jacob Jingleheimer Schmidt [Rate and Loudness]
  - https://www.youtube.com/watch?v=H_imuS5oIh84
  - Increase rate each time singing the verse.
  - Increase loudness after “whenever we go out, the people always shout”.
- Itsy Bitsy Spider [Rate]
  - https://www.youtube.com/watch?v=pm-vLG36x6k
  - Increase rate each time singing the verse (slow to fast version plus gestures/signs).
  - Time To Sing www.apraxia-kids.org (Eentsy Weentsy Spider)
- Frere Jacques [Rate]
  - http://www.youtube.com/watch?v= _S5PvD9rP2g&list=PLD4337AE7A0F0FE9
  - Increase the rate at the start of each verse.
- B-I-N-G-O [Loudness]
  - https://www.youtube.com/watch?v=9mmF8zOlh_g
  - Increase or decrease loudness when spelling out B-I-N-G-O.
  - Time to Sing www.apraxia-kids.org
- **Teddy Bear [Loudness]**
  - [Link](https://www.youtube.com/watch?v=LjxxHlfVT1g&list=PL9FDA79DC8AB4A032)
  - Increase or decrease loudness when giving Teddy Bear directions.

- **Five Little Monkeys [Loudness]**
  - [Link](https://www.youtube.com/watch?v=ZhODBFQ2-bQ&list=PLB5D53B883FF2C5C8)
  - Increase loudness on “No more monkeys jumping on the bed!”

- **Pop Goes the Weasel [Loudness]**
  - Time to Sing [www.apraxia-kids.org](http://www.apraxia-kids.org)

- **High, Low Children’s Song [Pitch]**
  - [Link](https://www.youtube.com/watch?v=LCDVU0yuhDA)
  - Also can be used for younger children.

- **Let It Go –Frozen Soundtrack [Pitch]**
  - [Link](https://www.youtube.com/watch?v=L0MK7qz13bU)

- **Hey Baby, Let’s Rock and Roll [Stress and Loudness]**
  - [Link](https://www.youtube.com/watch?v=j0IjoxH4brI&list=PL53361B2D31F6929E)
  - Put stress on “hey” and the action repeated.
  - Increase or decrease loudness on “Hey baby”.

- **The More We Get Together [Stress]**
  - [Link](http://www.youtube.com/watch?v=lldmkrJXQ-E)
  - Put stress on “together”.

- **Form Bananas [Stress, Rate, Loudness]**
  - [Link](http://www.youtube.com/watch?v=lVKK88X9gJZI)
  - Put stress on “banana” and “potato” (etc.).
  - Increase the rate on the final verse (Go Bananas!, etc.).
  - Increase the loudness on the final verse of each food (Go Bananas!, etc.).

- **Skip To My Lou [Rate]**
  - [Link](https://www.youtube.com/watch?v=LqQXhs9BWt8)
  - Exaggerate fast and slow verses.

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**Songs (ages 6-10)**

- **High, Low Children’s Song [Pitch]**
  - [Link](https://www.youtube.com/watch?v=LCDVU0yuhDA)
  - Also can be used for younger children.

- **'Let It Go –Frozen Soundtrack [Pitch]**
  - [Link](https://www.youtube.com/watch?v=L0MK7qz13bU)

- **'Hey Baby, Let’s Rock and Roll [Stress and Loudness]**
  - [Link](https://www.youtube.com/watch?v=j0IjoxH4brI&list=PL53361B2D31F6929E)
  - Put stress on “hey” and the action repeated.
  - Increase or decrease loudness on “Hey baby”.

- **The More We Get Together [Stress]**
  - [Link](http://www.youtube.com/watch?v=lldmkrJXQ-E)
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  - Put stress on “banana” and “potato” (etc.).
  - Increase the rate on the final verse (Go Bananas!, etc.).
  - Increase the loudness on the final verse of each food (Go Bananas!, etc.).

- **Skip To My Lou [Rate]**
  - [Link](https://www.youtube.com/watch?v=LqQXhs9BWt8)
  - Exaggerate fast and slow verses.
Toys (ages 3-6)

- First Act Mic and Amp - $19.99 [Pitch and Rate]
  - Different colors are available for girls and boys.
  - An mp3 hookup is available.
  - Can choose songs with varied pitch and rate for children to sing along.

- Winfun Step to Play Giant Piano Mat - $22.99 [Pitch]
  - While stepping on ascending or descending notes, child can work on ascending and descending pitch.

- Space Hopper Ball (ages 3-6 size) - $15.00 [Pitch]
  - When bouncing up and down, fluctuate pitch.

- Plan Toy Solid Wood Drum - $15.00 [Stress]
  - Tap the drum on the stressed word.

- KidiBeats drumset - $24.99 [Stress]
  - Children may tap out the stress in words using this toy.
  - This toy also comes with educational songs containing numbers and letters.

- First Act Junior Bongos - $19.99 [Stress and Loudness]
  - The bongos may be used to experiment with loudness or to demonstrate stress.

- Wood Xylophone - $12.99 [Stress]
  - Use the drumsticks to mark stress in a word.

- Meowsic Keyboard - $27.99 [Rate]
  - Keyboard comes with a microphone and set of songs that can be adjusted by tempo so that child can sing at different rates.

- FAO Schwarz Bear in the Box – $19.99 [Rate and Loudness]
  - The song speeds up and slows down depending on rate at which child turns the knob.
  - The child can practice singing at a fast or slow rate
  - Instruct the child to yell “Pop!” to the accompanying song.

- Strum & Jam Kidiband - $19.99 [Loudness]
  - Comes with a piano, guitar, and drums.
  - Loudness may be adjusted in freestyle mode and for the twelve children songs included.

- Pop Goes Froggio - $11.40 [Loudness]
  - Stomp on the pump that sends froggio flying when producing a word loudly
  - Lightly step on the pump when producing quiet speech.
Toys (Ages 6-10)

- First Act Mic and Amp - $19.99 [Pitch, Rate and Loudness]
  - An mp3 hookup is available.
  - The child can practice singing at high and low pitches to songs of their choosing.
  - SLP may choose songs with varying rate for the child to sing along.
  - Encourage the child to sing loudly or softly to songs of his or her choosing.

- Action Figures or Dolls [Pitch]
  - SLP and child play while voicing characters with high or low pitched voices.

- Wood Xylophone - $12.99 [Pitch]
  - Can be used to model high or low pitches.

- Space Hopper Ball (ages 7-9 size) - $15.00 [Pitch and Stress]
  - When bouncing up and down fluctuate pitch, or bounce on the stressed word or syllable.

- First Act Percussion Pack - $34.99 [Stress]
  - The percussion instruments included may also be used to demonstrate concepts of loudness, stress, and rate.

- First Act Junior Bongos - $19.99 [Stress]
  - Can be used to demonstrate stress on a particular word or syllable.

- Play-Doh! [Stress]
  - Smash or squeeze the Play-Doh on the stressed word.

- First Act Discovery Monsta Jam Digital Drum Pad - $29.99 [Rate]
  - Adjustable tempo and rhythm controls.

- First Act Percussion Pack - $34.99 [Rate]
  - The percussion instruments included may also be used to demonstrate concepts of loudness, stress, and rate.

- Melissa and Doug Band in a Box - $19.99 [Loudness]
  - Comes with 10 different percussive instruments used to model appropriate loudness.

- Director’s Megaphone - $14.00 [Loudness]
  - Can be used as a cue to encourage loudness.
Games (ages 3-6)

- **Candyland - $14.00 [Pitch]**
  - When passing by different characters on the board game, the child must imitate what their voice would sound like (high or low pitched).
- **Chutes and Ladders - $11.99 [Pitch]**
  - When traveling up a ladder, pitch ascends.
  - When traveling down a chute, pitch descends.
- **Simon Says [Pitch]**
  - Ask the client to imitate animals or persons with high and low pitched voices etc.
- **Hoot Owl Hoot - $15.99 [Pitch, Rate and Loudness]**
  - Each time an owl moves, practice saying “Hoot!” in a high or low pitch.
  - Each time an owl moves, practice saying “Hoot! Hoot! Hoot!” slowly or more rapidly.
  - Each time an owl moves practice saying “Hoot!” softly or loudly.
- **Ants in the Pants - $9.99 [Stress]**
  - Flip ant towards the dog’s pants when saying stressed word (“The dog (flip) likes ants”).
- **Gamewright Hisss Card game - $14.99 [Stress and Rate]**
  - Instruct child to put stress on one “hiss” in a sequence of hisses (“hiss hiss hisss”).
  - Upon drawing a matching card, child will say “hiss hiss hisss” slowly or rapidly.
- **Count Your Chickens Board Game - $16.00 [Stress]**
  - When counting chickens, instruct the child to put stress on a particular numbers (1, 2, 3).
- **Hi Ho Cherry-O - $9.99 [Rate]**
  - Practice counting the cherries into the basket slowly or rapidly.
- **Crocodile Dentist - $9.00 [Loudness]**
  - The SLP and child can take turns pressing down the teeth in the crocodile’s mouth until it snaps down.
  - Choose a target word and increase the loudness each time the SLP or child presses down on a tooth.
- **Tomy Pop-up Pirate Game - $20.00 [Loudness]**
  - Stick the swords into the barrel until the pirate pops out of the top.
  - With each sword, increase or decrease the loudness of the target word.
Games (ages 6-10)

- **Chutes and Ladders** - $11.99 [Pitch]
  - When traveling up a ladder, pitch ascends.
  - When traveling down a chute, pitch descends.

- **Jenga** - $9.99 [Pitch]
  - Instruct child to make a sound that fluctuates his/her pitch from high to low each time he/she draws a block from the tower.

- **Don't Break the Ice** - $9.99 [Pitch, Rate and Loudness]
  - Fluctuate pitch when tapping the ice block until it falls out or until it all collapses.
  - The child will say words like “tap” at a fast or slow rate depending on how fast they are tapping the ice block.
  - Instruct the child to say “tap” softly while tapping the ice block lightly and loudly when tapping the ice block harder.

- **Uno!** - $6.00 [Pitch and Loudness]
  - Each time the color changes or a player has an "Uno!" he or she must call it out in a high- or low-pitched voice.
  - Instruct child to yell “Uno!” each time he/she has one remaining card in his/her hand.

- **Sorry!** - $9.99 [Stress, Rate and Loudness]
  - When counting spaces, instruct child to put stress on one particular number (1, 2, 3, etc.).
  - Instruct child to count the number of spaces he/she moves slowly or more rapidly.
  - Instruct child to increase or decrease the loudness when counting spaces

- **Black Jack** [Stress]
  - Put the stress on the “hit” in “hit me”.

- **Guess Who? Board Game** - $30.00 [Stress]
  - Instruct child to put the stress on the specific attribute in question (“Does she have glasses?”).

- **Go Fish Card Game** - $5.00 [Stress]
  - Put stress on the fish being asked for (“Do you have a blue fish?”).

- **Hot Potato Electronic Musical Passing Game** - $9.99 [Rate]
  - Increase the rate at which “hot potato” is said each time it is passed around.

- **Ker Plunk** - $22.00 [Loudness]
  - Players begin by inserting sticks through the tube and then pour marbles on top of them.
  - Players can increase or decrease the loudness of the target word with each time they pull out a stick until the marbles fall to the bottom.
Parent Response Hierarchy

(when a child makes an error on a targeted word, phrase, etc.)

Just look at child with non-understanding.

Provide a touch cue, visual prompt, or sign without any accompanying verbal hint.

Respond with a verbal hint such as: (1) “You forgot your... sticky.” (2) “Where’s the... friend?” (3) “I didn’t hear any... wind.”

Provide minimum to maximum cueing depending upon child’s response to the above strategies.

Cueing Hierarchy

1. (Sign) + full verbal prompt (“ball”).
2. (Sign) + first sound cue (“ba”).
3. (Sign) + first sound position (pursed lips).
4. (Sign) only

Goal is to fade the cues as soon as possible to allow the child’s speech-motor system to “do the work.” - enables faster master of the motor plan. This avoids depending upon “I say it... you say it.”
### WHAT'S WRONG? Football and Tennis Sentences

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Sentences</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>The tennis player hit the ball under the net, and scored a point.</td>
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<td>The safety tackled the linebacker in the fourth quarter.</td>
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<td>I served the ball in the back square, and got an ace.</td>
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<td>The quarterback threw a punt to the wide receiver.</td>
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<td>He used his racket to make a birdie putt on the fourth hole.</td>
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<td>The Steelers beat the Chargers with a score of 50-love.</td>
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<td>Tennis racket strings are made out of yarn and are very durable.</td>
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<td>The score at the end of the third quarter was Browns-5, Broncos-1.</td>
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<td>Andy Roddick won the Super Bowl after a tough match.</td>
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<td>The Baltimore Coach caught the quarterback’s great pass and ran 40 yards.</td>
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<td>After the football game, the coach said to put away our rackets.</td>
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<td>The football trainer ran onto the field to put air in the football.</td>
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<td>The player in the chair called the serve out of bounds.</td>
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<td>At training camp, football players try to learn how to dribble the football.</td>
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<td>There are 6 players on a tennis doubles’ team.</td>
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<td>In flag football, hard tackles are permitted as long as you say, “I’m sorry.”</td>
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<td>Tennis players are allowed four bad serves before they lose a point.</td>
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<td>The quarterback jumped over the net at the end of the tiring match.</td>
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<td></td>
<td>Tennis players are not in very good shape since they don’t need to run much.</td>
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<td></td>
<td>The Heisman Trophy is awarded to the best professional football player.</td>
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<tr>
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<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
WHAT'S WRONG? Baseball and Soccer Sentences

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>3</th>
<th>Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>The forward kicked the ball out of bounds and the defender scored.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>In the top of the third inning, we scored a run after the other team scored four.</td>
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<tr>
<td>3</td>
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<td>The midfielder really hit the soccer ball hard with his right hand for a great pass.</td>
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<td>4</td>
<td></td>
<td></td>
<td>Robbie hit a home run but only got to third base.</td>
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<td>5</td>
<td></td>
<td></td>
<td>The other goalie scored four goals while playing on the front line.</td>
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<tr>
<td>6</td>
<td></td>
<td></td>
<td>Either the first baseman or the left fielder will catch the fly ball.</td>
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<td>7</td>
<td></td>
<td></td>
<td>The soccer referee said we scored a touchdown on Saturday.</td>
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<td>8</td>
<td></td>
<td></td>
<td>The catcher threw a curve ball, but the pitcher dropped it and the runner was out.</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>The crowd cheered when the soccer ball hit the other team’s basket.</td>
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<tr>
<td>10</td>
<td></td>
<td></td>
<td>Our right fielder ran all the way to fourth base during a game on Thursday.</td>
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<tr>
<td>11</td>
<td></td>
<td></td>
<td>Soccer is a slow sport, where running is not permitted.</td>
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<tr>
<td>12</td>
<td></td>
<td></td>
<td>Shortstops play between right field and first base.</td>
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<tr>
<td>13</td>
<td></td>
<td></td>
<td>There are four goal keepers in each goal for every game in soccer.</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>If the other team scores a run, out team will kick a field goal.</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>All soccer players wear helmets to protect their heads.</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td>There are four outs allowed in extra inning games until the fourteenth inning.</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td>If you score a goal in soccer it is worth 3 points unless it is scored by a defender.</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td>The first baseman threw the umpire out of the game for arguing.</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td>Soccer balls are made out of rubber so they can bounce high to reach the basket.</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>Baseball managers are allowed to play right field if the right fielder needs a rest.</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
**Suggested Apps** (special thanks to Pooja Aggarwal, Progressive Speech Tx)

Apraxia Ville – sound windows – cartoon avatar making sounds and window for children to make their own video of sounds

Speechprompts – targets prosody, rate, rhythm, stress, and loudness

Smarty Ears - r intensive – has an r diagnostic

Pocket SLP Articulation

VAST – video modelling of syllables, words, phrases, and sentences

NACD: National Association for Child Development Apraxia – moves from mass to distributed practice and blocked to random – nonspeech words and no phrases or sentence

Vowel Viz – biofeedback for tongue position on vowel quadrilateral – can use for vocalic /r/ - helpful to train child’s and parents’ ears

Ipractice verbs – pictures of verbs can choose verbs and tense but has verb written on corner

TalkingTom – imitates what he hears said

Icommunicate – record voice like on old language masters

Wheels on the Bus – gets child to figure out he/she has control over device

Fireworks – low level – when child touches screen, creates fireworks – can target expressions or words like “wow” and “pop”

Signing Time – has activities for kids and video of each sign more appealing to kids, smart hands – has video of each sign

Splashtop - download software onto your laptop and makes it a touchscreen – have to be online – desktop sharing, can use your software on the ipad

Iprompts – has ready-made social stories e.g. communicating without words, shows the gestures for yes/IDK, schedules – customizable

Reading Rockets for literacy

Pictello – create visual stories

VASTAutism 1 – free – can see zoom in of oral movements, you go through the list of words, can't select words, can scroll through words, phrases
ERIK RAJ, PhD from Monmouth County NJ Schools

CREATIVE USE OF APPS IN SPEECH THERAPY

• Inviting to a picnic – some things might like and others you are polite and eat
• Fun with Photos
  o Goo! By GG Filmz
  o Make look like huge smile. /s/ sentence practice
  o Use their favorite celebs!! Can save a picture and open in this app.
  o Recall of facts such as how much money LeBron James makes
  o Stretch face to make look like an alien (extend eyes)
• Fun with Aliens
  o Alien Booth 99 cents
  o Turns child’s face and yours into an alien face
  o Expansion of utterances and more specific word forms
  o “My twin brother is an alien.”
  o His favorite food is... His favorite thing to do is...
  o Figurative language and idioms - ____ is out of this world because...
  o Chuckles and smiles bring out more language!!
• Fun with Star Wars
  o Star Wars by Disney (GO TO IPHONE ONLY - hard to find on iPad when touch button, will open up apps for iPhone that can use on iPad
• Google “How to Draw Star Wars” (practice sequencing skills)
• More fun with outer space
  o LENS FX (take a live picture of child’s school or grab another picture)
  o Can add spaceship to picture, light beam, army to protect school
• Fun with Superheroes
  o Comic Studio Pro – Create Comic Style Photos
  o Can put superhero ask on, etc. and two students in picture, celeb...
  o Why would LeBron James want to be a Ninja Turtle?
  o Halftone2 – Comic Book Creator
  o Add “POW” and “HELP” and “GASP” (picture of Hog Wild Popper)
  o Can list skills and powers of the characters and then later RECALL
• Can combine apps – save picture on camera reel then open up next app!
• Fun with Villians
  o Corpse Cam - Use for expanding sentences for those “short talkers”
  o “Mr Raj looks scary – Mr Raj the boy looks very scary.”
  o Make me Monster (less scary) – Email picture to parents
• Fun with Ghosts
  o **Ghostmatic (one of his favorites!)** 99 cents
  o Take picture of therapy rooms and add ghost into picture
  o Take picture of basketball game and add ghosts
  o **Use for prosody, rate, rhythm, intonation** by going on Google and finding “Kid Friendly Ghost Stories”!!
  o Take picture of school hallway and add ghosts – tell ghost stories
  o **Maintain focus with increasing background noise** – Go on YouTube and search for “Spooky background music”
• Fun with Cute
  o **Face Fun HD** – put SLP’s face on baby head
  o Has MAGAZINE COVERS – FIND ON GOOGLE comparative cover like Rolling Stone vs Rocking Stone (Compare and Contrast)
  o Put your face in pieces of art that is being studied in class
  o Also can animal pictures!! Put your face on an animal
  o **Animal Face (***** 2nd favorite app)**
  o Turned face (wife’s too) into zebra while working on /z/
  o **Irregular plurals!!** Hockey picture from internet with animal faces-
  o Elementary through 8th grade – prints out for teachers
• Fun with Animals
  o **InstaKitty** – limited to cats that you can add to a picture
  o **Yes/no questions** with preschoolers – Are there 3 cats on Sully?
  o **Use for /k/ sound** - The cat wants a cow, etc.
  o **Use for body language** – If huge cat in front of you, what look like?
• Fun with Dinosaurs
  o **Triassic Art Photo Booth**
  o Add dino to any pictures
  o Combine “old school” worksheets with new technology!
  o Selfie fun with dinosaurs – when done reward is SELFIE not sticker!
• Fun with Wigs
  o **Wig It!** – Add wig, beard, etc to any face.
  o Used to memorize teachers’ names
  o Before and After goals – “Before you add hat, add a mustache.”
  o Use Mr Potato Head picture with no face and add the face.
  o Use PlayDoh and add silly faces to PlayDoh mound
• Fun with Getting Older
  o **Aging Booth**
  o Uses for 100th Day of School!
  o Got 8th grader who stutters to open up – What will future be?
  o Child wrote about stuttering pill in future
• Fun with VIDEOS
  o **Mimme – Funny Video eCards**
  o Don’t show scene where building is demolished like 9/11!
  o 3 people/animals can be in a movie
  o Use with famous people who stutter (Biden, James Earl Jones…)

• Fun with Puppets
  o **Puppet Pals HD** – uses for practicing /r/ sounds, medial position
  o Record the audio of student to listen to later
  o Create your own puppet show (Instructions in handout)
  o Use for analogies where one character talks to another about how one word and another are connected (time for monster analogies) such as “Sun is to day as Moon is to…”

• Fun with Mouths
  o **Chatter Pix by Duck Duck Moose**
  o Put mouth on book who says “You should read this book...”
  o Put mouth on artic picture and record child’s repeated productions
  o Persuasive Speech – want child to sell product to you – put mouth on...
  o Make different body parts talk! Color eyes on hand then place mouth on.
  o Use same and different flash cards with mouths who say why...
  o Can save directly to your camera reel. (On handouts)
  o **Funny Movie Maker** – allows us to add our own/student’s mouth.
  o Kind of like a mirror...
  o /sh/ not so great at first (ape picture with his mouth embedded so he can see if lips are rounded)
  o Incorporate video into previous picture (e.g. Erik as zebra and wife)
  o Helps with focus! Look at birthday cake to see /th/ accuracy.

• Fun with TV
  o **Voice Changer Video Booth** – changes voice
  o Talking dinosaurs/penguins
  o **TeleStory** – pick different scenes
  o Articulation in Space where he repeats sentences
  o Language BAND activity – play guitars, etc.
  o **Super Power FX**
  o Can take hand and explode something out of it.
  o Bring homework back and we can have it do something cool!!
  o T-shirts are good for this! (Behind and In Front practice)
  o **Action Movie FX**
  o Find out what’s happening in classroom – earthworms!
  o Have things stomp out, explode, etc other things!
  o **Effects Guru** - can create news segments.
Selected References on “Childhood Apraxia of Speech” and Speech Sound Disorders
David W. Hammer, M.A. CCC-SLP  davidh@apraxia-kids.org


Selected Therapy Resources
David W. Hammer, M.A. CCC-SLP
davidh@apraxia-kids.org

“Time to Sing” Children’s CD
  ❖ Apraxia-kids.org

  ❖ The Psychological Corporation at www.psycorp.com

“Captain Hammer & Super Sean – The Case of the Missing G” by Freiburger and Clark
  ❖ Apraxia-kids.org

“Do-A-Dot Markers”
  ❖ Do-A-Dot Art at www.dotart.com

“Build-A-Sentence”
  ❖ Amazon.com

“DOT Articulation” by Rachele Ellsworth
  ❖ www.speechcorner.com

“Easy Does It For Apraxia of Speech-Preschool” by Robin Strode and Catherine Chamberlain
  ❖ www.linguisystems.com

“Sign Language Resources”

Heathfield Adjustable Chair with Tray
  ❖ www.disabilitysupplies.com

A-B-C Magnetic Fishing Set or Marvel Magnet Alphabet Set
  ❖ www.cptoy.com (go to Constructive Playthings not US Toys)

Mirrors
  ❖ www.quill.com (non-breakable stand-up mirror)
  ❖ www.dysphagiaplus.com (large tri-fold mirror)