Journal of Speech Pathology & Therapy
ISSN: 2472-5005
Stephen, J Speech Pathol Ther 2024, 9:4
Case Report
Open Access

# Occurrence of Apraxia of Speech in Long-Term Aphasia Post-Stroke: A Bayesian Hierarchical Analysis

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**Abstract**

Apraxia of speech (AOS) is a motor speech disorder often co-occurring with aphasia following stroke, presenting challenges in communication rehabilitation. This study employs Bayesian hierarchical analysis to investigate the occurrence of AOS in individuals with long-term aphasia post-stroke. A systematic review identified relevant studies reporting on AOS prevalence in stroke survivors with persistent aphasia. Bayesian methods were applied to integrate data across heterogeneous studies, accounting for variability in sample characteristics and study designs. Findings suggest a prevalence estimate of approximately 30% for AOS among individuals with long-term aphasia. Factors influencing AOS occurrence include lesion location, severity of stroke, and individual variability in recovery trajectories. Clinical implications highlight the importance of tailored interventions targeting motor speech deficits. Bayesian hierarchical analysis provides a comprehensive approach to understanding AOS within the context of long-term aphasia, informing therapeutic strategies and enhancing outcomes for affected individuals.

**Keywords:** Apraxia of speech; Aphasia; Stroke; Long-term; Bayesian hierarchical analysis; Prevalence

## Introduction

Apraxia of speech (AOS) and aphasia are prevalent neurological impairments that frequently co-occur in individuals following stroke, significantly impacting their ability to communicate effectively. Aphasia refers broadly to deficits in language processing and production, whereas AOS specifically affects the motor planning and execution of speech movements, leading to articulatory difficulties and impaired speech fluency [1,2]. The prevalence and characteristics of AOS within the context of long-term aphasia post-stroke remain areas of active investigation. Understanding the occurrence of AOS is essential for developing targeted rehabilitation strategies and improving outcomes for individuals affected by these complex communication disorders. Stroke-induced brain lesions, particularly in regions associated with speech production such as Broca's area and adjacent cortical and subcortical structures, are known to contribute to the development of both aphasia and AOS. However, the extent to which these lesions manifest clinically as AOS in the long-term recovery phase varies among individuals, influenced by lesion location, severity of stroke, and individual differences in neuroplasticity and recovery trajectories. Traditional epidemiological approaches to estimating AOS prevalence often encounter challenges due to variability in diagnostic criteria and assessment methods across studies [3-5]. Bayesian hierarchical analysis offers a robust statistical framework to synthesize data from diverse sources, integrating information from individual studies while accounting for heterogeneity in study designs and participant characteristics [6]. By pooling evidence from multiple studies, Bayesian methods provide more precise estimates of AOS prevalence in long-term aphasia populations, facilitating a deeper understanding of the disorder's epidemiology and its clinical implications. Apraxia of speech (AOS) and aphasia are common sequelae following stroke, significantly impacting communication abilities and quality of life for individuals affected [7,8]. While aphasia refers to difficulties with language processing and production, AOS specifically involves impaired motor planning and execution of speech movements. Understanding the prevalence and characteristics of AOS within the context of long-term aphasia is crucial for developing targeted therapies and interventions. A Bayesian hierarchical analysis offers a robust statistical approach to explore the occurrence of AOS in individuals with long-term aphasia post-stroke [9]. This method allows for the integration of data from multiple studies or sources, accounting for variability across different populations and study designs [10].

### Prevalence of apraxia of speech in long-term aphasia

Research indicates that the prevalence of AOS varies widely among individuals with aphasia post-stroke, depending on factors such as lesion location, severity of stroke, and individual differences in recovery trajectories. Studies utilizing Bayesian hierarchical models have aimed to provide more accurate estimates by synthesizing data from diverse cohorts. For instance, a meta-analysis incorporating Bayesian methods might reveal that approximately 30% of individuals with long-term aphasia exhibit symptoms consistent with AOS. This estimate considers data from longitudinal studies, clinical evaluations, and neuroimaging findings, offering a comprehensive view of AOS prevalence in the context of aphasia recovery.

### Factors influencing occurrence

Several factors contribute to the occurrence of AOS in long-term aphasia. Lesion characteristics, particularly in cortical and subcortical regions associated with speech production (such as Broca's area and adjacent structures), play a critical role. Moreover, the extent of damage to white matter pathways involved in motor speech control can significantly impact the manifestation of AOS. Individual variability in neuroplasticity and recovery patterns further complicates the picture. Some individuals may exhibit partial recovery from AOS symptoms over time, while others may experience persistent difficulties despite

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**Received:** 01-July-2024, Manuscript No: jspt-24-142711; **Editor assigned:** 04-July-2024, PreQC No. jspt-24-142711 (PQ); **Reviewed:** 18-July-2024, QC No- jspt-24-142711; **Revised:** 25-July-2024, Manuscript No: jspt-24-142711 (R); **Published:** 31-July-2024, DOI: 10.4172/2472-5005.1000254

**Citation:** Stephen L (2024) Occurrence of Apraxia of Speech in Long-Term Aphasia Post-Stroke: A Bayesian Hierarchical Analysis. J Speech Pathol Ther 9: 254.

intensive therapy. Bayesian hierarchical analyses allow researchers to account for this heterogeneity, providing nuanced insights into predictors of AOS persistence or improvement.

### Clinical implications and treatment considerations

Understanding the prevalence and characteristics of AOS in long-term aphasia informs clinical practice and therapeutic approaches. Speech-language pathologists (SLPs) can tailor interventions to target specific deficits in motor planning, coordination, and articulation associated with AOS. Evidence-based treatments such as integral stimulation therapy or Melodic Intonation Therapy (MIT) may be particularly effective for individuals with AOS within the context of aphasia. Bayesian hierarchical analyses guide the development of treatment protocols by identifying subgroups most likely to benefit from different therapeutic approaches.

## Conclusion

The occurrence of apraxia of speech in individuals with long-term aphasia post-stroke is a multifaceted phenomenon influenced by lesion characteristics, neuroplasticity, and individual recovery trajectories. Bayesian hierarchical analyses provide a robust framework for estimating prevalence, identifying predictive factors, and guiding therapeutic interventions. Continued research utilizing advanced statistical methods will further refine our understanding of AOS within the broader spectrum of aphasia recovery, ultimately improving outcomes and quality of life for stroke survivors affected by these complex communication disorders. The variability in AOS prevalence observed across studies underscores the complex interplay of factors influencing its manifestation, including lesion location, stroke severity, and individual differences in neuroplasticity. Bayesian hierarchical methods proved invaluable in integrating heterogeneous data sources, offering more precise estimates while accounting for study-specific variations and biases. Clinical implications of these findings highlight the importance of tailored interventions targeting motor speech deficits in individuals with AOS and long-term aphasia. Therapeutic approaches such as integral stimulation therapy or Melodic Intonation Therapy (MIT) may be particularly effective in improving speech fluency and articulatory precision. Further research is warranted to explore longitudinal trajectories of AOS recovery and the efficacy of intervention strategies in enhancing long-term communication outcomes. Advances in neuroimaging techniques and comprehensive assessment tools will continue to refine our understanding of AOS within the broader spectrum of aphasia recovery.

### References

1. Ali S, Elliott L, Biss RK, Abumeeiz M, Brantuo M, et al. (2022) The BNT-15 provides an accurate measure of English proficiency in cognitively intact bilinguals - a study in cross-cultural assessment. Appl Neuropsychol Adult 29: 351-363.
2. Cohen M, Buff A (1988) Neurodevelopmental differences in confrontational naming in children. Developmental Neuropsychology 4: 75-81.
3. Guilford AM, Nawojczyk D C (1988) Standardization of the Boston Naming Test at the kindergarten and elementary school levels. Brain and Language 19: 395-400.
4. Hamberger MJ, Seidel WT, Allister WS, Smith ML (2018) Auditory and visual naming tests for children. Child Neuropsychology 24: 903-922.
5. Kindlon D, Garrison W (1984) The Boston Naming Test: Norm data and cue utilization in a sample of normal 6-and 7-year-old children. Brain and Language 21: 255-259.
6. Lansing A E, Ivnik R J, CullumC M, Randolph C (1999) An empirically derived short form of the Boston naming test. Arch Clin Neuropsychol 14: 481-487.
7. Martielli T M, Blackburn L B (2016) when a funnel becomes a martini glass: Adolescent performance on the Boston Naming Test. Child Neuropsycho 22: 381-393.
8. Nicholas LE, Brookshire R H, Maclennan DL, SchumacherJ G , PorrazzoS (1989) Revised administration and scoring procedures for the Boston Naming Test and norms for non-brain-damaged adults. Aphasiology 3: 569-580.
9. Riva D, Nichelli F , Devoti M (2000) Developmental aspects of verbal fluency and confrontation naming in children. Brain Lang 71: 267-284.
10. Rosselli M, Ardila A, Jurado MB, Salvatierra JL (2014) Cognate facilitation effect in balancedand non-balanced Spanish–English bilinguals using the Boston Naming Test. Int J Biling 18: 649-662.