The Narrative Abilities of Children with Localization-Related Epilepsy

Amy Strekas, B.A.1
Jessica Bienstock 2
Anna Synnestvedt 1
Andrea Riffanacht, B.A.1
Deborah Weber, Ph.D.3
Madison Berl, Ph.D.3
William Davis Gaillard, M.D.3
Nan Bernstein Ratner, Ed.D.1
1 University of Maryland, College Park
2 George Washington University
3 Children’s National Medical Center

What is Epilepsy?

- Recurrent unprovoked seizures that occur due to abnormal electrical activity in the brain
- It is highly possible that continued seizure activity leads to brain damage (Goldman & Golby, 2005).

Facts About Childhood Epilepsy

- Convulsive disorders are amongst the most common neurologic disorders in children (Hauser, 1994).
- About seven out of every 1000 children and adolescents are currently diagnosed with epilepsy (Drewel & Caplan, 2007).
- These children are at risk for the development of subtle speech-language deficits (Parkinson, 2002), but many such cases are frequently overlooked (Svoboda, 2004).

Previous Findings

- Children with epilepsy are at risk for:
  - Psychopathology, cognitive deficits and language problems (Caplan, et al., 2004)
  - Low academic achievement and poor peer relations (Caplan et al., 2006)
  - Learning, memory, attention and behavior deficits (Oostrom, et al., 2005)
Previous Findings (con’t)

- Children with epilepsy often present with:
  - Deficits in their use of auxiliary verbs (Dube, LeNormand, & Cohen, 2001)
  - Impaired use of conversational repair strategies (Caplan et al., 2001)
  - Linguistic-processing deficits (Henkin, et al., 2003)

Purpose

- Much of the research in childhood epilepsy contains a small sample size and a heterogeneous participant pool, in terms of epilepsy-type and focus of seizure activity.
- In this study, we examined the narrative language abilities of children with localization-related partial epilepsy, focused in the left hemisphere.

Research Questions

- What is the relationship between epilepsy and language function?
  - Does seizure activity lead to language impairment?
  - Or are seizures and language impairment symptoms of the same underlying process that causes seizures?
- Our Hypothesis:
  - Over time, epilepsy can impair narrative abilities in children.

Participants

- Two sets of comparisons:
  - 10 children with recent-onset (<1 year) epilepsy (CWE-R) age- and gender-matched with 10 typically-developing peers (TD-R)
    - Mean Age = 7 years; 8 months
    - 14 females; 16 males
  - 15 children with chronic (>3 years) epilepsy (CWE-C) age- gender-matched with 15 typically-developing peers (TD-C)
    - Mean Age = 9 years; 7 months
    - 8 females; 12 males
- Participants were matched within 3 months of age. All children were right-handed.
Methods
- Participants are part of a larger NIH-funded study (POLER, Plasticity of Language in Epilepsy Research) at the Children’s National Medical Center (CNMC).
  - PI: William Gaillard NINDS R01 NS44280
- They received speech, language, developmental, and psycho-educational testing, as well as fMRI scan.
- Spontaneous narratives were elicited at CNMC using the wordless picture book, *Frog Where Are You?* by Mercer Mayer (1969), and digitally recorded.
  - Experimenters at UMD transcribed and coded narratives in CHAT, using conventions from the Child Language Data Exchange System (CHILDES), and then tallied codes using CLAN (MacWhinney, 2000).

Variables of interest
- Cognitive measures:
  - Full Scale and Verbal IQs: Wechsler Abbreviated Scales of Intelligence or Differential Ability Scales (children < 6)
- Language structure indices:
  - Expressive Language Scores from the CELF-4 or CELF-P (children < 5)
  - Number of C-Units (“communication units”; Loban, 1976)
  - Mean Length of Turn (MLT)
  - Vocabulary Density (VOCD): Diversity of vocabulary
  - Syntactic Complexity: Proportion of complex sentences
  - Use of Cohesion (e.g., conjunctions, referential pronouns)
- Narrative components: taken from Trabasso & Rodkin’s (1994) taxonomy (see appendix).
  - Setting, initiating events, higher-order goals, attempts to locate frog, outcome

Results: Full Scale IQ

![Graph](image)

CWE-R obtained lower scores than TD-R peers. Differences significant by Mann-Whitney U, converted to $z$; $z = -2.1, p < .05$. CWE-C also obtained significantly lower scores than TD-C ($z = -3.1, p < .01$).

Verbal IQ

![Graph](image)

No significant differences were found between scores obtained by CWE-R and TD-R. However, CWE-C obtained significantly lower scores than did TD-C peers ($z = -2.9, p < .01$).
CWE-R obtained significantly lower CELF Expressive Language scores than did TD-R peers ($z = -2.9$, $p < .01$). CWE-C also scored significantly lower than TD-C ($z = -2.8$, $p < .01$).

No significant differences in narrative length were found between groups.

There were no significant differences in utterance lengths produced by CWE-R and TD-R. However, CWE-C produced significantly longer utterances than did TD-C ($z = -2.01$, $p < .05$).

There were no significant differences in the diversity of vocabulary contained in narratives produced by CWE-R and CWE-C and their matched pairs.
There were no significant differences between groups, in terms of their use of complex sentences or cohesive devices.

Differences between the number of narrative elements produced by CWE-R and TD-R were not statistically significant. In contrast, CWE-C included significantly more narrative elements in their stories than did TD-C ($z = -3.5$, $p = .0005$).

CWE-R narratives contained significantly more descriptions of setting than did TD-R narratives ($z = -2.2$). CWE-C narratives contained significantly more narrative elements pertaining to: setting ($z = -2.3$), initiating events ($z = -2.3$), and attempts ($z = -2.9$) than TD-C narratives.

These analyses were conducted on the four groups combined: CWE-R, TD-R, CWE-C, and TD-C. MLT correlated with total narrative score. An even stronger correlation was observed between verbal IQ and CELF scores.
Summary of Results

- Significant differences were seen between groups in both sets of comparisons regarding the following standardized test scores:
  - Full Scale IQ
  - CELF
  - However, differences between CWE-C and TD-C were larger than between CWE-R and TD-R.
- Significant differences were seen between CWE-C and TD-C (but not CWE-R and TD-R) in:
  - Verbal IQ
  - MLT
  - Inclusion of narrative components
- Strongest correlations among measures were for MLT and narrative score; CELF & WASI-VQ
  - In other words, standardized test scores did not predict story form or content well.

Discussion

- In virtually all measures, differences between CWE-C (Chronic Epilepsy) and TD-C were greater than differences between CWE-R (Recent-Onset) and TD-R.
- Largest differences were seen in the functional measure: story telling

Conclusions

- Our results imply that language function diminishes with the course of epilepsy over childhood, either as a result of repeated seizures or the medications used to manage it.
- It may be useful to take baseline measures of standardized and functional language at onset of focal epileptic symptoms and continue to monitor on a scheduled basis to ascertain any potential need for future intervention.
- Weakness of the present study: cross-sectional design
- Future research directions: a longitudinal study that examines expressive language skills over the course of childhood epilepsy.

Acknowledgments

- This research was supported by the POLER project (Plasticity of Language and Epilepsy Research), PI William Gaillard, MD (NINDS RO1 NS44280).
- Special thanks to following individuals, who assisted in collection, transcription and analysis of narratives:
  - Ashley Akrie, Darlene Foster, Laura J. Gutowski, Keena James, Erin Moore, and Lisa Rosenberger
References


Appendix: Narrative taxonomy

Trabasso & Rodkin (1994)