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Use of the LENA Tool to Evaluate the Effectiveness of a Parent Intervention Program

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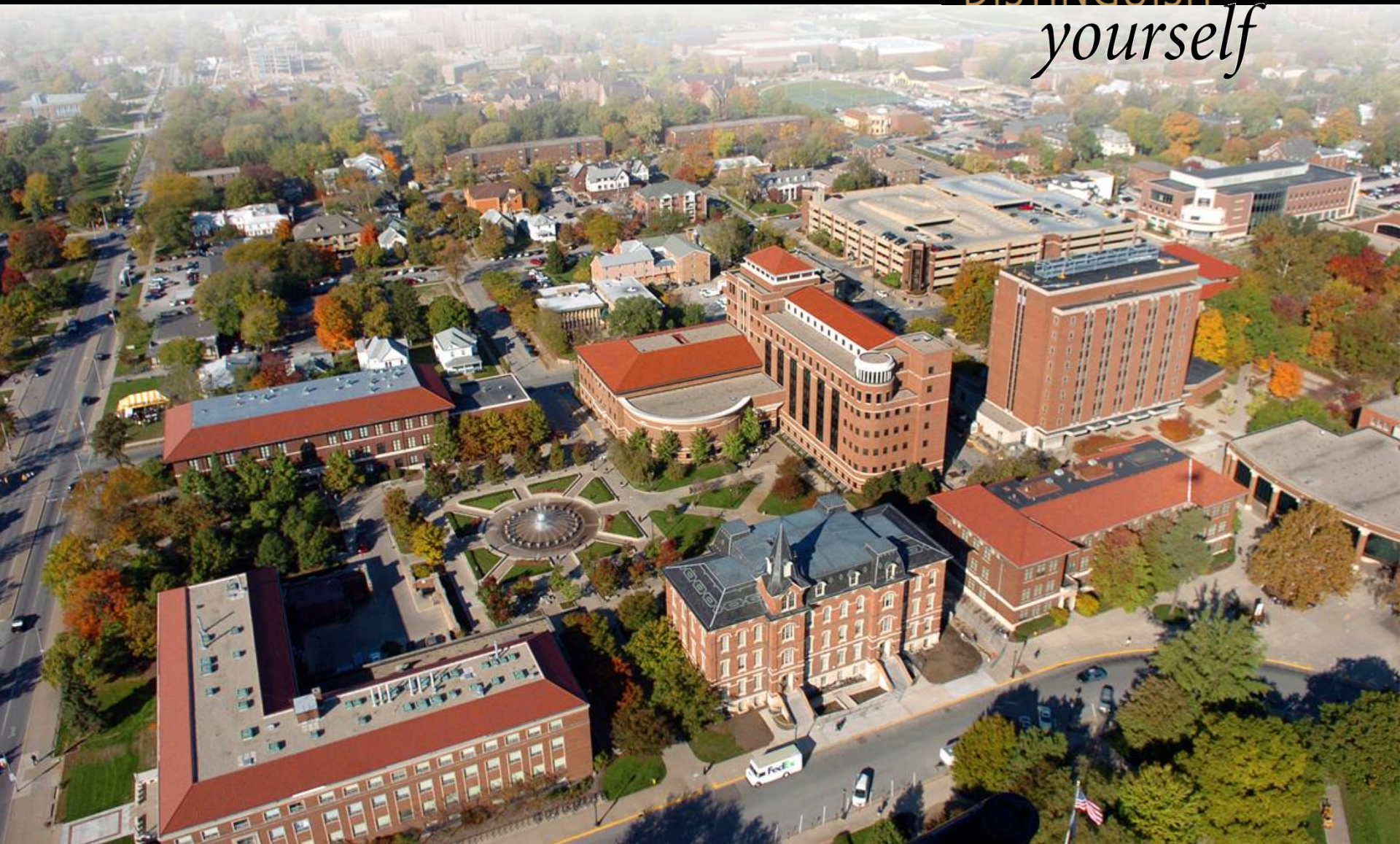

THANK YOU!

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Overview

- Application of LENA system to a parent intervention program
  - LENA
    - New research tool
    - Automatic analyses of naturalistic language
  - Adapted version of *It Takes Two to Talk: Hanen Program for Parents*
  - Pilot study

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LENA Measures

- The Language Environment Analysis (LENA) tool is a small wireless digital language processor worn in a special vest for up to sixteen hours per day
- Automated LENA measures:
  - Adult Word Count (AWC): total words spoken to the child (near and clear)
  - Child Vocalizations (CVC): total word and vocalization output from the child; meaningful child speech surrounded by 300 ms of silence or non-meaningful speech
  - Conversational Turns (CTC): child vocalizes & adult responds or adult speaks & child responds

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Application of LENA

- Clinical uses of LENA:
  - Assessment and diagnosis
  - Audio environment analysis
  - Enhanced treatment through in-home feedback
  - **Monitoring treatment fidelity & effectiveness**
    - **AWC and CTC measures increased after treatment in LENA Foundation case studies (LTR-09-1)**
    - **Efficient**

Parent-focused Intervention

- Early exposure to a language rich environment promotes later academic success (Hart & Risley, 1995)
- Late Talkers are sensitive to the amount and type of talk from their parents
- Parent-focused language intervention programs aim to teach parents strategies to facilitate language development
- Parent-based interventions and traditional therapy implemented by a SLP were found to be equally effective (Law, Garret, & Nye, 2004)

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It Takes Two To Talk: Hanen Program for Parents

- A family-centered intervention program
- Focuses on teaching parents techniques to build language skills during child-lead interactions.
- After enrollment in 10-week *ITTTT* program (Girolametto, Pearce, & Weitzman, 1996):
  - parents' language input to their child increased
  - children made expressive language gains
  - mothers' language input was slower, less complex, and more focused
  - children had larger vocabularies, used more multiword combinations, and used more early morphemes

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4-week Adapted It Takes Two To Talk: Hanen Program for Parents

- Covers the content of the first five weeks of the traditional 11-week *ITTTT* program (8 parent education sessions & 3 videotaped feedback sessions)
- Two 2-hour parent-education sessions
- Two 30-minute individual videotaped feedback coaching sessions
- Covers the core content of the *ITTTT* program
  - *Let Your Child Lead*
    - *Get face to face*
    - *Observe, Wait and Listen (OWL)*
  - *Follow Your Child's Lead*
    - *Imitate, Interpret, Comment*
    - *Match Your Turns to Your Child's Turns*
    - *Ask Questions That Keep the Conversation Going*
- Parents also receive a *It Takes Two to Talk* handbook (Pepper & Weitzman, 2004)

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Research Questions

- Do parents enrolled in a short-term parent-based intervention program demonstrate an increase in language input to their late-talking toddlers?
  - AWC and CT values > post tx?
- Do late-talking children whose parents enrolled in the parent-based intervention program demonstrate an increase in expressive vocabulary skills (a) parent report and (b) naturalistic child vocalization output?
  - MBCDI and CV values > post tx?

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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 the start of the study)
- Mono-lingual English speaking
- All children demonstrated the following:
  - expressive and/or expressive-receptive mixed language deficit (i.e., “late talkers”)
  - 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

Procedures

- Experimental Group (N = 2)
  - Pre-intervention LENA recording
  - Receive 4-week *ITTTT* intervention
  - Post-intervention LENA recording

- Wait-list Control Group (N = 4)
  - Pre-wait LENA recording
  - Wait 4-weeks while experimental group takes *ITTTT class*
  - Pre-intervention LENA recording
  - Receive 4-week *ITTTT* intervention
  - Post-intervention LENA recording

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Plan of Analysis

- Do parents enrolled in a short-term parent-based intervention program demonstrate an increase in language input to their late-talking toddlers?
  - AWC and CT values > post tx?
- Do late-talking children whose parents enrolled in the parent-based intervention program demonstrate an increase in expressive vocabulary skills (a) parent report and (b) naturalistic child vocalization output?
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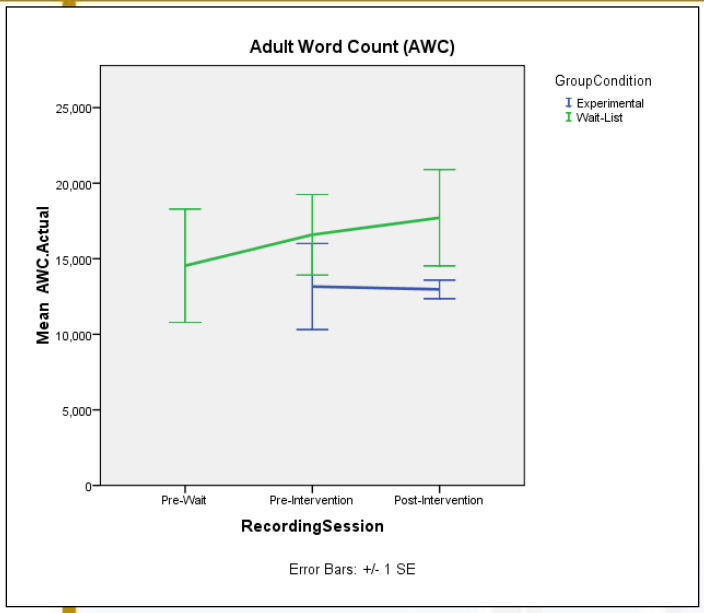
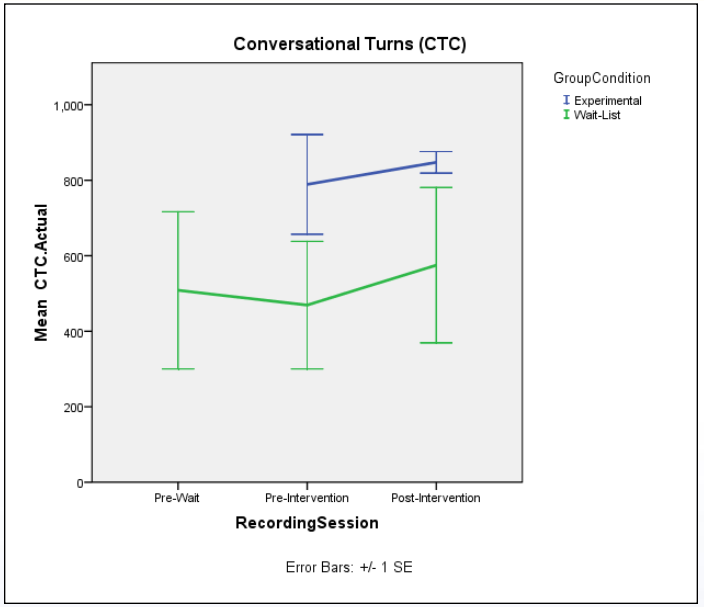
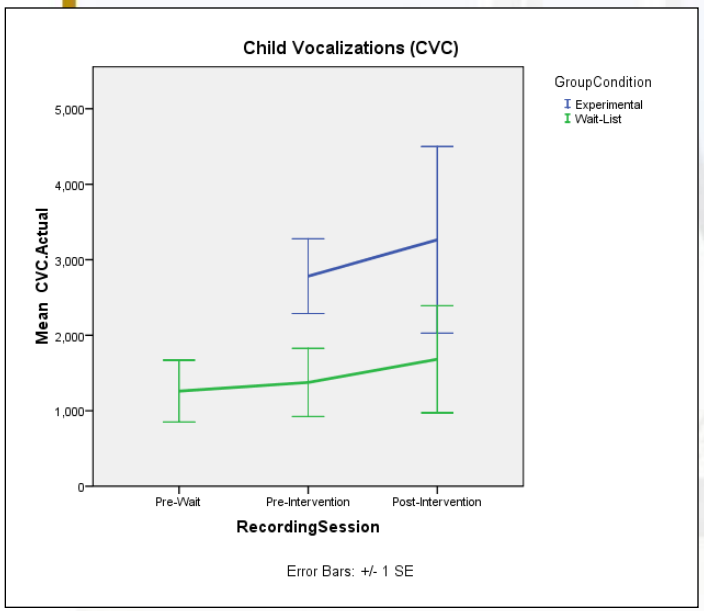
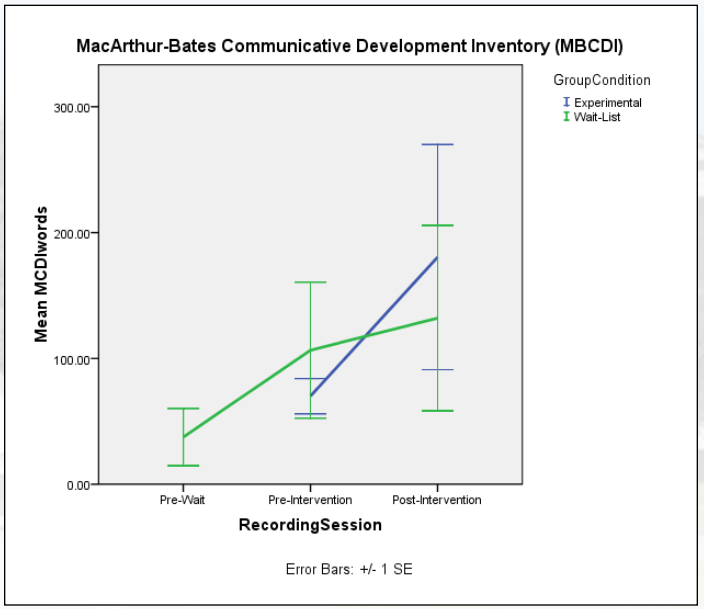
Group Data









Findings

- Due to 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
  - AWC, CT, and CV measures tended to remain stable or increase after intervention
  - MBCDI measures tended to remain stable or increase after intervention

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Interpreting LENA

- Let's look more closely at LENA's automated measures
- What factors may impact LENA's ability to detect changes?
- What do we need to be aware of when interpreting LENA's automated output?

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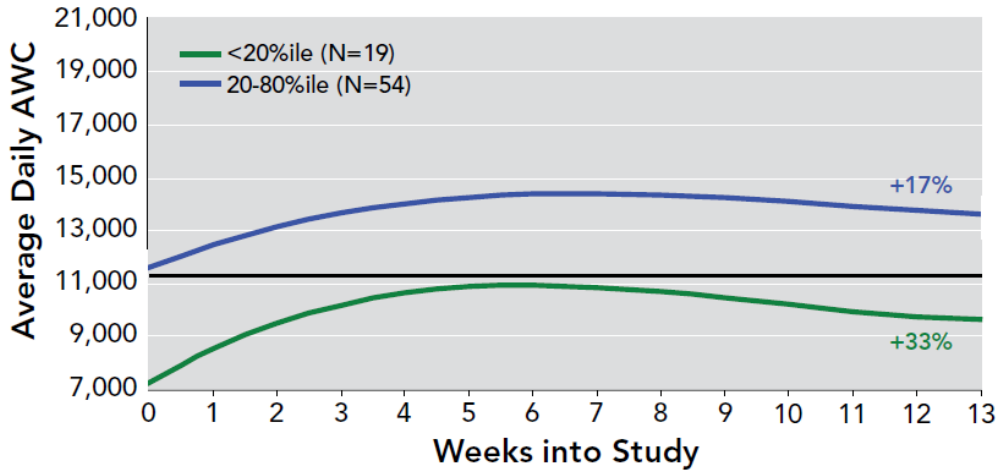
Factors

- Large Coefficient of Variation
- Amount of Awake Time
- Quantity vs. Quality

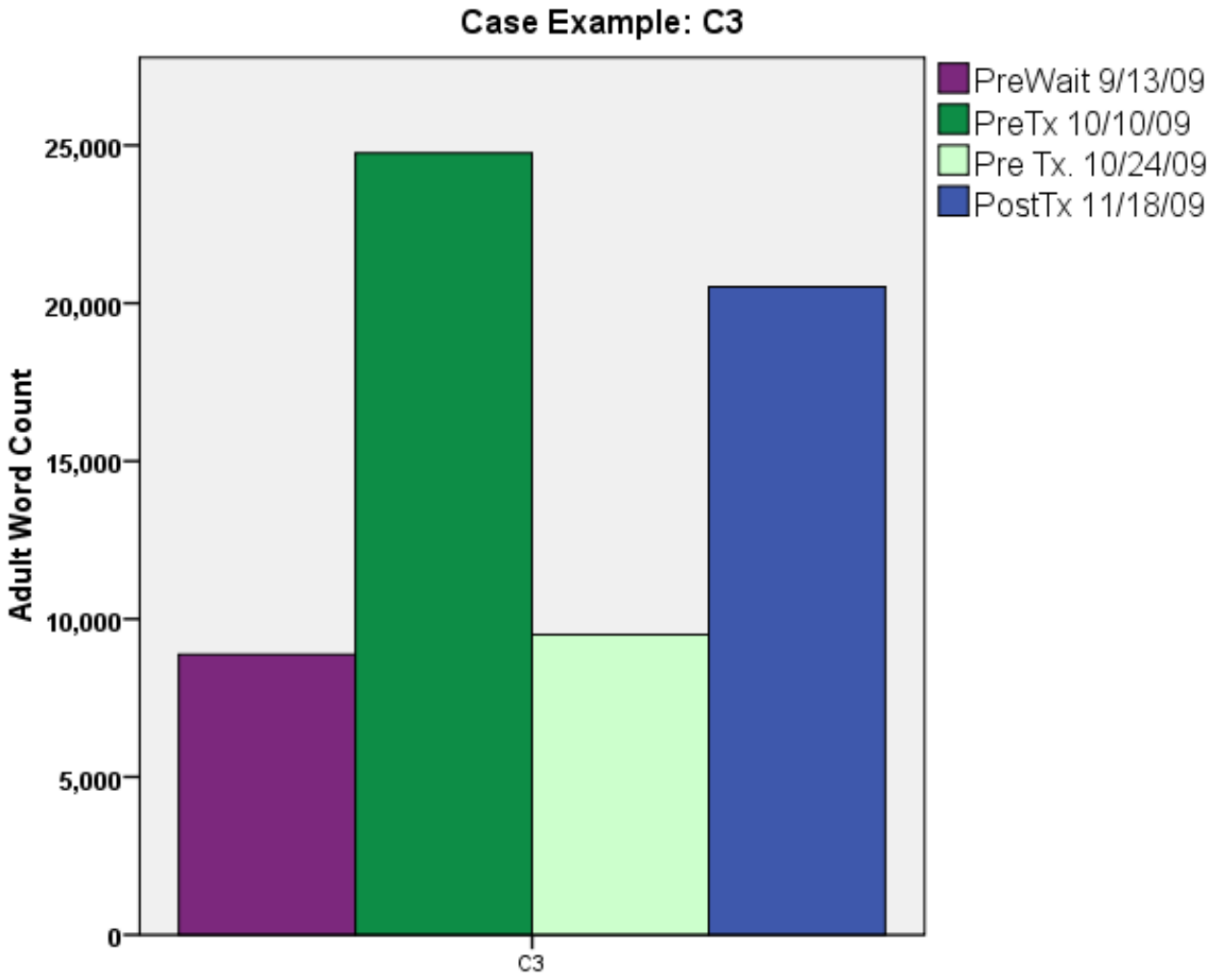
Adult Word Count

- In LENA normative study (N = 314), AWC coefficient of variation was 52.5%
  - A family can vary their AWC by more than 50% of the average amount
  - E.g., a family may produce as few as 6,000 words or as many as 19,000 words on a given day.
- AWC sample mean and standard deviation (M=11,270, SD=4,239).

Figure 18. Parents Using LENA Increase the Amount They Talk to Their Children



Case Example: Variability in AWC



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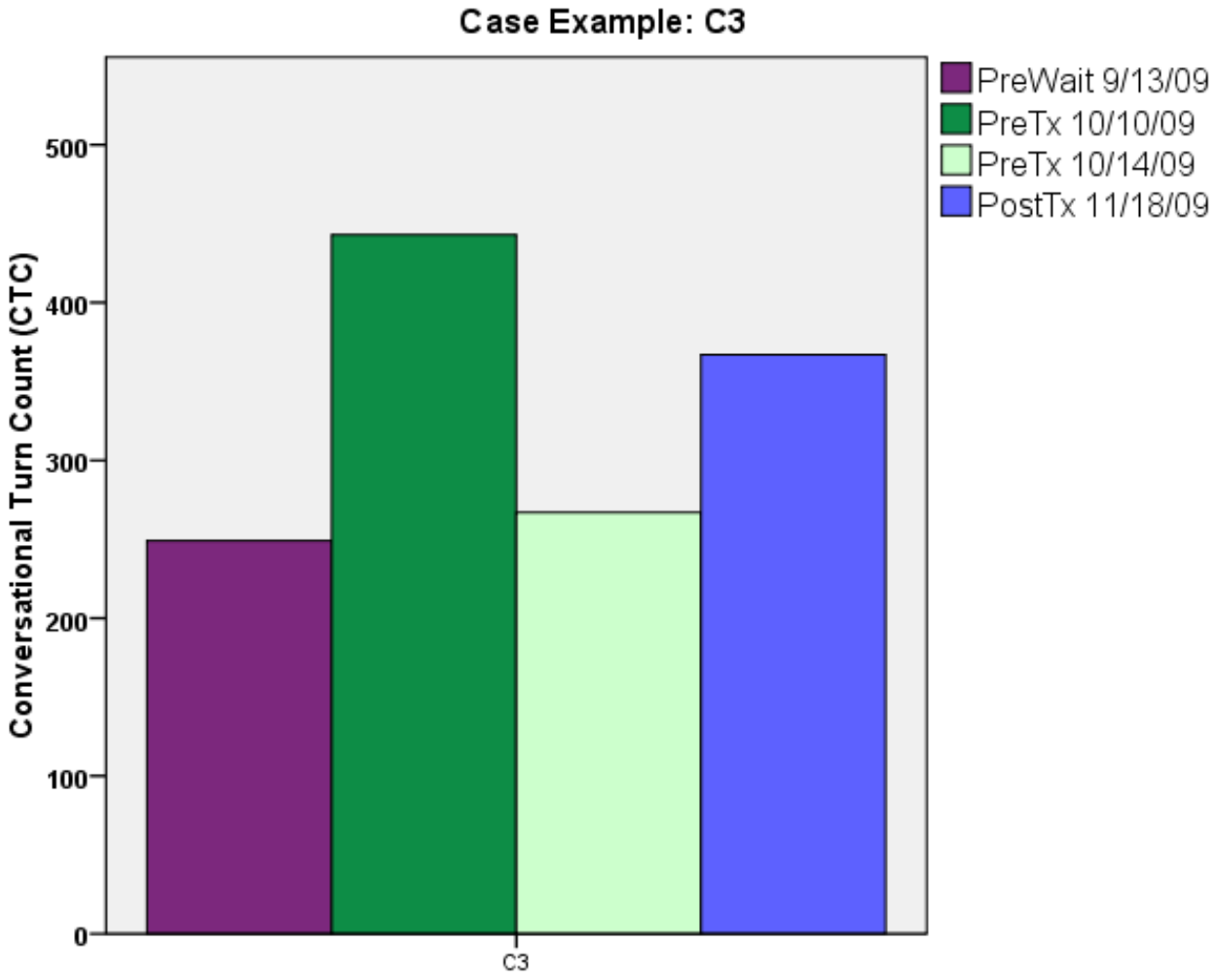
Conversational Turns

- In LENA normative study, coefficient of variation was 53% for a family with a 24-month-old.
  - Average CTC of 520 turns per day for a 24-month-old
  - On any given day CTC could be as few as 250 and as many as 800.

Case Example: Variability in CTC



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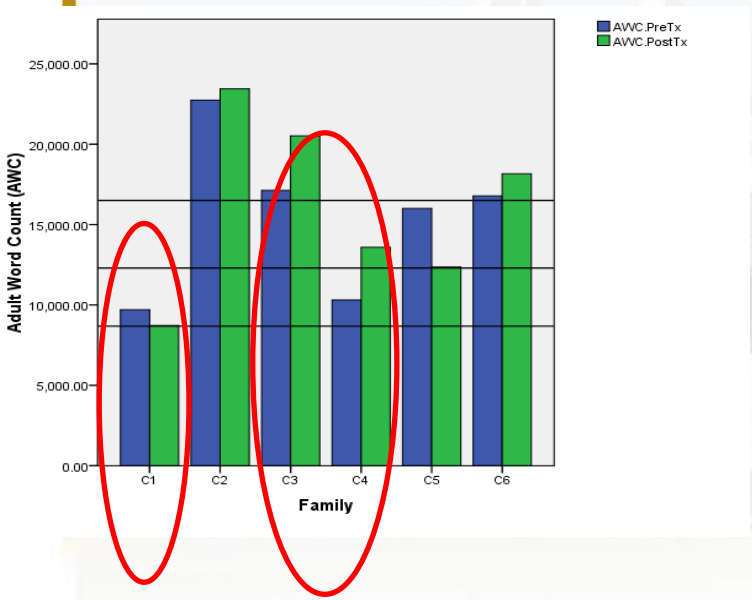
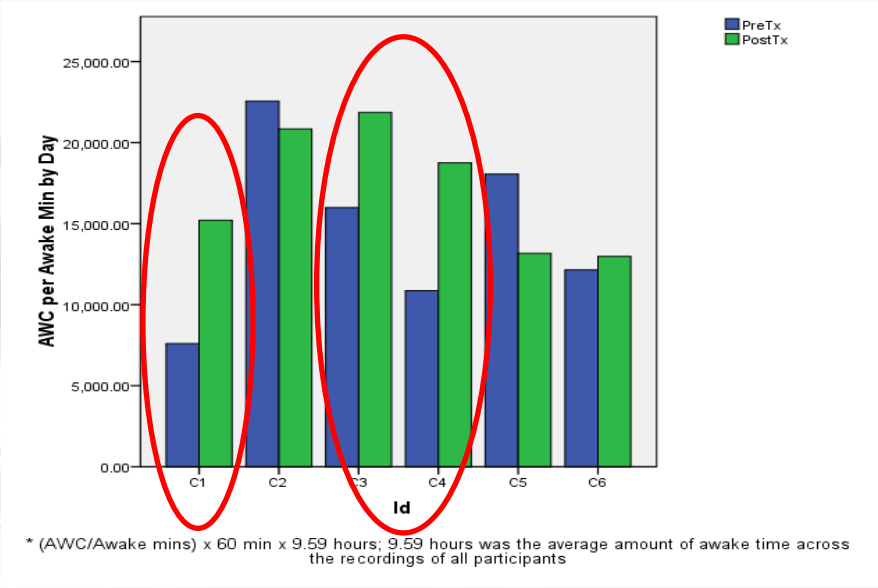
- Given the variability from day to day what magnitude of change on each LENA measure would be needed to show gains due to intervention?
- Multiple recordings (e.g., 2 weekdays and 1 weekend day) at each measurement point may be necessary

Awake Time

- AWC influenced by child awake time (AWC/awake mins * 60 * 9.6)
- AWC values changed more dramatically for kids who were awake less on the post-intervention recording day
  - C1: Pre-intervention: awake 735 mins
    Post-intervention: awake 330 mins
  - C3: Pre-intervention 1: awake 602 mins
    Post-intervention: awake 485 mins
  - C4: Pre-intervention: awake 546 mins
    Post-intervention: awake 417 mins





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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

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Ongoing Analyses

- Continued analysis using the Advanced Data Extractor (ADEX) LENA software tool may reveal additional findings in this pilot study
  - Separate out male vs. female AWC values
  - Looking at child initiation and response time within conversational blocks

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Research/Clinical Utility

- LENA system was useful in clinician-researcher collaboration
- Easy for clinician to collect data despite hectic clinic schedule
- Automated output was easily analyzed, understood, and shared

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