



Speech Delay Problem on Early Childhood Children in Paser Regency: A Neurolinguistics Analysis

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Abstract. This study aims to analyze speech delay phenomena among early childhood children in Paser Regency through a neurolinguistic perspective, focusing on the interaction between neural mechanisms, linguistic performance, and environmental influences. This study employed a qualitative case study design grounded in a neurolinguistic framework. Data were collected through in-depth interviews, participant observation, and document analysis involving children aged 3–6 years, their parents, and teachers. The data were analyzed using thematic and interpretive techniques, integrating linguistic domains (phonological, lexical, syntactic, and pragmatic) with neurolinguistic theory. The findings revealed that speech delay manifests as a multidimensional condition characterized by disruptions across phonological (articulation and phoneme substitution), lexical (limited vocabulary and retrieval difficulties), syntactic (telegraphic speech and grammatical omission), and pragmatic (impaired interaction and communication) domains. These linguistic deficits are closely associated with neurocognitive limitations, particularly in language-related brain regions and processing systems. Additionally, environmental factors—such as limited language input, low parental engagement, and excessive passive media exposure—significantly exacerbate the condition. The study also identifies challenges in early English language exposure, which may create cognitive overload when first language development is incomplete. In conclusion, speech delay should be understood as the result of dynamic interactions between neurolinguistic and environmental factors. Effective intervention requires an integrative approach combining early diagnosis, enriched linguistic input, and adaptive educational strategies. The study contributes to both theoretical development in neurolinguistics and practical implications for inclusive English language education.

Keywords: Early Childhood; English Education; Language Development; Neurolinguistics; Speech Delay.

1. INTRODUCTION

The phenomenon of speech delay among early childhood learners has increasingly attracted scholarly attention within the interdisciplinary nexus of neurolinguistics, psycholinguistics, and language education. This concern is particularly salient in multilingual and socio-culturally diverse contexts such as Indonesia, where linguistic development is shaped not only by biological maturation but also by complex environmental, cognitive, and sociocultural variables. Speech delay, broadly defined as a condition in which a child's expressive or receptive language abilities fall significantly below age-appropriate developmental norms, represents not merely a linguistic deficiency but a multidimensional developmental issue that intersects with neurological, cognitive, and social domains (Leonard, 2022).

From a neurolinguistic perspective, language acquisition is fundamentally rooted in the structural and functional maturation of the brain, particularly in regions such as Broca's area, Wernicke's area, and their interconnected neural pathways (Friederici, 2023a). Disruptions or delays in the development of these neural substrates can significantly affect phonological processing, lexical retrieval, and syntactic organization, ultimately manifesting as delayed

speech production. Contemporary neuroimaging studies employing functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI) have revealed that children with speech delay often exhibit atypical neural activation patterns and reduced connectivity within language-related cortical networks (Krishnan, Watkins and Bishop, 2022). These findings underscore the importance of examining speech delay not solely as a pedagogical issue but as a neurocognitive phenomenon requiring integrative analytical frameworks.

In the context of early childhood education, particularly within English language learning environments, speech delay poses substantial challenges for both learners and educators. Early childhood is widely recognized as a critical period for language acquisition, during which neural plasticity is at its peak, enabling rapid linguistic development through interaction and exposure. (Kuhl, 2022) When speech delay occurs during this sensitive phase, it may impede not only first language development but also the acquisition of additional languages such as English. This condition can result in long-term academic disadvantages, reduced communicative competence, and diminished self-efficacy in language use (Blank, 2021). Therefore, early identification and intervention are crucial to mitigating the potential negative impacts of speech delay on children's overall developmental trajectory.

The regional context of Paser Regency presents a unique setting for investigating speech delay phenomena due to its diverse linguistic ecology, which includes local languages, Indonesian as the national language, and increasing exposure to English as a foreign language. Such multilingual environments may both enrich and complicate language acquisition processes. On the one hand, exposure to multiple linguistic systems can enhance cognitive flexibility and metalinguistic awareness; on the other hand, it may contribute to confusion or delay in language production, particularly for children with underlying neurological vulnerabilities (Bialystok, 2021). Moreover, disparities in access to educational resources, parental awareness, and professional speech-language services in rural or semi-urban areas further exacerbate the challenges associated with early detection and intervention.

Despite the growing body of literature on speech delay, there remains a significant gap in research that specifically integrates neurolinguistic analysis with localized sociocultural contexts, particularly in regions such as Paser Regency. Most existing studies tend to adopt either a purely clinical approach, focusing on diagnosis and therapy, or a pedagogical perspective, emphasizing instructional strategies, without adequately bridging these domains (Nation and Nation, 2019). Consequently, there is a pressing need for research that synthesizes neurological, linguistic, and educational perspectives to provide a more holistic understanding of speech delay.

This study, therefore, aims to conduct a comprehensive neurolinguistic analysis of speech delay problems among early childhood children in Paser Regency. By examining the interplay between neural mechanisms, linguistic performance, and environmental factors, this research seeks to contribute to the development of more effective diagnostic frameworks and intervention strategies. Furthermore, it aspires to inform educational practices in English language teaching by highlighting the importance of neurocognitive considerations in addressing language development issues.

Ultimately, this research is expected to offer both theoretical and practical contributions. Theoretically, it advances the discourse in neurolinguistics by contextualizing speech delay within a specific socio-cultural setting. Practically, it provides insights for educators, parents, and policymakers in designing inclusive and responsive language learning environments for children with speech delays. In doing so, it aligns with contemporary paradigms in language education that emphasize inclusivity, interdisciplinarity, and evidence-based practice (Gee, 2023).

2. RESEARCH METHOD

This study employs a qualitative research design grounded in a neurolinguistic framework to investigate speech delay phenomena among early childhood children in Paser Regency. The qualitative paradigm is selected due to its epistemological orientation toward understanding complex, context-bound phenomena that cannot be adequately captured through purely quantitative measures (Marn, 2021). In the context of speech delay, which involves intricate interactions between neural mechanisms, linguistic performance, and environmental influences, a qualitative approach enables an in-depth exploration of individual variability, developmental trajectories, and socio-cultural contingencies.

More specifically, this research adopts a case study strategy, allowing for intensive examination of selected participants who exhibit characteristics of speech delay. The case study approach is particularly relevant in neurolinguistic investigations, as it facilitates the integration of behavioral observations, linguistic data, and contextual information into a coherent analytical narrative (Yin, 2023). By focusing on a limited number of cases, the study seeks to generate rich, nuanced insights into the underlying mechanisms of speech delay rather than aiming for statistical generalization.

The participants of this study consist of early childhood children aged between 3 to 6 years who have been identified as experiencing speech delay, along with their parents and teachers. Participant selection is conducted through purposive sampling, guided by specific

inclusion criteria such as delayed expressive language development, limited vocabulary production, and observable difficulties in phonological articulation (Fahlevi and Zainal, 2022). In addition, supporting informants, including early childhood educators and speech therapists (if available), are involved to provide triangulated perspectives on the children's linguistic behavior and developmental history.

Data collection is carried out using multiple techniques to ensure methodological triangulation and enhance the credibility of findings. The primary methods include in-depth interviews, participant observation, and document analysis. In-depth interviews are conducted with parents and teachers to elicit detailed information regarding the child's developmental milestones, language exposure, and communicative behavior in both home and educational settings (Brinkmann, 2026). Participant observation is employed to capture real-time linguistic interactions, focusing on aspects such as phonological production, lexical usage, syntactic structures, and pragmatic functions. These observations are systematically recorded using field notes and audio-visual documentation to facilitate subsequent analysis.

In addition to behavioral data, this study incorporates a neurolinguistic analytical dimension by examining indicators of cognitive-linguistic processing, such as response latency, error patterns, and speech fluency. Although direct neuroimaging techniques are not utilized due to practical and ethical constraints, the analysis draws on established neurolinguistic models to interpret observable linguistic behaviors as reflections of underlying neural processes (Burght et al., 2023). This inferential approach is consistent with contemporary research practices in applied neurolinguistics, where behavioral data serve as proxies for neural activity.

The data analysis process follows a thematic and interpretative procedure, integrating principles from discourse analysis and neurolinguistic theory. Initially, all collected data are transcribed and organized into analyzable units. Subsequently, coding is performed to identify recurring patterns related to phonological, lexical, syntactic, and pragmatic features (Kemmerer, 2023). These patterns are then interpreted through the lens of neurolinguistic frameworks, particularly with reference to the functional roles of brain regions involved in language processing. The analysis also considers environmental and sociocultural factors that may influence language development, thereby adopting a holistic perspective.

To ensure the trustworthiness of the research, several validation strategies are employed, including triangulation, member checking, and prolonged engagement. Triangulation is achieved by comparing data obtained from different sources (children, parents, teachers) and methods (interviews, observations, documents). Member checking involves verifying the

accuracy of interpretations with participants or relevant stakeholders (Saldaña, 2021). Prolonged engagement in the research setting allows the researcher to develop a deeper understanding of the context and to minimize potential biases.

Ethical considerations are rigorously observed throughout the research process. Informed consent is obtained from parents or legal guardians, and all data are treated with strict confidentiality. Given the involvement of young children as participants, special attention is paid to ensuring their comfort, safety, and well-being during data collection. (Lincoln, 2023). In summary, this research methodology is designed to capture the multifaceted nature of speech delay through an integrative, context-sensitive, and theoretically grounded approach. By combining qualitative inquiry with neurolinguistic analysis, the study aims to produce findings that are not only empirically robust but also theoretically meaningful and pedagogically relevant ((BERA), 2024).

3. RESULT AND DISCUSSION

The findings of this study reveal that speech delay among early childhood children in Paser Regency manifests through a constellation of linguistic, cognitive, and environmental indicators that are deeply interwoven within a neurolinguistic framework. The analysis demonstrates that delayed speech production is not a singular phenomenon but rather a multidimensional condition characterized by disruptions across phonological, lexical, syntactic, and pragmatic domains. These disruptions are further mediated by neurocognitive processing limitations and socio-environmental constraints, thereby reinforcing the necessity of an integrative analytical approach.

To provide a clearer analytical structure, the multidimensional manifestations of speech delay identified in this study can be summarized in the following table:

Linguistic Domain	Observed Features	Neurolinguistic Interpretation	Developmental Implication
Phonological	Phoneme substitution, cluster reduction	Immature motor planning (Broca's area dysfunction)	Delayed articulation mastery
Lexical	Limited vocabulary, slow retrieval	Weak semantic network activation (temporal lobe)	Restricted expressive ability
Syntactic	Telegraphic speech, omission of morphemes	Underdeveloped dorsal pathway	Incomplete grammatical competence
Pragmatic	Poor turn-taking, weak interaction	Limited prefrontal integration	Reduced communicative competence

Figure 1. Analysis structure.

This table illustrates that speech delay should be understood as a systemic disruption rather than an isolated linguistic impairment. Each domain reflects underlying neurocognitive inefficiencies that collectively shape the child's communicative profile.

From a phonological perspective, the observed children exhibit significant difficulties in articulatory precision, phoneme substitution, and syllabic simplification. For instance, complex consonant clusters are frequently reduced (e.g., “spoon” → “poon”), and fricatives such as /s/ and /f/ are replaced with plosives. This pattern aligns with neurolinguistic theories suggesting that immature neural coordination within the motor speech system, particularly involving the inferior frontal gyrus (associated with Broca’s area), contributes to impaired phonological encoding and motor planning (Friederici, 2023b). Furthermore, longitudinal observation indicates that these phonological processes persist beyond the typical developmental window, suggesting atypical stabilization of phonological representations in the child’s mental grammar.

Lexically, the children demonstrate limited vocabulary breadth and reduced lexical retrieval efficiency. A notable finding is the reliance on deictic expressions (e.g., “this,” “that”) and overgeneralized lexical items. This phenomenon reflects what neurolinguists term “lexical access bottleneck,” wherein activation thresholds within the mental lexicon are not efficiently reached (Kemmerer, 2023). Consequently, the mapping between conceptual intention and linguistic realization becomes disrupted, leading to hesitations, repetitions, and incomplete utterances. This lexical impoverishment has cascading effects on higher-order linguistic processes, particularly syntactic elaboration and discourse construction.

Syntactically, the findings reveal a predominance of telegraphic speech characterized by the omission of function words and inflectional morphemes. For example, utterances such as “want milk” or “go school” indicate the absence of auxiliary verbs and grammatical markers. From a neurolinguistic standpoint, this reflects delayed maturation of the dorsal stream, which is responsible for syntactic processing and hierarchical structure building (Friederici, 2023b). The absence of recursive structures further suggests that children with speech delay experience constraints in working memory capacity, which limits their ability to process and produce complex syntactic constructions.

Pragmatically, the children exhibit challenges in maintaining conversational coherence, initiating interactions, and interpreting contextual cues. These pragmatic deficits are particularly evident in structured classroom settings, where children struggle to follow instructions or engage in collaborative activities. Neurolinguistically, this may be linked to insufficient integration between language-processing networks and executive function systems located in the prefrontal cortex (Tomasello, 2021). Such integration is essential for managing discourse-level functions, including turn-taking, topic maintenance, and inferential reasoning.

To further illustrate the interaction between neurological and environmental factors, the following conceptual model is proposed:

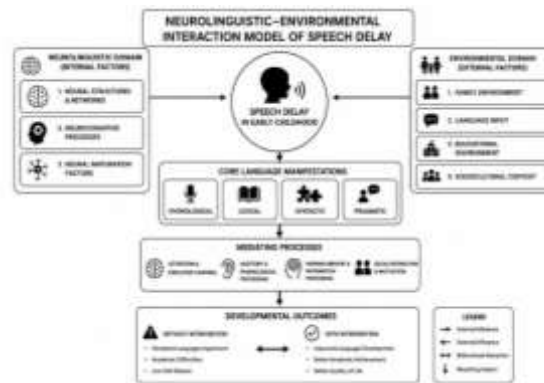


Figure 2. Neurolinguistic–Environmental Interaction Model of Speech Delay.

**Speech Delay = f (Neural Maturation + Linguistic Input + Social Interaction + Cognitive Processing)

In this model, speech delay is conceptualized as the outcome of dynamic interactions between internal (neural and cognitive) and external (environmental and social) variables. This aligns with contemporary dynamic systems theory, which views language development as a nonlinear and emergent process (Smith, 2003).

Beyond the linguistic dimensions, the findings underscore the significant role of environmental factors in exacerbating or mitigating speech delay. Children raised in linguistically impoverished environments characterized by minimal verbal interaction, low parental responsiveness, and high exposure to passive media demonstrate more severe delays (Huriati et al., 2023). Conversely, children who receive consistent scaffolding, such as dialogic reading and responsive feedback, exhibit relatively better language outcomes. This finding reinforces the interactionist perspective that language acquisition is co-constructed through social engagement.

In the specific context of English language exposure, the findings indicate that children with speech delay face compounded challenges. The introduction of English often occurs in a fragmented and non-systematic manner, without sufficient alignment with the child’s cognitive readiness. This results in what can be termed “dual-language processing overload,” where the child must simultaneously manage incomplete first language acquisition and emerging second language input (Bialystok, 2021). While bilingualism is generally associated with cognitive advantages, its benefits are contingent upon a stable linguistic foundation, which is often absent in children with speech delay.

The discussion of these findings highlights several critical implications. First, early diagnostic frameworks must incorporate neurolinguistic indicators, such as processing latency and error patterns, rather than relying solely on surface-level observations. Second, intervention strategies should adopt a multimodal approach, integrating auditory, visual, and kinesthetic stimuli to enhance neural activation and language acquisition. Third, English language pedagogy for children with speech delay must prioritize comprehensibility, repetition, and contextualized input rather than abstract linguistic instruction.

Furthermore, the findings contribute to the broader discourse on language development by emphasizing the plasticity of the developing brain. Speech delay should not be construed as a permanent deficit but as a developmental divergence that can be reshaped through targeted intervention (Leonard, 2022). This perspective aligns with neuroconstructivist theories, which posit that cognitive development emerges from the continuous interaction between neural structures and environmental input.

In conclusion, the study provides a comprehensive and theoretically grounded understanding of speech delay as a multifaceted phenomenon. By integrating neurolinguistic analysis with socio-environmental considerations, the research offers a robust framework for both academic inquiry and practical intervention, particularly within the context of early childhood English language education.

4. CONCLUSION

This study concludes that speech delay in early childhood children in Paser Regency constitutes a complex and multidimensional phenomenon emerging from the dynamic interaction between neurolinguistic mechanisms and environmental conditions. The findings demonstrate that disruptions in phonological, lexical, syntactic, and pragmatic domains are not isolated deficits but interconnected manifestations rooted in neurocognitive processing limitations, particularly in language-related brain networks.

Furthermore, environmental variables including the quality of linguistic input, parental responsiveness, and educational exposure play a decisive role in either mitigating or intensifying speech delay. The presence of limited interactional communication and excessive passive media consumption contributes significantly to the persistence of language delays. In the context of English language learning, premature or unstructured exposure may further complicate language acquisition, especially when first language competence has not been adequately established.

This study highlights the importance of early identification and intervention based on neurolinguistic indicators rather than solely observable behavior. It also emphasizes the need for integrative pedagogical approaches that combine cognitive stimulation, interactive communication, and adaptive language instruction. Ultimately, this research contributes to the advancement of inclusive English language education by providing a theoretically grounded and contextually relevant framework for addressing speech delay in early childhood.

ACKNOWLEDGEMENT

The author would like to express sincere gratitude to all individuals who have contributed to the completion of this research. Special appreciation is extended to the parents and teachers of the participating children in Paser Regency for their cooperation and valuable insights. The author also acknowledges the support of colleagues and academic mentors who provided constructive feedback throughout the research process.

REFERENCE

- BERA. (2024). *Ethical guidelines for educational research* (4th ed., pp. 1–26). British Educational Research Association.
- Bialystok, E. (2021). *Bilingualism in development: Language, literacy, and cognition* (updated ed., pp. 89–112). Cambridge University Press.
- Blank, C. S., & Leonard, M. L. (2021). Language development in early childhood. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology and developmental science* (latest ed.). Wiley.
- Brinkmann, S., & Kvale, S. (2026). *Qualitative interviewing* (pp. 1–25). Sage Publications.
- Burght, C. L. van der, Goucha, T., Friederici, A. D., Brauer, M., & Hoehl, S. (2023). Cleaning up the brickyard: How theory and methodology shape experiments in cognitive neuroscience of language. *Journal of Cognitive Neuroscience*, 35(12), 2067–2088. https://doi.org/10.1162/jocn_a_02058
- Fahlevi, M. R., & Zainal, S. (2022). The urgency of strengthening the Aceh Truth and Reconciliation Commission: An effort to sustain peace by reparations of conflict victims. In *Proceedings of ICoSPOLHUM* (pp. 264–272). <https://doi.org/10.29103/icospolhum.v3i.66>
- Friederici, A. D. (2023a). *Language in our brain: The origins of a uniquely human capacity* (rev. ed.). MIT Press.
- Friederici, A. D. (2023b). Language in our brain: The origins of a uniquely human capacity. *Frontiers in Psychology*, 14, 1–23. <https://doi.org/10.3389/fpsyg.2014.00282>
- Gee, J. P. (2023). *Social linguistics and literacies: Ideology in discourses* (latest ed., pp. 56–78). Routledge.
- Huriati, N., et al. (2023). The role of artificial intelligence (AI) in developing English language learners' communication skills. *Journal of Cambridge Studies*, 6(1), 750–757.

- Kemmerer, D. (2023). *Cognitive neuroscience of language* (rev. ed.). Routledge. <https://doi.org/10.4324/9781138318427>
- Krishnan, S., Watkins, K. E., & Bishop, D. V. M. (2022). Neurobiological basis of language learning difficulties. *Annual Review of Neuroscience*, 45(9), 701–714. <https://doi.org/10.1016/j.tics.2016.06.012>
- Kuhl, P. K. (2022). Early language acquisition: Cracking the speech code. *Nature Reviews Neuroscience*, 23(11), 831–843. <https://doi.org/10.1038/nrn1533>
- Leonard, L. B. (2022). *Children with specific language impairment* (latest ed.). MIT Press.
- Lincoln, Y. S., & Denzin, N. K. (2023). *The SAGE handbook of qualitative research* (latest ed., pp. 195–220). Sage Publications.
- Marn, T. M. (2021). *Reconceptualizing qualitative research: Methodologies without methodology* (pp. 23–45). Sage Publications.
- Nation, K. (2019). Children’s reading difficulties, language, and reflections on the simple view of reading. *Australian Journal of Learning Difficulties*, 24(1), 47–73. <https://doi.org/10.1080/19404158.2019.1609272>
- Saldaña, J. (2021). *The coding manual for qualitative researchers* (3rd ed.). Sage Publications.
- Smith, L. B., & Thelen, E. (2003). Bridging the representational gap in the dynamic systems approach to development. *Developmental Science*, 4, 392–412.
- Tomasello, M. (2021). *Constructing a language: A usage-based theory of language acquisition* (pp. 210–225). Harvard University Press. <https://doi.org/10.1097/01.chi.0000135676.06664.40>
- Yin, R. K. (2023). *Case study research and applications: Design and methods* (rev. ed.). Sage Publications.