

Linguistic familiarity and complexity of language competence recovery in Sundanese-Indonesian Bilingual Aphasia patients

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ABSTRACT

The incidence of stroke in Indonesia continues to increase, which causes an increase in cases of aphasia. Meanwhile, the Regulation of the Minister of Health of the Republic of Indonesia Number 81 of 2014 does not explicitly regulate the mechanism of speech therapy for bilingual aphasia patients, including those of Sundanese-Indonesian bilingual aphasia. The study aimed to find verbal expressions of bilingual aphasia patients, patterns of language competence recovery, and determinants of the language competence recovery process in Sundanese-Indonesian bilingual aphasia patients. We analyzed the data 4 Sundanese-Indonesian bilingual aphasia patients at a private Islamic hospital in Bandung and a private hospital in Jakarta, using a list of guiding questions and evaluation of TADIR: Tes Afasia untuk Diagnosis, Informasi, dan Rehabilitasi (Aphasia Test for Diagnosis, Information, and Rehabilitation). While the limited sample size of four patients may affect the generalizability and reliability of the findings, the study provides a crucial insight into recovery patterns specific to Sundanese-Indonesian bilingual aphasia patients. This study showed selective, asymmetric, and symmetric recovery patterns in bilingual Sundanese-Indonesian patients. This study reinforces the assumption that linguistic familiarity is the main factor in the recovery of language competence in Sundanese-Indonesian bilingual aphasia patients.

Keywords: Aphasia; bilingual aphasia; linguistics; neurolinguistics; Sundanese-Indonesian

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INTRODUCTION

The incidence of stroke, especially in Indonesia, is increasing daily. Based on the results of the Basic Health Research (Riskesdas) in 2018, strokes in Indonesia mainly attack the productive age (Kementerian Kesehatan RI, 2018). The World Health Organization (WHO) report in 2008 stated that 7.3 million people died from ischemic heart disease, and 6.2 million were caused by stroke and other cardiovascular diseases. Stroke is the sixth-leading cause of death in low-income countries and

the second-leading cause of death in middle- and high-income countries (Avan et al., 2019). Strokes frequently cause a condition known as aphasia, which is a language disorder created by damage to the brain's language centers (Nasrullah et al., 2019, 2021, 2023). Such damages greatly impair the communicative ability of patients. This research has also led to the development of treatment strategies that can help restore the patient's language abilities.

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Several treatments are given to aphasia patients to regain their language competence, such as rehabilitation, training, and therapy (Crosson et al., 2019; Efstratiadou et al., 2018; Fridriksson & Hillis, 2021; Gilmore et al., 2019; Marshall et al., 2018; Pierce et al., 2019). Treatment and treatment procedures are a prerequisite for an experimental answer and are carried out using therapy (Brogan et al., 2019; Purdy et al., 2019). In Indonesia, the treatment procedures given to aphasia patients are fully regulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 81 of 2014 concerning the standard of speech therapy services (Kementerian Kesehatan RI, 2014).

The screening stage is the initial stage before entering speech therapy for aphasia patients, as mentioned in the Minister of Health Regulation No. 81 of 2014. At this stage, clients receive an initial examination to determine the presence or absence of the symptoms leading to a suspected speech-language disorder. If no symptoms are found, the therapist reports the screening results to the referring party and educates the family. If the symptoms of the speech-language disorder are found, the therapist will begin to conduct a data evaluation (Kementerian Kesehatan RI, 2014).

The objects of the data evaluation on aphasia clients only concern things of a general nature, such as the type of speech-language disorder, the cause of the speech-language disorder, and the model prepared for the therapy process. In this case, during the implementation of aphasia speech therapy, the language chosen as the language of therapy is Indonesian without being associated with the patient's actual condition, who may have language competence other than Indonesian (e.g., Sundanese and Javanese). Therefore, the discussion of aphasia will be more interesting if it is brought to a more complex discussion, i.e., the aspect of bilingualism. In this case, the study will focus on Sundanese-Indonesian bilingual aphasia.

However, current regulations under the Regulation of the Minister of Health of the Republic of Indonesia Number 81 of 2014 do not adequately address the needs of bilingual aphasia patients, potentially hindering the development of effective speech therapy programs. To better accommodate the needs of Sundanese-Indonesian bilingual aphasia patients, specific regulatory changes are necessary. These changes include recognizing the importance of bilingualism in therapy and adapting therapy programs to include bilingual approaches.

Studies have explored bilingual aphasia, with Paplíkar et al. (2019) finding that bilingualism can positively impact language recovery in stroke patients. Sandberg et al. (2020) developed an online naming therapy for bilingual aphasia patients, available in English and Spanish and is being expanded to other languages. Van der Linden et al. (2018) studied cognitive effects in bilingual aphasia

patients and found similar lexical processing across patient groups. Patra et al. (2020) compared linguistic and cognitive verbal fluency in Bengali-English bilingual aphasia patients, finding higher executive control demands in verbal fluency variables but no cross-linguistic differences.

Nasrullah et al. (2019) conducted a study on a Sundanese-Indonesian bilingual aphasia patient and observed interesting recovery patterns. They found that while the second language (Indonesian) recovered earlier than the first language (Sundanese), both languages eventually showed parallel recovery. This indicates the significant role of language familiarity in the recovery process. However, their study was limited to a single case and did not explore the broader implications of linguistic familiarity and complexity in multiple patients.

The relevance of this study to previous studies lies in the same symptom, i.e., bilingual aphasia. However, the aspects raised in this study differ from those of previous studies. This study revealed a more complex aspect, i.e., verbal expressions of bilingual aphasia patients, patterns of language competence recovery, and the determinants of language competence recovery in Sundanese-Indonesian bilingual aphasia patients. The results of this study can provide theoretical and practical benefits in supporting the development of linguistic and neurologic studies for language and medical researchers, especially regarding verbal expression and patterns of restoring language competence in Sundanese-Indonesian bilingual aphasia patients. The results of this study can also at least help the therapy process and the recovery of language competence in Sundanese-Indonesian bilingual aphasia patients.

METHOD

Theoretically, the approach used in this research is a neurolinguistic and aphasiological approach. This study focused on studying the verbal expressions of post-stroke bilingual aphasia patients and the recovery pattern of their language competence. Methodologically, his research used a longitudinal case study method.

Participants

Four research participants were selected using a purposive technique and inclusion and exclusion criteria, with the inclusion criteria being ischemic and hemorrhagic post-stroke patients who had undergone outpatient treatment, expressive/Broca's aphasia patients, speakers of Sundanese and Indonesian, and those willing to participate and meeting particular education and age requirements. Exclusion criteria were receptive aphasia, global aphasia, and not mastering a third language.

Table 1
Profile of Sundanese-Indonesian Bilingual Aphasic Respondents

Patient	Age	Biological	Social	Lingual	Lesion	Types of Aphasia
A.S.	56		He started primary school education at the age of 6.5. He attended an elementary school in Bandung, which uses Indonesian as the language of instruction. At the age of 18, he continued his studies at a university in Bandung and finished at the age of 24.	He is a native speaker of Sundanese (the first language) and Indonesian (the second language). The first language acquisition started in a family context at 2. In contrast, second language acquisition started in elementary school at 6. Sundanese was acquired naturally in the family context, and Indonesian was acquired through formal learning in the educational context.	Left temporal-parietal caused by Cerebrovascular Disease (CVD) Hemorrhagic Stroke (ICH EC CVD SH)	expressive/ Broca's aphasia
S.H.	65	Born to a married couple whose backgrounds speak Sundanese as their first language and Indonesian as their second language	From 7 to 9, he attended an elementary school in Bandung, which used Indonesian as the language of instruction. At the age of 18, he continued his studies at a university in Bandung and finished at the age of 22	He is a native speaker of Sundanese (the first language) and Indonesian (the second language). The first language acquisition started in a family context at 2. In contrast, second language acquisition started in elementary school at 7. Sundanese was acquired naturally in the family context, and Indonesian was acquired through formal learning in the educational context.	Left temporal-parietal caused by Cerebrovascular Disease (CVD) Ischemic Stroke (ICH EC CVD SI)	expressive/ Broca's aphasia
E.D.	59		At 6, he started attending a private elementary school in Bandung Regency, which uses Indonesian as instruction. He works as a teacher in a school in Bandung Regency.	He is a native speaker of Sundanese (the first language) and Indonesian (the second language). His first language acquisition started in a family context at age 2. In contrast, his second language acquisition started in elementary school at age 6. Sundanese was acquired naturally in the family context, and Indonesian was acquired through formal learning in the educational context.	Left temporal-parietal caused by Cerebrovascular Disease (CVD) Ischemic Stroke (ICH EC CVD SI)	expressive/ Broca's aphasia
S.U.	51		At the age of 7, he started attending an elementary school in Bandung, which uses Indonesian as the language of instruction.	He is a native speaker of Sundanese (as a first language) and Indonesian (as a second language). His first language acquisition started in a family context at age 2. In contrast, his second language acquisition started in elementary school at age 6. Sundanese was acquired naturally in the family context, and Indonesian was acquired through formal learning in the educational context.	Left temporal-parietal caused by Cerebrovascular Disease (CVD) Hemorrhagic Stroke (ICH EC CVD SH)	expressive/ Broca's aphasia

Procedures

The reason for establishing the three assessments by therapists was based on current neurolinguistic and aphasiological research, including the first assessment, an assessment halfway through treatment, and a long-term assessment. Information from the respondents was collected at different times and on three different occasions: the acute period (14 days after the stroke attack), the second stage two weeks post-acute, and one month after the second stage.

Data were obtained through a list of guiding questions and assessments, specifically TADIR (Tes Afasia untuk Diagnosa, Informasi, dan Rehabilitasi/Aphasia Test for Diagnosis, Information, and Rehabilitation) and the Bilingual Aphasia Test by Johnson et al. (2021) and Khamis Dakwar et al. (2018). As previously mentioned, TADIR was utilized to diagnose the type of aphasia each patient had, whereas the Bilingual Aphasia Test was the key tool in assessing each patient's language proficiency. The discussions that stemmed from the interview and speech therapy were recorded on a 50 to 60-minute tape recorder.

The patients were subjected to three ratings by therapists, which involved onset (14 days after stroke), two weeks post-onset, and one month after the first stage. During these stages, different aspects of language competence were analyzed. This ranged from spontaneous speech, understanding, following orders, and naming. The section on spontaneous speech brings the patients to narrate a story and pose questions; under the understanding section, the patient is asked to point out words under semantic categories, synonyms, and antonyms. Giving an order includes testing patients on their ability to point out the subjects, follow simple or complex orders, and name objects.

Data Collection

This study took place at Al Islam Hospital Bandung City and Jakarta National Brain Center Hospital for six months, from September 2019 to February 2020. The data were collected through direct interviews with patients or their families and from medical records. Listening, note-taking, and recording techniques, were used during data collection, along with instruments and unstructured interviews. Additionally, naturalistic and intervention observations were conducted to gather information about the patients' linguistic backgrounds.

Data Analysis

The study used a qualitative approach to describe verbal expression and linguistic symptoms in Sundanese-Indonesian bilingual aphasia patients and a quantitative approach to evaluate language proficiency. Data analysis was conducted in two stages, focusing on the patients' verbal expressions and the speed of language competence recovery.

FINDINGS AND DISCUSSION

After the first evaluation, the therapy language for each Sundanese-Indonesian bilingual aphasia patient was determined. Theoretically, in deciding which language to use in the therapy, we have to refer to which language recovered the first time after the initial assessment. Since the patients AS and SH showed a fairly dominant recovery in their second language (Indonesian), they were given treatment in Indonesian in the second evaluation. As for the patient E.D., who showed a dominant recovery in her first language (Sundanese), she was given treatment in Sundanese. The patient S.U. showed a symmetrical recovery in both languages (Sundanese and Indonesian), so treatment was provided in both languages.

From 2 weeks post-onset to one month of post-onset (second evaluation), treatment was given in the Indonesian language (in the patients AS and SH), Sundanese (in the patient ED patients), and Sundanese and Indonesian (in the patient SU patients).

The second evaluation showed an increase in language competence in the language given to the patients. The patients AS and SH showed a significant increase in language competence in Indonesian. At the same time, there was no improvement in Sundanese because Sundanese in patients AS and SH were not given treatment. The patient ED showed inconsistent recovery in Sundanese (the language being treated), sometimes increasing in one aspect but decreasing in another. However, what is interesting about the recovery patterns of language competence in the patient ED is that there was an increase in Indonesian competence, even though the Indonesian in ED was not given any treatment in this second evaluation. The patient S.U. showed a significant increase in language competence in both languages (Sundanese and Indonesian). Due to the increase in the patient ED's Indonesian competence, the patient ED was given treatment in both languages (Sundanese and Indonesian) simultaneously in the third evaluation. As for the patients AS and SH were treated only in Indonesian. Both Sundanese and Indonesian in SU were given treatment.

Overall, the speech produced by all Sundanese-Indonesian bilingual aphasia patients in the third evaluation showed a significant increase in the languages given treatment, except for Sundanese in the patient E.D., which showed a decrease in competence. The patients AS and SH increasingly showed increased Indonesian competence in speech. The patient ED showed a dominant increase in Indonesian competence, in contrast to his Sundanese competence, which continued to decrease. The patient SU showed symmetrically increased language competence in both languages (Sundanese and Indonesian).

The only unique decrease in Sundanese competence observed in patient E.D., which is contrary to the general trend of increased competence in the treated languages among other patients, may be attributed to several factors. A possible explanation could be that there was a difference between the two patients concerning familiarity with and emotional attachment to the languages since it is noticed that patient E.D. An emotional attachment to Indonesian, such as its use in everyday talk or a more predominant place in the social world of the patient, could also have been there. In addition, the cognitive demands and the mental efforts made during the processing of two languages at the same time might have facilitated the deterioration of the Sundanese language. Such an anomaly would, therefore, suggest that language-specific therapy does not always have uniform results across all patients but, on the other hand, stresses the need to take specific account of individual differences in linguistic background and emotional connection with languages. Results

indicated that a personalized approach, based on the linguistic and emotional profile of the patient, will enhance the efficacy of therapy for bilingual aphasia patients.

Patient 1 (A.S.)

In the spontaneous speech evaluation, from one evaluation to another, the Indonesian competence of the patient AS increased, while the Sundanese competence did not appear. In the first evaluation, AS's spontaneous speech was still severe (speech production was poor) in both languages. AS could only produce short utterances in Indonesian, but they were not informative and did not fit language functions. Meanwhile, Sundanese speech could not be produced at all. In the second evaluation, the speech produced by AS significantly improved the language given treatment. AS continued to improve Indonesian competence, which was dominant in speech. In the last evaluation, AS increasingly increased Indonesian competence, which was dominant in speech (as shown in Table 2).

Table 2
Language Competence Evaluation Results of Patient 1 (A.S.)

Aspects of Assessment	Evaluation I		Evaluation II		Evaluation III	
	Indonesian	Sundanese	Indonesian	Sundanese	Indonesian	Sundanese
Spontaneous Speech	Short, Uninformative Speech	No Speech Appearing	Short, Informative Speech	No Speech Appearing	Long Speech	No Speech Appearing
Understanding Semantic Categories	0.4	0	0.6	0	0.4	0
Understanding Synonyms	0.6	0	0.4	0	0.8	0
Understanding Antonyms	0.4	0	0.2	0	0.2	0
Following Orders (Pointing)	0.6	0.2	0.9	0	0.8	0
Following Simple Orders	0.5	0	0.8	0	0.9	0
Following Complex Orders	0.2	0	0.2	0	0.6	0
Naming	0.45	0	0.75	0	0.7	0

AS's Indonesian competence fluctuated in understanding semantic categories and synonyms but significantly decreased in understanding antonyms. AS's Indonesian competence fluctuated in following orders while the Sundanese competence degraded. AS's Indonesian competence increased in evaluating following simple and complex orders and naming, but not Sundanese competence.

Patient 2 (S.H.)

A similar condition was also seen in the patient SH's Indonesian competence, which increased from one evaluation to another. The Sundanese competence in

the patient SH did not appear at all. In the first evaluation, patient SH's spontaneous speech was still severe (speech production was poor) in both languages. SH could only produce short utterances in Indonesian, but they were not informative and did not fit language functions. Meanwhile, Sundanese speech could not be produced at all. In the second evaluation, the speech produced by the patient SH showed a significant increase in the language given treatment. SH increasingly showed increased Indonesian competence, which was dominant in speech. In the last evaluation, SH increasingly showed an increase in Indonesian competence, dominant in speech (as shown in Table 3).

Table 3
Language Competence Evaluation Results of Patient 2 (S.H.)

Aspects of Assessment	Evaluation I		Evaluation II		Evaluation III	
	Indonesian	Sundanese	Indonesian	Sundanese	Indonesian	Sundanese
Spontaneous Speech	Short, Uninformative Speech	No Speech Appearing	Short, Informative Speech	No Speech Appearing	Long Speech	No Speech Appearing
Understanding Semantic Categories	0.6	0	0.6	0	0.8	0
Understanding Synonyms	0.8	0	0.6	0	1	0
Understanding Antonyms	0.6	0	0.8	0	0.8	0
Following Orders (Pointing)	0.7	0.2	0.7	0	0.9	0
Following Simple Orders	0.5	0	0.8	0	0.9	0
Following Complex Orders	0.4	0	0.2	0	0.8	0
Naming	0.65	0	0.85	0	0.8	0

Patient SH's Indonesian competence fluctuated in understanding semantic categories and synonyms. However, there was an improvement in understanding antonyms. In following orders (pointing) and following simple orders, Indonesian competence increased while Sundanese competence did not. In following complex orders, Indonesian competence fluctuated, but Sundanese did not appear. In naming, SH's Indonesian competence increased while Sundanese competence did not.

Several factors may be at work in causing this variability in the development of Indonesian competence across participants in the SH task, especially in semantic categories and synonyms. One explanation may be that different linguistic tasks give rise to different cognitive loads. Allowing for making sense of the meanings between semantic categories and synonyms is certainly a much more complex cognitive functioning than with antonyms, which would explain the performance differences. Moreover, these might be elements for more frequent use in daily communication contexts. If patient SH had such close opportunities to antonyms in real language uses, then he should have been building up his ability more stably because of more frequent exposure. Another potential factor could be therapy focus and intensity. If the speech therapy provided to subject SH emphasized some linguistic tasks more than others, that would have been another source of the differential pattern of recovery. The very nature of the particular strategies and actual exercises done in therapy might make some aspects of language be learned better than other aspects.

Regarding Sundanese competence always being in the lurch, even in regions where Indonesian is recovering well, this might have occurred due to a number of reasons. One major reason might be the

status of pre-stroke proficiency and use frequency of both languages. If patient SH had greater proficiency and frequency in use of Indonesian as compared to Sundanese before stroke, it would certainly be one reason why recovery in Indonesian would be better. Moreover, the emotional and practical attachment to Indonesian, perhaps more due to daily interaction in that dominant language environment, would have reinforced its recovery over Sundanese. The differential recovery of Indonesian versus Sundanese competence strongly suggests complex recovery processes in bilingual aphasia, in which language-specific factors like pre-stroke usage patterns, emotional connection, and focus during therapy may play a critical role. It is important to understand these factors for developing more effective and individual therapeutic interventions for patients with bilingual aphasia.

Patient 3 (E.D.)

The patient ED showed an asymmetrical recovery in both languages in evaluating spontaneous speech. Sundanese competence initially showed a dominant recovery. However, after the second evaluation, the conditions reversed; Indonesian competence increased, while Sundanese competence declined. Indonesian was not given any treatment in the second evaluation. In the first evaluation, ED produced fairly informative Sundanese utterances but no Indonesian ones. In the second evaluation, ED showed a dominant increase in the Sundanese competence and symptoms of code-mixing and code-switching between Indonesian and Sundanese. In the last review, ED showed a dominant increase in Indonesian competence, in contrast to Sundanese competence, which continued to decrease (as shown in Table 4).

Table 4
Language Competence Evaluation Results of Patient 3 (E.D.)

Aspects of Assessment	Evaluation I		Evaluation II		Evaluation III	
	Indonesian	Sundanese	Indonesian	Sundanese	Indonesian	Sundanese
Spontaneous Speech	No Speech Appearing	Informative Speech	Speech Appearing with Symptom of Code-Mixing	Long, Informative Speech	Decreased Competence	Long, Informative Speech
Understanding Semantic Categories	0.2	0.8	0.6	0.8	1	0.2
Understanding Synonyms	0.2	0.6	0.4	0.6	1	0.2
Understanding Antonyms	0.4	0.6	0.4	0.6	0.8	0.6
Following Orders (Pointing)	0.2	0.7	0.5	0.8	0.8	0.5
Following Simple Orders	0.5	0.8	0.8	0.5	0.9	0.5
Following Complex Orders	0.4	0.6	0.2	0.6	0.8	0.6
Naming	0.50	0.75	0.45	0.5	0.85	0.6

Patient ED showed asymmetrical recovery in both languages during evaluations of understanding of semantic categories, synonyms, antonyms, pointing, following simple and complex orders, and naming. Sundanese competence initially increased significantly, while Indonesian did not. However, after the last evaluation, the conditions reversed, with Sundanese competence decreasing and Indonesian competence significantly increasing. The only exception was the understanding of antonyms, where Sundanese competence stagnated while Indonesian competence significantly increased.

There are several underlying reasons that may explain the observed asymmetrical recovery pattern in patient ED's language competence, particularly the stagnation in understanding antonyms in Sundanese. One possibility is that understanding the antonym may be a unique process, associated with the language and not shared by other tasks. Specific cognitive difficulties in the area of understanding antonyms for Sundanese experienced by patient ED would lead to stagnation in performance.

A second potential factor is the amount and kinds of language patient ED was using before the stroke. If ED was using Indonesian much more frequently across his or her daily interactions and was at a higher level of proficiency in Indonesian, this would be a contributing factor to why Indonesian is recovering more quickly. In contrast, if Sundanese was less spoken, it would have accounted for the initial rise seen with therapy but a plateau as the language tasks became more demanding and the basic initial pattern of language might not be adequately generalized. Other factors that may contribute could be emotional or social relevance to each language. For instance, if the patient ED had a stronger emotional or social connection to Indonesian, perhaps because of

practical use and socialization, this would favor better rehabilitation in the Indonesian language. The stagnation in the Sundanese competence, especially with antonyms, may reflect less emotional engagement or practical utility of Sundanese in the daily life of ED.

Such insights call for a more balanced bilingual recovery with respect to the therapeutic approach for patient ED. One possible modification is to include more focused and intensive tasks on specific linguistic tasks that have shown stagnation—for instance, understanding antonyms in Sundanese. Besides, therapy can be adapted with emotionally involving and contextually relevant materials for Sundanese in an attempt to deepen the emotional and practical connection with the language. Further, the activities for therapy will have to allow the naturalistic use of the two languages so that the ED of the patient is exercised and given natural exposure to both the Sundanese language and Indonesian. Special cognitive, emotional, and social factors that influence language recovery need to be dealt with in a personalized manner so that a balance between recoveries in bilingual competence can be attained in bilingual aphasia patients.

Patient 4 (S.U.)

In evaluating the aspect of *spontaneous speech*, the patient S.U. showed a symmetrical recovery in both languages. However, at the end of the evaluation, Indonesian showed a more dominant increase than Sundanese. In the first evaluation, the patient S.U. showed symmetry between both languages (Sundanese and Indonesian). SU managed to produce short utterances in Sundanese and Indonesian. In the second evaluation, SU increasingly showed increased competence in both

languages (Sundanese and Indonesian). In this second evaluation, the symptoms of neologistic jargon, verbal paraphasia, and semantic jargon diminished. In the last evaluation, SU also increasingly showed a symmetrically increased

language competence in both languages (Sundanese and Indonesian). However, Indonesian was ultimately more dominant than Sundanese (as shown in table 5).

Table 5.
Language Competence Evaluation Results of Patient 4 (S.U.)

Aspects of Assessment	Evaluation I		Evaluation II		Evaluation III	
	Indonesian	Sundanese	Indonesian	Sundanese	Indonesia	Sundanese
Spontaneous Speech	Short Speech	Short Speech	Short Speech with Symptom of Neologism	Short Speech	Informative Speech	Short Speech
Understanding Semantic Categories	0.6	0.4	0.6	0.6	1	0.4
Understanding Synonyms	0.8	0.6	0.6	0.6	1	0.2
Understanding Antonyms	0.8	0.6	0.6	0.6	0.8	0.6
Following Orders (Pointing)	0.8	0.7	0.8	0.6	1	0.9
Following Simple Orders	0.8	0.7	0.9	0.7	1	0.8
Following Complex Orders	0.8	0.6	0.8	0.8	0.8	0.8
Naming	0.70	0.75	0.9	0.5	0.9	0.6

Patient SU's Indonesian competence significantly increased in understanding semantic categories and synonyms, while Sundanese showed a fluctuating increase. In understanding antonyms, Sundanese competency stagnated, but Indonesian competence significantly increased. Following orders of pointing, both Indonesian and Sundanese competencies increased symmetrically. Following simple orders, both Indonesian and Sundanese competencies increased. Sundanese competency significantly increased in following complex orders, while Indonesian competence stagnated. In the aspect of naming, Indonesian competence showed an increase, while Sundanese competency showed a fluctuating development.

Discussion

Patterns of Language Competence Recovery

Studies of bilingual aphasia generally show parallel patterns of recovery (Kuzmina et al., 2019; Peñalozza et al., 2020; Sajid et al., 2020). However, many facts showing various recovery patterns have been found (Nasrullah et al., 2019). Overall, the existing theories related to the recovery patterns of bilingual aphasia will be readdressed in the following.

Ribot (Goral, 2022; Nadeau, 2019; Nickels et al., 2019) stated that the age aspect of language acquisition is the determining factor in the pattern of bilingual aphasia recovery. According to him, a language learned earlier (first language) will experience an earlier recovery than another language learned later. Ribot's law concerning

bilingual aphasia is that the language learned comes back first (Nadeau, 2019).

Pitres concluded the opposite of Ribot's opinion. He proposed that the language mainly spoken before the onset of aphasia is first recovering (Goral, 2022). Therefore, Pitres concluded that the intensity of language use is the determining factor for bilingual aphasia recovery (Goral, 2022; Nadeau, 2019). Unlike Ribot and Pitres, Krapf (Sidtis & Sidtis, 2018) stated that the social environment and affection (emotional attitude) towards a language before or after brain injury determines which language is recovering first.

Overall, the patterns of language competence recovery in the Sundanese-Indonesian bilingual aphasia patients at Al Islam Hospital, Bandung, and National Brain Center Hospital, Jakarta, were as follows.

The patients AS and SH experienced a particular pattern of recovery, which occurs when one of the two languages is not restored. Sundanese competence (the first language) in AS and SH did not appear from the first to the third evaluation. From evaluation to evaluation, Indonesian competence (the second language) continued to experience a relatively significant increase.

The patient ED experienced an asymmetric recovery pattern; one language competence recovered to some extent first but began to experience a decline as the other language began to heal. The asymmetric recovery pattern is seen as the least common recovery pattern. In the first evaluation, ED showed a dominant increase in

Sundanese competence compared to Indonesian. Because in the first evaluation, Sundanese competence showed a dominant increase, in the second evaluation, Sundanese was determined as the language to be given treatment (as the language of the therapy). The second evaluation showed a stagnation of Sundanese competence and a relatively significant Indonesian competence. In the second evaluation, Indonesians were not given any treatment.

Opting to administer speech therapy for Sundanese after the first evaluation, despite a pattern of asymmetric recovery, influenced the patient's overall process of language recovery when the simultaneous need for Indonesian recovery was compensated for—an answer that could have led to the stagnation of competence in Sundanese and, as a matter of fact, to a significant rise in competence in Indonesian due to its natural recovery and daily use. An alternative would be to add a balance therapy that would consider both languages simultaneously, targeting languages exercises in Sundanese and Indonesian. It should help keep pace with the two languages and hopefully not lead to attrition of the gaining language. There are some suggestions also that alternating therapy or combining both languages in one session would provide better bilingual facilitation.

Because Indonesian began to show an increase in competence in the second evaluation, it was determined that both languages (Sundanese and Indonesian) would be treated in the third evaluation.

The third evaluation showed a decrease in Sundanese competence and a significant increase in Indonesian competence. This suggests that the patient ED experienced an asymmetric recovery pattern.

The patient S.U. in this study had a symmetrical pattern of recovery, which occurs when both languages are impaired to the same degree of deficit and recover at the same rate. From the first evaluation to the third evaluation, the linguistic competence of the two languages experienced a symmetrical increase and decrease. In this case, we can also refer to the opinion of Gill et al. (Geng et al., 2023; Peréa et al., 2018), who have developed an approach to the dynamic recovery process. He formulated a theoretical factor for each individual with bilingual aphasia to improve their language skills through a "dynamic tree" from one symptom to another. According to Gill et al. (Geng et al., 2023; Peréa et al., 2018), the recovery pattern of bilingual aphasia is not monolithic, but many factors determine the recovery process. Based on the dynamic recovery approach, a bilingual aphasia patient has the opportunity to experience a different condition of aphasia at each onset, so it is necessary to repeat the diagnosis. For example, an individual may initially be diagnosed as having expressive-receptive aphasia. Still, speech therapy diagnoses

them as having dominant receptive aphasia and then again as expressive aphasia.

Factors for Language Competence Recovery

Variables that may affect language recovery in bilingual aphasia patients are age and language acquisition context. In addition to Ribot (Goral, 2022; Nadeau, 2019; Nickels et al., 2019), Lambert and Fillenbaum (Gardner, 2020) also gave the view that the languages acquired in the same context are likely to show a parallel recovery and the languages developed in different ages and contexts will show different recovery processes from one another. However, the hypothesis of Lambert and Fillenbaum does not apply to the AS, SH, and SU in this study, who are relatively the same in age, language acquisition context, and recovery processes. AS, SH, and SU acquired Indonesian in official education (elementary school).

In contrast, Sundanese was acquired in a different context, i.e., the family context, so Sundanese was the first language (the mother tongue). If observed in this context – Sundanese was acquired earlier while Indonesian was acquired later – Sundanese, the first language, should have experienced an earlier recovery. However, the second language, Indonesian, recovered earlier than the first in these patients. That means another factor had a more significant influence on language recovery in the three patients.

In the case of ED, the first language (Sundanese) recovered earlier than the second language (Indonesian). In this context, it is strongly suspected that age and language acquisition factors influenced the recovery of ED's language competence.

Language Familiarity

Another factor that influences language recovery in bilingual aphasia patients is linguistic familiarity. Linguistic familiarity is seen in a pre-onset language in bilingual aphasia patients. However, in this study, the linguistic familiarity of Sundanese-Indonesian bilingual aphasia patients was related to more detailed aspects instead of focusing on only one aspect, the use of pre-onset language by bilingual aphasia patients. The elements of linguistic familiarity in bilingual aphasia patients were at least determined based on the biological aspect, mental-emotional aspect, social aspect, and structural aspect.

The biological aspect is meant as the background concerning the birth and development of a person in a particular environment. More focused, this biological aspect was narrowed down to the family background. If related to linguistic familiarity, the biological aspect means that a person's family background influences language acquisition, development, and characteristics. In addition, the neurobiological aspect also influences

the pronunciation ability of a child (Kralova et al., 2018).

In this case, the mental aspect is meant as a series of a person's emotional, rational, and mental conditions manifested in behavior, which is language behavior. An indicator of a person's mental and emotional closeness to their language is the choice of the language in expressing emotional and mental conditions that are intimate and private. If someone complains and expresses his emotional feelings using Sundanese instead of Indonesian, it means that unconsciously, that person has a greater mental-emotional closeness to Sundanese than to Indonesian.

The social aspect is the background of a person's daily interactions in various activities. Discussion about this factor can be seen from the linguistic track record of bilingual aphasia patients. We can ask the patients or their families about their language utilization before the onset of bilingual aphasia in daily social life.

The structural aspect is the background of the closeness of the two languages' structures owned by an individual. Therefore, in the aspect of language competence recovery in bilingual aphasia patients, a language with structural closeness and familiarity has the potential to experience recovery in both languages and has the potential for a cross-linguistic transfer effect competence in both languages. This cross-linguistic transfer effect will be discussed in the following subsection.

The structural similarity between Sundanese and Indonesian particularly enhances cross-linguistic transfer effects in the recovery of language competence because the shared linguistic features make syntax and phonology source-supportive for the therapy process. Studies on bilingual aphasia, such as that of Nasrullah et al. (2019), have shown that such transfer is helpful, and improvement in one language facilitates improvement in the other. However, the extent of transfer might be limited by variables such as an individual's pre-stroke

proficiency in and frequency of use of each language. This suggests that even though structural similarity may aid in recovery, therapy approaches need to be fine-tuned to maximize the benefits and address individual differences in patient needs.

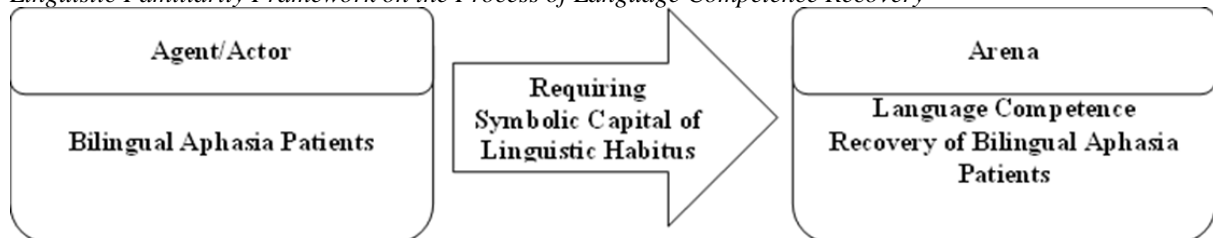
The next interesting thing is that the concept of linguistic familiarity is related to the concepts of habitus, arena, and capital presented by Bourdieu (Ancelovici, 2021; Bourdieu, 2018; Costa et al., 2019; Grillo, 2018). According to Bourdieu, habitus is meant to internalize meanings that will form a hierarchy of cultural practices and ethical codes of behavior (Jackson, 2019). Habitus can also be referred to as an individual's essential character structure or competence manifested in their arena. The future can become a capital to navigate the fight in the arena they inhabit. Social actors act in concrete social situations governed by objective social relations. Any social condition is shaped through a series of hierarchically organized arenas. The arenas in question are the economic arena, educational arena, political arena, cultural arena, and so on. In the context of linguistic familiarity, the linguistic arena is also included.

To exist in an arena, participate in competition, and play in it, one must have a certain habitus as initial capital. That means a person's habitus becomes a capital and a basic nature to enter a certain arena and become a recognized player.

In the context of language competence recovery in bilingual aphasia patients, the recovery process through a series of therapies and treatments is an arena for aphasia patients to get maximum benefit in the form of their language competence recovery. To get maximum results, bilingual aphasia patients must have certain habits that can be used as initial capital to enter the arena (language competence recovery). That is the capital we can uncover in the framework of "linguistic familiarity" with various aspects, including biological, mental-emotional, social, and structural aspects (see Figure 1).

Figure 1

Linguistic Familiarity Framework on the Process of Language Competence Recovery



Biologically, as the research subjects, all the patients had a very high biological affinity to the Sundanese language. They were born to married couples with Sundanese as their first language and Indonesian as their second language. However, the biological aspect alone is not enough. Other aspects

must also be considered: mental-emotional, social, and structural.

Mentally-emotionally, the bilingual aphasia patients in this study showed different phenomena. AS, SH, and SU uttered all things related to emotions like complaints and vented intimate and

private topics, anger, and pain in Indonesian, while the patient ED did so in Sundanese. That means, from a mental-emotional perspective, the patients AS, SH, and SU had linguistic familiarity with Indonesian, while the ED had that with Sundanese.

The linguistic track records of the patients AS and SH—Indonesians had a higher level of social familiarity than Sundanese—correlated with the recovery of both languages. Indonesians recovered earlier than the Sundanese. That means linguistic familiarity was a determining factor in language recovery in the patients AS and SH at the National Brain Center Hospital, Jakarta.

Another exciting thing happening in the recovery process of the Sundanese-Indonesian bilingual aphasia patient E.D. is that there was an effect of the treatment to the language of the therapy (Sundanese) on the recovery of language not used in the therapy (Indonesian). This could be seen after Indonesian competence increased in the second evaluation. Even though, during the 2-week post-onset therapy, Indonesian was not given any treatment at all. Does the linguistic familiarity factor in terms of the interlanguage structure in bilingual aphasia individuals also significantly influence the process of language recovery?

Theoretical and Practical Implications

It suggested major theoretical implications regarding the nature of bilingual aphasia and language competence recovery. These results highlight the importance of linguistic familiarity and dynamic interrelationships among biological, mental-emotional, social, and structural variables in the recovery process of patients suffering from bilingual aphasia. The observed patterns of recovery—selective, asymmetric, and symmetric—emphasize that theoretical models of bilingual aphasia recovery have to account for the many individual differences in terms of language history, language usage, and emotional attachment. Lastly, the structural overlap between Sundanese and Indonesian favors the concept of cross-linguistic transfer effect and fits with existing neurolinguistic theories in suggesting that therapy in one language could be beneficial for recovery in another. The above, therefore, calls for theoretical models to take into account such inter-language dynamics in the case of bilinguals.

The practical implications of this study are important in developing better therapy for patients with bilingual aphasia. As per the data, the therapy should be targeted at the linguistic and emotional profiles of the patients. For example, if strong emotional association has been identified in one language, this fact will lead us to directions on how to develop therapy that could help improve recovery. Bilingual therapy approaches, such as those described above, which take account of cross-linguistic transfer effects and provide exercises in

both languages in a balanced way, can strongly enhance effectiveness. These findings also call for changes in regulations to confirm bilingual therapy in official treatment protocols and ensure that all the other unique needs of bilingual aphasia patients are met.

Research Limitations and Suggestions for Future Research

A serious limitation is the small sample size: only four patients. Therefore, the generalization and reliability of the findings are not guaranteed. Great as the insights gained are, they might not represent a bigger population of Sundanese-Indonesian bilingual aphasia patients. Hence, in future studies, the sample size should be larger, whereby these findings might be valid and applicable. A more elaborate understanding of the patterns of recovery and, hence, long-term effectiveness with different therapeutic approaches could be derived if longitudinal studies that have tracked recovery over extended periods are done. Another limitation is that the study is nondiverse since the participants belong to the same linguistic background. The present study was based on Sundanese-Indonesian bilingual patients only, although Indonesia has several other language combinations in bilingualism. Future studies should examine a greater number of bilingual pairs to determine if the results would be upheld in the presence of this existing available population of bilingual individuals.

Moreover, the current rule, that is, The Regulation of the Minister of Health of the Republic of Indonesia Number 81 of 2014, is not fully capable of meeting the expectations of this pool of patients. There are many regulatory reforms required to ensure that better speech therapy programs can be developed. Such changes may include a bilingual therapy approach and the permissibility of linguistic diversity in therapy protocols. Tailoring the treatment to the linguistic profile and emotional attachment of the individual patient can be extremely beneficial in enhancing the outcome of recovery.

This last point also emphasized, as an implication for practice, that parameters related to linguistic familiarity and emotional attachment should be considered during the process of recovery. How these factors work is yet to be explored further, and results of the mechanisms in therapy might be possible. In addition, a more in-depth study into cross-linguistic transfer effects would give insights into optimizing bilingual therapeutic strategies. Addressing these limitations with future research expands the scope: We will be able to understand the complex dynamics of language recovery in bilingual aphasic patients and develop more effective, specialized therapeutic approaches.

CONCLUSION

US and SH patients experienced selective recovery patterns in recovering their language competence. ED patient experienced asymmetric recovery patterns, and SU patients experienced symmetric recovery patterns.

Linguistic familiarity is a significant factor in the recovery of the language competence of Sundanese-Indonesian bilingual aphasia patients. The elements included in linguistic familiarity factors are determined based on biological, mental-emotional, social, and structural aspects. Biologically, all patients have a biological affinity with the Sundanese language. Mentally-emotionally, all Sundanese-Indonesian bilingual aphasia patients exhibit different phenomena from each other. ED, SH, and SU patients express various emotion-related things using Indonesian, while ED patients express them using Sundanese.

The emotional responses and language preferences of the Sundanese-Indonesian bilingual aphasic patients greatly affect whether or not a tailored speech therapy program is useful. A patient who is more emotionally attached to Indonesian, for example, may recover faster in that language than the other way around with Sundanese. In these cases, treatment protocols should be flexible in line with individual emotional connections and usage patterns. Aligning therapy with these preferences could enhance recovery by leveraging the patient's emotional and practical connections to each language.

The lingual track record of US and SH patients correlates with the language recovery processes. In ED patients, the effect of treatment on therapeutic language (Sundanese) on the recovery of nontherapy language (Indonesian). This condition is seen after an increase in Indonesian linguistic competence in the second evaluation. In contrast, Indonesian was not treated at all during the second therapy process.

The study's overall results suggest that other aspects can still be studied, namely the cross-linguistic transfer effect in restoring the language competence of Sundanese-Indonesian bilingual aphasia patients. This aspect can be used for further research by considering the recovery factor of language competence that focuses on linguistic familiarity.

The pedagogical implications of this study suggest that bilingual aphasia therapy programs should consider linguistic familiarity and emotional attachment to the languages of concern. It helps if treatment can be matched to the particular linguistic and emotional profile to improve effectiveness in recovery. This further evidences that the concept of cross-linguistic transfer found in this study is also applicable to language learning, where advancements made in one language can assist the recovery or learning of another. Consequently, language education programs should be, to a great

extent, flexible in nature to optimize the recovery and learning process in bilingual learners or aphasia patients.

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REFERENCES

- Ancelovici, M. (2021). Bourdieu in movement: Toward a field theory of contentious politics. *Social Movement Studies, 20*(2), 155–173. <https://doi.org/10.1080/14742837.2019.1637727>
- Avan, A., Digaleh, H., Di Napoli, M., Stranges, S., Behrouz, R., Shojaeianbabaei, G., Amiri, A., Tabrizi, R., Mokhber, N., Spence, J. D., & Azarpazhooh, M. R. (2019). Socioeconomic status and stroke incidence, prevalence, mortality, and worldwide burden: An ecological analysis from the Global Burden of Disease Study 2017. *BMC Medicine, 17*(1), 1–30. <https://doi.org/10.1186/s12916-019-1397-3>
- Bourdieu, P. (2018). Structures, habitus, practices. In *Rethinking the Subject* (pp. 31–45). Routledge. <https://doi.org/10.4324/9780429497643-2>
- Brogan, E., Ciccone, N., & Godecke, E. (2019). Treatment fidelity in aphasia randomised controlled trials. *Aphasiology, 33*(7), 759–779. <https://doi.org/10.1080/02687038.2019.1576442>
- Costa, C., Burke, C., & Murphy, M. (2019). Capturing habitus: Theory, method and reflexivity. *International Journal of Research and Method in Education, 42*(1), 19–32. <https://doi.org/10.1080/1743727X.2017.1420771>
- Crosson, B., Rodriguez, A. D., Copland, D., Fridriksson, J., Krishnamurthy, L. C., Meinzer, M., Raymer, A. M., Krishnamurthy, V., & Leff, A. P. (2019). Neuroplasticity and aphasia treatments: New approaches for an old problem. *Journal of Neurology, Neurosurgery and Psychiatry, 90*(10), 1147–1155. <https://doi.org/10.1136/jnnp-2018-319649>
- Efstratiadou, E. A., Papanthasiou, I., Holland, R., Archonti, A., & Hilari, K. (2018). A systematic review of semantic feature analysis therapy studies for aphasia. *Journal of Speech, Language, and Hearing Research, 61*(5), 1261–1278.

- https://doi.org/10.1044/2018_JSLHR-L-16-0330
- Fridriksson, J., & Hillis, A. E. (2021). Current approaches to the treatment of post-stroke aphasia. *Journal of Stroke, 23*(2), 183–201. <https://doi.org/10.5853/jos.2020.05015>
- Gardner, R. C. (2020). The socio-educational model of second language acquisition. In *The Palgrave Handbook of Motivation for Language Learning* (pp. 21–37). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-28380-3_2
- Geng, S., Quiñones, I., Robles, S. G., Pomposo, I., Bermudez, G., Timofeeva, P., Molinaro, N., Carreiras, M., & Amoruso, L. (2023). “Neural dynamics supporting longitudinal plasticity of action naming across languages: MEG evidence from bilingual brain tumor patients.” *Neuropsychologia, 181*, 108494. <https://doi.org/10.1016/j.neuropsychologia.2023.108494>
- Gilmore, N., Meier, E. L., Johnson, J. P., & Kiran, S. (2019). Nonlinguistic cognitive factors predict treatment-induced recovery in chronic poststroke aphasia. *Archives of Physical Medicine and Rehabilitation, 100*(7), 1251–1258. <https://doi.org/10.1016/j.apmr.2018.12.024>
- Goral, M. (2022). What can aphasia tell us about how the first-acquired language is instantiated in the brain? *Languages, 7*(4), 283. <https://doi.org/10.3390/languages7040283>
- Grillo, C. M. (2018). Revisiting Fromm and Bourdieu: Contributions to habitus and realism. *Journal for the Theory of Social Behaviour, 48*(4), 416–432. <https://doi.org/10.1111/jtsb.12182>
- Jackson, P. (2019). *Teori-teori kritis, menantang pandangan utama studi politik internasional* [Critical theories, challenging mainstream views of international politics studies] (J. Edkins & N. Vaughan-Williams (eds.)). BACA.
- Johnson, W. D., Camille Peres, S., Benden, M. E., Mehta, R. K., Pickens, A., Lee Smith, M., Sweany, N., & Johnson, M. A. (2021). Lingual and non-lingual safety training methodology effectiveness: Does language of origin impact effectiveness. *International Journal of Industrial Ergonomics, 86*, 103183. <https://doi.org/10.1016/j.ergon.2021.103183>
- Kementerian Kesehatan RI. (2014). *Peraturan Menteri Kesehatan Republik Indonesia nomor 81 Tahun 2014 tentang standar pelayanan terapi wicara* [Regulation of the Minister of Health of the Republic of Indonesia number 81 of 2014 on speech therapy service standards] (pp. 1–23). Kementerian Kesehatan Republik Indonesia.
- Kementerian Kesehatan RI. (2018). *Hasil utama Riskesdas 2018*.
- Khamis Dakwar, R., Ahmar, M., Farah, R., & Froud, K. (2018). Diglossic aphasia and the adaptation of the Bilingual Aphasia Test to Palestinian Arabic and Modern Standard Arabic. *Journal of Neurolinguistics, 47*, 131–144. <https://doi.org/10.1016/j.jneuroling.2018.04.013>
- Kralova, Z., Tirpakova, A., & Skorvagova, E. (2018). Personality factors and foreign language pronunciation anxiety: The effect of psycho-social training. *European Journal of Contemporary Education, 7*(4), 728–740. <https://doi.org/https://doi.org/10.13187/ejced.2018.4.728>
- Kuzmina, E., Goral, M., Norvik, M., & Weekes, B. S. (2019). What influences language impairment in bilingual aphasia? A meta-analytic review. *Frontiers in Psychology, 10*, 455. <https://doi.org/10.3389/fpsyg.2019.00445>
- Marshall, J., Devane, N., Edmonds, L., Talbot, R., Wilson, S., Woolf, C., & Zwart, N. (2018). Delivering word retrieval therapies for people with aphasia in a virtual communication environment. *Aphasiology, 32*(9), 1054–1074. <https://doi.org/10.1080/02687038.2018.1488237>
- Nadeau, S. E. (2019). Bilingual aphasia: Explanations in population encoding. *Journal of Neurolinguistics, 49*, 117–143. <https://doi.org/10.1016/j.jneuroling.2018.10.002>
- Nasrullah, R., Lukman, F., & Parmin, P. (2023). Exploring code-switching and code-mixing dynamics in Sundanese-Indonesian bilingual aphasia. *LITERA, 22*(3), 292–306. <https://doi.org/10.21831/ltr.v22i3.62494>
- Nasrullah, R., Suganda, D., Wagiaty, & Riyanto, S. (2019). Recovery patterns and a linguistic therapy model of Sundanese-Indonesian bilingual aphasia: A neurolinguistic study. *Indonesian Journal of Applied Linguistics, 9*(2), 452–462. <https://doi.org/10.17509/ijal.v9i2.20243>
- Nasrullah, R., Suganda, D., Wagiaty, & Riyanto, S. (2021). Verbal-lexical expression of Indonesian-speaking persons with Broca’s aphasia. *Ilkogretim Online-Elementary Education Online, 20*(5), 692–706. <https://ilkogretim-online.org/index.php/pub/article/view/3062>
- Nickels, L., Hameau, S., Nair, V. K. K., Barr, P., & Biedermann, B. (2019). Ageing with bilingualism: Benefits and challenges. *Speech, Language and Hearing, 22*(1), 32–50. <https://doi.org/10.1080/2050571X.2018.1555988>
- Paplikar, A., Mekala, S., Bak, T. H., Dharamkar, S., Alladi, S., & Kaul, S. (2019). Bilingualism and the severity of poststroke aphasia.

- Aphasiology*, 33(1), 58–72.
<https://doi.org/10.1080/02687038.2017.1423272>
- Patra, A., Bose, A., & Marinis, T. (2020). Lexical and cognitive underpinnings of verbal fluency: Evidence from Bengali-English bilingual aphasia. *Behavioral Sciences*, 10(10), 155.
<https://doi.org/10.3390/BS10100155>
- Peñalosa, C., Barrett, K., & Kiran, S. (2020). The influence of prestroke proficiency on poststroke lexical-semantic performance in bilingual aphasia. *Aphasiology*, 34(10), 1223–1240.
<https://doi.org/10.1080/02687038.2019.1666082>
- Peréa, F. C., Padilla-Martínez, V., & Coll, C. G. (2018). The social and cultural contexts of bilingualism. In *An Introduction to Bilingualism: Principles and Processes, Second Edition* (pp. 259–299). Routledge.
<https://doi.org/10.4324/9781315101682>
- Pierce, J. E., O'halloran, R., Togher, L., & Rose, M. L. (2019). What is meant by “multimodal therapy” for aphasia? *American Journal of Speech-Language Pathology*, 28(2), 706–716.
https://doi.org/10.1044/2018_AJSLP-18-0157
- Purdy, M., Coppens, P., Madden, E. B., Mozeiko, J., Patterson, J., Wallace, S. E., & Freed, D. (2019). Reading comprehension treatment in aphasia: A systematic review. *Aphasiology*, 33(6), 629–651.
<https://doi.org/10.1080/02687038.2018.1482405>
- Sajid, N., Friston, K. J., Ekert, J. O., Price, C. J., & Green, D. W. (2020). Neuromodulatory control and language recovery in bilingual aphasia: An active inference approach. *Behavioral Sciences*, 10(10), 161.
<https://doi.org/10.3390/bs10100161>
- Sandberg, C., Gray, T., & Kiran, S. (2020). Development of a free online interactive naming therapy for bilingual aphasia. *American Journal of Speech-Language Pathology*, 29(1), 20–29.
https://doi.org/10.1044/2019_AJSLP-19-0035
- Sidtis, D. V. L., & Sidtis, J. J. (2018). The affective nature of formulaic language: A right-hemisphere subcortical process. *Frontiers in Neurology*, 9, 573.
<https://www.frontiersin.org/journals/neurology/articles/10.3389/fneur.2018.00573/full>
- Van der Linden, L., Verreyt, N., De Letter, M., Hemelsoet, D., Mariën, P., Santens, P., Stevens, M., Szmalec, A., & Duyck, W. (2018). Cognate effects and cognitive control in patients with parallel and differential bilingual aphasia. *International Journal of Language and Communication Disorders*, 53(3), 515–525. <https://doi.org/10.1111/1460-6984.12365>