



An Investigation of Chronic Epilepsy in Children: Language Profiles

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Introduction

- Each year in the United States, approximately 150,000 children and adolescents seek medical attention for newly occurring seizure disorders (Hauser, 1994).
- 45,000 children under the age of 15 develop epilepsy each year.
- 326,000 school children through age 14 have epilepsy (Epilepsy Foundation, 2006).
- These children are at risk for the development of speech-language problems and yet, many such cases are frequently overlooked (Svoboda, 2004).



Previous Findings: Cognition & Psychopathology

- Childhood-onset epilepsy adversely impacts cognition (Ellenberg, Hirtz, & Nelson, 1986; Hermann, 2002).
- Caplan, et al. (2004) reported that significantly more children with complex partial epilepsy experienced psychopathology, cognitive deficits, and language problems than their typically-developing peers.
- Caplan et al. (2006) found that children with complex partial seizures who also experienced thought disorder (i.e. difficulties with formulation and organization of thoughts) were at a higher risk for psychopathology, school problems, low academic achievement, and poor peer relations.

● ● ● | Previous Findings:
Memory, Attention, and Auditory Processing

- Kolk et al. (2001) reported that children who had recently been diagnosed with epilepsy, showed impairments in attention, short-term memory, auditory perception, lexical function, and speech comprehension.
- Epilepsy patients commonly complain of memory problems (Bortz, 2003).
- Oostrom, et al. (2005) found that, when compared to a group typically-developing peers, children with epilepsy displayed learning, memory, attention, and behavior deficits.

● ● ● | Previous Research:
Language

- Dube, LeNormand, & Cohen (2001) found that children with simple partial epilepsy showed deficits in their use of auxiliary verbs.
- Caplan et al. (2001) found that children with complex partial seizure disorder were impaired in their use of conversational repair strategies.
- Parkinson (2002) discovered a subtle association between focal epilepsy and language disorder.
- Henkin, et al. (2003) found linguistic-processing deficits in children with idiopathic generalized epilepsy.

● ● ● | Purpose

- Few studies have specifically described large groups of children with epilepsy in terms of chronicity of disease and focus of seizure activity.
- In this study, we examined expressive language abilities of children with chronic (duration > 3yrs) localization-related partial epilepsy, focused in the left hemisphere.



Participants

- Two groups:
 - 14 children with chronic (duration > 3 yrs) localization-related epilepsy (**CWE-C**), focused in the left hemisphere
 - 14 typically-developing peers (**TD**), matched by age (within 3 months) and gender
- Each group consisted of 7 males and 7 females.
- All children were between the ages of 4 and 12 years (mean age = 9 years; 6 months).
- 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 (PI: William Gaillard NINDS R01 NS44280).
- All participants received speech, language, developmental, and psycho-educational testing, as well as fMRI scans.
- Spontaneous narratives, elicited with the wordless picture book, *Frog Where Are You?* by Mercer Mayer, were digitally recorded.





Methods (continued)

- Standard scores from Expressive Language subtests of the *Clinical Evaluation of Language Fundamentals, 4th edition (CELF-4)*, or the *CELF-P* (younger children) were compared across groups.
- Spontaneous narratives were transcribed and coded in CHAT, using conventions from the Child Language Data Exchange System (CHILDES) and then analyzed in CLAN (MacWhinney, 2000).
- Narrative structures were analyzed with Trabasso & Rodkin's (1994) taxonomy.



Variables of interest

- Language structure indices:
 - CELF-4 or CELF-P Expressive Language Scores
 - Number of C-Units
 - Mean Length of Utterance (MLU)
 - Vocabulary Density (VOCD)
- Narrative components:
 - Setting
 - Initiating events
 - Higher-order goals
 - Attempts to locate frog
 - Outcomes
- Syntactic complexity and use of cohesive devices
- Proportion of grammatical and semantic errors
- Fluency of story telling:
 - Repetitions
 - Revisions

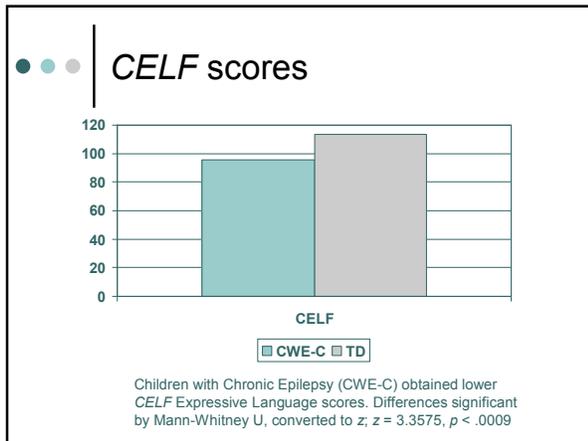


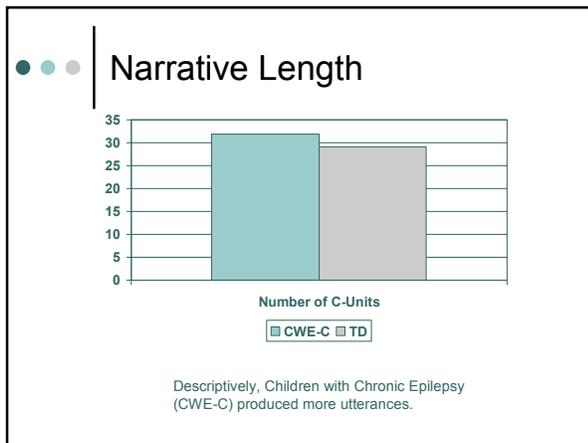
Analysis

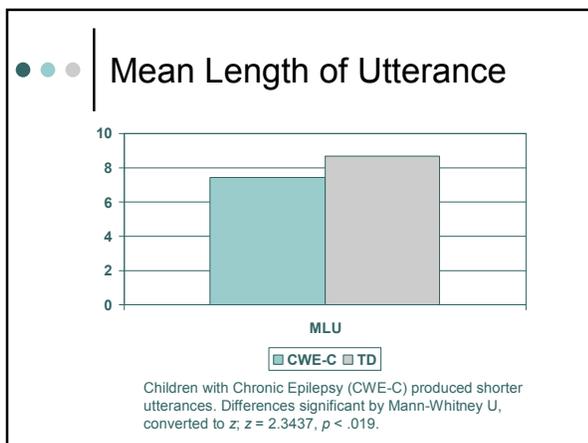
- Two-sample T-tests
 - NCSS – PASS Statistical and Power Analysis Software
- Because of unequal variances for some comparisons, all comparisons were computed using non-parametric statistics.



Results

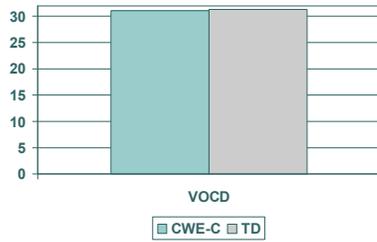








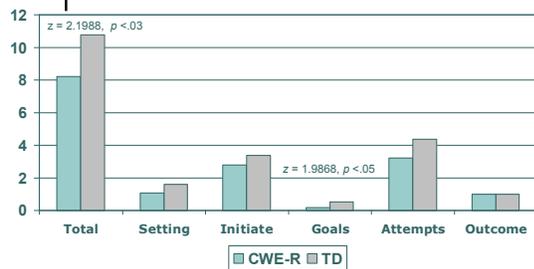
Vocabulary Diversity



Descriptively, Children with Chronic Epilepsy (CWE-C) and their typically-developing peers (TD) produced narratives that were almost identical in terms of vocabulary diversity.



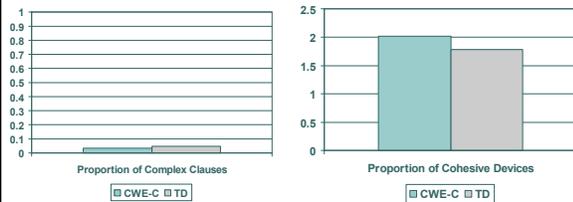
Narrative Scores



Children with Chronic Epilepsy (CWE-C) used fewer narrative elements. Differences in goal and total narrative scores significant by Mann-Whitney U, converted to z.



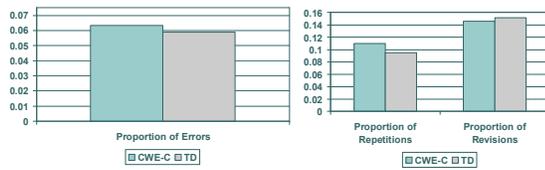
Syntactic Complexity and Discourse Cohesion



Descriptively, Children with Chronic Epilepsy (CWE-C) and their Typically-Developing peers (TD) produced similar proportions of complex clauses and discourse cohesion.



Accuracy and Fluency



Children with Chronic Epilepsy (CWE-C) and their Typically-Developing peers (TD) produced similar proportions of errors, repetitions and revisions.



Discussion

- Children with chronic epilepsy scored significantly lower than typically-developing peers on the *CELF* (Expressive Language).
- Major differences in narrative construction between children with chronic epilepsy and unaffected peers were found in:
 - Length of utterance (MLU)
 - Overall narrative score
- The only individual narrative component that was significantly lacking in the CWE's stories was explicit mention of "Higher Order Goals" (e.g., the boy wishes to find the frog or get the frog back), the most sophisticated component of the schema.



Discussion

- Although statistical analyses did not pinpoint any other particular aspect that was impaired in the CWE's stories, they DID, in fact, sound "less good" beyond mere statement of goals.
 - We continue to look for measures to capture this perception.



Patterns of performance: comparing CWE-R and CWE-C

- o Greater differences in language performance were seen between children with chronic epilepsy (CWE-C) and peers than between children with recent-onset epilepsy (CWE-R) and their peers (see King, et al., session # 1379).
- o Differences tended to be in global language scores, syntax or narrative skills, but vocabulary profiles did not differentiate typical children from either group of children with epilepsy.



Conclusions

- o These preliminary results imply that language function diminishes with the course of epilepsy over childhood
 - However, additional variables must be considered, such as IQ, SES, side-effects of drug therapies, and history of pre-existing speech-language problems (only one child in the CWE-C group was known to have had speech/language therapy).
 - Finally, larger numbers of children must be examined. In all, almost 256 children, typically-developing and those with epilepsy, will eventually be studied.



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Appendix: Narrative taxonomy

Trabasso &
Rodkin (1994)

Component	Proportion of Narrators Who Include Planning Component				
	3 yrs	4 yrs	5 yrs	9 yrs	Adult
Setting					
Introduce Frog	1.00	1.00	1.00	1.00	1.00
Possession	0.17	0.25	0.58	1.00	0.90
Initiating Events					
Boy Asleep	0.58	0.58	0.92	0.83	1.00
Frog Leaves	0.67	0.83	1.00	1.00	1.00
Boy Wakes	0.08	0.30	0.67	0.58	0.90
Boy Finds Jar	0.90	0.25	0.25	0.42	1.00
Frog Gone	0.33	0.83	0.83	0.92	0.90
Boy Sad	0.00	0.00	0.08	0.08	0.80
Average	0.28	0.50	0.63	0.63	0.93
Attempts					
A1 Room	0.00	0.58	0.50	0.58	0.90
A2 Window	0.08	0.33	0.38	0.75	0.90
A3 Outside	0.08	0.25	0.50	0.92	1.00
A4 Hole in Ground	0.00	0.25	0.67	0.75	1.00
A5 Hole in Tree	0.00	0.17	0.58	0.75	1.00
A6 Rock	0.00	0.25	0.58	0.67	0.90
A7 Log	0.08	0.25	0.33	0.83	0.90
Average	0.03	0.30	0.53	0.75	0.94
Proportion Attempts Marked with Purpose	0.00	0.21	0.35	0.47	0.55
Outcome					
Find or Take	0.16	0.42	0.42	0.75	1.00
Higher-Order Goals					
G1 [Get the Frog Back]	0.00	0.00	0.25	0.83	0.90
G2 [Find the Frog]	0.00	0.17	0.33	1.00	1.00
