

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

Cathy Binger
University of New Mexico, USA

Jennifer Kent-Walsh
University of Central Florida, USA

Marika King
University of New Mexico, USA

ISAAC 2014

© Binger, Kent-Walsh, King 2014

1

© Binger, Kent-Walsh, King 2014

2

Disclosures

- This research has been supported with funds from:
 - NIH grant: 1R03DC011610
 - American Speech-Language-Hearing Foundation
- No non-financial disclosures to report

Clinical Challenges

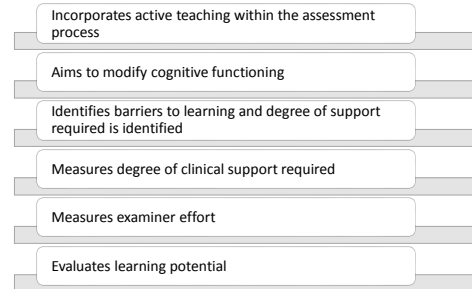
How do we accurately assess children's abilities to use aided AAC to develop generative language skills?



© Binger, Kent-Walsh, King 2014

3

Dynamic Assessment (DA) – A Holistic Approach



© Binger, Kent-Walsh, King 2014

4

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>

© Binger, Kent-Walsh, King 2014

5

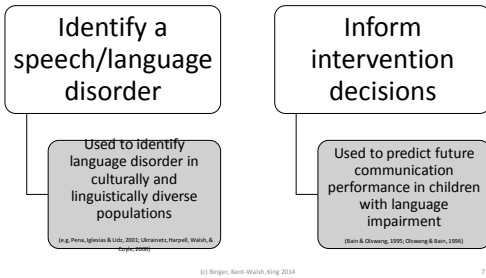
© Binger, Kent-Walsh, King 2014

6

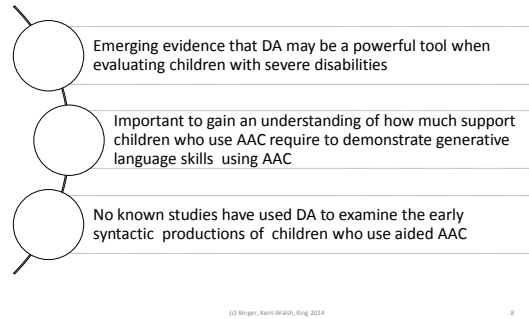
Graduated Prompting

- 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?
- (c) Binger, Kent-Walsh, King, 2014 9

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)
- (c) Binger, Kent-Walsh, King, 2014 10

Study 1

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

(c) Binger, Kent-Walsh, King, 2014 11

Participants

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

(c) Binger, Kent-Walsh, King, 2014 12

Setting, Experimenters, and Instrumentation

- DA and experimental sessions administered by the author, another SLP graduate student and the principal investigator for the larger study
- Conducted in a private therapy room
- Approximately 2, 60-minute sessions per week
- Video-recorded
- iPad containing Proloquo2Go™ app
- Static pages with line drawings representing target vocabulary

© Binger, Kent-Walsh, King 2014

13

Communication Board Used During DA



© Binger, Kent-Walsh, King 2014

14

Communication Board Used During Experimental Task



© Binger, Kent-Walsh, King 2014

15

Targets

Target	Example
Agent-Action	<i>PENGUIN JUMPS</i>
Attribute-Entity	<i>HAPPY PENGUIN</i>
Possessor-Entity	<i>PENGUIN'S MOTORCYCLE</i>
Action-Object	<i>CHASES PENGUIN</i>
Agent-Action-Object	<i>MONKEY CHASES PENGUIN</i>
Attribute-Agent-Action	<i>HAPPY PENGUIN JUMPS</i>

© Binger, Kent-Walsh, King 2014

16

DA Session Materials

- Puppets and plastic animals representing target vocabulary
- Additional materials used to depict various conditions (e.g., water sprayer to make animals wet)
- Objects representing possessions
- Simple prompts used to demonstrate actions (e.g., box for animals to hide behind)

© Binger, Kent-Walsh, King 2014

17

DA Session Procedures

Adapted from Olswang and Bain's (1996) procedures

- Graduated Prompting
- DA for each target administered in a separate block
- 10 trials administered for each semantic-syntactic target
- Child's production at each level of cueing recorded
- Examiner used toy animals and objects to demonstrate target structure

© Binger, Kent-Walsh, King 2014

18

Cueing Levels

Target: HAPPY PENGUIN Contrast: SAD COW			
Level	Prompt	Example	Scoring
		Set up/Directions	
		Prompt	
Level A	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
Level 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
Level C	Direct spoken model of the target	Point to happy Penguin	See, this is happy Penguin. Who is this? 2
Level D	Direct spoken and aided model of the target	Point to happy Penguin	Tell me, happy Penguin HAPPY PENGUIN. 1

(c) Binger, Kent-Walsh, King 2014

19

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)

(c) Binger, Kent-Walsh, King 2014

20

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

(c) Binger, Kent-Walsh, King 2014

21

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

(c) Binger, Kent-Walsh, King 2014

22

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)

(c) Binger, Kent-Walsh, King 2014

23

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

(c) Binger, Kent-Walsh, King 2014

24

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

(c) Binger, Kent-Walsh, King 2014

25

Research Question 3:

Correlation Between DA and Experimental Task

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

(c) Binger, Kent-Walsh, King 2014

26

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*

(c) Binger, Kent-Walsh, King 2014

27

(c) Binger, Kent-Walsh, King 2014

28

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 th percentile	5 th percentile	45 th percentile
IASCC (no context/ context)	16/32%	38/61%	13/35%

(c) Binger, Kent-Walsh, King 2014

29

Targets

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

(c) Binger, Kent-Walsh, King 2014

30

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

(c) Binger, Kent-Walsh, King 2014

31

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

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

(c) Binger, Kent-Walsh, King 2014

32

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

(c) Binger, Kent-Walsh, King 2014

33

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

(c) Binger, Kent-Walsh, King 2014

34

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

(c) Binger, Kent-Walsh, King 2014

35

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: $r^2 = 0.48$

(c) Binger, Kent-Walsh, King 2014

36

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

© Binger, Kent-Walsh, King 2014

37

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

© Binger, Kent-Walsh, King 2014

38

Future Directions

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

© Binger, Kent-Walsh, King 2014

39

Acknowledgements

- Many thanks to:
 - The children and families who participated in the studies
 - AAC Lab students from UNM and UCF for countless hours of hard work
 - The NIH and ASHFoundation for supporting this work

© Binger, Kent-Walsh, King 2014

40

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.

© Binger, Kent-Walsh, King 2014

41

CONTACT INFORMATION

Cathy Binger
Dept. of Speech and Hearing Sciences
University of New Mexico
cbinger@unm.edu

Jennifer Kent-Walsh
Dept. of Communication Sciences and Disorders
University of Central Florida
jkentwalsh@ucf.edu

Website:
<http://aac-ucf.unm.edu>

© Binger, Kent-Walsh, King 2014

42