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Neuroplasticity and Language Recovery: Predictive Factors and Clinical Limits in Post-Stroke Aphasia Rehabilitation

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Abstract:

This study critically examines the predictive factors influencing language recovery, integrating lesion-related variables (location, size, stroke subtype) with non-lesion factors (age, education, cognitive reserve, and socio-economic status). Emphasis is placed on the role of neuroplasticity and early intervention in facilitating functional reorganisation of language networks. The paper further explores the limitations of current prognostic models, highlighting the substantial inter-individual variability that constrains predictive accuracy. In addition, the emotional and psychological impact of aphasia is considered, underscoring the importance of integrating psychological support within rehabilitation frameworks. The findings contribute to a more nuanced understanding of recovery mechanisms and support the development of personalised, network-informed therapeutic strategies aimed at optimising both linguistic and psychosocial outcomes.

Keywords: post-stroke aphasia; neuroplasticity; language recovery; predictive factors; neuropsychological rehabilitation; cognitive reserve; psychological support

Introduction

Cerebrovascular accidents (stroke) represent a major global public health concern, characterized by high rates of mortality and long-term disability. In Romania, the burden of stroke remains particularly significant. According to SAFE (2017), more than 61,000 stroke cases are recorded annually, with a mortality rate of 156.8 deaths per 100,000 inhabitants. Furthermore, approximately 40% of stroke survivors are left with moderate disability, while 15–30% experience severe disability (Păun et al., 2023; Duncan et al., 2005).

Among the most common neuropsychological consequences of stroke is aphasia, a language disorder resulting from brain dysfunction. Studies indicate that between 20% and 40% of patients with acute stroke develop acquired language impairments (El Hachioui et al., 2013; Pedersen et al., 2004), typically due to lesions in the language-dominant hemisphere. Aphasia affects a wide range of linguistic abilities, including verbal expression, comprehension, repetition, naming, reading, and writing. Given the central role of language in human communication, cognition, and social interaction, its impairment represents a profound disruption of both individual functioning and social participation.

Language processing is arguably one of the most complex human cognitive functions, and its disruption following stroke is both common and debilitating. Consequently, the mechanisms underlying language recovery have been extensively debated in the literature (Brady et al., 2016; Geranmayeh et al., 2014). Although spontaneous recovery may occur in some cases, early and sustained therapeutic intervention is essential for optimizing functional outcomes.

Speech and language therapy, delivered by trained specialists, has been shown to significantly improve communication abilities in individuals with aphasia. However, access to such interventions is often limited by economic and geographical factors. In many cases, patients receive therapy only during the initial months following stroke, despite evidence indicating that continued intervention may yield benefits even years after onset (Brady et al., 2016). This limitation is particularly pronounced in rural areas, where access to specialized services may be minimal or entirely absent.

Recent advances in neuroscience have highlighted the potential of non-invasive brain stimulation techniques, such as transcranial magnetic stimulation and transcranial direct current stimulation, to enhance language recovery in post-stroke aphasia (Norise & Hamilton, 2017). These approaches support the notion that recovery is closely linked to the brain's capacity for functional reorganization. Indeed, accumulating evidence suggests that language recovery depends on dynamic changes within the neural networks of the dominant hemisphere (Abel et al., 2015; Fridriksson et al., 2013).

Therapeutic approaches to aphasia may target specific linguistic deficits (e.g., anomia, agrammatism) by focusing on distinct language functions such as word retrieval or syntactic processing (Simmons-Mackie & Kagan, 2007). Alternatively, interventions may aim to improve functional communication through pragmatic and socially oriented strategies, emphasizing interaction and participation. Understanding both the mechanisms and the limitations of language recovery is therefore essential for designing effective rehabilitation strategies.

In this context, the present study aims to examine the key factors influencing language recovery in individuals with post-stroke aphasia, considering both lesion-related and non-lesion-related variables, as well as the inherent limitations associated with predicting recovery outcomes.

1. Determinants and Mechanisms of Language Recovery in Post-Stroke Aphasia

Recovery of language following aphasia involves the dynamic reorganisation of neural networks supporting linguistic processing. However, this process cannot be understood solely in neurobiological terms. Increasing evidence suggests that recovery emerges from the interaction between neurological, cognitive, emotional, and social factors, thus requiring a multidimensional explanatory framework.

From a clinical perspective, this implies that effective rehabilitation must move beyond deficit-based models and adopt an integrative approach that considers both biological constraints and patient-specific psychosocial resources.

In this context, determinants of recovery can be broadly categorised into lesion-related and non-lesion-related factors, which interact continuously with psychological and environmental variables shaping rehabilitation outcomes.

Lesion-related factors include lesion location and size (Goldenberg & Spatt, 1994), stroke characteristics and aphasia severity (Fillingham et al., 2006), type of linguistic deficit (Pedersen, 2004), stroke subtype (Jung et al., 2011), and metabolic factors (Fridriksson et al., 2012). Non-lesion-related factors encompass patient sex (Engelter et al., 2006), age (Pedersen et al., 2004), handedness (Pedersen et al., 1995), educational attainment (Connor et al., 2001), intelligence (Kertesz & McCabe, 1975), and socio-economic status (Asch et al., 2006). Importantly, these variables do not operate independently but interact with motivational, emotional, and social dimensions, which may either facilitate or hinder recovery trajectories.

1.1. Lesion-Related Determinants

A substantial body of research indicates that language recovery is inversely related to lesion size (Goldenberg & Spatt, 1994; Henseler et al., 2014). Nevertheless, recovery cannot be reliably predicted in the early post-stroke phase based solely on structural variables such as lesion size, age, or initial severity (Lazar et al., 2008). Instead, lesion location within functionally critical language networks appears to play a more decisive role. Even small lesions affecting eloquent language areas may result in severe and persistent deficits, whereas larger lesions located outside these regions may have comparatively limited impact.

Neurofunctional evidence further supports this perspective. Henseler et al. (2014) demonstrated distinct associations between lesion sites and specific aphasia profiles (e.g., Broca's vs. Wernicke's aphasia), suggesting that recovery is constrained by the disruption of specialised linguistic subsystems. At the same time, recovery is not purely a function of structural damage, but also of the brain's capacity for functional reorganisation. Patients with chronic aphasia frequently exhibit adaptive communicative strategies and partial reorganisation of language networks, particularly during the subacute phase (Saur et al., 2006). Initial severity of aphasia remains one of the most robust clinical predictors of outcome (Fillingham et al., 2006; Pedersen et al., 2004), with milder impairments associated with more favourable recovery trajectories (Laska et al., 2001).

Clinically, this highlights the importance of early stratification of patients based on severity, allowing clinicians to tailor intervention intensity and set realistic therapeutic goals. Patients with severe aphasia may require longer-term, multimodal, and psychologically supported interventions to sustain engagement and prevent withdrawal. However, inconsistencies in the literature (Seniów et al., 2009) highlight that severity alone cannot fully account for recovery variability. These discrepancies may reflect the influence of non-linguistic factors, including attention, motivation, emotional regulation, and engagement in therapy, dimensions that are rarely controlled for but critically shape rehabilitation outcomes.

Recovery patterns also differ across aphasia types. Global and anomic aphasia are generally associated with poorer outcomes, whereas Broca's aphasia often shows better recovery (Henseler et al., 2014; Jung et al., 2011), although this relationship is not consistently observed (Sarno & Levita, 1979). Furthermore, recovery is not uniform across linguistic domains: phonological processes tend to improve earlier than semantic or syntactic functions, and receptive language often recovers before expressive language (El Hachioui et al., 2013).

From an applied standpoint, these differences suggest that rehabilitation programmes should be adapted not only to severity but also to aphasia subtype, prioritising specific linguistic domains (e.g., phonological vs. semantic processing) according to the expected recovery trajectory.

Beyond structural damage, physiological mechanisms such as cerebral perfusion and metabolic recovery play a critical role. Improved outcomes have been associated with restoration of cerebral blood flow, successful reperfusion, and normalisation of glucose metabolism in perilesional regions (Fridriksson et al., 2012). Conversely, persistent hypoperfusion and delayed metabolic recovery are linked to poorer long-term outcomes (Hillis, 2010). Nevertheless, the relationship between these biological processes and functional recovery remains complex and not fully understood (Richardson et al., 2011).

These findings underline the importance of early medical stabilisation and neurorehabilitation timing, suggesting that therapeutic windows should be strategically exploited to maximise neuroplastic potential.

1.2. Non-Lesion-Related Determinants

Non-lesion-related factors contribute to the variability of recovery outcomes, although their effects are often indirect and mediated by psychological and social processes.

Gender differences in aphasia incidence remain inconclusive, with some studies reporting higher prevalence in women (Engelter et al., 2006; Kyrozis et al., 2009), others in men (Kertesz & Sheppard, 1981), and some finding no significant differences (Kang et al., 2010). Similarly, age is associated with aphasia incidence, with higher rates observed in older populations (Engelter et al., 2006; Pedersen et al., 2004), but its impact on recovery remains inconsistent (Inatomi et al., 2008; Pedersen et al., 2004). While younger patients may demonstrate greater neural plasticity (Laska et al., 2001), age alone does not reliably predict recovery outcomes. Clinically, this suggests that age should not be used as an exclusion criterion for intensive rehabilitation, but rather as a contextual factor informing pacing, support needs, and expectations.

Handedness has been hypothesised to influence recovery due to differences in hemispheric language representation. Left-handed and ambidextrous individuals may exhibit more bilateral language organisation and potentially greater neural flexibility (Ferro et al., 1999; Knecht et al., 2000). However, empirical evidence does not support a significant independent effect of handedness on aphasia recovery (Pedersen et al., 1995; Pickersgill & Lincoln, 1983).

Educational attainment and socio-economic status are frequently discussed in relation to cognitive reserve and access to healthcare. Higher education may reduce vulnerability to language impairment (Connor et al., 2001; González-Fernández et al., 2011), yet its role in recovery remains unclear (Lazar et al., 2008). Socio-economic status, encompassing income, healthcare access, and health-related behaviours, may indirectly influence outcomes (Asch et al., 2006; Bernheim et al., 2008; Engelter et al., 2006), although consistent empirical evidence is lacking.

From an applied perspective, these findings highlight the need for personalised rehabilitation strategies that account for disparities in cognitive reserve, health literacy, and access to care. Patients with lower socio-economic status may require additional support structures to ensure adherence and continuity of therapy.

Similarly, premorbid intelligence has been associated with initial aphasia severity (Kertesz & McCabe, 1975; David & Skilbeck, 1984), but not with long-term recovery trajectories (Ferro et al., 1999). These results suggest that clinicians should avoid overestimating the role of cognitive baseline in predicting recovery, focusing instead on modifiable factors such as engagement, therapy intensity, and environmental support.

To facilitate the translation of these determinants into clinical practice, Table 1 synthesises the main recovery predictors alongside their corresponding therapeutic implications, supporting a more structured and individualised approach to aphasia rehabilitation.

Table 1: Clinical implications of determinants of language recovery in post-stroke aphasia

Determinant Category	Key Factor	Empirical Evidence	Clinical Implication
Lesion-related	Lesion size and location	Goldenberg & Spatt (1994); Henseler et al. (2014)	Early neuroimaging should guide prognosis and localisation-specific therapy planning
Lesion-related	Initial aphasia severity	Fillingham et al. (2006); Pedersen et al. (2004)	Stratify patients by severity to adjust therapy intensity and set realistic goals
Lesion-related	Aphasia type	Jung et al. (2011); Henseler et al. (2014)	Tailor interventions to linguistic profiles (e.g., expressive vs. receptive deficits)
Lesion-related	Cerebral perfusion and metabolism	Fridriksson et al. (2012); Hillis (2010)	Optimise timing of intervention to align with neuroplastic recovery windows
Non-lesion-related	Age	Laska et al. (2001); Inatomi et al. (2008)	Adapt pacing and expectations, but do not limit access to rehabilitation
Non-lesion-related	Gender	Engelter et al. (2006); Kang et al. (2010)	No major adjustment required; monitor individual variability
Non-lesion-related	Handedness	Pedersen et al. (1995); Knecht et al. (2000)	Limited clinical relevance; not a primary decision factor
Non-lesion-related	Education and cognitive reserve	Connor et al. (2001); González-Fernández et al. (2011)	Adapt therapy complexity and support according to cognitive and educational background
Non-lesion-related	Socio-economic status	Asch et al. (2006); Bernheim et al. (2008)	Provide additional support for adherence, access, and continuity of care
Non-lesion-related	Intelligence	Kertesz & McCabe (1975); Ferro et al. (1999)	Focus on engagement rather than baseline cognitive ability

Source**:** Authors' synthesis

2. Predicting and Mechanistically Understanding Language Recovery in Post-Stroke Aphasia

Predicting recovery from post-stroke language disorders is of considerable clinical importance, as patients and caregivers seek realistic expectations regarding functional outcomes (Price et al., 2010). Lazar et al. (2010) developed a predictive model based on the Western Aphasia Battery (WAB), suggesting that patients may achieve up to approximately 70% of their maximum recovery potential within the first 90 days post-stroke.

However, predicting aphasia recovery remains challenging due to the substantial variability in outcomes, even among individuals with similar lesions (Kiran, 2012). To address this complexity, the PLORAS study (Price et al., 2010) proposed a data-driven predictive model based on recovery patterns observed in patients with comparable lesion characteristics and clinical profiles. This approach relies on large-scale datasets and high-resolution MRI scans, where lesions are reconstructed in three dimensions and compared with those of other patients in the database. Language scores and recovery trajectories from the most similar cases are then used to estimate outcomes for new patients.

Despite their promise, such predictive models face several limitations. First, aphasia deficits are often complex and multidimensional, making it difficult to accurately match new patients to predefined profiles, thereby increasing the risk of prediction errors. Second, statistical complexity arises from interactions among multiple predictors; as the number of variables increases, statistical inference becomes more difficult, a phenomenon known as the "curse of dimensionality" (Bellman & Bellman, 2015). Saur et al. (1995) noted that regression-based approaches must adequately account for variable interactions before reliable predictive models can be established. Third, increasing statistical complexity may also introduce risks of analytical bias, including p-hacking, whereby statistical procedures are manipulated to obtain significant results (Price et al., 2010).

From a clinical perspective, these limitations suggest that predictive models should be used cautiously and as complementary tools rather than definitive prognostic instruments.

Neurobiological Mechanisms of Recovery

Theoretical models of recovery in post-stroke aphasia largely rely on the assumption that brain regions not previously involved in language processing, or involved in a different capacity, can be recruited to compensate for functions formerly supported by damaged perisylvian structures in the dominant hemisphere (Belin et al., 1996; Turkeltaub et al., 2012).

The effectiveness of this compensatory mechanism depends on at least two fundamental properties. The first concerns the extent to which newly recruited brain regions possess computational capacities similar to those of the damaged areas. In other words, how effectively can these regions perform the linguistic functions previously carried out by the injured structures? The second property relates to the degree of anatomical and functional connectivity between compensatory regions and the damaged networks. Efficient compensation is more likely when newly recruited regions maintain connections with the original functional network.

In this context, perilesional areas and right-hemisphere homologues of left-hemisphere language regions represent plausible candidates for functional reorganisation. However, they are not the only structures involved in recovery. For instance, Xing et al. (2016) demonstrated that increased grey matter volume in the right temporoparietal region is associated with improved language performance in post-stroke aphasia, even when these regions are not direct homotopic counterparts of the lesion site.

Functional Connectivity and Network Reorganisation

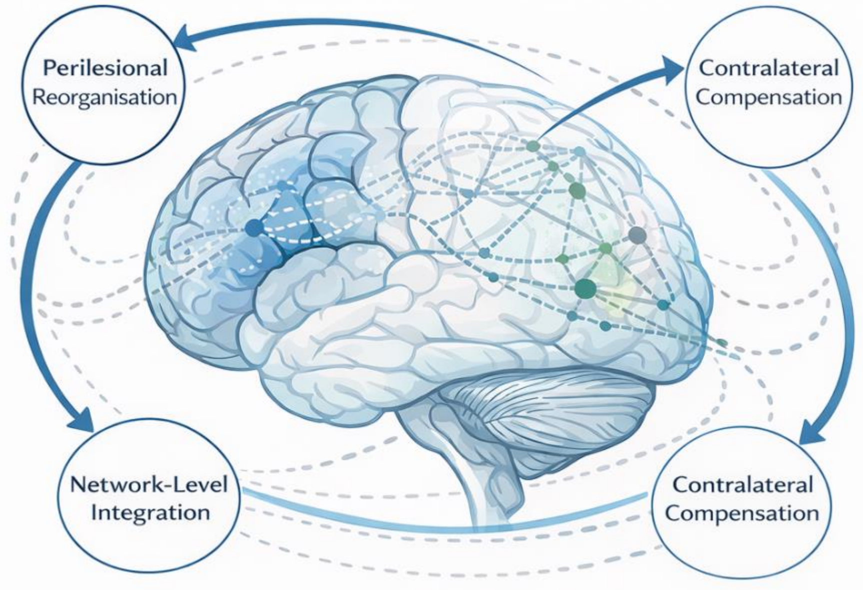
Advances in neuroimaging and connectivity analysis have enabled a more nuanced understanding of how large-scale brain networks reorganise during recovery. Studies have shown that increased frontoparietal integration is associated with improved language outcomes (Sharp et al., 2010). Moreover, treatment-related changes in functional connectivity have been observed, including a shift from right middle temporal gyrus activation to left temporal and supramarginal regions following therapy (van Hees et al., 2014).

Yang et al. (2016) reported increased activity in contralesional medial temporal and lateral temporal cortices in patients with aphasia compared to age-matched controls. Taken together, these findings suggest that recovery is associated with increased activation and integration of both ipsilesional and contralesional networks.

Interestingly, patterns of reorganisation differ between post-stroke aphasia and primary progressive aphasia. While post-stroke recovery tends to involve more bilateral network changes, primary progressive aphasia is characterised by more localised disruptions in functional connectivity (Mandelli et al., 2016). Specifically, reduced connectivity has been observed in the dorsal opercular portion of the left inferior frontal gyrus in progressive aphasia.

The network-based mechanisms underlying language recovery are illustrated in Figure 1, highlighting the dynamic interaction between perilesional reorganisation, contralateral compensation, and large-scale network integration processes. The figure illustrates the principal neurobiological mechanisms supporting language recovery following stroke, including perilesional reorganisation, recruitment of contralateral homologous regions, and large-scale network integration. These processes reflect adaptive neuroplastic changes occurring at both local and distributed network levels.

Figure 1. Network-based mechanisms of language recovery in post-stroke aphasia



Source: Authors' conceptual synthesis

These mechanisms provide the neurobiological foundation upon which behavioural and psychological interventions act, reinforcing the need for integrated, network-informed rehabilitation strategies.

3. Emotional Impact of Aphasia and the Role of Psychological Support: Applied Implications for Rehabilitation

Post-stroke aphasia affects not only linguistic functions but also exerts a profound impact on patients' emotional well-being, personal identity, and social functioning. The loss of communicative ability frequently leads to frustration, anxiety, depression, and social isolation, significantly diminishing quality of life. Empirical evidence indicates that post-stroke depression and difficulties in psychological adjustment are consistently associated with poorer functional outcomes in language recovery (Hilari et al., 2012; Northcott et al., 2016; Vaughan & Manning, 2023).

From a clinical perspective, these emotional responses should not be regarded merely as secondary consequences, but as active factors influencing the trajectory of recovery. Elevated levels of anxiety and depression may reduce engagement in therapy, impair attention and working memory, and hinder learning and cognitive reorganization processes that are fundamental for neuroplasticity (Cahana-Amitay & Albert, 2015).

In this context, effective rehabilitation requires the systematic integration of structured psychological components. From an applied standpoint, this involves:

- systematic psychological screening in the early post-stroke phase;
- adaptation of therapeutic communication (e.g., visual aids, simplified language);
- interventions targeting motivation and self-efficacy;
- emotional regulation and frustration management during speech and language therapy.

The main psychological and therapeutic interventions relevant to post-stroke aphasia rehabilitation are summarized in Table 2, highlighting their clinical objectives and their contribution to functional recovery outcomes.

Table 2: Psychological interventions in post-stroke aphasia rehabilitation

Intervention domain	Applied strategy	Clinical objective	Impact on recovery
Psychological screening	▪ Assessment of depression, anxiety, motivation	▪ Identification of psychological risk	▪ Enhances therapy personalization
Therapeutic communication	▪ Visual support, simplified language	▪ Facilitation of comprehension	▪ Reduces frustration
Adapted CBT	▪ Cognitive restructuring	▪ Reduction of depression/anxiety	▪ Increases therapy engagement
ACT	▪ Acceptance and meaning-making	▪ Psychological adaptation	▪ Reduces avoidance and stress
Family support	▪ Communication training	▪ Improved interpersonal relationships	▪ Reduces social isolation
Interdisciplinary interventions	▪ Neurology + psychology + speech therapy	▪ Holistic approach	▪ Maximizes recovery outcomes

Note**:** CBT = Cognitive Behavioral Therapy; ACT = Acceptance and Commitment Therapy.
Source**:** Authors' synthesis based on Hilari et al. (2012), Northcott et al. (2016), Cahana-Amitay & Albert (2015), Baker et al. (2024), and Bi & Wang (2022).

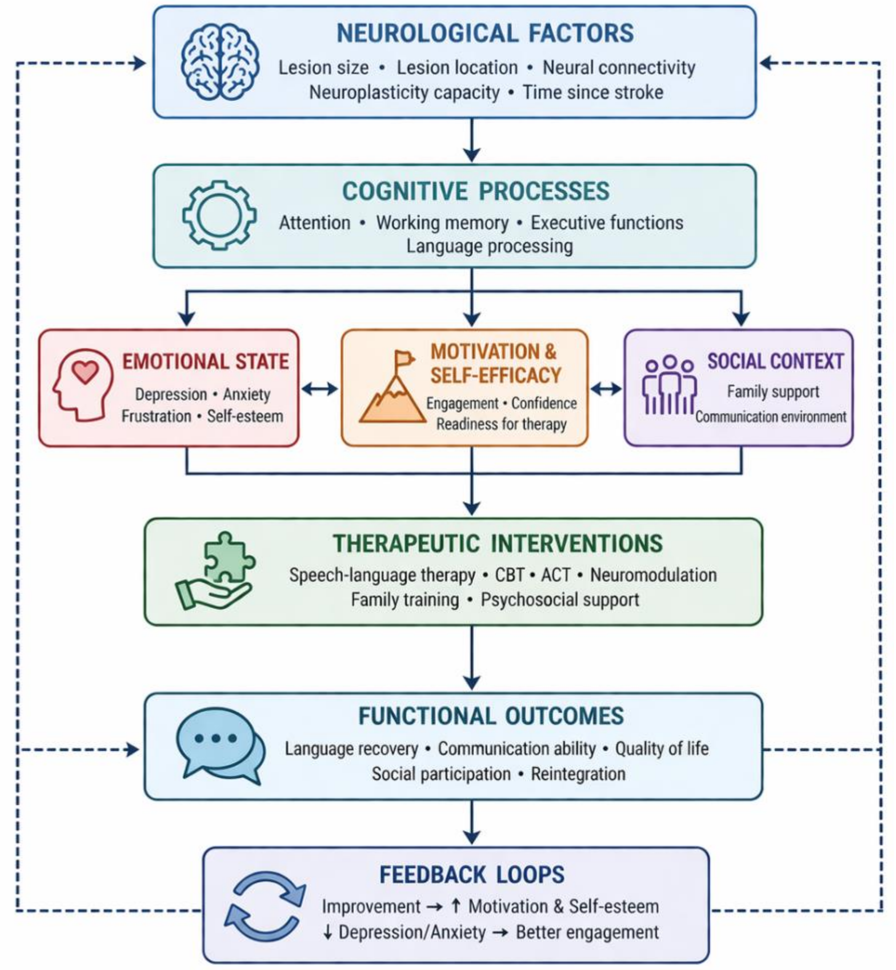
Psychotherapeutic approaches relevant in this context include Cognitive Behavioral Therapy (CBT), Acceptance and Commitment Therapy (ACT), and psychosocial support interventions. Recent evidence suggests that interventions adapted for individuals with aphasia can effectively reduce depressive symptoms and enhance social participation (Baker et al., 2024). Adapted CBT facilitates cognitive restructuring and the development of coping strategies, while ACT supports acceptance of functional limitations and the reconstruction of personal meaning and identity.

Family and caregiver involvement represents a critical component of the rehabilitation process. Interventions targeting caregivers contribute to improved communication patterns, emotional support, and reduced social isolation, all of which are associated with better long-term outcomes (Bi & Wang, 2022; Northcott et al., 2016).

Therefore, integrating a biopsychosocial perspective into aphasia rehabilitation is essential. Language recovery is not solely dependent on neural reorganization but is also shaped by emotional adaptation, social support, and psychological interventions. Interdisciplinary approaches, combining neurology, psychology, and speech-language therapy, are important for optimizing both functional recovery and social reintegration.

A biopsychosocial model of language recovery is illustrated in Figure 2**,** emphasizing the dynamic and bidirectional interactions between neurological, cognitive, emotional, and social factors, as well as the role of therapeutic interventions in shaping recovery trajectories.

Figure 2: Biopsychosocial pathways of language recovery in post-stroke aphasia



Source**:** Authors' compilation

Conclusion

Language recovery following post-stroke aphasia is a multidimensional and highly individualised process shaped by the dynamic interaction of neurobiological, cognitive, and psychosocial factors. A multitude of interrelated variables must be considered when determining prognosis, and while any prediction may represent only the clinician's "best estimate", the current body of evidence provides an increasingly robust framework for more accurate, evidence-based assessments of recovery potential.

The findings of this study confirm that lesion-related variables, particularly lesion size and localisation, remain the most consistent and clinically relevant predictors of recovery patterns. In contrast, patient-related variables such as age, sex, handedness, education, and intelligence appear to exert a more limited and less consistent influence on language outcomes. These insights underscore the importance of prioritising stroke-specific indicators when clinicians evaluate functional recovery potential in post-stroke aphasia.

At the same time, recovery cannot be fully understood through isolated predictors. The substantial variability observed across patients reflects the complex interaction between lesion-related, non-lesion, and treatment-related factors, many of which remain insufficiently controlled in existing studies. Although a considerable proportion of patients achieve functional improvement, a large number continue to experience persistent linguistic deficits of varying severity, reinforcing the need for more precise and individualised prognostic approaches.

Importantly, advances in cognitive neuroscience, neuroimaging, and network science are progressively transforming our understanding of both normal and disrupted brain function. These developments support a shift from localisation-based models towards network-based frameworks that better capture the distributed and adaptive nature of language recovery. Within this context, neuroplasticity emerges as a central mechanism, enabling functional reorganisation across both perilesional and distributed brain networks.

Furthermore, recovery should not be conceptualised solely in linguistic terms. Emotional adaptation, psychological resilience, and patient engagement play a critical role in shaping rehabilitation trajectories. Integrating psychological support into rehabilitation frameworks is therefore essential for achieving optimal outcomes.

Looking forward, both clinicians and researchers are encouraged to adopt integrative, model-informed approaches that align with emerging evidence on brain plasticity, connectivity, and recovery dynamics. In particular, the development and application of non-invasive neuromodulation techniques, combined with personalised rehabilitation strategies, hold significant promise for addressing not only language deficits but also broader cognitive impairments associated with neurological conditions.

Credit Authorship Contribution Statement

The author was solely responsible for the conceptualisation, literature review, methodology design, analysis, interpretation of data, writing of the original draft, and revision of the manuscript.

Conflict of Interest Statement

The author declares that there are no conflicts of interest regarding the publication of this paper.

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Data Availability Statement

No new data were created or analysed in this study. Data sharing is not applicable to this article.

Ethical Approval Statement

This study is based exclusively on a review and synthesis of existing literature and does not involve human participants or animal subjects. Therefore, ethical approval was not required.

References

Abel, S., Weiller, C., Huber, W., Willmes, K., & Specht, K. (2015). Therapy-induced brain reorganization patterns in aphasia. *Brain*, 138, 1097–1112. https://doi.org/10.1093/brain/awv022

Asch, S. M., Kerr, E. A., Keesey, J., Adams, J. L., Setodji, C. M., Malik, S., & McGlynn, E. A. (2006). Who is at greatest risk for receiving poor-quality health care? *New England Journal of Medicine*, *354*(11), 1147-1156. https://doi.org/10.1056/NEJMsa044464

Baker, C., Thomas, S., Tjokrowijoto, P., Ryan, B., Kneebone, I., & Stolwyk, R. (2024). Aphasia Depression and Psychological Therapy (ADaPT): Perspectives of People with Post-Stroke Aphasia on Participating in a Modified Cognitive Behavioral Therapy. *Healthcare*, *12*(7), 771. https://doi.org/10.3390/healthcare12070771

Bi, H., & Wang, M. (2022). Role of social support in poststroke depression: A meta-analysis. *Frontiers in psychiatry*, *13*, 924277. https://doi.org/10.3389/fpsyt.2022.924277

Belin, P., Zilbovicius, M., Remy, P., Francois, C., Guillaume, S., Chain, F., ... & Samson, Y. (1996). Recovery from nonfluent aphasia after melodic intonation therapy: a PET study. *Neurology*, *47*(6), 1504-1511. https://doi.org/10.1212/WNL.47.6.1504

Bellman, R. & Bellman, R. (2015). *Adaptive Control Processes: A Guided Tour*. Princeton: Princeton University Press. https://doi.org/10.1515/9781400874668

Bernheim, S. M., Ross, J. S., Krumholz, H. M., & Bradley, E. H. (2008). Influence of patients' socioeconomic status on clinical management decisions: a qualitative study. *The Annals of Family Medicine*, *6*(1), 53-59. https://doi.org/10.1370/afm.749

Brady, M. C., Kelly, H., Godwin, J., Enderby, P., & Campbell, P. (2016). Speech and language therapy for aphasia following stroke. *Cochrane Database of Systematic Reviews*, (6). https://doi.org/10.1002/14651858.CD000425.pub4

Cahana-Amitay, D., & Albert, M. L. (2015). Neuroscience of aphasia recovery: the concept of neural multifunctionality. *Current Neurology and Neuroscience Reports*, *15*(7), 41. https://doi.org/10.1007/s11910-015-0568-7

Connor, L. T., Obler, L. K., Tocco, M., Fitzpatrick, P. M., & Albert, M. L. (2001). Effect of socioeconomic status on aphasia severity and recovery. *Brain and Language*, *78*(2), 254-257. https://doi.org/10.1006/brln.2001.2459

David, R. M., & Skilbeck, C. E. (1984). Raven IQ and language recovery following stroke. *Journal of Clinical and Experimental Neuropsychology*, *6*(3), 302-308. https://doi.org/10.1080/01688638408401220

Duncan, P. W., Zorowitz, R., Bates, B., Choi, J. Y., Glasberg, J. J., Graham, G. D., ... & Reker, D. (2005). Management of adult stroke rehabilitation care: a clinical practice guideline. *Stroke*, *36*(9), e100-e143. https://doi.org/10.1161/01.STR.0000180861.54180.FF

El Hachioui, H., Lingsma, H. F., van de Sandt-Koenderman, M. E., Dippel, D. W., Koudstaal, P. J., & Visch-Brink, E. G. (2013). Recovery of aphasia after stroke: a 1-year follow-up study. *Journal of Neurology*, *260*(1), 166-171. https://doi.org/10.1007/s00415-012-6607-2

Engelter, S. T., Gostynski, M., Papa, S., Frei, M., Born, C., Ajdacic-Gross, V., ... & Lyrer, P. A. (2006). Epidemiology of aphasia attributable to first ischemic stroke: incidence, severity, fluency, etiology, and thrombolysis. *Stroke*, *37*(6), 1379-1384. https://doi.org/10.1161/01.STR.0000221815.64093.8c

Ferro, J. M., Mariano, G., & Madureira, S. (1999). Recovery from aphasia and neglect. *Cerebrovascular diseases*, *9*(Suppl. 5), 6-22. https://doi.org/10.1159/000047571

Fillingham, J. K., Sage, K., & Lambon Ralph, M. A. (2006). The treatment of anomia using errorless learning. *Neuropsychological Rehabilitation*, *16*(2), 129-154. https://doi.org/10.1080/09602010443000254

Fridriksson, J., Guo, D., Fillmore, P., Holland, A., and Rorden, C. (2013). Damage to the anterior arcuate fasciculus predicts non-fluent speech production in aphasia. *Brain*, 136, 3451–3460. https://doi.org/10.1093/brain/awt267

Fridriksson, J., Richardson, J. D., Fillmore, P., & Cai, B. (2012). Left hemisphere plasticity and aphasia recovery. *Neuroimage*, *60*(2), 854-863. https://doi.org/10.1016/j.neuroimage.2011.12.057

Geranmayeh, F., Brownsett, S. L., & Wise, R. J. (2014). Task-induced brain activity in aphasic stroke patients: what is driving recovery? *Brain*, *137*(10), 2632-2648. https://doi.org/10.1093/brain/awu163

Goldenberg, G., & Spatt, J. (1994). Influence of size and site of cerebral lesions on spontaneous recovery of aphasia and on success of language therapy. *Brain and Language*, *47*(4), 684-698. https://doi.org/10.1006/brln.1994.1063

González-Fernández, M., Davis, C., Molitoris, J. J., Newhart, M., Leigh, R., & Hillis, A. E. (2011). Formal education, socioeconomic status, and the severity of aphasia after stroke. *Archives of Physical Medicine and Rehabilitation*, *92*(11), 1809-1813. https://doi.org/10.1016/j.apmr.2011.05.026

Henseler, I., Regenbrecht, F., & Obrig, H. (2014). Lesion correlates of patholinguistic profiles in chronic aphasia: comparisons of syndrome-, modality-and symptom-level assessment. *Brain*, *137*(3), 918-930. https://doi.org/10.1093/brain/awt374

Hilari, K., Needle, J. J., & Harrison, K. L. (2012). What are the important factors in health-related quality of life for people with aphasia? A systematic review. *Archives of Physical Medicine and Rehabilitation*, *93*(1 Suppl), S86–S95. https://doi.org/10.1016/j.apmr.2011.05.028

Hillis, A. E. (2010). The ‘standard’ for poststroke aphasia recovery. *Stroke*, *41*(7). https://doi.org/10.1161/STROKEAHA.110.585364

Inatomi, Y., Yonehara, T., Omiya, S., Hashimoto, Y., Hirano, T., & Uchino, M. (2008). Aphasia during the acute phase in ischemic stroke. *Cerebrovascular Diseases*, *25*(4), 316-323. https://doi.org/10.1159/000118376

Jung, I. Y., Lim, J. Y., Kang, E. K., Sohn, H. M., & Paik, N. J. (2011). The factors associated with good responses to speech therapy combined with transcranial direct current stimulation in post-stroke aphasic patients. *Annals of Rehabilitation Medicine*, *35*(4), 460. https://doi.org/10.5535/arm.2011.35.4.460

Kang, E. K., Sohn, H. M., Han, M. K., Kim, W., Han, T. R., & Paik, N. J. (2010). Severity of post-stroke aphasia according to aphasia type and lesion location in Koreans. *Journal of Korean Medical Science*, *25*(1), 123-127. https://doi.org/10.3346/jkms.2010.25.1.123

Kertesz, A., & McCabe, P. (1975). Intelligence and aphasia: performance of aphasics on Raven's coloured progressive matrices (RCPM). *Brain and Language*, *2*, 387-395. https://doi.org/10.1016/S0093-934X(75)80079-4

Kertesz, A., & Sheppard, A. N. N. (1981). The epidemiology of aphasic and cognitive impairment in stroke: age, sex, aphasia type and laterality differences. *Brain: A Journal of Neurology*, *104*(Pt 1), 117-128. https://doi.org/10.1093/brain/104.1.117

SAFE - Stroke Alliance for Europe (2017). The Burden of Stroke Report. https://www.safestroke.eu/wp-content/uploads/2017/12/SAFE_STROKE_ROMANIA.pdf

Kiran, S. (2012). What is the nature of poststroke language recovery and reorganization? *International Scholarly Research Notices*. https://doi.org/10.5402/2012/786872

Knecht, S., Dräger, B., Deppe, M., Bobe, L., Lohmann, H., Flöel, A., ... & Henningsen, H. (2000). Handedness and hemispheric language dominance in healthy humans. *Brain*, *123*(12), 2512-2518. https://doi.org/10.1093/brain/123.12.2512

Kyrozis, A., Potagas, C., Ghika, A., Tsimpouris, P. K., Virvidaki, E. S., & Vemmos, K. N. (2009). Incidence and predictors of post-stroke aphasia: The Arcadia Stroke Registry. *European journal of Neurology*, *16*(6), 733-739. https://doi.org/10.1111/j.1468-1331.2009.02580.x

Laska, A. C., Hellblom, A., Murray, V., Kahan, T., & Von Arbin, M. (2001). Aphasia in acute stroke and relation to outcome. *Journal of Internal Medicine*, *249*(5), 413-422. https://doi.org/10.1046/j.1365-2796.2001.00812.x

Lazar, R. M., Speizer, A. E., Festa, J. R., Krakauer, J. W., & Marshall, R. S. (2008). Variability in language recovery after first-time stroke. *Journal of Neurology, Neurosurgery & Psychiatry*, *79*(5), 530-534. https://doi.org/10.1136/jnnp.2007.122457

Mandelli, M. L., Vilaplana, E., Brown, J. A., Hubbard, H. I., Binney, R. J., Attygalle, S., ... & Gorno-Tempini, M. L. (2016). Healthy brain connectivity predicts atrophy progression in non-fluent variant of primary progressive aphasia. *Brain*, *139*(10), 2778-2791. https://doi.org/10.1093/brain/aww195

Norise, C., & Hamilton, R. H. (2017). Non-invasive brain stimulation in the treatment of post-stroke and neurodegenerative aphasia: parallels, differences, and lessons learned. *Frontiers in Human Neuroscience*, *10*, 675. https://doi.org/10.3389/fnhum.2016.00675

Northcott, S., Moss, B., Harrison, K., & Hilari, K. (2016). A systematic review of the impact of stroke on social support and social networks: associated factors and patterns of change. *Clinical Rehabilitation*, *30*(8), 811–831. https://doi.org/10.1177/0269215515602136

Păun, O., Serbănescu, M. S., Badea, O., & Mogoantă, L. (2023). Assessment of Stroke Patients Admitted to a Tertiary Emergency County Hospital of Mehedinți - Romania. *Current Health Sciences Journal*, *49*(2), 179–185. https://doi.org/10.12865/CHSJ.49.02.179

Pedersen, P. M., Stig Jørgensen, H., Nakayama, H., Raaschou, H. O., & Olsen, T. S. (1995). Aphasia in acute stroke: incidence, determinants, and recovery. *Annals of Neurology: Official Journal of the American Neurological Association and the Child Neurology Society*, *38*(4), 659-666. https://doi.org/10.1002/ana.410380416

Pedersen, P. M., Vinter, K., & Olsen, T. S. (2004). Aphasia after stroke: type, severity and prognosis. *Cerebrovascular Diseases*, *17*(1), 35-43. https://doi.org/10.1159/000073896

Pickersgill, M. J., & Lincoln, N. B. (1983). Prognostic indicators and the pattern of recovery of communication in aphasic stroke patients. *Journal of Neurology, Neurosurgery & Psychiatry*, *46*(2), 130-139. http://dx.doi.org/10.1136/jnnp.46.2.130

Price, C. J., Seghier, M. L., & Leff, A. P. (2010). Predicting language outcome and recovery after stroke: the PLORAS system. *Nature Reviews Neurology*, *6*(4), 202-210. https://doi.org/10.1038/nrneurol.2010.15

Richardson, J. D., Baker, J. M., Morgan, P. S., Rorden, C., Bonilha, L., & Fridriksson, J. (2011). Cerebral perfusion in chronic stroke: implications for lesion-symptom mapping and functional MRI. *Behavioural Neurology*, *24*(2), 117-122. https://doi.org/10.3233/BEN-2011-0283

Sarno, M. T., & Levita, E. R. I. C. (1979). Recovery in treated aphasia in the first-year post-stroke. *Stroke*, *10*(6), 663-670. https://doi.org/10.1161/01.STR.10.6.663

Saur, D., Lange, R., Baumgaertner, A., Schraknepper, V., Willmes, K., Rijntjes, M., & Weiller, C. (2006). Dynamics of language reorganization after stroke. *Brain*, *129*(6), 1371-1384. https://doi.org/10.1093/brain/awl090

Seniów, J., Litwin, M., & Leśniak, M. (2009). The relationship between non-linguistic cognitive deficits and language recovery in patients with aphasia. *Journal of the Neurological Sciences*, *283*(1-2), 91-94. https://doi.org/10.1016/j.jns.2009.02.315

Sharp, D. J., Turkheimer, F. E., Bose, S. K., Scott, S. K., & Wise, R. J. (2010). Increased frontoparietal integration after stroke and cognitive recovery. *Annals of Neurology*, *68*(5), 753-756. https://doi.org/10.1002/ana.21866

Simmons-Mackie, N., & Kagan, A. (2007). Application of the ICF in aphasia. *Seminars in Speech and Language*, *28*(4), 244–253. https://doi.org/10.1055/s-2007-986521

Turkeltaub, P. E., Eickhoff, S. B., Laird, A. R., Fox, M., Wiener, M., & Fox, P. (2012). Minimizing within-experiment and within-group effects in activation likelihood estimation meta-analyses. *Human Brain Mapping*, *33*(1), 1-13. https://doi.org/10.1002/hbm.21186

Vaughan, E., & Manning, M. X. (2023). Are People with Aphasia Included in Stroke Trials? A Systematic Review and Narrative Synthesis. *Clinical Rehabilitation*, *37*(10), 1375–1385. https://doi.org/10.1177/02692155231172009

van Hees, S., McMahon, K., Angwin, A., de Zubicaray, G., Read, S., & Copland, D. A. (2014). A functional MRI study of the relationship between naming treatment outcomes and resting state functional connectivity in post-stroke aphasia. *Human Brain Mapping*, *35*(8), 3919-3931. https://doi.org/10.1002/hbm.22448

Xing, S., Lacey, E. H., Skipper-Kallal, L. M., Jiang, X., Harris-Love, M. L., Zeng, J., & Turkeltaub, P. E. (2016). Right hemisphere grey matter structure and language outcomes in chronic left hemisphere stroke. *Brain*, *139*(1), 227-241. https://doi.org/10.1093/brain/awv323

Yang, M., Li, J., Li, Y., Li, R., Pang, Y., Yao, D., ... & Chen, H. (2016). Altered intrinsic regional activity and interregional functional connectivity in post-stroke aphasia. *Scientific Reports*, *6*(1), 1-9. https://doi.org/10.1038/srep24803