

Exploring the LENA Adult Word Count Measure: What Researchers and Clinicians Should Know

Lisa Wisman Weil, Purdue University
Laura Middleton, Columbus Speech & Hearing Center
Laurence B. Leonard, Purdue University



OVERVIEW

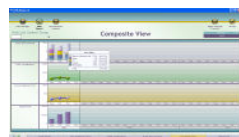
Application of LENA system to a parent-focused intervention

- LENA
 - New research tool
 - Automatic analyses of naturalistic language
- It Takes Two to Talk: Hanen Program for Parents* (Adapted)
- Pilot study
- Interpreting LENA

WHAT IS LENA?



- A small, wireless digital recorder that a child wears for up to 16 hours per day
- Automated LENA measures:
 - Adult Word Count (AWC)**: total number of words said to child
 - Child Vocalizations (CV)**: total number of vocalizations (words and phrases) said by the child
 - Conversational Turns (CT)**: child vocalizes & adult responds or adult speaks & child responds



It Takes Two To Talk: Hanen Program for Parents (ITTTT), 4-Week Adapted Program

- Early exposure to a language rich environment promotes later academic success (Hart & Risley, 1995)
- Parent-based interventions and traditional SLP-implemented therapy are equally effective (Law, Garret, & Nye, 2004)
- Focuses on teaching parents techniques to build language skills during child-lead interactions.
- Covers the core content of the traditional 11-week ITTTT program
- Two 2-hour parent-education sessions
- Two 30-minute individual videotaped feedback coaching sessions
- Parents also receive a *It Takes Two to Talk* handbook (Pepper & Weitzman, 2004)

RESEARCH QUESTIONS

- Will parents show and increase in language input to their late-talking toddlers after the intervention?
 - Hypothesis: Yes, AWC and CT values: post tx > pre tx*
- After the intervention, will late-talking children demonstrate improved language skills based on (a) parent report and (b) naturalistic child vocalization output?
 - Hypothesis: Yes, MBCDI and CV values: post tx > pre tx*

METHOD

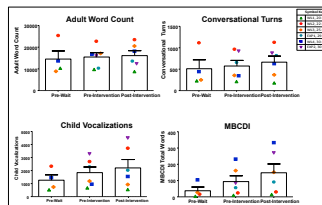
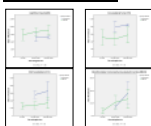
PARTICIPANTS

- Eight participants were recruited
 - 1 lost to technical error & 1 lost to attrition
- Results from 6 participants reported (ages 20 to 30 months at start)
- Mono-lingual English speaking
- All children were late-talkers:
 - expressive and/or expressive-receptive mixed language deficit
 - below the 10th percentile for total productive vocabulary on the MacArthur-Bates Communicative Development Inventory
 - normal oral and speech motor abilities
 - normal hearing ability
 - no frank neurological, gross-motor, or cognitive impairments.

DESIGN

- Quasi-experimental
 - 4 families in experimental group (2 families lost)
 - 4 families in wait-list control group
 - Pre-and post-tx data on 6 families
- Pilot Study

GROUP DATA



FINDINGS

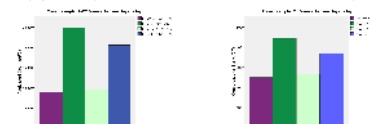
- Given a small sample size, we cannot make definitive conclusions about the effectiveness of the adapted *It Takes Two To Talk: Hanen Program for Parents*
- For individual participants
 - LENA measures (AWC, CT, and CV) tended to remain stable or increase after intervention
 - Expressive Vocabulary (MBCDI) measures tended to remain stable or increase after intervention

INTERPRETING LENA

- What factors may impact LENA's ability to detect changes?
- What do we need to know when interpreting LENA's automated output?

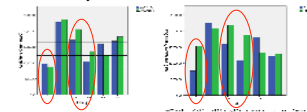
LARGE COEFFICIENT OF VARIATION

- AWC coefficient of variation was 52.5%, in LENA normative study (N = 314).
 - A family can vary their AWC by more than 50% of the average amount
- CT coefficient of variation was 53% for a family with a 24-month-old, in LENA normative study.
 - Average CT of 520 turns per day for a 24-month-old
 - On any given day CT could be as few as 250 and as many as 800.



AMOUNT OF AWAKE TIME

- AWC influenced by child awake time (AWC/awake mins * 60 * 9.6)
- If total AWC (graph left) was higher/similar post tx, and child had less awake time post tx. (see table), AWC values increased more dramatically when data was normalized for awake time (graph right).



ID	Awake (mins) Pre-tx	Awake (mins) Post-tx
C1	735	330
C2	580	620
C3	602	485
C4	546	417
C5	510	540
C6	795	795

QUANTITY vs. QUALITY

- Consider goals of intervention program
- Do LENA's automated measures reflect the goals of the intervention?
 - E.g., ITTTT aims to teach parents to follow their child's lead which may decrease overall AWC if child has low language
- Advanced LENA analyses may capture more qualitative information

ACKNOWLEDGMENTS

This work was supported in part by Grant T32 DC00030 and an ASHA Division 1 Starfish Mini-grant to Lisa Wisman Weil.
Contact: lwel@purdue.edu

REFERENCES

- Hart, B., & Risley, T. R. (1995). *Meaningful Differences in the Everyday Experience of Young American Children*. Baltimore: Brookes Publishing Company.
- Law, J., Garrett, Z., & Nye, C. (2004). The Efficacy of Treatment for Children with Developmental Speech and Language Delay/ Disorder: A Meta-Analysis. *Journal of Speech Language and Hearing Research*, 47(4), 924.
- Pepper, J., & Weitzman, E. (2004). *It Takes Two To Talk® Guidebook: A Practical Guide for Parents of Children with Language Delays* (2nd. ed.). Toronto: The Hanen Center.