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**CAS Intervention throughout the
Childhood Years**

March 4-8, 2013

Guest Editor: Gregory Lof, Ph.D., CCC-SLP, ASHA Fellow

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**Intervention for Preschool Children
with CAS**

Presenter: Ruth Stoeckel, Ph.D., CCC-SLP

Moderated by:
Amy Hansen, M.A., CCC-SLP, Managing Editor, SpeechPathology.com

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CAS Intervention Throughout the Childhood Years

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INTERVENTION FOR PRESCHOOL CHILDREN WITH CAS

Ruth Stoeckel, Ph.D., CCC-SLP
Mayo Clinic College of Medicine

Disclosure

- Financial
 - Childhood Apraxia of Speech Association of North America (CASANA): speaking fees, DVD sales
- Nonfinancial
 - Childhood Apraxia of Speech Association of North America (CASANA): professional advisory board

Childhood Apraxia of Speech (CAS)

ASHA (2007) Technical Report: "... core impairment in planning and/or programming spatiotemporal parameters of movement sequences..." with 3 possible markers:

- (a) Inconsistent errors on consonants and vowels in repeated productions of syllables or words,
- (b) Lengthened and disrupted coarticulatory transitions between sounds and syllables, and
- (c) Inappropriate prosody, especially in the realization of lexical or phrasal stress.

CAS “Red Flags”

- Difficulty achieving articulatory configurations
- Limited phonetic inventory
- Vowel distortions
- Predominant use of simple syllable shapes
- Errors increase with length/complexity of utterance
 - Individual sounds correct in isolation or CV combinations but not in longer sequences
 - Sounds produced accurately in some sequences; not accurate in other sequences

Intervention: Evidence-Based Practice

- Is not a “label of approval” for specific techniques, approaches, or programs
- It is a way of thinking that takes into account:
 1. Best available evidence
 2. Clinical experience and knowledge
 3. Patient/client and family values and culture

There is little empirical evidence for CAS intervention (Cochrane Review, 2007)

Intervention: Evidence-Based Practice

- Ask yourself:
 - What goals am I working toward for this particular child?
 - What evidence do I have to support the technique(s) I am using?
 - Is the child making progress? If “no,” how will I modify goals or approach based on best available evidence?
 - Am I keeping the family’s values and culture in mind?

Intervention: Phonologic vs CAS

| | | | | |
|---|--|---|--|---|
|  | |  | | Sound patterns |
| Tea | | Key | | |
| Motor patterns | |  | |  |
| | | Home | | My puppy |
| | | CVC | | CVCVCV |

Intervention: Phonologic vs CAS

| | |
|--|--|
| <p>Phonologic Intervention</p> <ul style="list-style-type: none"> • Emphasizes the sound patterns of language • Emphasizes how changes in sound pattern affect meaning • Targets are single sounds or sound patterns • Coarticulation is not considered critical | <p>CAS/Motor Intervention</p> <ul style="list-style-type: none"> • Emphasizes principles of motor learning; movement vs sounds • Emphasizes proprioception and how variations in movement affect output • Targets are movement sequences (syllable level or higher) • Coarticulation is critical |
|--|--|

Intervention for Preschoolers

- *Communication* is the priority
 - ✓ For minimally verbal children, we may need to start with imitation, AAC, etc. (DeThorne, et al.,)
 - ✓ The child needs to understand the task
 - ✓ The child should be stimuable for target stimuli
 - ✓ Use of functional target stimuli can increase motivation (Strand & Debertine, 2000)

✓ Minimally Verbal Children

- Provide access to AAC
- Minimize pressure to speak
- Imitate the child
- Use exaggerated intonation and slowed tempo
- Augment auditory, visual, tactile and proprioceptive feedback
- Avoid emphasis on nonspeech-like articulator movements; focus on function

(DeThorne, et al., 2009)

✓ Understanding the Task

- Emphasis is on *movement* versus sounds
- Communication involves cognitive and linguistic aspects as well as motor skill (Nip, Green & Marx, 2010)
 - A child's developmental level must be taken into account

✓ Stimulability

- The child should be able to produce the target with some level of cuing
 - Success can lead to increased motivation/effort
 - If the child is not stimuable, the result may be frustration and distrust

✓ Functional Target Stimuli

- Think about the needs of the “whole child”
 - Build vocabulary and language as well as speech accuracy
 - Give the child ways to interact with others and with their environment

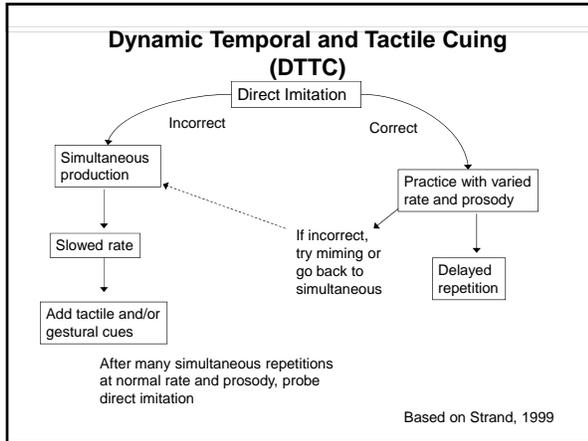
Intervention Framework

- The intervention approach for which there is the most empirical evidence is Integral Stimulation and a variation called Dynamic Temporal and Tactile Cuing

(Edeal & Gildersleeve-Neumann, 2011; Maas, Butalla & Farinella, 2012; Maas & Farinella, 2011; Maas, et al., 2008; Strand, Stoeckel, & Baas, 2006)

Dynamic Tactile and Temporal Cuing (DTTC)

- Adapted from Rosenbek, et al., 1973 by Strand (2004)
- This technique:
 - Allows high levels of success
 - Emphasizes extensive practice
 - Uses meaningful, useful utterances for motivation and functional communication
 - Maximizes proprioceptive input
 - Can easily incorporate aspects of both “top down” and “bottom up” approaches



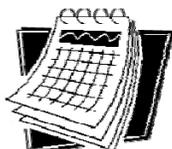
- The child may be working on different stimuli at different levels of the hierarchy
 - The level of cueing is constantly changing within and between sessions, depending on the child's responses
- Treatment is continually adjusted to adapt to changes in the child's speech motor skill**

- Intervention**
- With any intervention approach, we need to make choices about
 - ✓Therapy sessions
 - Number of sessions per week
 - Length of sessions
 - ✓Stimuli
 - Number of stimuli
 - Type of stimuli
 - ✓How to organize a session
 - Incorporate principles of motor learning

Sessions

“There is emerging research support for the need to provide **three to five individual sessions per week** for children with apraxia as compared to the traditional, less intensive, one to two sessions per week (Hall et al., 1993;Skinder-Meredith, 2001; Strand & Skinder, 1999).”

ASHA Technical Report, 2007



Sessions

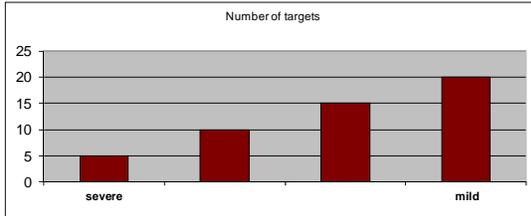
- Number of sessions per week should be adjusted based on:
 - Severity of the CAS
 - Child’s ability to participate
 - Family/Educational support
 - Other interventions
- Small group work may be appropriate to facilitate development of pragmatic skills

Sessions

- Length of sessions will depend on:
 - Child’s developmental ability to attend/participate
 - Tasks to accomplish (e.g., time to counsel/educate parent, demonstrate techniques, etc., in addition to intervention with child)
 - Clinician preference and therapy style

How Many Stimuli?

- Depends on severity of child's speech disorder
 - Increase number (and complexity) as skills improve

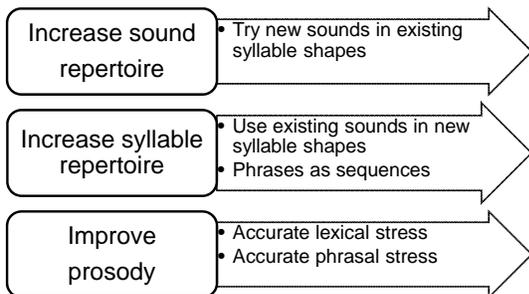


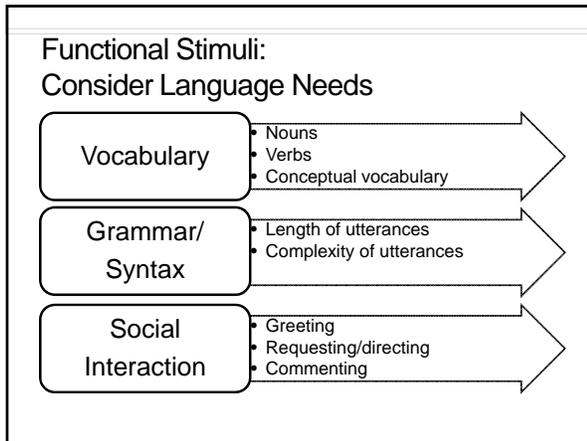
Type of Stimuli

- Use what the child has in their inventory and consider:
 - Single syllables vs syllable sequences
 - Types of syllables/sequences
 - Phonetic complexity
 - Be aware of, but not bound by, a general sequence of sound development (e.g., early, middle, late)
 - Try varied syllable shapes (CV, VC, CVC, etc.)
 - Try sequences as soon as possible



Functional Stimuli: Consider Speech Needs





Organizing a Session

- Principles of Motor Learning
 - See tutorial by Maas, et al., 2008

| Principle | Acquisition | Retention |
|-----------------------|---|---|
| Practice Distribution | Mass | Distributed |
| Practice Variability | Consistent context, consistent prosody, pitch, rate | Varied context, varied prosody, pitch, rate |
| Practice Schedule | Blocked, predictable order | Random unpredictable order |
| Feedback Type | Knowledge of performance | Knowledge of results |
| Feedback Frequency | Often, immediate | Inconsistent, delayed |
| Rate | Slow | Normal, varied |

Session Organization: Example

I want one X40
All done X1

Thomas X50
All done X1

Puppy X40
All done X1

I want one X20
Time to go X5

Adapting Treatment

- CAS treatment that addresses phonological patterns
 - Motor principles and core vocabulary are emphasized
 - Stimuli may be chosen to include specific phonological targets (FCD, stopping, fronting, etc.)
 - E.g., see you, I want some, sit down, yes, my house as stimuli that purposefully include /s/
- Phonological treatment that addresses motor planning/programming
 - Phonological targets take precedence
 - Incorporate principles such as slowed rate, multiple repetitions, practice distribution, etc.
 - E.g., a game board is developed with minimal pairs. Every time the child lands on a spot, they say a set of minimal pairs, with multiple repetitions of the target word

Intervention for Preschoolers

- Play can be an appropriate context for young children
 - *With a well-defined goal*
 - Drill-play activities can appeal to the child while accomplishing many repetitions of a target
 - Multiple activities to address the same goal may be more engaging than one longer activity
 - Play activities can be used for distributed practice to facilitate generalization and retention

Video Example

- S1 "go"

Video Example

- S2 "out"

Intervention for Preschoolers

- Facilitate emergent literacy
 - Children with history of speech-language disorders are at risk for literacy problems (Anthony, et al., 2011)
 - Literacy skills can often be incorporated into sessions with minimal extra effort
 - Use books as part of therapy – notice letters, word boundaries, specific words, etc.
 - Play around with recognition of rhyme or generating rhyme, depending on the child's age

Intervention: Example Activities

- For multiple repetitions, develop verbal routines with
 - Nursery rhymes
 - Songs
 - Repetitive books
 - Daily activities (e.g., yum, yum, yum, yum for foods; toe, toe, toe, toe while counting toes)

Example Activities

- See handout
- Toys with multiple parts → child earns a part for producing X repetitions
- Throw a ball back and forth → Clinician asks "Who wants it?" Child responds "I do!" or "My ball!"
- Hop/jump over cards or spots on the floor as you say a target word or phrase
- Small sand/rice box, find small toys or cards buried that relate to targets
- Drop toys in a bucket after saying target
- Link "baby links" together as each word is said or to represent a multisyllable sequence
- Use colored counting bears to designate number of repetitions
- Use magnet chips/magnet
- Toss beanbags at pictures or as reinforcement for saying targets
- Look for games with many pieces (pop-up pirates, "feed the animals" box from Super Duper, Mr. Potato Head, Tumblin' Monkeys, Poppa's Pizza Pile, Acrobats, etc.)
- Shoot a disk short or nerf rocket
- Send matchbox cars down a tube from table to a box on the floor
- See the article "How to Help Your Child with Speech Practice at Home" and "Some Ways to Elicit Multiple Repetitions from Children with Apraxia" in the Apraxia-Kids virtual library at www.apraxia-kids.org

Video Example

- C1 "cars"

Caregivers

- Solicit input
 - What child may want to talk about
 - What terms are used in the family for nicknames, for requesting, refusing, etc.
 - Understanding child's temperament
 - Their goals

Caregivers

- Give caregivers *specific* recommendations
 - How to cue effectively
 - How to balance practice with unstructured time
 - How to embed practice in "teachable" moments throughout daily activities

See course handout for sample "homework"

Documenting Progress

- Data collection is important – we have an ethical obligation to show that intervention is working
 - Rate of change may be slow at first, but...
 - You should see change within a few sessions
 - Be conscious of criteria
- In addition to objective data, are there qualitative changes?
 - Is the child's functional ability to communicate improving?
 - Are they more confident attempting new sounds and words?

**Documenting Progress:
One Basic Procedure**

- Choose behavior(s) to measure
- Collect baseline data
- Provide intervention for target
- Collect data at periodic intervals throughout intervention
- Evaluate efficacy of intervention
- Adjust goals or method of intervention if satisfactory progress is not being made

- Probes for data collection should be conducted on a regular basis
 - E.g., every 3rd or 4th session
- Use data collection to determine
 - Whether to continue with current goal or treatment methods or if there is a need to modify

3-point System

- Used in Strand, Stoeckel & Baas, 2006
- 2 = correct production;
 - 1 = mostly correct, with error in place, manner or voicing of 1 consonant sound in the syllable or phrase;
 - 0 = vowel distortion and/or more than one error of consonant production.
- Scores are awarded for child's production in direct imitation, usually 5 productions of each item for a possible total score of 10 points per item
 - Recording form in handout

Sample Goal

(Child) will improve accuracy of production of a functional core vocabulary.

Criteria: cumulative accuracy of 80% for each target.

- a. Accuracy in CV, VC, CVC syllable shapes: (EXAMPLES: me, no, more, mine, hi, up, on, etc)
- b. Syllable sequences (EXAMPLES: no more, go home, time to go, my turn, hi mom, etc.)

These goals may emphasize work on sound targets, such as specific vowels or consonants within the target set

- The idea is to expand both sound and syllable repertoire, with flexibility in the stimuli used
- As a child meets criteria for one item from the stimulus set, that item moves to generalization/retention efforts and a new target is added to the "work" list
- Progress is reported in terms of accuracy for each individual item, as well as number of stimulus items on which child has reached criterion.

Progress Reporting Example

(Child) has met criterion for "me", "no", "up", "go", "my turn", and "hi mom."

Current targets:

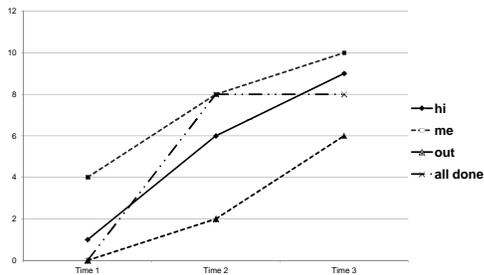
- 70% cumulative accuracy for "go home"
- 60% cumulative accuracy for "sit", "mine"
- 40% cumulative accuracy for "computer", "Bamber Valley"

Sample Data

| Date | Syllable/phrase | Responses in Direct Imitation | | | | | Total Points |
|---------|--------------------|-------------------------------|---|---|---|---|--------------|
| 11/1/11 | Hi | 0 | 0 | 0 | 1 | 0 | 1 |
| 11/1/11 | Me | 1 | 1 | 1 | 0 | 1 | 4 |
| 12/4/11 | Out | 0 | 0 | 0 | 0 | 0 | 0 |
| 12/4/11 | All done (aw done) | 0 | 0 | 0 | 0 | 0 | 0 |

| Date | Syllable/phrase | Responses in Direct Imitation | | | | | Total Points |
|----------|-----------------------|-------------------------------|---|---|---|---|--------------|
| 12/7/11 | Hi | 1 | 1 | 2 | 1 | 1 | 6 |
| 12/7/11 | Me | 2 | 2 | 1 | 2 | 1 | 8 |
| 12/15/11 | Out (vowel is tough!) | 0 | 0 | 0 | 2 | 0 | 2 |
| 12/15/11 | All done | 2 | 1 | 1 | 2 | 2 | 8 |

Sample Data



Back to the Beginning: Evidence-Based Practice

- Ask yourself:
 - What goals am I working toward for this particular child?
 - What evidence do I have to support the technique(s) I am using?
 - Is the child making progress? If “no,” how will I modify goals or approach based on best available evidence?
 - Am I keeping the family’s values and culture in mind?

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CAS Intervention throughout the Childhood Years

Guest Editor: Gregory Lof, Ph.D., CCC-SLP, ASHA Fellow

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|------------------|--|
| Mon. 3/4 | Childhood Apraxia of Speech (CAS): Defining the Territory <i>Peter Flipsen, Ph.D., Jr., S-LP(C), CCC-SLP</i> |
| Tues. 3/5 | Principles of Motor Learning in Childhood Apraxia of Speech <i>Edwin Maas, Ph.D</i> |
| Wed. 3/6 | Therapy for Children Birth-to-3 Who May Receive a Diagnosis of CAS <i>Barbara L. Davis, Ph.D.</i> |
| Thur. 3/7 | Therapy for School-Age Children with CAS <i>Jonathan Preston, Ph.D., CCC-SLP</i> |
| Fri. 3/8 | Intervention for Preschool Children with CAS <i>Ruth Stoeckel, Ph.D., CCC-SLP</i> |
