

## New Mobile Technologies for Augmentative and Alternative Communication in Autism

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## Disclosure Statement

- A commercial product, SPEAKall!®, will be shown in this presentation
  - Oliver Wendt is Chief Science Officer for SPEAK MODalities, LLC.
  - Examples in this presentation will use SPEAKall! but can be replicated with a variety of other AAC devices and apps.

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## Program

- AAC & Autism
- Mobile Technology Applications:
  - Functional Communication and Natural Speech Production
  - Early Language
  - Social Communication
  - Q & A

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## Minimally Verbal Children with Autism

- Autism includes a “delay in, or lack of the development of spoken language” (American Psychiatric Association, 2000)
- Up to 66% of children diagnosed with an autism spectrum disorder (ASD) do not develop communicative speech (Lord & McGee, 2001)
  - No sufficient natural speech or writing to meet their daily communication needs (Light, Roberts, DiMarco, & Greiner, 1998)
  - Candidates for intervention in **augmentative and alternative communication (AAC)**


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## AAC for Autism includes...

- Manual signs and gestures
- Pictographic symbols sets/systems
  - Picture Exchange Communication System (PECS)
- Speech generating devices for synthesized and/or digitized speech
  - Dedicated
  - Tablets
- Evidenced-based speech-language learning devices (tablets)

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## Industry Changes

<ul style="list-style-type: none"><li>• <b>Pre-2010</b></li></ul> <ul style="list-style-type: none"><li>▪ \$2,000-\$10,000 high device price tags</li><li>▪ <b>Prescriptive</b> therapist led</li><li>▪ <b>Isolation</b> learner device</li></ul>		<ul style="list-style-type: none"><li>• <b>Post-2010</b></li></ul> <ul style="list-style-type: none"><li>• \$0-\$300 lower app price tags</li><li>• <b>Do It Yourself</b> parental experimentation</li><li>• <b>Shared Community</b> between learner, parent, clinicians</li></ul> <p><i>Integration of language research with leading edge technology</i></p>
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### Autism Apps Market is a Noisy Place

Showing results for "aac"

Showing results for "autism"

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### Autism Apps Can be Noisy Places

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### iPad and *SPEAKall!*

Highly iconic symbols

Simple swipes to navigate vocabulary

Drag & drop or 1-touch Activation

Randomization for symbol learning

Very customizable interface

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### New Mobile Technologies in AAC

## FUNCTIONAL COMMUNICATION AND NATURAL SPEECH PRODUCTION

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### Teaching Requesting

- Core symptom in autism/developmental disabilities: "profound impairment in verbal & non-verbal communication"
- Establishing functional communication initial AAC goal
  - Meeting basic wants and needs
  - Motivational considerations
- Popular and promising strategies:

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### Intervention Protocol

- Modified Protocol of Picture Exchange Communication System (PECS; Bondy & Frost, 1994) (Preference Assessment)
  - iPad Phase I (Ph 1): One-Symbol Activation
  - iPad Phase II (Ph 2): Distance and Persistence
  - iPad Phase III (Ph 3): Discrimination Between Symbols
  - iPad Phase IV (Ph 4): Sentence Structure
    - ⇒ *Added more rigorous speech elicitation, parent and child read "sentence strip" together*
  - iPad Phase V (Ph 5): Responding to "What do you want?"/ Increasing Spontaneity (Boesch, Wendt, Subramanian, & Hsu, 2013a,b)

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## Experiment: Parents using Modified PECS

- Multiple Probe Design across participants (Horner & Baer, 1978)
  - Generalization probes taken throughout baselines and all subsequent intervention phases
- Dependent measures:
  - Requesting skills: number of correct requests during 20-trials session
  - Emerging speech: intentional word approximations or full word utterances

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## Parent Training

- Modeling of intervention steps
- Role-playing with clinician
- Cheat-sheets & videos



#PECS Phase 1 (October 1) - Treatment Integrity Checklist - Parent Implementation

Name: \_\_\_\_\_ Study Center: \_\_\_\_\_ Participant: \_\_\_\_\_

Session: \_\_\_\_\_ (Date: \_\_\_\_\_) Session Order: \_\_\_\_\_ Session #: \_\_\_\_\_

COMPLETION:  Mark (X) if component is fulfilled  
 1. Parent is offering at least two sets of possible items, transferring items during each session  
 2. Any transferring items is not used more than two times

ENVIRONMENT:  Instructional environment is professional

	Sat 1	Sat 2	Sat 3	Sat 4	Integrity
1. Parent places only one symbol on iPad display					
2. Parent or child removes position of symbol on iPad display when done with trial					
3. Parent collects from verbal prompts					
4. Parent returns child with guidance					
5. Parent gives reinforcement to child within 1 second					
6. Parent provides verbal praise					

Integrity: \_\_\_\_\_

\*\*Mark (X) if component is professional, mark (-) if component is not professional during these observations, and (N/A) if component is not applicable and is correctly not applicable to this session (N/A)\*\*

- Treatment integrity checklists for each phase
- Need to have 100% correct during role-play

## Participant Characteristics

Participant	Age/ Gender	Dx*	Communication Skills
P1	7 yrs./ Female	severe autism	some echolalia and scripted speech, less than 15 functional words
P2	8 yrs./Male	moderate-severe autism, dual diagnosis: Down syndrome	no vocalizations, no functional speech
P3	6 yrs./Male	severe autism	vocalization and jargon, no meaningful words, no functional speech

\*based on ADOS and CARS scores

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## Participant P1 Baseline



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## Participant P1 Phase 1 – One-symbol Requests




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## Participant P1 Phase 2 – Distance and Persistence




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### Participant P1 Phase 3 – Symbol Discrimination




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### Participant P1 Phase 4 – Sentence Structure




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### Participant P1 Phase 5 – “What Do You Want?”




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### Participant P1 Phase: iPad Fadeout

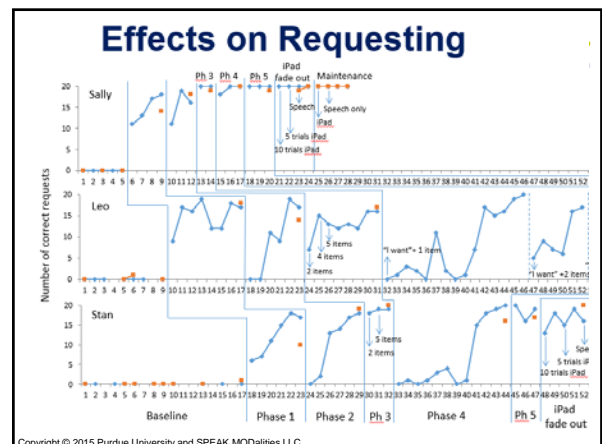


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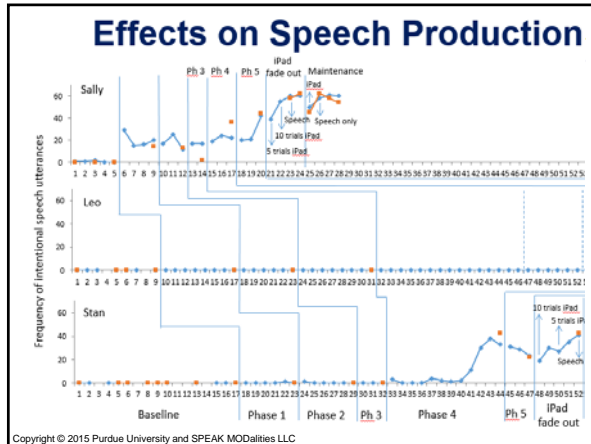
### Participant P1 Maintenance and Generalization



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- ### Conclusions
- Findings provide support that AAC can have facilitative effect on natural speech development
    - Refute myth that AAC prevents speech
  - Confirm PECS principles (behavioral) hold true regardless of modality
  - Potential of including parents for maximizing benefits of AAC intervention
  - Research-based approach key to AAC app development
  - Mostly taught symbolic communication, need to follow-up with early language support
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### New Mobile Technologies in AAC EMERGING LANGUAGE

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- ### Early Language Intervention
- Using SPEAKall!® and additional low technology AAC strategies in intervention
    - Requesting
    - Commenting and joint attention
    - Greeting
    - Giving and following directions/ making sentences
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- ### Intervention Principles
- Using AAC to supplement speech and language intervention for individuals with Autism Spectrum Disorders (ASD)
  - Using AAC within a social context
  - Individual and group settings
  - Activity-Specific and Non-Activity Specific Pages
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## Intervention Targets

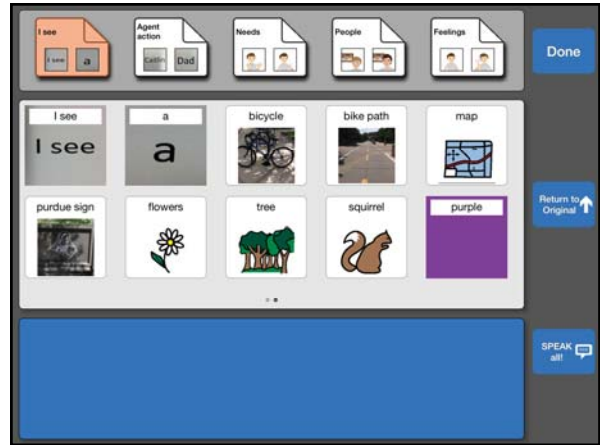
- Using SPEAKall! and additional AAC strategies in intervention
  - Commenting
  - Pairing 2 and 3 words
  - Giving and following directions/ sentence formulation
  - Socially providing information (“go,” “stop,” “again”)
  - Turn-taking and joint attention

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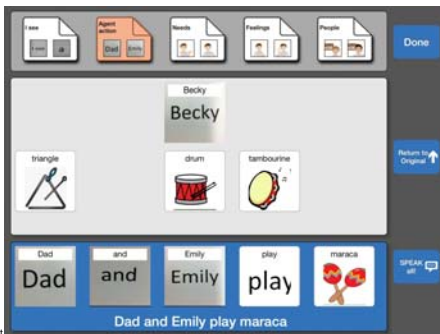
## Commenting: “I see – You see”



## Commenting: “I see – You see”



## Pairing Words: Agent – Action – Object



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## Shared Storybook Reading

- Children who use graphic symbols to communicate can struggle with creating multi-word messages (Tönsing, Dada, & Alant, 2014)
- Shared story reading fosters a natural situation where pictures, symbols and words can be combined
- Children with autism who use AAC need the same type of interactions with books as their verbal peers (Berkowitz, 2015)

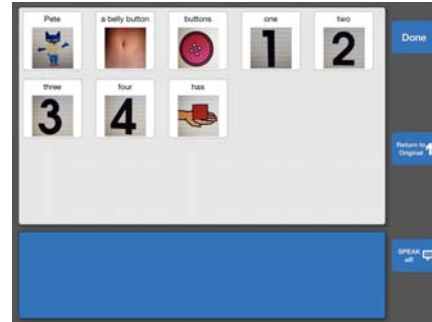
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### Shared Storybook Reading How Does It Help?

- Develops a shared topic
- Language skills targeted in a repetitive and structured way
- Carrier phrases (“I see \_\_\_”) target creating word combinations in a more concrete format yet only requires the child to change one word in the phrase per page
- Use of a limited amount of words on the AAC page decreases the demand of word retrieval
- Teaches emergent literacy skills
- Natural setting for incorporating visuals (already requires picture and symbol attention)

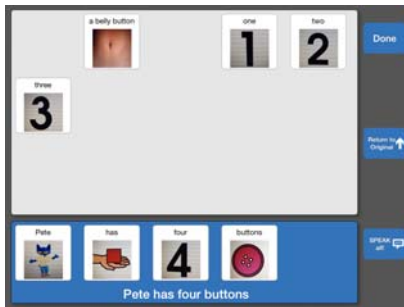
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### “Pete the Cat” Page



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### “Pete the Cat” Sentence Strip



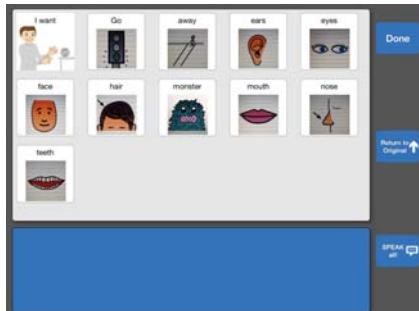
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### Shared Book Reading Activity Specific Page



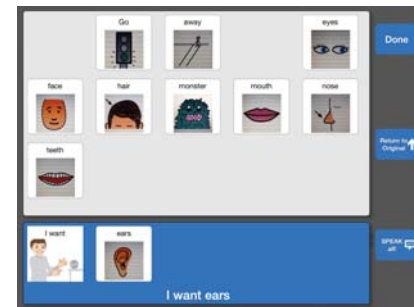
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### “Go Away Big Green Monster” Page



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### “Go Away Big Green Monster” Sentence Strip



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### Shared Story Book Reading Activity Specific Page



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### Shared Story Book Reading Activity Specific Page



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### New Mobile Technologies in AAC **SOCIAL COMMUNICATION**

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### Communication is Social

- Communication functions:
  - Behavior regulation (request object, request action, protest/reject)
  - Joint attention (comment, request information, provide information)
  - Social interaction (request for social routine, request comfort, greet, request permission, show off)

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### Social Communication Page



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### Group Context - Science



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## Bingo



## Don't Break the Ice



## Kerplunk



## Points to Remember

- Make sure to target language in a social context
- Incorporate AAC across contexts to maximize benefits
- Motivation is key, intervention needs to be engaging
  - Instruction plus technology
- Support multi-modal communication

## Parent Perspectives



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## SPEAKall!® Resources

- Website: [www.speakmod.com](http://www.speakmod.com)
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## Questions ???



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