

# LAMP

## Language Acquisition through Motor Planning

The Center for AAC & Autism  
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### The Center for AAC & Autism Mission:

- To improve public awareness of the unique qualities of the power of AAC to change the lives of non-verbal individuals with autism and other developmental disabilities by:
  - Providing specialized clinical training to health care professionals, teachers, and parents
  - Supporting clinical research
  - Supporting clients and families with education, resources, and information

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### Who We Serve

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### Agenda

- Who are you?
- Who is LAMP?
- Why LAMP?
- 5 Key Elements
- Vocabulary selection

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### Who are you?

- Parents? Teachers? Therapists?
- Don't accept that 50-60% of individuals with ASD graduate without a functional way to communicate
- Don't accept one method for addressing communication needs is right for all children
- Presume competence in children's communication and educational abilities
- Know that spontaneous, novel utterance generation is the goal (not just participation)
- Not limited in the tools they can use to address communication needs
- Treat every child as their own

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### Who Are We?

- John & Cindy Halloran
- Practicing therapists and teachers
- Parents



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## The Learning Center of N Arkansas



- "To Empower and Enhance the Lives of the Developmentally Disabled and Their Families by Providing Quality Services and Advocacy."
- Established 1959
- Serving birth – adult
- Center based, and home based early intervention and adult services
- Physical, Occupational, Speech, Developmental and Behavioral Therapy
- Family support programs

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Work with weaknesses

Lazy eyed John

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## Communication Deficits in ASD

### • Presumed causes

- **Inadequate sensory processing**
  - (Rogers, Hepburn & Wehner, 2003) (Windeck & Laurel, 1989)
- **Poor auditory processing**
  - (Siegal & Blades, 2003) (Bruneau, Bonnet-Brilhault, Gomot, Adrien & Barthélémy, 2003)
- **Apraxia/Motor delays**
  - 41% of 2-7 year-olds with autism show clear signs of motor impairments (Ming, Brimacombe & Wagner, 2007)
  - 84% of children with autism studied showed significant delays in motor skills; remaining 16% showed mild delays (Provost, Lopez & Heimerl, 2007)
  - Early manual- and oral-motor skills predict later speech fluency in autism (Gernsbacher, Sauer, Geye, Schweigert & Goldsmith, 2008)

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### The role of the visual system

- Children with autism have visual strengths, but...
  - Iconicity has been shown to NOT be a factor in the successful use of PECS for children with autism (Angermeier, Schlosser, Luiselli, Harrington & Carter, 2007)

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### ASD & SGDs

- Speech and print feedback aid in spelling acquisition (Schlosser & Blischak, 2004)
- Increased requesting during play tasks with enhanced milieu teaching techniques (Olive, et al., 2006)
- More effective communication in home-based activities with parent instruction (Thunberg, Ahlsen & Sandberg, 2007)
- Increase expressive and receptive language skills (Light, Roberts, DiMarco & Greiner, 1998)
- 92% showed at least some "success" as determined by educators (Mirenda, Wilk & Carson, 2000)
- Decreased problem behaviors with FCT (Durand, 1999)
- Increase in interactions with naturalistic teaching strategies (Schepis, Reid, Behrmann & Sutton, 1998)

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### ASHA's AAC Glossary

- Communication is based on the use of the individual words of our language. True communication is spontaneous and novel. Therefore, communication systems cannot be based significantly on pre-stored sentences. Communication requires access to a vocabulary of individual words suitable to our needs that are multiple and subject to change. These words must be selected to form the sentences that we wish to say.

<http://www.asha.org/public/speech/disorders/accPrimer.htm>

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### What is Your Goal?

- When developing and implementing a treatment plan, parents and therapists must have a clear vision.
- Let's make the least dangerous assumption and presume competence despite previous performance
- Is it ever ok to assume that a child will never produce spontaneous novel utterances?

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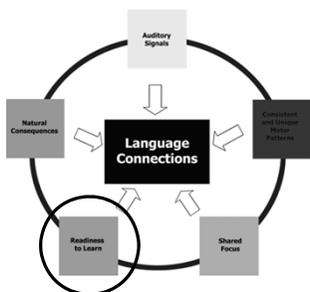
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### Five Key Elements



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### Readiness To Learn

- Arousal level cannot be too high or too low to achieve optimal learning
  - Sensory seeking behaviors have been shown to negatively correspond to academic performance (Ashburner, Ziviani & Rodger, 2008)
- Some children need to be calmed
- Some children need to be alerted

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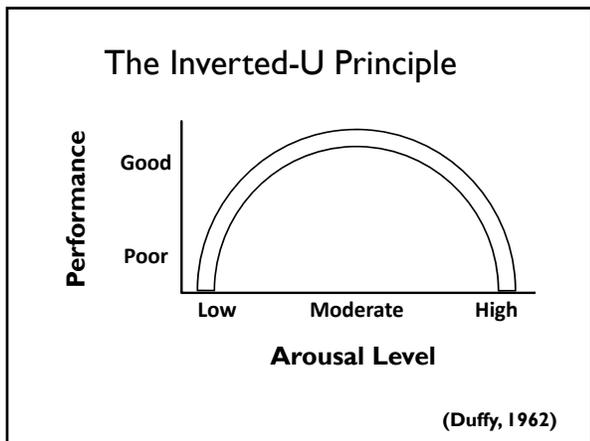
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- ### Alerting Activities
- Quick, erratic movements
    - Spinning, rolling, bouncing
  - Light touch
    - Feathers, koosh ball
  - Oral – sour, bitter tastes and crunchy textures
  - Louder environment
  - Bright lights

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- ### Calming Activities
- Slow, linear swinging
  - Heavy work
    - Pushing, pulling, lifting/carrying, hanging
  - Deep pressure
    - Squeezes, weighted vests/backpacks
  - Chewing – gum, tube
  - Quiet environment – voices/music
  - Dim lights

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### Also a learning opportunity

- Teach vocabulary to help children get their sensory needs met

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### My OTs' Favorite Sites

- [www.sensory-processing-disorder.com](http://www.sensory-processing-disorder.com)
- [www.out-of-sync-child.com](http://www.out-of-sync-child.com)
- [www.sensoryint.com/index.htm](http://www.sensoryint.com/index.htm)
- [www.sinetwork.org](http://www.sinetwork.org)
- <http://www.incrediblehorizons.com/sensory-integration.htm>

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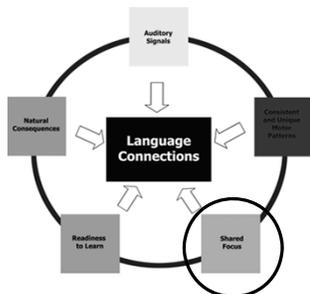
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### Shared Focus



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### Shared Focus

- **Joint attention:** the process by which one alerts another to a stimulus via nonverbal means, such as gazing or pointing. For example, one person may point to another, and then point to an object. In this case, the pointing person is trying to get the other to look at the object. The person seeing the other point responds to the gesture by looking at the object. It typically develops around one year of age in human infants and is essential to building strong social connections. Before one year of age, infants merely look at the hand of the person pointing; after developing joint attention, they look in the direction of the pointing. (Wikipedia)

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### Joint Attention

- “An expression of the exquisitely honed human capacity to coordinate attention with a social partner, which is fundamental to our aptitude for learning, language, and sophisticated social competencies throughout life” (Bruinsma, Koegel & Koegel, 2004)
- Joint attention is an early-developing social-communicative skill in which two people (usually a young child and an adult) use gestures and gaze to share attention with respect to interesting objects or events (Jones & Carr, 2004)

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### Child-Directed

- Follow the child's lead
- Engage in and build on child's interests
- Cautiously interrupt routines
- Share surprising and novel activities
- Join in play with the child – don't rely on request-exchange dynamic only
- Purposeful/Intentional
- Movement
- Target academic vocab in a fun way
- Danger of forcing therapist's will only

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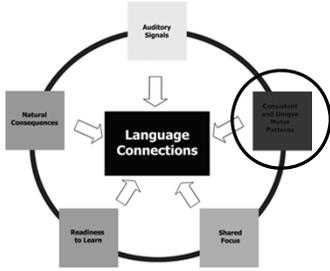


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### Consistent and Unique Motor Patterns



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### Automaticity

- We develop motor plans for ...
  - Driving
  - Typing
  - Playing instruments
  - Speaking
  - Sports performance
  - Handwriting
  - ADLs
  - ETC!!

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- Levelt's (1993) model of spoken language focuses on the cognitive processes associated with utterance generation. Levelt argued that "normally speakers have no conscious access to language encoding or articulation. For most speakers, language production is relatively effortless." ([The Efficacy of Augmentative and Alternative Communication](#), Schlosser, 2003 p. 48).

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### Motor Learning Stages

- **Cognitive stage**
  - learner must attend to the process of learning a motor action
  - highly variable performance
  - needs guidance to detect and correct errors
- **Associative stage**
  - refining his skill
  - able to detect and correct errors
- **Autonomous stage**
  - result of much practice
  - not concentrating on the movement and can attend to other aspects of the activity. (Fitts & Posner, 1967)

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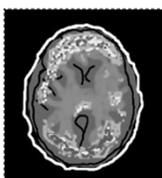
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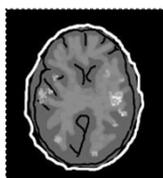
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### Your Brain on Automaticity



New task



Automatic task

- Habitual movements become subcortical
- Cortical areas can be put to "better use"

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### Automaticity: The Great Equalizer

- **Natural Language**
  - Cognitive activity: Formulation of thoughts
  - Motor activity: Speech & Gesture (automatic)
- **AAC Language**
  - Cognitive activity: Formulation of thoughts
  - Motor activity: Device activation (automatic???)

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## Pattern not Metaphor

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- "In the practiced automatic movements of daily life attention is directed to the sense impression and not to the movement. So, in piano playing, the beginner may attend to his fingers but the practiced player attends only to the notes or to the melody. In speaking, writing and reading aloud, and in games and manual work, attention is always directed to the goal, never to the movement. In fact, as soon as attention is directed to the movement, this becomes less automatic and less dependable."
- **Cattell, J.M.**  
1893

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### How Automaticity Works

- **Motor Learning**
  - Acquisition & retention of movement for task
- **Repetition of a neuromotor pathway**
  - Eventually requires less energy
  - Eventually enhances performance
  - Example: touch typing

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### Automaticity in Communication

Modality	Cognitive Activity	Motor Activity
Spoken Language	Formulation of Thoughts	Speech & Gesture (Automatic)
AAC Language		Device Activation (Automatic)

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### Automaticity on an AAC Device

- Possible when:
  - Location of icons is consistent
  - Small icon set allows for immediate recognition
  - Moving from one icon to the next is predictable
- Not possible when:
  - Significant navigation is required
  - Continuous visual refocusing and reorientation is required

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### LAMP LAW

Every word has a consistent and unique motor plan

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Requiring a child to "master" a level before gaining access to more vocabulary forces a significant amount of relearning

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Which is easier?

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(Not metaphors!)

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**LAMP**  
**Law**

Every word has a consistent and unique motor plan

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**Meaning in the movement**

- Areas of the brain responsible for speech production (motor movements) are also critical for speech perception
- Passive listening activates motor areas (D'Ausilio, Pulvermuller, Salmas, Bufalari, Begliomini & Fadiga, 2009)

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**Consider:**

- Device position
- Perseveration?
- Overlay overstimulation
- Hide/show
- Independent exploration
- Need large vocabulary

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## Prompting

- **Hand-over-hand** physical assist
  - Help child with finger isolation, but allow them to feel and activate the key themselves
  - Fade as quickly as possible – perhaps to the child's wrist, arm or shoulder
  - Two-person prompting
- **Direct models**
- **Visual/Gestural prompts**
  - A sustained or quick point to the targeted word
  - A gesture or glance toward the device

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## How to Model Vocabulary to Achieve Motor Automaticity

- The goal is that the child will press the correct icon or icon sequence spontaneously and independently. However, to get to that end, you may have to help the child through the movement initially. You want to back off the amount of cuing that you are giving as soon as possible so that the child does not become cue dependent. Remember, it is a lot easier to remember how to get somewhere if you were the driver last time rather than the passenger.

### Levels of motor assistance:

- Hand over hand
- Point to icon
- Point to general area of icon
- Point to device
- Wait for child to activate

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## Aided Input

- Use the device in addition to spoken language to provide input
- “Language modeling is a seamless component of interactive communication. The speaking communication partner responds; he reinforces by repeating, expands by including new vocabulary and repairs by modeling a corrected communicative unit.” (Cafiero, 2007)
- Parent gave aided input for 2 years before child generated output.

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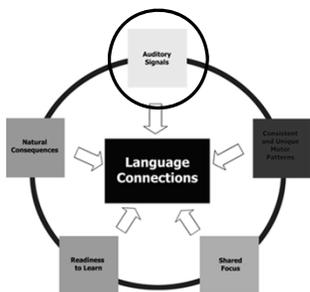
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## Auditory Signals



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## Consider:

- Voice selection
- Volume of the device
- Activation beep feedback
- Speech modeling – be a good communication partner
  - Use exaggerated intonation and slowed tempo (DeThorne, Johnson, Walder, Mahurin-Smith., 2009)
  - Use simplified but not telegraphic language (Fey, 2008)
- Verbal prompts
  - Allow peers to prompt

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Sam

Using Peers

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### Auditory Signal/Feedback

La Sorte (1993), he found that synthetic speech facilitated natural speech production. He found that, "Synthetic speech can facilitate the segmenting of speech into word units since the boundaries are more clearly defined than in human speech, and stress is not an important aspect of synthesized speech."

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- Prizant (1983): "Individuals with autism have trouble segmenting incoming speech into meaningful word units."

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- In the *Language Instinct* by Steven Pinker, he credits Chomsky for our understanding of "two fundamental facts about language. First, virtually every sentence that a person utters or understands is a brand new combination of words appearing for the first time in the history of the universe. Therefore, a language cannot be a repertoire of responses. The brain must contain a recipe or program that can build an unlimited set of sentences out of a finite list of words. That program may be called a mental grammar"

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• **According to Pinker (1994), if a person started memorizing all the possible 10-word sentences, it would take, at a rate of five seconds a sentence, a hundred trillion years (with no time for eating or sleeping).**

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**Pinker: 2 tricks to language**

- “The first is the arbitrariness of the sign.”  
The wholly conventional pairing of a sound with meaning. The word dog does not look like a dog, walk like a dog, or woof like a dog, but it means dog.....for the price of this standardized memorization, the members of a language community receive an enormous benefit....

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**Second trick**

- The second trick behind language instinct is captured in a phrase from Wihelm Von Humbodt that presaged Chomsky,
- “Language makes infinite use of finite media.”

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### Think about this:

- Poor auditory processing may lead to increased word-based combinations to create new words:
  - Golf horse
  - Brent
  - Fix Bird
  - Mickey Mouse
  - Madagascar
- Let's teach this skill!

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### Auditory-Visual Integration

- McGurk Effect

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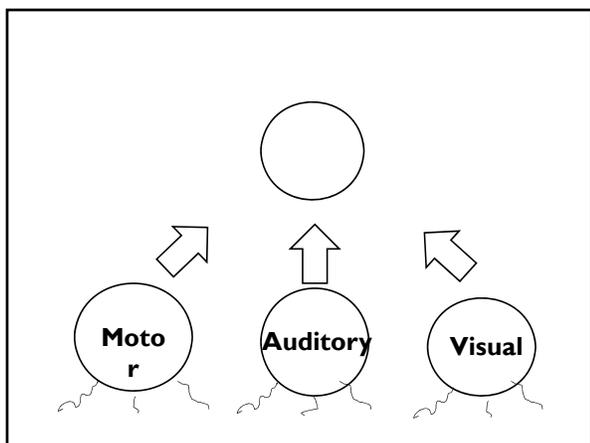
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### Exciting side effects!

- Speech
- Literacy
  
- Jeffery
  - Later...
  
- Max
  - Later...

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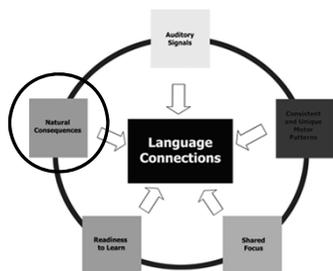
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### Natural Consequences



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### Respond!!!

- The vocabulary available to the child during intervention should easily result in a positive, animated response.
- Reinforce miss-hits!
  - This is a great teaching opportunity!
  - Allow the child to connect meaning to the motor movement they just completed and auditory feedback they received.
  - Expressive can generalize/come before receptive (Wynn & Smith, 2003)

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## Multi-Modal Communicators

- Gestures
  - Processed in the area of the brain as spoken language (Xu, Gannon, Emmorey, Smith & Braun, 2009)
  - Children with autism who use gestures appear to be more communicatively competent (Buffington, Krantz, McClannahan & Poulson, 1998)
- Facial expressions
- Vocalizations
  - Koneya & Barbour (1976)
    - Body language – 55%
    - Intonation/Facial expressions – 38%
    - Words – 7%

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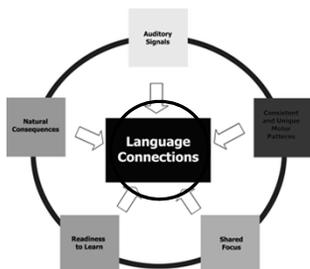
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## Language Connections




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## Language Connections

- The AAC device is a tool that allows the child to “babble” and learn about language. For example, after saying “more” to get bubbles, the child might think that pressing the key for “more” means “bubbles.” A beginning talker might make the same conclusion. However, in another instance when the child says “more” and gets more juice, the meaning of “more” is revised by the child.
- As the child learns with the AAC device, he/she is learning consistent motor patterns that result in an auditory signal. Depending on the natural consequence triggered by the auditory signal, the child may modify his/her perception of what the auditory signal means.

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### Communicative Functions

- Protesting
- Commenting
- Greeting
- Asking
- Directing
- Suggesting

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### Access to Single Words

• *“Communication is based on the use of the individual words of our language. True communication is spontaneous and novel. Therefore, communication systems cannot be based significantly on pre-stored sentences. Communication requires access to a vocabulary of individual words suitable to our needs that are multiple and subject to change. These words must be selected to form the sentences that we wish to say.”*



ASHA's AAC Glossary

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### Give 10 examples of using go and stop

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

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10 examples of how to teach core words "go" and "stop" in the classroom

1. Go vs. stop at circle time to start pledge
2. Kids all dance/jump around until they hear stop then they all freeze
3. On slide, child says "go" and "stop" for next child to come down slide
4. Therapist gets child or self in rolling chair/wagon
5. Spinning/swinging
6. Musical chairs go go go go go go stop
7. Doll that you squeeze and it pee's on "go" quits on "stop"
8. Video go = play and stop = pause
9. Animated pictures on power point of things going and stopping
10. Make fan stop and go on command
11. Computer games with mouse click to make something stop and go

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Core Vocabulary has few Picture Producers

- Fewer than 5 percent of all words used by toddlers are picture producers (Banajee, Dicarlo & Stricklin, AAC, 2003)
- Concrete graphics can only be made for picture producers
- More than 90 percent of core vocabulary words are not picture producers (Hill, Dissertation, Establishment of Performance Indices, 2001)

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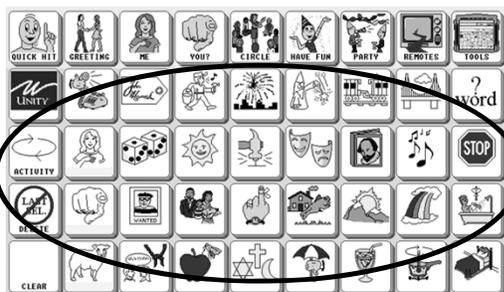
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Core Vocabulary




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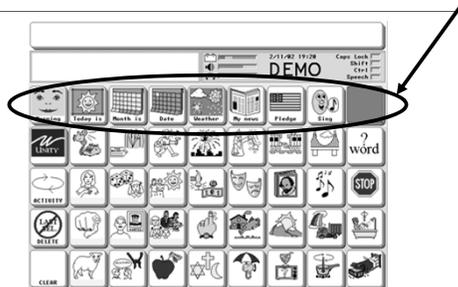
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### Vantage has an Activity Row for Fringe Vocabulary



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### Over generalize

- Over generalize words to give them more meanings
- Visual reactions to words is the best method to teach new words
- 3 sensory systems used to teach words
  1. tactile
  2. auditory
  3. visual

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### Model Vocabulary for Automaticity

- Decrease cuing to encourage independence
- The location of a learned icon or icon sequence **should not** change

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### Please...

- Presume competence
- Remember all communicative functions
- Keep it fun!
- Allow automaticity to develop through consistent & unique motor patterns
- Power of core vocabulary

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### Thank You!

- Host a LAMP Training!
  - [www.aacandautism.com](http://www.aacandautism.com)
- Check out the Center for AAC & Autism on Facebook!
  - Weekly core vocabulary posts
  - Discussions about LAMP implementation, success stories, etc!

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**Your LAMP Trainer**

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MCD, CCC-SLP, BCBA

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