

**“AAC strategies and considerations for children with severe speech disorders: Not a substitution, just part of the solution”**

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**“I Know Who I Am, But Who Are You?”**  
-No Doubt "Sunday Morning"

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- B.S. in Communication Disorders in 2000 (NMSU)
- M.S. in Speech-Language Pathology 2002 (PSU)
- Ph.D. in ASD and AAC 2008 (PSU)
  
- I have worked with school age children, preschool age children and in early intervention over the course of my career.
- I am currently an assistant professor at Penn State.
  - My research is with school age children with ASD, particularly those with AAC needs.

**Objectives of this Session**

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- To state and explain (at least) 3 factors that make a child with a severe speech disorder a good candidate for an AAC system or strategy.
- To explain how to determine functional speech intelligibility for a student with a severe speech disorder.
- To explain and demonstrate how to conduct a functional speech intelligibility assessment for any student on his or her caseload.
- To explain how to scaffold language and communication while continuing to target articulation and speech intelligibility goals in speech and language intervention sessions.
- To name and describe at least 3 AAC strategies that are evidence-based and commonly used with children with severe speech disorders.

**Agenda**

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- 9:00-9:45
  - Candidacy requirements for AAC systems and strategies
- 10:00-11:00
  - Assessment of speech intelligibility and functional comprehensibility
- 11:00-12:00; 1:00-2:15
  - Interventions for children with severe motor speech disorders
    - Overview of Evidence-Based Practices
- 2:30-3:15
  - Integrating AAC strategies into existing intervention sessions
- 3:15-3:30
  - Summary and Questions

**Candidacy requirements for AAC systems and strategies**

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**Everyone Communicates...**

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<ul style="list-style-type: none"> <li>• Crying</li> <li>• Eye contact</li> <li>• Sounds</li> <li>• Words</li> <li>• Pointing</li> <li>• Falling asleep</li> <li>• Screaming</li> </ul>	<ul style="list-style-type: none"> <li>• Communication boards</li> <li>• Picture exchange system</li> <li>• Voice output systems</li> <li>• Gestures/signing</li> <li>• Hair-pulling</li> </ul>
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Silence 

## Channels of Communication

- Face to face interactions
  - One on one
  - Small group
  - Large group
- Written communication
  - Note taking
  - Formal writing
- Telecommunication
  - Telephone / cell phone
  - E-mail/ text messaging / IM

## Augmentative and Alternative Communication

- Augmentative communication systems are used to **supplement** speech
- Alternative communication systems are used as a **replacement** for speech
- Typically refer to augmentative and alternative communication (AAC)

## Augmentative and Alternative Communication

- AAC services are provided to people who have communication disabilities such that **their natural speech is inadequate to meet their daily communication needs.**

## Augmentative and Alternative Communication

- This can be manifested in several ways, including:
  - Having no access to natural speech.
  - Being at risk for speech development.
  - Having some speech, but not sufficient to meet all needs.
  - Having speech that is functional in many contexts, but not functional in some contexts with some partners.
  - Having speech that is temporarily inadequate to meet communication needs, but is expected to improve or recover.

## Populations who may require AAC

- Developmental disabilities (e.g., cerebral palsy, intellectual disability, autism, developmental apraxia)
- Acquired disabilities (e.g., traumatic brain injury, cerebral vascular accident, spinal cord injury, asphyxia)
- Progressive neurological disorders (e.g., ALS - amyotrophic lateral sclerosis, multiple sclerosis, muscular dystrophy]
- Temporary conditions (e.g., shock, surgery/intubation, Guillain Barre)

## Populations who may require AAC

- Today we are going to talk about disorders more commonly seen in preschools and schools.
  - With particular emphasis on those who currently have some speech or who are expected to develop speech.
- These include primarily developmental disabilities:
  - Childhood Apraxia of Speech
  - Down Syndrome
  - Cerebral Palsy
  - Autism Spectrum Disorders

## Demographics

- It is estimated that 2 million Americans (NIDRR, 1990); 8 per 1,000 could benefit from AAC systems or strategies.
- Matas, Mathy-Laikko, Beukelman & Legresley (1985)
  - 3-5% of special education students require AAC
  - 20-25% did NOT have access to AAC
  - 20-45% needed initial assessments
  - 20-30% needed follow up services

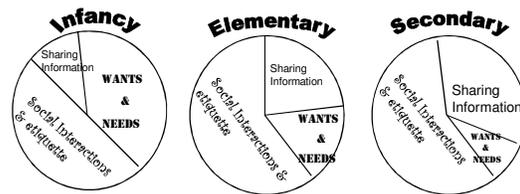
## Updated Demographics

- Binger & Light (2006)
  - Survey of SLPs in **Pennsylvania**
    - Approx 11-12% of preschoolers with special needs use AAC.
    - A mean of 24% of preschoolers receiving speech and language services required AAC.
    - The mean number of children with AAC needs on each SLPs caseload was 7, with a mean overall caseload being 29.
  - Primary disability:
    - 38% = developmental delay
    - 33% = autism/PDD
    - **17% = speech/language impairment**
    - 10% = multiple disabilities

## Purposes of Communication

- Express needs and wants
  - Goal is to regulate someone's behavior to fulfill your needs
- Exchange information
  - Goal is to impart or request information from others
- Develop social closeness
  - Goal is to establish, develop, & maintain personal relationships
- Fulfill social etiquette routines
  - Goal is to conform to social conventions of politeness

## Changing Purposes of Communication



*The importance of different communication purposes changes over our lifetime*

J. Cumley, 2001  
Based on J. Light, 1988, 1997, 2005



***If we only have to think about encouraging our students to communicate for three different purposes, why is it so HARD..... what can make it easier?***

## AAC: Augmentative/Alternative Communication

- Examples:
  - Communication boards/books/picture symbols
  - Speech Generating Devices (SGDs)
  - Picture Exchange Communication System (PECS)
  - Morse Code
  - Eye Gaze
  - Picture Schedules
  - iMobile Technology

**AAC can be a vehicle for developing:**

- Expressive language
- Receptive language
- Literacy
- Control over the environment or over one's own life
- Communication initiation (and other social skills)

**AAC is not....**

A last resort  
 "Giving up" on speech  
 Only for those of a certain IQ or Age  
 Only the job of the speech-language pathologist

**Myths and Misconceptions:  
 Young Children with CCN**  
 (Complex Communication Needs)

<p style="text-align: center;"><b><i>Myth and Misconceptions</i></b></p> <p style="text-align: center;">AAC hinders or stops further speech development</p>	<p style="text-align: center;"><b><i>The Evidence</i></b></p> <p>AAC approaches (signs, picture symbols, VOCAs*) <b>do NOT</b> hinder speech development. In fact, speech often increases during AAC treatment approaches</p>
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\*VOCAs= Voice Output Communication Aid

From: Augmentative Communication News, Volume 18, Number 2, June, 2006

**Myths and Misconceptions:  
 Young Children with CCN**  
 (Complex Communication Needs)

<p style="text-align: center;"><b><i>Myth and Misconceptions</i></b></p> <p>There is a representational hierarchy of symbols from objects to written words</p>	<p style="text-align: center;"><b><i>The Evidence</i></b></p> <p>Children can learn to understand and use a variety of symbols at a very young age (e.g., sign language) through repeated exposure to the symbol and its referent in <u>natural contexts</u></p>
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From: Augmentative Communication News, Volume 18, Number 2, June, 2006

**Myths and Misconceptions:  
 Young Children with CCN**  
 (Complex Communication Needs)

<p style="text-align: center;"><b><i>Myth and Misconceptions</i></b></p> <p>Children must have certain skills to benefit from AAC (e.g., be at a certain age, have a particular cognitive or linguistic level, etc.)</p>	<p style="text-align: center;"><b><i>The Evidence</i></b></p> <p>There are NO prerequisites for communication. AAC focuses on all aspects of communication and communication begins at birth. AAC is an appropriate intervention approach for anyone with CCN.</p>
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From: Augmentative Communication News, Volume 18, Number 2, June, 2006

**Myths and Misconceptions:  
 Young Children with CCN**  
 (Complex Communication Needs)

<p style="text-align: center;"><b><i>Myth and Misconceptions</i></b></p> <p>AAC is a last resort and means professionals are "giving up" on speech</p>	<p style="text-align: center;"><b><i>The Evidence</i></b></p> <p>The "Wait and See approach" is not an effective way for teams (e.g., speech-language pathologists, teachers, paraprofessionals, parents to develop communicative competence)</p>
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From: Augmentative Communication News, Volume 18, Number 2, June, 2006

## **AAC:**

- Establishes a means of communication
- Provides opportunity for social interaction
- Promotes receptive communication
- Encourages expressive communication
- Decreases frustration
- Provides opportunity for initiation

**Think about YOUR students  
who are struggling to  
communicate effectively...**

**WHAT ARE SOME  
CHARACTERISTICS OF  
THEIR  
COMMUNICATION?**

### **Common Characteristics of Students Either Using AAC or Who are Good Candidates for AAC**

- Rarely initiate interactions.
- Usual form of communication is NOT using a communication device.
- Gestural responses (head nods) to yes/no questions main form of communicating.
- May use “challenging” behaviors to communicate.

### **Common Characteristics of Students Either Using AAC or Who are Good Candidates for AAC**

- Most vocalizations are unintelligible.
- Rarely interact with peers.
- Communication system may not be available when needed.
- Necessary vocabulary is not programmed or correct symbol is not available.

### **Is This Child A Candidate for AAC?**

- <http://www.youtube.com/watch?v=szjfC9K19oU>
- Why or why not?
- If yes, list the variables discussed in the previous slides that might apply.

## **Assessment of Speech Intelligibility and Functional Comprehensibility**

**ASSESSMENT STRATEGIES**

**CASE EXAMPLES FOR DECISION MAKING**

### Decision Making for Children with Severely Unintelligible Speech

- Decision making in AAC is difficult.
  - More complicated when the child has some speech that can only be understood under particular circumstances or by a narrow set of listeners.
- For children who primarily use speech for communication there are two main AAC options to consider:
  - Augmentative strategies, namely speech supplementation strategies
  - Alternative communication as a primary strategy when speech supplementation fails.

### Decision Making for Children with Severely Unintelligible Speech

- Another variable to consider is the varying perspectives of partners with various amounts of experience with the child.
  - Conflicts may arise between partners who can understand the child's speech (generally familiar communication partners) and those who cannot understand the child's speech (generally unfamiliar communication partners).
  - Both groups may feel that the other group is "wrong" in how they approach communication for the child.
- Also want to consider the perspective of the child - when possible and appropriate.
- Sometimes these conflicts can be resolved through collecting data on intelligibility and comprehensibility.

### Speech Intelligibility

- Traditionally, SLPs assess articulation (or speech intelligibility) in children with severe speech impairments.
  - These assessments focus on the adequacy of the speech production to signal sounds (articulation) or to convey meaning (intelligibility).
- Generally accomplished through the use of various tests of articulation.

### Assessment of Speech Intelligibility

- This is not a bad approach, but research has shown that there are other variables to consider.
  - In addition to the child's speech, we should consider the impact of:
    - ✦ The speaking task
    - ✦ The transmission conditions
    - ✦ The listening task
    - ✦ Characteristics of the listener

### Assessment of Speech Intelligibility

- Factors that Affect Speech Intelligibility:
  - Emotional state
  - Partner familiarity
  - Seating/positioning
  - Background noise
  - Rate of speech
  - Oral motor function
  - Context
  - Linguistic structure/predictability
  - Fatigue
  - Visual cues/AAC
  - Medium – Face-to-face, phone

### "Range of Intelligibility Potentials"

Kent, Miolo & Bloedel, 1994

- Focuses on the idea that intelligibility is not a constant.
- Intelligibility can vary along a range, and is impacted by:
  - Physical setting
  - Listener familiarity
  - Nature of the linguistic message
  - Motivation
  - Effort level, etc.
- This is a dramatic shift in the traditional definition of intelligibility.

## “Range of Intelligibility Potentials”

- This definition blurs the line between the impact of intrinsic variables and extrinsic variables on speech intelligibility.
- Intrinsic factors:
  - Articulation
  - Respiration
  - Phonation
- Extrinsic factors:
  - Environmental conditions
  - Whether the semantic or syntactic context is known to the listener
  - Familiarity and patience of the listener

## Intelligibility and Comprehensibility

- Yorkston, Strand and Kennedy (1996):
  - Model of Adequacy of Communication
    - Speech intelligibility – adequacy of the acoustic signal to convey meaning (affected by intrinsic factors only).
    - Speech comprehensibility – how well the message can be understood in the natural communicative context.
      - Affected by both intrinsic and extrinsic factors.
- Measuring speech comprehensibility is not as easy as measuring speech intelligibility.
  - Involves more than the administration of an articulation test.

## Index of Augmented Speech Comprehensibility in Children (I-ASCC)

Downen, 1997

- Developed as a non-standardized clinical measure to help address these issues.
- Administration of the I-ASCC:
  - Speaking task is to produce words from a specific word pool.
  - Words should be elicited with the least amount of prompting possible:
    - 1. picture only (e.g., “what is this?”)
    - 2. picture plus context (e.g., “it’s clothing you might wear. What is it?”)
    - 3. picture plus an embedded model (e.g., “It’s a shirt. Now you say it.”)
    - \*\*Try to avoid direct imitation, it has the greatest impact on articulation and may result in inflated scores.\*\*

APPENDIX B  
I-ASCC Master Word Pool

Something children eat at snack time	cookie	cracker	banana	carrot	apple	orange	grape	bread	grapes	cheese
Something children use during quiet time	scissors	glue	tape	crayons	paper	pen	pan	chalk	penicil	playdoh
Something children eat for lunch	fruit	apple	banana	orange	soup	sandwich	cookies	hotdog	chicken	
Children young girls wear outside	skirt	sweater	dress	shirt	boots	mittens	gloves	hats	coat	
Things children play with outside	sandbox	shovel	tricycle	slide	swing	balls	hoola-hoop	rocks	stick	
What you use children doing with a book	buying	carrying	clipping	giving	knitting	knocking	opening	reading	sharing	
Things boys play with	truck	blocks	animals	cars	balls	motorcycle	frisbee	yo-yo	train	
Something a child might make with blocks	nest	tower	house	road	car	castle	boat	airplane	truck	
Something a child wears outside in winter	hat	mittens	jacket	sweater	scarf	boots	mittens	coat	snowsuit	
Something children play with in	merg-ferret	climber	swing	balls	slide	sandbox	bars	bicycle	tricycle	toy car
Something children like with parents	airplane	car	bus	bicycle	truck	train	motorcycle	helicopter	ship	boat
Places children go with the family	airport	movie	beach	church	park	school	zoo	store	playground	pool
Something children eat for breakfast	pancakes	doughnut	apple	cereal	bread	egg	baet	orange	chicken	banana
Things children play with in the bathtub	cup	boat	duck	bubbles	animals	toys	balls	car	doll	soap
Something children like to eat for dinner	rice	potato	spaghetti	hamburger	chicken	corn	bread	fish	meat	pie
Parts of the body children can name	head	hand	foot	leg	arm	eye	ear	arm	mouth	
Types of people children pretend to be	nurse	mom	dad	brother	teacher	politician	farmer	doctor	fireman	
A farm animal children talk about	horse	cow	pig	sheep	duck	chicken	dog	cat	bunny	mouse
Animals in toys that make this sound	hobbies	chocchur	cocker	grr	meow	woof	quack	zoom	buzz	
Children young boys wear indoors	pants	undershirt	shorts	shirt	socks	gpp	shorts	socks	jeans	
Animals seen at the zoo	lion	tiger	horse	zebra	monkey	elephant	giraffe	bird	bear	cat
Types of weather children talk about	rainy	thunder	lightning	rain	snow	hot	cold	cloudy	windy	wet
Number less than 11	one	two	three	four	five	six	seven	eight	nine	ten
Fruit children eat	apple	banana	apple	orange	strawberry	peach	pear	grapes	melon	watermelon
Things children hate to eat	raisin	chicken	soup	meat	peas	potatoes	carrots	corn	fish	beans
Colors children can name	black	green	red	blue	white	purple	pink	yellow	orange	brown
Things in children's rooms	bed	clock	light	picture	table	chair	radio	crib	shower	door
What you use children doing with a ball	catching	chasing	dropping	finding	giving	holding	kicking	pushing	throwing	
Things children like to pick up outside	stick	rock	sand	flower	stone	plant	grass	cube	die	bug
What you use people doing with food	biting	buying	cooking	cutting	washing	eating	feeding	licking	tasting	spilling

## Index of Augmented Speech Comprehensibility in Children (I-ASCC)

- For each child there are two types of listeners:
  - Familiar listeners, usually family members
  - Unfamiliar listeners
- All listeners will listen to recordings of the spoken words, and will judge the words under 2 conditions:
  - 1. The no context condition
    - The listener listens to each word twice and then writes down what they heard.
  - 2. The semantic context condition
    - The listener listens to the same words again, and this time make their judgments with semantic context knowledge.
      - Score sheet would contain the semantic context next to the blank provided for writing the answer.

## Index of Augmented Speech Comprehensibility in Children (I-ASCC)

- The listening task can also be completed in a third condition (if appropriate for the target child):
  - With additional first-letter cues provided.
  - Example: Something children eat for snack. First letter is “c”. Target word = cracker.
- This step can be done if the child is successful if the child had previously demonstrated the skills necessary for using first-letter cues.
  - Alphabet knowledge
  - Letter-sound correspondences.

### Index of Augmented Speech Comprehensibility in Children (I-ASCC)

- Credit can be given for correct answers in the following conditions:
  - 1. The response word matched the target word exactly.
  - 2. The response word differed from the target word only in grammatical case.
    - Examples: plural vs. singular; past vs. present; noun vs. adjective; adjective vs. verb
  - 3. The response word is a homonym of the target word.
    - Example: meat and meet
  - 4. The response word is misspelled but clearly indicated the target word.
    - Example: "sissors" for "scissors"

### Limitations of the I-ASCC

- Only comprised of single word stimuli.
- Listeners hear words in same order in the various conditions, so there could be an order effect.
  - According to research, this is not likely to account for the entire effect observed in terms of the increases in comprehensibility with the addition of context and letter cues.
- Scores will not reflect the benefits of nonverbal cues as they are gleaned from a taped listening of words.
- Only a limited number of the target child's listeners participate in the assessment.

### Functional Speech Comprehensibility

- A more functional measure of speech comprehensibility would need to involve judgment of connected speech samples.
- Determining Functional Speech Comprehensibility:
  - Collect several samples of the individual communicating with others in the natural environment in typical situations.
  - Ensure that the samples are representative of the individual's speech production.
  - Analyze at least 100 spoken words (messages) per sample.

### Functional Speech Comprehensibility

- Determining Functional Intelligibility (continued)
  - Calculate word by word intelligibility.
    - # words understood correctly by the partner divided by the # words communicated.
  - Calculate general message comprehensibility.
    - # messages understood correctly by the partner divided by the # messages communicated.
  - Investigate under various conditions.
    - Like with the I-ASCC – can add context cues, etc.

### Functional Speech Comprehensibility

- Investigating Clarification Strategies
  - Frequency of communication breakdowns.
    - # of breakdowns per # messages communicated
  - % of breakdowns recognized by client and repair attempted.
  - Range and frequency of clarification strategies used.
  - % and type that lead to successful resolution.

### Functional Speech Comprehensibility

- Clarification Strategies:
  - Speech supplementation strategies
    - Letter cues, topic cues, gestural cues
  - Slow down rate – pacing board
  - Proper positioning/stabilization
  - Repetition
  - Modify content
  - Writing/drawing
  - Light tech devices (alphabet board)
  - High tech devices
  - Partner strategies
  - Introduction strategy
    - How communication happens
    - What to do if you don't understand

## Functional Speech Comprehensibility

- ALWAYS consider parallel programming:
  - 1. Maximize natural speech function through traditional speech therapy and clarification strategies.
  - 2. Augment natural speech via AAC to enhance communication.
- It is NOT an either/or decision.

## Functional Speech Comprehensibility

- Impact of AAC on speech development (Millar, Light & Schlosser, 2005)
  - There is evidence that AAC enhances:
    - Communicative competence
    - Language development
  - What is the impact of AAC on speech development?
    - 23 studies reviewed (published between 1975-2003).
    - Involved 67 individuals with developmental disabilities.

## Functional Speech Comprehensibility

- “Best Evidence” Results
  - AAC interventions did NOT result in decreased speech production.
  - None of the participants showed a decrease.
  - 11 % showed no change in speech production.
  - 89% of the participants showed an increase in speech.
    - Gains were modest for most subjects.
      - +20 words or less
    - Gains were observed.
      - Immediately in 79% of cases
      - After a lag (6-25 sessions) in 21% of cases

## Case Example #1 for Decision Making

- Kevin – 13-year-old boy with dysarthria secondary to CP.
- Believes his speech is just as effective with unfamiliar partners as it is with his family.
  - Not interested in using AAC strategies to supplement his speech, even though unfamiliar listeners report difficulty understanding him.
  - Family and school team want Kevin to consider using a laptop computer to support his communication via speech.
  - Want to use assessment of comprehensibility to convince Kevin that speech alone is not adequate in all contexts and with all partners.

## Kevin’s I-ASCC Results

- Familiar Partners:
  - Comprehensibility of words alone: **50%**
  - Comprehensibility of words given semantic context: **90%**
  - Comprehensibility of words given semantic context and a first letter cue: **95%**.
- Unfamiliar Partners:
  - Comprehensibility of words alone: **20%**
  - Comprehensibility of words given semantic context: **60%**
  - Comprehensibility of words given semantic context and a first letter cue: **80%**.

## Case Example #2 for Decision Making

- Eliza – 19-year-old girl with severe dysarthria and cognitive impairments following a TBI.
- Has a VOCA but does not use it consistently.
- Attends a high school extension program.
- Referred for assessment because there was disagreement between the team and the family about the need for AAC strategies.
- The family is adamant that people at school would be able to understand Eliza if they would just listen carefully.

### Eliza's I-ASCC Results

- **Familiar Partners:**
  - Comprehensibility of words alone: **28%**
  - Comprehensibility of words given semantic context: **74%**
- **Unfamiliar Partners:**
  - Comprehensibility of words alone: **10%**
  - Comprehensibility of words given semantic context: **46%**

### Case Example #3 for Decision Making

- Michael – 8-year-old boy with dysarthria and a significant language delay secondary to Down Syndrome.
  - PPVT scores indicate receptive language at about the 3-year-old level.
- Uses some gestures and some signs to support his speech.
- Breakdowns are rare at home and school, however, Michael is beginning to show frustration and exhibit challenging behaviors when he is not understood.
- Parents report difficulty when he tries to tell them about his school day.
- School reports difficulty when he tries to tell them about his weekend.

### Michael's I-ASCC Results

- **Familiar Partners:**
  - Comprehensibility of words alone: **15%**
  - Comprehensibility of words given semantic context: **65%**
- **Unfamiliar Partners:**
  - Comprehensibility of words alone: **20%**
  - Comprehensibility of words given semantic context: **60%**

### Case Example #4 for Decision Making

- Rita – 9-year-old girl with quadriplegia and developmental delays secondary to CP.
- Has a VOCA that she does not use regularly because she thinks the voice output is difficult to understand.
  - Also says she doesn't use the VOCA because it has "the wrong vocabulary" in it.
- Parents requested assessment for Rita to determine why Rita was not using her device at school.
- Rita made it clear that she did not like the device and wanted to speak only.

### Rita's I-ASCC Results

- **Familiar Partners:**
  - Comprehensibility of words alone: **6%**
  - Comprehensibility of words given semantic context: **30%**
  - Comprehensibility of words given semantic context and a first letter cue: **70%**
- **Unfamiliar Partners:**
  - Comprehensibility of words alone: **4%**
  - Comprehensibility of words given semantic context: **28%**
  - Comprehensibility of words given semantic context and a first letter cue: **50%**

### Decision Making for Children with Severely Unintelligible Speech

- So let's bring it back around...
- AAC decision making for children with moderately severe and severe communication disorders involves choosing among several options:
  - 1. Allow the child's communication to remain compromised in all or most situations while waiting for his or her speech to develop through maturation or aggressive speech intervention.
  - 2. Provide AAC intervention to enhance (augment) communication concurrently with speech intervention.
  - 3. Provide AAC intervention to enhance (alternative) communication while simultaneously providing less intensive speech intervention.

### Decision Making for Children with Severely Unintelligible Speech

- Research has shown that, in children with childhood apraxia of speech, AAC did not decrease the frequency of speech use.
- Use of AAC did seem to decrease the quantity of gestures used in children who used their AAC systems as their primary mode of communication with “high frequency”. (Cumley, 1997).
- Existing research seems to support the notion that implementation of AAC systems and strategies with children with developmental disabilities does not hinder the use of speech as a mode of communication.

### Potential Intervention Targets/Outcomes

- Recently, the construct of “Communication Effectiveness” has received increased attention as the outcome measure for intervention with children with severe speech impairments.
- Communication Effectiveness = the success with which a speaker is perceived to interact, or exchange information, in various communication situations compared with speakers without disabilities of similar age, background, and experience

### Communication Effectiveness

- Subjective outcome.
- Is measured based on speaker and partner perceptions of success in various communication situations.
- This measure is particularly useful for determining a discrepancy in perception between speakers and their communication partners.
  - Some speakers may have unrealistic beliefs regarding their own communication effectiveness in different situations.
    - This is important to determine because this may influence the strategies they employ in certain situations – how those judgments are made.

### Communication Effectiveness

- Skills that appear critical to effective communication in individuals who use speech that is reduced in intelligibility include:
  - The ability to monitor partners for comprehension
  - The means and ability to ask partners for feedback.
  - The ability to accept and use feedback from partners in useful and functional ways.

### Communication Effectiveness

- For partners – it is critical to provide HONEST feedback to indicate when messages were not fully understood.
- The consequences of inaccurate feedback may have far reaching effects.
  - They may fail to develop insight into their intelligibility problems.
  - They may come to believe that what they say is not important when the intents of messages go unfulfilled.
  - They may not learn to look for indicators of comprehension in their communication partners.

### Communication Effectiveness

- When the listener (partner) does not have enough information to process the message produced by the speaker, additional information can be provided by the speaker via AAC strategies.
- This kind of monitoring between partners needs to begin early in communication development and continue throughout the lifespan.
- The sooner children learn to identify communication breakdown and acquire the tools to repair it, the more effective communication will be.

## Interventions for Children with Severe Motor Speech Disorders

### OVERVIEW OF EVIDENCE-BASED INTERVENTIONS

## Intervention Options

- Historically, speech-language assessment and intervention for children with compromised speech intelligibility has taken a developmental approach with a focus on remediating underlying impairments.
  - Sound specific errors
  - Feature specific processes
- Yet, functional communication often remains markedly compromised.
- AAC strategies can be added to these intervention efforts as part of a comprehensive intervention package.

## Intervention Options

- Natural speech is clearly the most efficient mode of communication for those who are able to use it effectively.
  - This can sometimes make introducing AAC a “hard sell”.
- Using a complete arsenal of tools to maximize communication and support communication needs provides a strong rationale for introducing AAC options, even when one avenue of therapeutic emphasis continues to be speech production.

## Clarification Strategies

- Speech supplementation strategies
  - Letter cues, topic cues, gestural cues
- Slow down rate – pacing board
- Proper positioning/stabilization
- Repetition
- Modify content
- Writing/drawing
- Light tech devices (alphabet board)
- High tech devices
- Partner strategies
- Introduction strategy
  - How communication happens
  - What to do if you don't understand

## Letter Cues – Alphabet Supplementation

- This strategy combines the use of natural speech with an alphabet board.
- To use this approach:
  - The speaker points to the first letter in the word in the message as he or she speaks it.
    - E.g., pointing to the letter “r” as the word “rainbow” is spoken.
- Rationale for this approach:
  - The first letter of each word provides orthographic-phonetic context supporting the individual's speech production
  - This improves the listener's ability to understand.

## Letter Cues – Alphabet Supplementation

- Can be used with:
  - Low tech ABC board
  - High tech AAC system
    - There are pros and cons to both of these – we will discuss a few in a few minutes.
- Prerequisite Skills Needed:
  - Basic literacy skills:
    - Knowledge of letter-sound correspondences
    - Letter recognition
  - Ability to select letter from display
    - Can be accomplished a variety of ways.
    - Determined on an individual by individual basis.

## Letter cues – Alphabet Supplementation

- Other considerations:
  - The size and arrangement is typically customized according to the child's preferences and motor skills.

A	B	C	D	E	F
G	H	I	J	K	L
M	N	O	P	Q	R
S	T	U	V	W	X
Y	Z	Space	New Word	Start Over	Please Wait

## Literacy Instruction for Children with Severe Speech Disorders

- Full discussion is beyond the scope of this presentation.
- Resources related to evidence-based literacy instruction program are available on the internet:
  - <http://aacliteracy.psu.edu/>

## Topic Cues – Topic Supplementation

- This strategy combines the use of natural speech with communication boards containing topic words or pictures.
- To use this approach:
  - The speaker indicates the topic of a message on a communication board before producing the desired message via speech.
    - E.g., pointing to the topic "things to play" before speaking the message "I want to play with the kitchen stuff".
- Rationale for this approach:
  - Topic words or pictures provide contextual information that helps the listener prepare for the forthcoming message by delimiting the potential referents.

## Topic Cues – Topic Supplementation

- Can be used with:
  - Low tech ABC board
  - High tech AAC system
    - There are pros and cons to both of these – we will discuss a few in a few minutes.
- Prerequisite Skills Needed:
  - Ability to select topic from display
    - Can be accomplished a variety of ways.
    - Determined on an individual by individual basis.

## Gestural Cues

- This strategy combines the use of natural speech with gestures, either informal (gesticulations) or formal (signs).
- To use this approach:
  - The speaker uses gestures while producing spoken information. This can either be the use of informal hand and arm movements or through the use of key word, or first-letter signing.
- Rationale for this approach:
  - Gestures provide nonverbal cues and information that add to the linguistic information being presented through speech.

## Gesture Cues

- Prerequisite Skills Needed:
  - Ability to produce the gestures
    - Motor ability
    - Recall memory
- Other considerations:
  - No other (external) materials are required to use gestures.
  - Some gestures are readily used and understood by speakers and listeners alike.

## Gesture Cues

- The selection of gestures to include in a child's repertoire may be guided by the following principles:
  - Follow the path of least resistance
    - Teach common gestures, and encourage any use of socially acceptable gestures.
    - Begin with gestures that have a high "payoff".
      - Wave, thumbs up/down, a-okay, etc.
  - Capitalize on the child's manual dexterity
    - Choose gestures the child can easily produce.
  - Use pointing as a means identify and clarify.
  - Select gestures that will help in most problematic situations.
  - Teach communication partners to understand gestural cues.

## Pacing Board

- This strategy uses shapes on a board or piece of paper to support/scaffold/monitor rate of communication.
- Can also be used to visually mark linguistic elements in a sentence to aid with language building and increasing utterance length.
- To use this approach:
  - <http://www.youtube.com/watch?v=V29dlMJN7S8>
- Rationale: Visual cue prompts speaker to slow down rate of speech or to include more complex linguistic information. Makes the task more concrete.

## Proper positioning/stabilization

### Why is it important?

- Appropriate positioning facilitates the optimal use of existing motor skills to access a technical aid
- Proximal stability = distal mobility
- Research has shown that:
  - Positioning impacts the speed of several functional hand tasks.
  - Positioning changes affect speed and accuracy of head controlled typing.

## Proper positioning/stabilization

### What are the goals?

- Provide comfort
- Safety and stability
- Increase functional skills
- Accommodate impaired sensation
- Minimize effects of abnormal tone and reflexes
- Accommodate deformities
- Delay or prevent development of deformities

## Proper positioning/stabilization

### What are the dangers of poor seating?

- Contractures
- Skin breakdown
- Compensatory movements
- Pain
- Submaximal performance
- Lack of motivation

## Proper positioning/stabilization

- All professionals need to be able to recognize the impact of positioning, basic positioning needs
  - OT will be primary professional/expert on seating/positioning, but SLPs need to know the 3 Rs:
    - 1. **Recognize**
    - 2. Know your **Resources**
    - 3. **Refer** when necessary
- For more information on these considerations, see:
  - <http://aac-rerc.psu.edu/index.php/webcasts/show/id/9>

## Repetition

- This strategy involves the speaker repeating his or her message in its entirety and exact form when a communication breakdown occurs.
- To use this approach:
  - The speaker repeats his or her message verbatim in an attempt to increase listener comprehensibility of his or her intended message.
- Rationale for this approach:
  - Repetition provides the listener with an additional opportunity to interpret the spoken message produced. This may be all that is necessary for the message to be understood.

## Modify Content

- This strategy involves the speaker repeating his or her message but using modified content to express the same intent as the message that was previously produced but not comprehended by the listener.
- To use this approach:
  - The speaker repeats his or her message using different words, word order, syntactic structure, etc. in an attempt to increase listener comprehensibility of his or her intended message.
- Rationale for this approach:
  - Repetition provides the listener with an additional information to support interpretation of the spoken message produced.

## Writing/drawing

- This strategy combines the use of natural speech with writing or drawings that contain topic words or pictures related to the content of the message.
- To use this approach:
  - The speaker will either write or draw key words related to the intent of the message that is being produced via speech.
    - E.g., drawing a picture of a horse while speaking the message "Let's ride horses tomorrow".
- Rationale for this approach:
  - Topic words or pictures provide contextual information that helps the listener understand the spoken message by delimiting the potential referents and adding contextual information.

## Writing/drawing

- Prerequisite Skills Needed:
  - Literacy skills (if writing is to be used):
  - Motor skills to hold writing/drawing instrument
    - Determined on an individual by individual basis.

## Light Tech Devices

- Advantages
  - Portability – tends to be lightweight and relatively small in size
  - Cost – relatively low cost
  - Durability – can be used in places where high tech cannot (e.g., pool, bathtub, sandbox)
  - Doesn't break down!
- Disadvantages
  - Communication partner must always be present – only works in face to face interactions

## High Tech Devices

- Advantages
  - Easier to get listener's attention
  - Can communicate easily in groups
  - Hearing voice output can facilitate device learning/use
  - Speaker is more independent
  - Can interface with computer for access to internet, e-mail, written communication
- Disadvantages
  - Can be very expensive
  - Systems not always portable (although this is improving)
  - Technology can break down; no one should only have a high tech system

### Major Components of Aided Systems (Light Tech and High Tech)

- **Representation**
  - Symbols: how to represent language
- **Organization**
  - Organization of language concepts in physical space of AAC technologies
    - Type of display
    - Organization of representations within layout
- **Selection Technique**
  - Access method: physical means by which user controls communication system
- **Output / Feedback**

### Partner Strategies

- This strategy involves the partner/listener providing feedback to the speaker regarding the comprehensibility of the spoken message.
- To use this approach:
  - The listener will repeat back parts of or entire messages spoken by the speaker prior to responding in order to confirm that a breakdown has not occurred.
    - E.g., Speaker says "Let's ride horses tomorrow". Listener says "Let's ride horses tomorrow." (PAUSE for confirmation) "Yes, that sounds like fun."
- Rationale for this approach:
  - Having the partner repeat the message back to the speaker before responding reduces the likelihood that a breakdown will not be identified. If the breakdown can be identified then there is a greater likelihood that it will be repaired.

### Introduction Strategy

- This strategy is used when meeting new people. Provides unfamiliar communication partners with information about modes and methods of communication.
- To use this approach:
  - There are 2 essential components of an introduction strategy:
    - 1. Appropriate information about the means of communication.
    - 2. Instructions for how the partner can best communicate with the speaker.
  - The speaker will use the introduction strategy when beginning an interaction with someone he or she has not communicated with before.

### Introduction Strategy

- Rationale for this approach:
  - Through the introduction strategy, the new partner obtains necessary knowledge on how to interact with the speaker, and the new partner is put more at ease.
- Example Introduction Strategy:
  - "Hi, my name is Jessica. I have a disability called Cerebral Palsy. I have had CP since I was born. I am able to understand everything you say to me. Please watch my mouth when I speak. Ask me to repeat anything you don't understand. I will spell words using this alphabet board if you don't understand, or I can type the word out on my computer. This may take me some time, so please wait patiently and give me some time. I really want to talk with you!"

### Metacognitive Ability – Switching Modes

- Just a note:
  - Using natural speech, speech supplementation and/or other AAC systems or strategies is considered multimodal communication.
  - People using these forms of communication are going to need the metacognitive ability to assess situations and make determinations about the best mode(s) of communication for them to use in that context with the particular communication partner.
    - Or when to add or switch to an alternative mode because the message is not being comprehended.
  - This is something you may also want to consider as part of your intervention plan as metacognitive skills can be improved with coaching and practice for some individuals.

### Hierarchy of Strategy Use

- Some researchers have recommended the following hierarchy of strategy use: (Hustad, Morehouse & Gutman, 2002)
  - 1. Say the message using speech. If the listener does not understand, go to the next step.
  - 2. Say the message by using speech while simultaneously producing gestures or pointing to environmental referents, if available. If the listener does not understand, go to the next step.
  - 3. Say the message using speech while simultaneously employing a supplementation strategy (alphabet cue, topic cue, etc.). If the listener does not understand, go to the next step.

## Hierarchy of Strategy Use

- 4. Repeat the message by using supplementation strategy. If the listener does not understand, go to the next step.
- 5. Use a VOCA to produce the entire message or the components of the message that the listener did not understand.
- This is obviously a less-to-more approach to communication augmentation, however, the needs of the individual child and partner should always take precedence.
  - Some children may start at Step #2 or #3 (or even #4).

## Ultimate Intervention Outcome

- The ultimate outcome of any communication intervention should be improvement of the individuals' ability to communicate effectively using any and all means available.
- For many, this means that both speech and AAC are primary modes of communication, depending on the communication partner and the context.
- Remember – the communication mode used will be dependent on the communication partner's skill in understanding the message.
  - This further illustrates the importance of honest feedback.

## Integrating AAC Strategies into Existing Intervention Sessions

## Integrating AAC into Intervention

- I hope that by this point it is not such a huge leap for you to consider how these strategies might be added into the intervention programs that you are currently implementing for children with severe speech intelligibility disorders.
- To finish up our day I want to present three cases that illustrate the decision making and intervention prioritization process for children with speech intelligibility challenges.

## Christopher

Hustad et al, 2002

- 5-year-old boy with dysarthria secondary to CP.
- Mild cognitive and language impairments.
- Moderate gross and fine motor impairments.
- Highly verbal and highly interactive
  - Frequently tells stories
  - Readily sought interaction with other children
  - Although peers often had a difficult time understanding him – he was not deterred in his attempts.
- Communication breakdown repair strategy:
  - Repeat message, adding gestures for emphasis
  - Persists in his attempts until partners understand.

## Christopher

- Speech intelligibility was moderately reduced overall.
- Became further reduced as he got frustrated
  - Increased spasticity and muscle tone
- Because of the neuromotor etiology of Christopher's disability, a number of dysarthric characteristics were present in his speech:
  - Mild consonant distortions
  - Reduced respiratory support
  - Mild hypernasality
- Overall, targeting developmental processes with Christopher would likely not affect his speech, as his underlying neurological impairments could not be alleviated.

## Christopher

- However, because he is a child, his gross and fine motor skills will continue to develop and change over time – therefore, intervention should not entirely disregard sound segment and connected speech production skills.

- **Assessment Information:**

	<b>Word Intelligibility</b>	<b>Sentence Intelligibility</b>	<b>Narrative Intelligibility</b>
No cues	61%	52%	43%
Topic	92%	65%	50%
ABC		76%	

## Christopher

- **These assessment data suggest:**
  - 1. Intelligibility decreases as length and complexity increase.
    - May be due to his rapid rate of speech
    - May be due to his difficulty with word segmentation
    - May be due to his motor coordination problems
  - 2. Christopher benefited from topic cues, but benefit decreased with length and complexity increases.
  - 3. Christopher's speech intelligibility was optimal at increased lengths and complexities when ABC cues were used.

## Christopher – Intervention Decision Making

- **What should be done in intervention with Christopher?**
  - Should traditional speech intervention continue?
  - Should AAC strategies be added into his intervention program?
  - If so, which strategies?
  - If so, how and where should they be added?
  - What intrinsic and extrinsic factors do we need to consider when making these decisions?

## Christopher – Intervention Plan

- **Communication profile clearly indicated a need for AAC strategies to supplement speech**
  - Particularly for sentence and narrative length productions.
- **Speech intervention will be necessary to focus on coordination and rate reduction.**
- **Speech and language intervention will be necessary to build prerequisite literacy skills for functional use of ABC cues.**
- **In the meantime, Christopher should be taught to use functional gestures and topic cues to supplement his speech.**

## Christopher – Intervention Plan

- **Priorities:**
  - Introduce low-technology AAC topic boards.
    - Teach integration of natural speech and pointing to the referent or topic for addressing communication breakdowns.
  - Work on the segmentation of words in connected to speech to improve listeners' ability to identify word boundaries.
    - Contemplate use of pacing boards to help with this instruction.
  - Work on reducing rate of speech to provide listeners with more processing time.
    - Pacing board might be considered for this target as well.

## Christopher – Intervention Plan

- Introduce VOCA as a backup and replacement for natural speech when listeners are unable to understand speech that is supplemented with pictures.
  - Potentially a good use of iMobile technology (text-to-speech apps)
- Teach hierarchical use of communication strategies.
  - Metacognitive piece of intervention
  - Recognizing partner feedback.

## Julie

Hustad et al, 2002

- 6-year-old girl with childhood apraxia of speech.
- Moderately delayed expressive language.
- Cognitive and gross motor are WEL.
- History of chronic Otitis Media, allergies, hyperactivity and challenging behavior (that appears to be associated with communication problems).
- Communication breakdown repair strategy:
  - Does NOT persist in her communicative attempts.
- Is socially isolated from her peers because of their inability to understand her.

## Julie

- Uses challenging behaviors to get positive and negative reinforcement.
  - Physical aggression
- Has become reluctant to attempt verbal communication to avoid communication failure with her peers.
- Challenging behaviors have further isolated her socially.
- Julie uses a number of phonological processes
  - Incorrectly produces approximately 40% of target consonants.

## Julie

- Also has difficulty with syntactic and morphological aspects of spoken language.
  - Possibly because of her speech impairment.
- Assessment Information:

	Word Intelligibility	Sentence Intelligibility	Narrative Intelligibility
No cues	38%	60%	73%
Topic	82%	75%	73%
ABC		88%	

## Julie

- These assessment data suggest:
  - 1. Intelligibility and comprehensibility increases as length and complexity increase.
    - ✦ This is a more typical pattern than what was observed with Christopher.
  - 2. Julie benefited from topic cues were provided to her listeners.
    - ✦ But with narratives, comprehension was not affected by provision of cues.
  - 3. Julie's speech intelligibility was optimal at increased lengths and complexities when ABC cues were used.

## Julie – Intervention Decision Making

- What should be done in intervention with Julie?
  - Should traditional speech intervention continue?
  - Should AAC strategies be added into his intervention program?
  - If so, which strategies?
  - If so, how and where should they be added?
  - What intrinsic and extrinsic factors do we need to consider when making these decisions?

## Julie – Intervention Plan

- Communication profile clearly indicated she benefited from AAC strategies to supplement speech
  - Particularly for word and sentence length productions.
- There is an immediate need for intervention focused on functional communication.
  - To replace her challenging behaviors.
- Speech and language intervention will be necessary to continue build literacy skills for functional use of ABC cues.
- Julie exhibits age appropriate literacy skills, so the use of alphabet supplementation would need to be introduced in highly structured therapeutic contexts, and over time, generalized to broader conversational contexts.

## Julie – Intervention Plan

- **Priorities:**
  - Introduce low-technology AAC topic boards.
    - Teach integration of natural speech and pointing to the referent or topic while speaking in words or isolated sentences.
  - Emphasize the provision of context through the verbal production of narratives or contiguous messages that maintain topic cohesion.
    - This might be accomplished through partner dependent prompting (e.g., “Tell me more,” “What else?”).

## Julie – Intervention Plan

- Introduce alphabet supplementation strategies, and work on first letter identification of words in structured contexts.
- Address phoneme- and process’ specific speech production errors in words and connected speech.
- Teach hierarchical use of communication strategies.
  - Metacognitive piece of intervention
  - Recognizing partner feedback.

## Erik

Hustad et al., 2002

- 4-year-old boy.
- Typical cognitive skills.
- Mild language impairment
- Severely impaired speech production skills
- Gross motor skills are WEL.
- Difficulty with fine motor skills.
- Seeks interaction with other children and adults.
  - Attempts are often not successful because of his speech impairment.
- Erik is easily frustrated by his unsuccessful communication.
  - Exhibits physically aggressive behavior toward his peers and himself when others fail to understand him.

## Erik

- Does not use gestures or other environmental cues (like pointing).
- Frequently makes developmental articulation errors and uses phonological processes
  - Atypical patterns of errors
  - Nondevelopmental processes
- Oral motor examination showed motor planning difficulties.
  - Oral groping
  - Coordination difficulties on repeated productions of single words and multisyllabic words.

## Erik

- Has received S/L intervention specifically targeting phonological processes, articulation and motor planning
  - Minimal progress
  - Virtually no change in functional communication skills
- **Assessment Information:**

	<b>Word Intelligibility</b>	<b>Sentence Intelligibility</b>	<b>Narrative Intelligibility</b>
No cues	3%	3%	3%
Topic	33%	11%	17%
ABC		28%	

## Erik

- These assessment data suggest:
  - Although speech supplementation strategies markedly enhanced Erik’s intelligibility and comprehensibility, his speech intelligibility and comprehensibility continued to be severely impaired.

## Erik – Intervention Decision Making

- What should be done in intervention with Erik?
  - Should traditional speech intervention continue?
  - Should AAC strategies be added into his intervention program?
  - If so, which strategies?
  - If so, how and where should they be added?
  - What intrinsic and extrinsic factors do we need to consider when making these decisions?

## Erik – Intervention Plan

- Implementing speech supplementation strategies might not provide meaningful functional improvement for Erik.
- Erik's communication profile suggests that a VOCA is necessary to enhance his functional communication skills.

## Erik – Intervention Plan

- **Priorities:**
  - Introduce VOCA immediately.
    - Focus intervention on operation, social, linguistic and strategic competencies.
    - Encourage use of natural speech with VOCA for future integration of speech and AAC.
  - Encourage and increase the use of gestures and other paralinguistic cues, such as pointing to facilitate the exchange of meaning.
  - Work on speech production skills, including sound segments, coordination and sequencing.
  - As speech production skills and speech intelligibility improve, reassess the usefulness of speech supplementation strategies.

## Conclusion

## Today we have discussed...

- Candidacy requirements for AAC systems and strategies.
- Assessment of speech intelligibility and speech comprehensibility.
- Communication strategies and intervention options for children with reduced speech intelligibility.
  - Such that they are unable to meet their communication needs across all contexts.

## I have advocated...

- For a communication approach in which natural speech, supplemented with AAC strategies, is regarded as the primary mode of communication for all but the most severe cases.
- Using a hierarchy of communication strategies that move from less to more dependency on AAC systems.
- That functionally oriented AAC interventions and developmentally oriented speech interventions should not be mutually exclusive options for children with speech intelligibility challenges.

Questions?



THANK YOU FOR COMING!