- If you are viewing this course as a recorded course after the live webinar, you can use the scroll bar at the bottom of the player window to pause and navigate the course.
- This handout is for reference only. Non-essential images have been removed for your convenience. Any links included in the handout are current at the time of the live webinar, but are subject to change and may not be current at a later date.

Technical issues with the Recording?

- Clear browser cache using these instructions
- Switch to another browser
- Use a hardwired Internet connection
- Restart your computer/device

Still having issues?

- Call 800-242-5183 (M-F, 8 AM-8 PM ET)
- Email customerservice@SpeechPathology.com

Back to Basics: Foundations for CAS Intervention

1. Which of the following is a type of childhood speech disorder?

A. Articulation Disorder
B. Phonological Processing Disorder
C. Childhood Apraxia of Speech
D. All of the above

2. What is the current and preferred label for describing children who have difficulty planning/programming the movements required for production of speech?

A. Dyspraxia
B. Developmental Verbal Apraxia
C. Childhood Apraxia of Speech
D. Apraxia

3. Which of the following is the *most current* theory associated with CAS?

A. Linguistic
B. Neurological
C. Combination of Linguistic and Motor Programming
D. Pure Motor

4. Comorbidities commonly associated with CAS include:

A. Language Problems
B. Gross Motor Problems
C. Academic Problems
D. All of the above

5. **Which of the following features is commonly agreed upon by experts to help with differential diagnosis of CAS?**

   A. Rapid rate of speech
   B. Inconsistent errors across repeated productions
   C. Consistent errors every time a problem sound is produced
   D. Poor respiratory support for speech

6. **Which of the following is true about random/blocked practice conditions?**

   A. "Blocked" refers to practice of multiple targets in large blocks of time
   B. Multiple targets should be presented via random practice when a child is first learning a skill
   C. Blocked practice results in greater generalization of skills
   D. Random practice results in greater generalization of skills

7. **Which of the following is an example of providing feedback about *results*?**

   A. "Put your tongue behind your teeth"
   B. "Close your teeth"
   C. "Good job on that /s/!"
   D. "You put your lips together like this"

8. **Which of the following is an example of providing *knowledge*?**

   A. "You know how you bit your bottom lip? That's how you do it"
   B. "Well done"
   C. "Not quite there, but close"
   D. "Awesome"

9. **How often should a child with CAS receive speech therapy?**

   A. As frequently and intensely as will be tolerated based on the child's age/severity of impairment
   B. Once to twice a week
   C. Every other week, with a home program carried out between clinic treatment sessions
   D. Therapy should be provided in a group setting, so whenever the group can meet

10. **The mnemonic "ACEM" is an acronym for the key speech therapy components:**

    A. Apraxia, Childhood, Effort, Motor
    B. Apraxia, Cognition, Education, Motivation
    C. Attention, CAS, Effort, Motor
    D. Attention, Cognition, Effort, Motivation

ONLINE CONTINUING EDUCATION FOR THE LIFE OF YOUR CAREER

Back to Basics: Foundations for CAS Intervention

Joleen R. Fernald, PhD, CCC-SLP, BCS-CL

Moderated by:
Amy Natho, MS, CCC-SLP, CEU Administrator, SpeechPathology.com

Need assistance or technical support?

- Call 800-242-5183
- Email customerservice@SpeechPathology.com
- Use the Q&A pod

CONTINUED

How to earn CEUs

- Must be logged in for full time requirement
- Log in to your account and go to Pending Courses
- Must pass 10-question multiple-choice exam with a score of **80%** or higher
  - Within **7 days** for live webinar; within **30 days** of registration for recorded/text/podcast formats
- Two opportunities to pass the exam

CONTINUED

Back to Basics: Foundations for CAS Intervention

Joleen R. Fernald, PhD, CCC-SLP, BCS-CL

www.JoleenFernald.com

Joleen@JoleenFernald.com

https://www.facebook.com/JoleenRFernaldPediatricTherapyServices/

CONTINUED

Learning Outcomes

After this course, participants will be able to:

- Define childhood apraxia of speech.
- Describe the theories which contribute to a diagnosis of CAS.
- Identify key treatment concepts for working with children with CAS.
- Describe two treatment activities for children with CAS.

Childhood Speech Disorders

- Dysarthria
- Articulation Disorder
- Phonological Processing Disorder
- Childhood Apraxia of Speech

CONTINUED

Childhood Apraxia of Speech

- "(CAS) is a ***neurological childhood (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". (ASHA, 2007)

CONTINUED

Theories of CAS

- Linguistic (ASHA, 2007)
  - Held by Velleman, Strand, Aram, and Nation
  - Phonologically-based disorder of…
    - Sound sequencing
    - Substitutions, omissions, inconsistent production of consonants and vowels
    - Later problems with reading and spelling

CONTINUED

Theories of CAS

- Neurological (ASHA, 2007)
  - Held by Crary and Sussman
  - Deficit in neural tissue
  - Lesions in the brain
  - Neurological "soft signs" (clumsiness, mild incoordination)
  - Sensory integration problems

CONTINUED

Theories of CAS

- Motor Programming (ASHA, 2007)
  - Held by Crary and Sussman
  - Incoordination of planning and/or movements of the oral structures for speech activities
  - Groping
  - Difficulty sequencing oral motor movements
- Now – Motor/Linguistic theory compared with pure motor theory
  - Pure CAS is RARE, so the comorbid challenges make treatment more complex

Other Problems Associated with CAS

- Expressive and Receptive Language problems
- Academic problems
  - Reading
  - Writing
  - Spelling
  - Other academic areas such as mathematics (Lewis et al, 2004)
- Motor skill problems
  - Gross motor (walking, running)
  - Fine motor (writing, cutting)
- Chewing and swallowing difficulties

Gross Motor Planning Video

Prevalence / Incidence

- Still inconclusive – poor diagnostic criteria, small sample sizes
- One to two children per thousand (Shriberg, Aram, & Kwiatkowski, 1997a)
- "In a study of 12,000 to 15,000 estimated diagnostic outcomes for children referred with speech delay of unknown origin from 1998 to 2004, a staff of 15 speech language pathologists in a large metropolitan hospital diagnosed 516 (3.4%-4.3%) of these children as having suspected CAS (Delaney & Kent, 2004)"

Prevalence / Incidence

- 2 – 3 times as common in boys than girls (Hall, Jordan, & Robin, 1993; Lewis et al., 2004)
- Often a comorbidity of various syndromes:
  - Galactosemia (Shriberg, Potter, & Strand, 2011),
  - Fragile X Syndrome (Spinelli, Rocha, Giacheti, & Richieri-Costa, 1995), and
  - Velocardiofacial syndrome (Kummer, Lee, Stutz, Maroney, & Brandt, 2007)
- Not more common in Autism Spectrum Disorder (Shriberg, Paul, Black, & van Santen, 2011).

Assessment / Differential Diagnosis

- "…three segmental and suprasegmental features that are consistent with a deficit in the planning and programming of movements for speech have gained some consensus among investigators in apraxia of speech in children:
  - (a) inconsistent errors on consonants and vowels in repeated productions of syllables or words,
  - (b) lengthened and disrupted coarticulatory transitions between sounds and syllables;
  - (c) inappropriate prosody, especially in the realization of lexical or phrasal stress (ASHA, 2007, p. 1).

Strand's 10-Point Checklist

- Difficulty achieving initial articulatory configurations and transitions into vowels
- Syllable segregation (pausing between syllables)
- Lexical stress errors or equal stress
- Vowel or consonant distortions including distorted substitutions
- Groping (non-speech)
- Intrusive schwa
- Voicing errors
- Slow rate
- Slow DDK rate
- Increased difficulty with longer or more phonetically complex words

** Strand's dx criterion for CAS is 4/10 over three different tasks*

CONTINUED

Components of a CAS Evaluation

- Hearing Assessment, Comprehension & Production
- Segmental Speech Abilities
  - Phonemic Repertoire
  - Articulation
    - Arizona Articulation Proficiency Scale (Western Psychological Services)
    - Secord Contextual Articulation Test (S-CAT), Wayne Secord
  - Spontaneous Speech Sample
  - Controlled Phrases
    - Days of the week
    - Months of the year
    - Rote counting to 20
- The Dynamic Evaluation of Motor Speech Skill (DEMSS) (Strand et al, 2012)
  - For young children and children who are very severe with limited phonemic repertoire
  - Determines to what degree motor impairment may impact speech

CONTINUED

Evaluation continued…

- Syllable Sequencing
  - Familiar multi-syllabic words
  - Unfamiliar multi-syllabic words
  - Diadochokinetic syllable rates
- Suprasegmental Patterns
  - Intonation Contours (nasality, pitch)
  - Modulation of Volume (too loud, too quiet)
  - Prosody (rate and rhythm)
- Motor Postures and Gestures
  - Strength, Tone, and Stability of articulators
  - Positioning of articulators
  - Sequencing (alternating movements: pucker/smile etc.)

CONTINUED

What if the child is too young/severe?

- The Dynamic Evaluation of Motor Speech Skill (DEMSS) by Strand et al, 2012
  - Developed for young children who would struggle with traditional standardized assessments
  - For people who are considered very severely impaired and have a limited phonemic repertoire
  - Determines to what degree motor impairment may impact speech

CONTINUED

Treatment

- “Yellow light" interventions
  - Approaches that have a lot of buzz, but less evidence than the Linguistic and Motor Programming Approaches to be discussed
    - Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT)
    - Melodic Intonation Therapy (MIT)
    - Kaufman Cards
- (Murray, McCabe, Ballard 2014; Maas, Gildersleeve-Neurmann, Jakielski, Stoeckel 2014)

CONTINUED

Linguistic Approaches to Treatment

- Focus on the linguistic and phonological aspects of speech
- Emphasize the importance of functional communication (Velleman, 2003)
  - Cycles Approach (Hodson, 1989)
  - Integrated Phonological Awareness (IPA)

CONTINUED

Motor Programming Approaches

- Distinguishes between performance and learning
- Motor PERFORMANCE is the accuracy of in-session behavior (Schmidt & Bjork, 1992)
- Motor LEARNING is the transfer of knowledge outside of the practice session (Schmidt & Bjork, 1992)
  - Dynamic Temporal and Tactile Cueing (DTTC)
  - Nuffield Dyspraxia Program(NDP3®)
  - Rapid Syllable Transitions (ReST): https://rest.sydney.edu.au/

Conditions of Practice

- Randomized versus Blocked Practice
  - Blocked
    - One target is practiced at a time
    - Good when first learning a skill
    - Provides repetition and lots of opportunities to practice (Schmidt & Bjork, 1992)
  - Random
    - More than one target is practiced in the same activity
    - Leads to generalization of skills (Schmidt & Bjork, 1992)

Video of Blocked Practice

Video of Random Practice

Mass versus Distributed Practice

- Length of session and time between sessions
  - Mass Practice
    - One 60 minute session a week
  - Distributed Practice
    - Three 20-minute sessions over the course of the week or even daily
    - Shown to lead to greater learning (Strand et al., 2006)

Practice Variability

- Practicing targets in different settings
  - In different word positions within words, phrases or in conversational speech
  - "Promotes generalization in learning more effectively than consistent practice in which environmental and practice conditions don't vary" (Wulf & Schmidt, 1997)

Blocked with Variability Video

Useful Prompts

- Visual prompts
  - Vowel Turtles
  - Consonant pictures
- Physical prompts
  - Placing your finger on your bottom lip and pushing to facilitate /f/ production
- Verbal prompts
  - "Bite down on your bottom lip and blow"

Providing Feedback

- Extrinsic Feedback
  - "Information and critique from the clinician regarding the client's task performance" (Edeal & Gildersleeve - Neumann, 2011)
- Intrinsic Feedback
  - Client's own assessment of performance
  - Develops self-monitoring and awareness

CONTINUED

Providing Knowledge Versus Results

- Providing knowledge
  - "Information about the movement characteristics that lead to the performance outcome."
    - Moving your lip under your top teeth really seemed to help!
- Providing results
  - "Knowledge about achieving the goal of the performance or externally presented information about the outcome of performing a skill."
    - Great production of /f/!

(Sharma et al, 2016)

CONTINUED

Really Severe Children

- Augmentative and Alternative Communication (AAC)
  - Picture Exchange Communication System
  - Speech Generating Device
    - Language Acquisition through Motor Planning (LAMP)
    - TouchChat
    - ProLoQuo 2 Go
- Use of literature / toys to increase linguistic skills
  - Brown Bear, Brown Bear by Eric Carle
    - Great for repetition
    - Basic concepts

AAC Video

Nick,
Nick,
What do you see?

I see Mom
looking at me.

Dosage and Session Format

- Intense and Frequent
  - Multiple repetitions and repeated opportunities for practice
- Frequency
  - Range from 3 – 5 individual speech therapy sessions per week (apraxia-kids.org)
  - Younger children with shorter attention spans, increased fatigue
    - Shorter, more frequent sessions (Skinder-Meredith, 2001)
- Clinical and home practice reveals best outcomes

Putting It All Together Video

Keys To Take Home

Remember the Acronym: **ACEM**
A ttention
C ognition
E ffort
M otivation

Content \ Frame		
	Old	**New**
Old	**Old**	**Old**
Old	**New**	**New**
New	**New**	

Keys to Take Home

- There are different programs on the market – no single program works for every child
- Always consider development – the "job" of a child is to play… therapy can be fun even if it's hard
- Every child is an individual and therefore an individual profile should be considered for every child

CONTINUED

References

- American Speech-Language-Hearing Association. (2007). *Childhood Apraxia of Speech [Technical Report].* Available from www.asha.org/policy.
- Davis, B., & Velleman, S.L. (2000). Differential diagnosis and treatment of developmental apraxia of speech in infants and toddlers. *Infant-Toddler Intervention: The Transdisciplinary Journal, 10, 177-192.*
- Delaney, A. L., & Kent, R. D. (2004, November). *Developmental profiles of children diagnoses with apraxia of speech.* Poster session presented at the annual convention of the American-Speech-Language-Hearing Association, Philadelphia.
- Edeal, D. M. & Gildersleeve-Neumann, C. E. (2011). The importance of production frequency in therapy for childhood apraxia of speech. *American Journal of Speech Language Pathology.*

CONTINUED

- Lewis, B. A., Freebairn, L. A., Hansen, A. J., Iyengar, S. K., & Taylor, H. G. (2004). School-age follow up of children with childhood apraxia of speech. *Language, Speech, and Hearing Services in Schools,* 35, 122-140.
- Maas, E., Gildersleeve-Neumann, C. E., Jakielski, K. J., & Stoeckel, R. (2014). Motor-based intervention protocols in treatment of childhood apraxia of speech (CAS). *Current Developmental Disorders Reports*, 1 (3).
- Murray, E., McCabe, P. & Ballard, K., (2014). A systematic review of treatment outcomes for children with Childhood Apraxia of Speech. *American Journal of Speech-Language Pathology*, 23:
- Sharma D. A., Chevidikunnan M. F., Khan F. R., Gaowgzeh R. A. (2016). Effectiveness of knowledge of result and knowledge of performance in the learning of a skilled motor activity by healthy young adults. J. Phys. Ther. Sci. 28, 1482–1486. 10.1589/jpts.28.1482
- Schmidt, R. A., & Bjork, R. A. (1992). New conceptualizations of practice: Common principles in three paradigms suggest new concepts for training. Psychological Science, 3, 207-219.

CONTINUED

- Shriberg, L. D., Aram, D. M., & Kwiatkowski, J. (1997a). Developmental apraxia of speech: I. Descriptive and theoretical perspectives. Journal of Speech, Language, and Hearing Research, 40, 273–285.
- Strand, E.A., McCauley, R.J., Weigand, S.D., Stoeckel, R.E., Baas, B.S. (2012). A motor speech assessment for children with severe speech disorders: Reliability and validity evidence. Journal of Speech Language Hearing Research. Retrieved from http://jslhr.asha.org/cgi/content/abstract/1092-4388_2012_12-0094v1
- Strand, E. A., Stoeckel, R., & Baas, B. (2006). Treatment of severe childhood apraxia of speech: A treatment efficacy study. Journal of Medical Speech-Language Pathology, 14, 297-306
- Wulf, G., & Schmidt, R. A. (1997). Variability of practice and implicit motor learning. Journal of Experimental Psychology: Learning, Memory, and Cognition, 23, 987-1006.