

## Using Dynamic Assessment for Early Sentence Structures with Children using an iPad AAC App

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ISAAC 2014

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### Disclosures

- This research has been supported with funds from:
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  - American Speech-Language-Hearing Foundation
- No non-financial disclosures to report

### Clinical Challenges

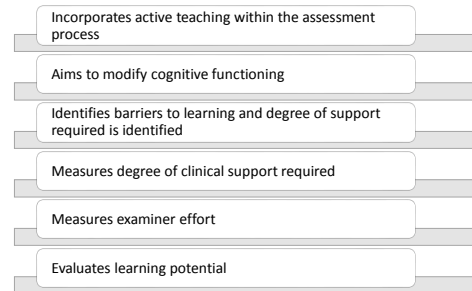
How do we accurately assess children's abilities to use aided AAC to develop generative language skills?



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### Dynamic Assessment (DA) – A Holistic Approach

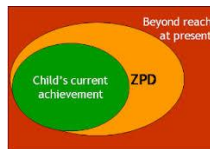


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### Zone of Proximal Development

- Rooted in Vygotsky's sociocultural theory of learning
- Difference between a child's level of independent performance and level of assisted performance
- Level of potential development is determined through problem solving under adult guidance or in collaboration with more capable peers



Taken from: <http://www.berringtonlearning.co.uk/learning/zone-of-proximal-development.htm>

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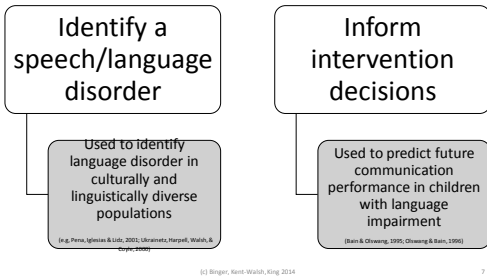
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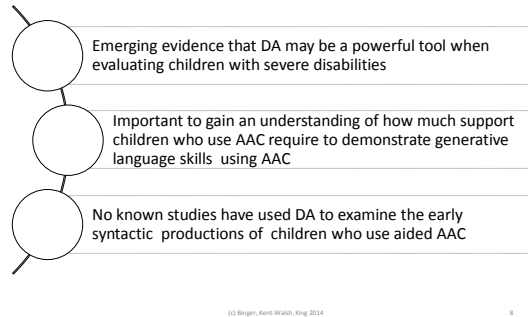
### Graduated Prompting

- Uses a predetermined, least-to-most cueing hierarchy
- Indicates child's ZPD by measuring amount of support required
- Measures changes in level of support required across similar tasks
- May indicate transfer of learning

### Applications of DA in Speech-Language Pathology



### Rationale for Current Studies



### Research Questions

- How much support do preschoolers using AAC need to create simple, rule-based sentences using an AAC iPad app?
  - Do these children show rapid improvements (i.e., modifiability) in their sentence productions when a least-to-most cueing hierarchy is used?
  - Is performance during dynamic assessment predictive of future performance?
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### Research Design

- Study 1 & 3**
    - Part of an NIH-funded study in the Department of Speech and Hearing Sciences at the University of New Mexico
  - Study 2**
    - Part of an ASH Foundation-funded study at in the Department of Communication Sciences and Disorders at the University of Central Florida
  - All children participated in DA prior to beginning an experimental phase (plus intervention as required)
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## Study 1

5-Year-Old children's Sentence Productions using Aided AAC

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### Participants

	Amy	Ben	Carmen	Darryl
<b>Chronological age (yr;mo.)</b>	5;10	5;0	5;1	5;9
<b>Gender</b>	Female	Male	Female	Male
<b>Disability</b>	Suspected ataxic speech disorder; Suspected CP	Severe speech disorder; History of TBI; Microdeletion of 7q11.22*	Severe speech disorder	Severe speech disorder
<b>Test of Auditory Comprehension of Language</b>	27 <sup>th</sup> percentile	77 <sup>th</sup> percentile	19 <sup>th</sup> percentile	77 <sup>th</sup> percentile
<b>IASCC (no context/ context)</b>	13%/52%	0%/3%	16%/55%	35%/68%

Note: TBI = Traumatic Brain Injury.  
 \*This deletion has been associated with autism, but data are incomplete in the research literature at this time. Ben does not demonstrate symptoms of autism.

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Cueing Levels

Target: HAPPY PENGUIN Contrast: SAD COW			
Level	Prompt	Example	Scoring
		Set up/Directions	
		Prompt	
<b>Level A</b>	Elicitation question/prompt	Arrange happy Penguin and sad Penguin as well as contrast puppets, happy Cow and sad Cow, in front of child. Point to the happy penguin	Who is this?  4
<b>Level B</b>	Spoken and aided model of a contrast target	Point to sad Cow, then point to happy Penguin	Look, this is sad Cow SAD COW and this is  3
<b>Level C</b>	Direct spoken model of the target	Point to happy Penguin	See, this is happy Penguin. Who is this?  2
<b>Level D</b>	Direct spoken and aided model of the target	Point to happy Penguin	Tell me, happy Penguin HAPPY PENGUIN.  1

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Sample Data Sheet: DA

- Scoring
  - Point value assigned for each trial
- Data Reliability
  - 33% of the data re-coded by a coder blinded to the purposes of the study and order of the data
  - Reliability calculated for scoring procedures
    - Kappa = 1.0 (perfect agreement)

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Experimental Task Materials

- iPad with same communication board except for inclusion of different characters: Mickey Mouse Clubhouse characters
- Separate iPad containing videos depicting target relations

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Experimental Task Procedures

- Examiner showed child a video depiction of given target
- Then asked elicitation question/prompt
  - E.g., for agent-action target the elicitation prompt was, "What's happening?"
- Child was then expected to produce the target structure using the graphic symbols on the iPad (e.g, GOOFY CRIES)
- Examiner presented 10 randomly ordered videos depicting target structures

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Data Collection: Experimental Task

- Scoring
  - Experimental Task
    - Percent of correct productions for each set of 10 videos depicting a target structure
- Data Reliability
  - 33% of the data were re-coded by a coder blinded to the purposes of the study and order of the data
  - Reliability calculated for scoring procedures
    - Kappa = 1.0 (perfect agreement)

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Research Question 1:

How did the children perform at each cueing level?

- Targets produced accurately at each of the four cueing levels at some point during DA
- All participants produced the targets at Level A cueing
- Mean level of support was above 2.5 for all participants for most targets

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Research Question 2: Did the children’s performance change during each DA session?

- Performance on first five trials compared with performance on last five trials
  - Taken as a group, results were HIGHLY significant;  $p < .001$
  - Scores on second half of the trials for any given session were higher or the same for 21/24 trials

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Research Question 3:

Correlation Between DA and Experimental Task

- Strong correlations for Children B, C, & D
- Mild correlation for Child A

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Study 2

Productions of YES/No Statements and Questions using Aided AAC

Many similarities to Study 1

- Setting
- Materials
- Cueing hierarchy
- Communication pages on iPad
- Inclusion criteria for participants
- *Main changes*
  - *Targets*
  - *Multiple baseline and intervention sessions followed DA*

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Participants

	Alex	Bella	Cory
Chronological age (mo.)	4;10	6;2	4;9
Gender	Male	Female	Male
Disability	Developmental apraxia of speech	Down syndrome	Developmental apraxia of speech & auditory processing disorder
Test of Auditory Comprehension of Language	65 <sup>th</sup> percentile	5 <sup>th</sup> percentile	45 <sup>th</sup> percentile
IASCC (no context/ context)	16/32%	38/61%	13/35%

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Targets

Target	Example
Subject + auxiliary verb + main verb	<i>GOOFY IS CRYING</i>
Auxiliary verb + subject + main verb	<i>IS GOOFY CRYING?</i>

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## Results

**Observational data:**

- All children were able to complete the DA task
- Alex and Bella's performance in DA was comparable, but Bella took approximately twice as long to complete the intervention
- Cory required full support on DA and took the longest to complete the subsequent intervention

## Study 3: Preliminary Findings (some data collection in process)

3- AND 4-Year-Old children's Sentence Productions using Aided AAC

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### Method: Participants

- 10 children ages 3 & 4
- Less than 50% intelligible (single word, unfamiliar listeners)
- Most had no prior AAC experience

	PPVT-IV		TACL-3		Leiter-R
	AE	Percentile	AE	Percentile	Full IQ SS
Child G (4;8)	3;7	13	3;10	13	84
Child H (4;11)	5;2	53	4;9	39	108
Child I (3;11)	3;8	37	3;5	23	101
Child J (4;2)	5;10	92	4;9	84	113
Child K (4;3)	3;11	37	4;4	61	116
Child L (4;9)	4;4	30	3;7	5	95
Child M (4;3)	4;1	45	3;10	27	102
Child N (4;9)	5;0	58	4;3	27	101
Child O (3;5)	7;8	85	3;4	77	143
Child P (3;3)	2;9	30	3;5	65	114

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### Research Question 1:

How did the children perform at each cueing level?

#### Participants' Performance at Each Cueing Level during DA

- Targets accurately produced at all cueing levels
- Overall, higher levels of cueing needed than for Study 1, but still successful at Level A cueing for some participants
- Possessor-entity target required the least amount of cueing, followed by locatives, then attribute-entity, then agent-action-object

### Research Question 2:

Did the children's performance change during each DA session?

- Performance on first five trials compared with performance on last five trials
  - Results were highly significant;  $p < .001$
  - Scores on second half of the trials within each set of probes were higher or the same for 31/36 DA sessions

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### Research Question 3:

Was there a Relationship between DA Performance and Mastery of Target in Intervention?

**(Preliminary findings)**

- Significant correlation between the participant's performance in DA and performance the subsequent intervention
  - Pearson:  $r^2 = 0.48$

## Summary

- Set appropriate expectations:
  - Five-year-old children who use AAC are able to learn to construct basic messages using graphic symbols with relatively little support
  - Three- and four-year old children were also successful but required more support overall
  - Initial data with question forms are promising
  - Significant improvements in performance may be noted even within a brief DA task

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## Predicting Future Performance

- DA may help predict future performance on similar AAC tasks
  - Useful in determining goals for intervention
    - Little to no cueing needed during DA → Select more challenging targets
    - Moderate cueing needed during DA → Probably an appropriate target
    - Extensive cueing needed during DA, especially with no accurate responses at all → Consider slightly simpler target

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## Future Directions

- Assess participants with varying ages and cognitive abilities
- Assess other language areas: morphology, semantics and more complex syntactic structures

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## References

- Bain, B. A., & Olswang, L. B. (1995). Examining readiness for learning two-word utterances by children with specific expressive language impairment: Dynamic assessment validation. *American Journal of Speech-Language Pathology, 4*, 81–91.
- Olswang, L., Feuerstein, J., Pinder, G. L., Dowden, P. (2013). Validating dynamic assessment of triadic gaze for young children with severe disabilities. *American Journal of Speech Language Pathology, 22*, 449-462.
- Peña, E., Iglesias, A., & Lidz, C. (2001). Reducing test bias through dynamic assessment of children's word learning ability. *American Journal of Speech-Language Pathology, 10*, 138-154.
- Ukrainetz, T. A., Harpell, S., Walsh, C., & Coyle, C. (2000). A preliminary investigation of dynamic assessment with Native American kindergartners. *Language, Speech, and Hearing Services in Schools, 31*, 142-154.
- Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

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