Lexical Deficits in SLI: Evidence from Auditory N400 ERPs

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ABSTRACT

Lexical processing is important for monitoring comprehension of spoken language. There is evidence that children with Specific Language Impairment (SLI) have particular difficulty in processing high-frequency words due to a deficit in semantics. However, the mechanisms behind these processes are not well understood. In this study, we explored event-related potentials (ERPs) in adolescents with and without SLI. We investigated lexical decision and sentence processing using event-related potentials (ERP) in adolescents with and without SLI. When lexical adolescents showed an effect of frequency in ERPs and accuracy, adolescents with SLI only showed an effect in accuracy. Accuracy and ERP differences were not significant for morphology, indicating that lexical representations of individuals with SLI may be degraded and may require greater resources to manipulate than typical peers.

REFERENCES

Coady, J.A. & Evans, J.L. (2008). Uses and indicate, consistent with prior Accuracy and ERP waveforms showed an effect of frequency in children with and without SLI. When typical adolescents showed an effect of frequency in ERPs and accuracy, adolescents with SLI only showed an effect in accuracy.

BACKGROUND

In addition to morphosyntactic deficits, children with SLI have lexical deficits. They have delayed vocabulary and inferential comprehension compared to peers, requiring more exposure to inferential processing (Bates, 1993; Coady, 1999). In a recent study, we extended our analysis to children with SLI and developmental auditory processing disorders (Arnold, Evans, & Coady, 2008).

In addition to reduced working memory capacity and speed of processing (Arnold, et al., 2007), children with SLI have deficits in cognitive mechanisms related to rapid word processing (Coady & Evans, 2008; Evans, Haffar, & Kutas, 2008).

Accuracy and reaction time in children with SLI were not related to lexical processing. Event-related potentials showed an effect of frequency in children with and without SLI. The N400 ERP component is a negative-going waveform peaking ~ 400 ms following a semantic anomaly, reflecting the facilitation of processing (Kutas & Federmeier, 2000).


RESULTS

Accuracy

Adolescents with SLI were significantly more accurate at processing high frequency words than low frequency words. N400 word frequency effect observed for HF words versus LF words: (F(1, 25) = 6.3, p = .02) in the TD group.

Adolescents with SLI were significantly more accurate at processing HF words than LF words (F(1, 25) = 5.7, p = .02). In the SLI group, N400 word frequency effect observed for HF words versus LF words: (F(1, 25) = 4.9, p = .02). In the TD group, N400 word frequency effect observed for HF words versus LF words: (F(1, 25) = 5.3, p = .02).

Adolescents with SLI receive facilitation in processing high frequency words, reflected in reduced N400 amplitude of high frequency as compared to low frequency words. Adolescents with SLI do not – there is no evidence of facilitation in processing high frequency words in their N400s. By the time they reach adolescence, individuals with SLI are still having difficulty processing words, even simple, one-syllable, high-frequency words.

SUMMARY

Adolescents with SLI significantly differ from age-matched peers in their processing of high frequency words, with reduced N400 amplitudes in a lexical decision task for adolescents with SLI and age-matched peers. The N400 ERP component is a negative-going waveform peaking ~ 400 ms following a semantic anomaly, reflecting the facilitation of processing (Kutas & Federmeier, 2000). The N400 word frequency effect observed for HF words versus LF words: (F(1, 25) = 6.3, p = .02).

In the TD group, N400 word frequency effect observed for HF words versus LF words: (F(1, 25) = 5.3, p = .02). adolescents with SLI do not receive facilitation in processing high frequency words, reflected in reduced N400 amplitude of high frequency as compared to low frequency words. Adolescents with SLI do not – there is no evidence of facilitation in processing high frequency words in their N400s.