

INFLEXIBLE ADAPTATION AND OVERRELIANCE ON SEMANTIC PROCESSING IN CHINESE CHILDREN WITH DEVELOPMENTAL LANGUAGE DISORDER: AN ERP STUDY OF N400-P600 TRADEOFF

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Abstract: Exploring the neurobiological basis of Developmental Language Disorder (DLD) is challenging, particularly in determining whether it constitutes grammar-specific deficits or interacts with broader non-morphosyntactic processes like semantic processing. Using event-related potentials (ERPs), we investigated semantic (N400) and syntactic processing (P600), and their interaction (N400-P600 tradeoff) in Chinese children with DLD. We tested 14 children with DLD (aged between 6 to 11 years old) and 14 typically developing age-matched (TD) peers in a grammaticality judgement task of auditory sentences. Chinese classifier-noun agreements are manipulated: correct classifier (baseline), incorrect classifier (semantic anomaly), generic classifier (minor semantic anomaly), and classifier omission (major syntactic anomaly). Behaviorally, the DLD group exhibited difficulties with Chinese classifiers (lower overall accuracy). ERP results revealed distinct patterns for the two groups (a significant condition-group interaction in mixed-effects models): in the DLD group, generic and incorrect classifiers triggered similar N400 effects, unlike the graded responses in the TD group. They also showed comparable P600 effects for classifier omissions and incorrect classifiers, despite the differences observed in the TD peers. Further analysis revealed a significant interaction between N400 effects, conditions, and groups on P600 effects. The DLD group showed consistently steep slopes in the N400-P600 tradeoff across all conditions, differing from the TD children who exhibited a flatter slope for classifier omission. That is, while the TD group showed enhanced syntactic processing (a robust P600 effect) relatively independent of their N400 effect during major syntactic anomalies, the DLD group lacked this modulation - their syntactic processing remaining consistently tied to their semantic processing. Our findings underscore a unique, possibly maladaptive, interaction between syntactic and semantic processing in some Chinese children with DLD. This suggests they may have reduced flexibility in adapting to varying degrees of semantic and syntactic violations, face challenges in prioritizing syntactic processing, and potentially over-rely on semantic processing as a compensatory mechanism during syntactic challenges. Such insights emphasize DLD's complexity beyond syntactic deficits and highlight the need to explore potential compensatory mechanisms. Further data collection and update is ongoing.

