



Original Article

Cohesive Properties in the Discourse of Persian-speaking with Transcortical Motor Aphasia

Omid Azad^{1*}, PhD ¹Assistant Professor of Linguistics, Faculty of Literature and Humanities, University of Gonabad, Gonabad, Iran

ARTICLE INFO

Article History:

Received: 23/07/2021

Revised: 27/10/2021

Accepted: 18/11/2021

Keywords:

Discourse

Aphasia

Persian

Please cite this article as:
Azad O. Cohesive Properties in the Discourse of Persian-speaking with Transcortical Motor Aphasia. JRSR. 2021;8(4):182-188.

ABSTRACT

Background: Although discourse properties of aphasic patients have been investigated utilizing microlinguistic as well as macrolinguistic approaches, there have been only a few studies in the Persian setting which have tried to investigate discourse properties of these brain-damaged patients. Previous researchers have concentrated mainly on the two most notorious types of aphasia, namely Broca and Wernicke. Thus, the coherence properties of transcortical motor patients have never been given serious consideration by scientists. The current study aimed to investigate whether and how transcortical aphasia patients differ from their healthy counterparts in the cohesive properties of their discourse with the aim of presenting an exhaustive account of the issue and filling the gap existing in the literature.

Methods: In doing so, via mixed-methods approach, cohesive devices in the discourse of six transcortical motor aphasics (3 participants of each gender, mean age, 56.9 years) and 6 healthy non-aphasic controls (3 participants of each gender, mean age=57.4 years) were compared.

Results: The results corroborate our hypotheses that the discourse of transcortical aphasics is less cohesive than that of healthy individuals, and they have lots of challenges in constructing grammatically cohesive devices.

Conclusion: The findings further demonstrate that discourse could be differently disrupted in diverse forms of aphasia. It is recommended that more research be conducted on different languages so as to shed more light on the issue, enriching our understanding of the nature of this disease.

2021© The Authors. Published by JRSR. All rights reserved.

Introduction

Aphasia is a type of language deficit in which people's linguistic capabilities are diminished, restraining them to have an efficient communication. Although scientists have meticulously examined the linguistic properties of different types of aphasia [1-7], only a few scholars have scrutinized the discourse properties of these patients [8-10]. The study of discourse characteristics of transcortical aphasia, as a rare type of aphasia, has never been the

main concern of researchers. In other words, the study of the connection between contextual cues and linguistic performance of transcortical motor aphasics has rarely been tackled by researchers. More recently, researchers who understand the importance of discourse properties in aphasics' communication have tried to analyze language beyond the sentence level. The present research, following the previous studies in the literature, has tried to scrutinize the discourse performance of aphasics. Moreover, it aimed to fill the gap in the literature by analyzing the cohesive properties of transcortical motor aphasics in the Persian setting.

Two major microlinguistic and macrolinguistic approaches have been used in attempts to analyze

*Corresponding author: Omid Azad, PhD; Faculty of Linguistics, No.44, 7th Imam Ali Street, Khorasan Razavi, Postal Code: 96919-86774, Gonabad, Iran. Tel: +98 51 57260569
Email: oazadling@gmail.com

linguistic properties of aphasics. Microlinguistic approaches concentrate mainly on the lexical or syntactic components of aphasic discourse, while in the lexical level, either a grammatical aspect [11, 12] or a semantic aspect has been tested [13, 14]. In the grammatical aspect, it has been acknowledged that agrammatics have a strong tendency to use nouns rather than verbs, while in the linguistic performance of Wernicke's aphasia, the opposite pattern is observed [11]. The omission of closed class categories of words and determiners, the use of fewer syntactically complex constructions, short and grammatically simple clauses, more concise argument structures, and the omission of inflectional markers have been envisaged as the most predominant syntactic features of agrammatics [10].

On the macrolinguistic level, however, different studies, which have analyzed three main components of text, have reported different results. On the functional communication level, aphasics in the early stages of the disease were capable of successfully conveying a specific message [15]. The same intact performance was also observed in the specific interactive phenomenon between aphasics and their dialogue partners, meaning these patients were capable of recruiting different types of turn-taking as well as conversation repair [16]. Concerning language efficiency, which is speakers' adherence to the main topic or their capability to impart accurate informational unit, however, the amount of information produced by aphasics was much less than that of healthy individuals [17].

It is noteworthy that although the separate analysis of microlinguistic or macrolinguistic components of aphasic linguistic performance has always inspired researchers, to date only a few studies have attempted to analyze the specific connection between these aforementioned components. However, the separate analysis of each of these components could lead to the conclusion that deficiency on the lexico-syntactic level has little impact upon a subject's performance on the macrostructure level. Consequently, it might be tempting to assert that microlinguistic and macrolinguistic components could be regarded as autonomous components [17] or dependent ones [18]. Upon this controversy in the literature, conducting further research among a variety of aphasics, including transcortical motor aphasia (which is rather less known than Broca and Wernicke's types), could shed light on the possibility of this connection. In doing so, the analysis of cohesion in languages other than English, like Persian which has a different linguistic typology, could be very illuminating.

According to Armstrong [19], cohesion can be regarded as one important way whereby microstructural aspects of a language could be connected to its macrostructural aspects. That is, the way different clauses are connected and arranged in discourse is as important as the content of the individual clause and sentence. In cohesion analysis, it is believed that instead of analyzing the meanings of separate words and clauses, it would be more rational to analyze intended words in relation to their neighboring counterparts. To achieve a plausible linguistic analysis of a text, cohesion analysis scrutinizes the semantic as

well as grammatical coherence of the text. As concerns aphasic discourse, cohesion analysis tries to analyze how the microlinguistic deficit could affect the macrolinguistic capability of the patient. In other words, the investigation of cohesion could shed light on how microlinguistic disruption could affect aphasics' capability to build a text and express their intention coherently. As a result, the analysis of cohesion in the discourse of aphasic patients could fill the gaps left by studies which have analyzed language from a solely either microlinguistic or macrolinguistic perspective.

The literature review conducted in this study highlighted the challenges faced by aphasics regarding cohesive devices. As concerns grammatical coherence, aphasics tend to use expressions without clear antecedents [11, 20] or to misuse definite articles [20]. On the other hand, these patients also tend to utilize less lexical cohesive devices than their healthy counterparts [21]. In the narrative task, aphasic patients produced not only microlinguistic and macrolinguistic types of errors, but also abundant cohesion errors, and the plausible interaction which should have existed in their discourse was missing [22, 23].

Although some studies have investigated the quantity of cohesive cues in the discourse of aphasics concluding their decreased number of cohesive cues compared with their healthy counterparts, they have held inconsistent views regarding the distribution of cohesive ties in the discourse of these patients [11, 24]. While some studies have asserted that the pattern of discourse produced by aphasics was similar to that of healthy individuals [24, 25], in other lines of studies, aphasics' different cohesion patterns were highlighted [18]. However, the possibility could not be ruled out that a lack of homogeneous aphasic group might have distorted the results. Needless to say, had sociodemographic variables been well controlled, the results might have been different.

Furthermore, previous studies have tackled the issue of cohesion in the discourse of aphasics either from a quantitative [24] or a qualitative perspective [18]. However, in order to grasp the issue more comprehensively, it is essential to replicate quantitative studies conducting qualitative ones [25]. In other words, although the quantitative approach could be beneficial in having a general comparison of cohesive devices employed by aphasics vs. healthy individuals, a qualitative approach could enrich our understanding of the nature of aphasics' deficit. It is noteworthy that while quantitative comparison has been observed to highlight a lack of difference between healthy controls and aphasics, qualitative analysis has confirmed stark differences between these two groups. Consequently, employing qualitative along with quantitative analysis could boost the cross-validity of any research in this field [26]. Upon these methodological considerations, a mixed-methods approach was employed herein to illuminate both the extent as well as the quality of aphasics' deficit. In doing so, it would be feasible to have an in-depth understanding of the nature of the cohesion deficit in aphasia along with a general comparison of the cohesive properties of the two groups of aphasic and non-aphasic individuals.

Taking all these considerations into account, it can be concluded that neither studies focusing on the microlinguistic component of the discourse nor research emphasizing the macrolinguistic component could explain the existing complexities of the discourse of aphasics in general, and the discourse of transcortical motor aphasia in particular. Rather, through conducting cohesion analysis and recruiting a mixed-methods approach, how specific errors committed by transcortical motor aphasics affect the accurate and coherent construction of text can be investigated. As previously mentioned, the lack of a homogeneous group, the selection of participants which were not well matched with each other according to the sociodemographic variables like gender and age, the sheer reliance on either qualitative or quantitative approaches, and the lack of distinction between different types of aphasia overall rendered sometimes inconsistent results, the reliability of which could be doubted. Considering these shortcomings, the present study tried to fill the gap by analyzing the cohesion characteristics of a specific type of aphasia, namely transcortical motor aphasia, and comparing the performance of patients with this type with that of healthy people. In doing so, more specifically two questions were addressed. First, is the quantity and number of cohesive devices observed in the discourse of aphasics different from the quantity of cohesive devices employed by healthy people? Secondly, is the distributional pattern of cohesive clues manifested in the discourse of transcortical motor aphasics different from that of healthy people? The first hypothesis was that the quantity and number of cohesive devices in transcortical motor aphasia patients is dramatically different from those of healthy people. It was further hypothesized that the distributional pattern of cohesive ties in the discourse of transcortical motor aphasics differs from that of shown by healthy individuals. As a result, it was assumed that the difference between healthy people and transcortical motor aphasics does not have only a quantitative origin; rather, a qualitative foundation should also be taken into account to explain their differences.

Methods

In this mixed-methods study, transcortical motor aphasics were selected through convenient sampling. The inclusion criteria included a) lesions encompassing the anterior watershed area and occlusion of the left anterior cerebral artery as well as prefrontal regions of the left or right hemisphere or the cingulate cortex; b) a transcortical motor aphasia with a duration of at least 7 months; c) Persian as the primary language, d) a minimum of a BA degree; e) monolingual speakers; f) an intact auditory or visual capability; g) lack of depression, anxiety, or any other neuropsychiatric diseases; and h) lack of addiction to alcohol or drug. All control counterparts were strictly matched for gender, age, education, and language status. Data was collected by examiners endowed with at least 12 years of interaction with aphasics. Thirty-two transcripts of discourses by 6 transcortical motor aphasics (3 of each gender, mean age=56.9 years) and the same number of matched healthy participants (3 of each gender, mean

age=57.4 years) were produced; in total, sixty-four transcripts were generated. Using different types of narratives including free speech, picture description, story narratives, and procedural discourse, the discourse data was obtained. Noteworthy to mention, before the conduction of the research, a written consent was taken from our participants demonstrating their voluntary participation in the study. Furthermore, the study was approved by the ethical board of university of Gonabad (Code IR.UOG.REC.1400.024).

Procedure

Following the framework of Halliday and Hasan [27], the quantity and distribution of cohesive devices in the discourse of the participants were elicited and analyzed. Each transcript was coded based on six types of cohesive device. The grammatical devices to be included in the analysis were reference, substitution, and ellipsis. In reference, we are dealing with an expression that does not have a fixed meaning, but whose meaning is exactly related to the context in which it occurs, possessing a fluctuating kind of meaning. For example, different types of pronouns belong to this category. In replacement, one linguistic category is replaced with another as the pronoun in the sentence "I saw Ali. He was so disturbed." Regarded also as a zero substitution, ellipsis occurs when a specific linguistic category is substituted by a null one (I bought two types of shirts. The green (ϕ) was so beautiful/(ϕ) stands for shirt). Lexical cohesion is met with the two cohesive devices of reiteration and collocation. In reiteration, the linguistic element referring to the previous linguistic segment denotes the same area of meaning, i.e. synonyms, hypernyms, and near-synonyms. For example, the second Maryam in the sentence "I saw Maryam. Maryam seemed to be so happy." On the other hand, collocation has to do with the ways words in any particular language tend to co-occur. For example, the co-occurrence of "women" and "men" in the sentence "Men are incapable of concentrating on two or more things simultaneously. In contrast, women can focus on many tasks at the same time" proves that collocational coherence is preserved in the sentence. Ultimately, cohesion could also be achieved with conjunctions which, as Halliday and Hasan asserted, are difficult to define. These linguistic elements could connect ideas within the text in a well-organized manner. They include so, but, and, yet, afterward, and so on. After all the transcripts were printed and coded, they were analyzed. After a random selection of 30% of the transcripts, the inter-coder reliability was checked. The inter-coder agreement was achieved through Cohen's kappa. The correlation coefficient between the two coders was 0.92. In the case of disagreements between the two coders, a consensus was reached through discussion.

Data Analysis

Employing the mixed-method approach, i.e. both qualitative and quantitative approaches, the data was analyzed. In the quantitative approach, both the number of cohesive ties and the proportion of cohesive ties were taken into consideration. The data was analyzed

using SPSS software (V. 6). An Independent t-test was administered, because the variance of the data was normal and homogeneous. A P value<0.05 was considered statistically significant.

Number of Cohesive Ties

As Halliday and Hasan [27] pointed out, a cohesive tie demonstrates an individual instance of coherence. To compare appropriately, the participants' lengths of discourse and the ratios of total cohesive clues by the whole T-units were measured. Adopting Young's [28] framework, a T-unit in this study encompassed a distinctive clause, a matrix clause along with its subordinate elements, and the clausal fragments generated by ellipsis. It is worth mentioning that the scope of T-units embraced discourse fillers like "um", "aha", and "ha" and discourse boundary clues like "besar khob", "khob", "mochaher", and "ali".

Proportion of Cohesive Devices

In accordance with Halliday and Hasan's [27] framework, all cohesive devices used herein were classified into three broad categories: grammatical devices, lexical devices, and conjunctions. The proportion of each category was measured by dividing a single category's number of occurrence by the total number of occurrences of all three categories. An ANOVA was conducted, while grammatical and lexical categories were regarded as dependent variables.

Qualitative Analysis

Following Glaser's 1965 constant comparative method [29], the current analysis was data-driven such that any recurring patterns across data were sought. Hence, three components of a single-transcript comparison, a between-transcript comparison of the same group, and a different-group comparison of transcripts were taken into consideration. The procedure for analyzing data was cyclical meaning; after examining the content of the transcript, each problem was labeled with a specific code (for example, inaccurate use of ellipsis). When a specific type of problem was detected, other discourse segments in which the same type of problem might have existed were searched. The frequent occurrence of the codes

was regarded as patterns. Indeed, the qualitative analysis could explain the statistical results. Thus, those areas of aphasics' discourse which are not divulged by quantitative analysis could well be explained by qualitative analysis, boosting and enriching our understanding of and insight into the nature of the discourse generated by transcortical motor aphasics.

Results

Quantitative Results

The results of quantitative analysis showed that the number of cohesive clues per T-unit in the transcortical motor aphasia was smaller than that of those employed in the discourse of healthy people. Moreover, the proportion of cohesive devices in the two groups demonstrated diverse distributions. The difference between transcortical motor aphasics and healthy people lied mainly in the cohesive categories of grammatical cues and conjunctions.

Number and Proportion of Cohesive Clues

As Tables 1 and 2 demonstrates, the results of the Independent t-test highlighted a significant difference between the two groups of transcortical motor aphasics and healthy people regarding the number of cohesive clues per T-unit (T (2, 24)=452.81, P<0.05). Furthermore, regarding the proportions of cohesive devices in the discourse, there was also a significant difference between the two groups (T=2.96, P<0.05). When the proportions of each category were analyzed separately, significant differences were observed between the two groups in the components of lexical devices (T (2, 24)=7.42, P<0.05), grammatical devices (T (2, 24)=4.68, P<0.05), and conjunctive devices (T (2, 24)=12.04, P<0.05).

Qualitative Results

The analyses of clauses produced by aphasics showed that transcortical motor aphasics, compared to healthy people, had a strong tendency to generate simple clauses. Furthermore, transcortical motor aphasics tended to recruit cohesive devices in their discourse less than the healthy controls. When comparing the patterns of discourse generated by transcortical motor aphasics with

Table 1: Mean of T-units, mean of total cohesive ties, and mean of cohesive ties per T-unit in the discourse of healthy people and transcortical motor aphasics

Parameters	TMA	Healthy people
Thematic units	63.12	182.19
Total Cohesive Clues	61.28	454.18
Cohesive Ties Per T. unit (0.096)	1.01 (0.148)	2.34
t-test Statistics	T (2, 24)=412.68, P=0.000	

Table 2: Mean of proportions of cohesive devices in relation to the total cohesive cues in the discourse of transcortical motor aphasics and healthy people (Standard deviations in the parentheses)

Type of cohesive cues	TMA results	Healthy people	ANOVA
Lexical devices	17.25% (0.06)	20.08% (0.02)	F (2, 28)=6.41, P=0.005
Conjunction	39.26% (0.06)	30.22% (0.04)	F (2, 28)=12.21, p=0.000
Grammatical devices	42.68% (0.06)	54.42% (0.05)	F (2, 28)=4.27, P=0.054
t-test statistics	T=2.83, P=0.036		

*TMA: Transcortical motor aphasia

those of healthy participants, we found two common patterns in the discourse of the former group worth mentioning. The first pattern was transcortical motor aphasics' insufficient use of grammatical markers. Example (1) below well illustrates this pattern.

1) gusfanda daran chera mikonan. Va chupun unja vastadeh. Va chupun [unrecognizable word] kenare derakhte. Va sage dare pars mikoneh. Va donafar az ahalie rusta unja [unrecognizable word]. Va Gusfanda va chupun [unrecognizable word].

Example 1 is the transcript of a narrative produced by transcortical motor aphasics. In the task "gusfand", the participants were presented with a consecutive set of pictures and asked to make up a story about the rescue of sheep by two villagers. As this example indicates, the aphasic group had a strong propensity to omit grammatical markers, like demonstratives. In doing so, they would fail to build satisfactory cohesive ties between grammatical cues and their antecedents.

Regarding lexical cohesive devices, transcortical motor aphasics were inclined to produce lexical devices in a monotonous manner. Within this broad device, they tended to utilize repetition more than other devices. The following examples illustrate this point vividly.

4) Maryam bache yatim tu [unrecognizable word]. Maryam ... Bache yatim tu un shahr. Shohar-pedaresh mikhast tata vase bachehaye khodesh lebas bekhare. Shohar-pedaresh ba mamananesh bachehaye khodesh sohbat mikard. Maryam dar morede lebas nazari nadasht (Transcortical motor aphasics).

5) Maryam ye bache yatimi budesh ke dar ye ki az shahraye jonube kerman bedonya umad. u pedaresho tu ye sanehe ranandegi az dast dad. In doktor, badan vakhti mamananesh ezdevaj kard majbur shod ba khaharaye nataniash tu ye khune zire ye saqf zendegi kone. Una hichvaqt ba ham nasakhtan. Ina ye khanevade ye dast nabudan. Khob, marde be bachehash bishtar az farzande hamsare dovomesh tavajo mikard. Dorost az inja budesh ke moshkelate dokhtarake bichare shoru shod.

As example 4 showed, transcortical motor aphasics resorted to repetition only as a main cohesive device (e.g., Maryam....Maryam....Maryam; Bachehaye khodesh bachehaye khodesh; Bache yatim....bache yatim; Shoharpedaresh....shoharpedaresh; lebas....lebas).

In sharp contrast with the example (4), the example (5) demonstrates that healthy participants tend to use diverse categories of cohesive ties in their discourse including collocation (bache...pedar; dokhtar....maman; khune.....saqf...zendegi;...khanevade; yatim.....bichare; nasakhtan....moshkelat) and reference (e.g., "u" in the second sentence; "in" in the second sentence; "una" and "ina" in the fourth sentence and also "inja" in the sixth sentence).

Regarding the distribution of cohesive categories in the two groups, the patient group outperformed the healthy group in the maintenance of lexical cohesion, but the distribution of cohesive ties, as the above examples, was equal in the healthy participants. It is noteworthy that the excessive use of the cohesive device of conjunction "va (and)" was an outstanding phenomenon in the discourse of transcortical motor aphasics.

Discussion

Despite the fact that the important role of cohesive ties in the construction of a well-organized discourse and the crucial role that it plays in connecting microlinguistic and macrolinguistic structures have been tackled by previous researchers, only a few studies have investigated the cohesion of aphasics in general and transcortical motor aphasics in particular. The major objective of the current research was to illustrate the cohesive devices employed by transcortical motor aphasics and compare their production with that of healthy individuals. Having employed both quantitative and qualitative approaches, it was concluded that the discourse produced by transcortical motor aphasics is less cohesive than that of their healthy counterparts. Furthermore, the distribution of cohesive properties differed between the two groups. Quantitative and qualitative approaches sometimes showed discrepancies in this regard, while other times consistency in the results was obvious. The quantitative analysis demonstrated that transcortical motor aphasics performed poorly compared to their healthy counterparts. The results of two important qualitative analyses corroborated this finding. The first property has to do with transcortical motor aphasics' lesser cohesive ties than their healthy counterparts, culminating in their decreasing number of cohesive clues. Another important property is transcortical motor aphasics' propensity to produce individual clauses or coordinate clauses instead of subordinate clauses, culminating in the creation of a higher number of T-units. As the number of cohesive ties is obtained through the proportion of the total cohesive ties to the whole T-units, why cohesive ties in the patient group are fewer than their healthy counterpart can be explained. In this regard, the current findings are consistent with those of previous studies which acknowledged that the number of cohesive ties and errors produced by aphasics is smaller than that of their healthy counterparts [18].

Although the distribution and diversity of cohesive clues showed that the amount of conjunctive cohesion in the discourse of transcortical motor aphasics was much greater than their healthy counterparts, this finding should not be interpreted as aphasics' propensity to use cohesive clues voluntarily. According to the qualitative analysis, it became evident that the higher number of conjunctions in the patients' discourse might be due to the fact that their ability to create a well-organized lexical and grammatical cohesion was more negatively affected than their ability to build conjunctive cohesion. Moreover, according to the qualitative analysis, while there was abundant employment of cohesive ties of the additive type in the discourse of the patient group, there were only a few types of adversative, temporal, and causal conjunctions. This finding is in agreement with the previous results in the literature which emphasized aphasics' tendency to generate so many simple concatenations, yet only a few complex subordinate structures [11]. As Sherratt and Bryan [30] correctly asserted, the excessive use of the conjunction "and" by aphasics suggests their challenges in selecting an accurate conjunction, highlighting the

relationships between different propositions. Hence, as their last resort, they tend to utilize “*va*” as the most unmarked form of conjunction in their discourse.

Transcortical motor aphasics demonstrated different patterns of distribution of grammatical and lexical cohesion when compared with healthy individuals. Quantitative results showed a significant difference between the patient group and healthy individuals in the proportion of grammatical cohesion. This result was consistent with the qualitative observation that transcortical motor aphasics face many challenges in creating reference cohesion, because they cannot appropriately use articles and pronouns. This tendency led to the employment of less grammatical ties by the patient group. The current results about aphasics’ propensity to delete determiners and their violation of grammatical cohesion are in line with the findings of previous research [10-11, 15, 19]. Nonetheless, although quantitative results did not divulge any significant difference between the two groups, qualitative analysis showed that the patient group employed lexical cohesion with less diversity and flexibility. This rather similar performance of the two groups could well be explained by aphasics’ propensity to resort to lexical repetition as an efficient communicative strategy to continue talking, as they are incapable of creating a clear anaphoric relationship [31].

Ultimately, as the current results proved and according to previous research on the maintenance of coherence in other types of aphasia, it could be concluded that the maintenance of cohesion in aphasia has a multifaceted nature. In other words, cohesion might be diversely employed by individuals with different types of aphasia. Therefore, future studies should be geared toward researching other types of aphasia as well as shedding more light on the nature of the deficit. Moreover, the current study employed only narratives to elicit cohesive clues; however, if other types of discourse were used, the results might have been different, as previous research has already claimed that different types of discourse would prompt speakers to utilize diverse cognitive as well as linguistic resources [32, 33]. Furthermore, if other techniques for the analysis of cohesive properties in the discourse of the participants had been recruited, we might have observed different outcomes. Needless to say the employment of different methods for the selection of the participants might have distorted the results. Worthy to mention, future researches should concentrate on the employment of longitudinal methodologies and on-line techniques to monitor better the function of cohesive clues in the discourse of transcortical motor aphasics.

Conclusion

As the current results showed, transcortical motor aphasics performed poorly in the quantity of cohesive devices as well as the manner and pattern of distribution of cohesive devices. Transcortical motor aphasics face many challenges in building a satisfactory grammatical cohesion. As a result, the possibility that microlinguistic deficits might be related to macrolinguistic impairments

could not be ruled out.

Acknowledgment

The authors’ special thanks go to all participants in the study as well as their families for their tolerance and enthusiasm in cooperating with this research.

Funding

The research was not supported by any private or non-private institution.

Conflict of Interest: None declared.

References

1. Libben G. Morphological representations and morphological deficits in aphasia. In *Morphology, phonology, and aphasia 1990* (pp. 20-31). Springer, New York, NY.
2. Sung JE, DeDe G, Lee SE. Cross-linguistic differences in a picture-description task between Korean- and English-speaking individuals with aphasia. *Am J Speech Lang Pathol.* 2016; 25(4S): 813-22.
3. Shapiro K, Shelton J, Caramazza A. Grammatical class in lexical production and morphological processing: Evidence from a case of fluent aphasia. *Cogn Neuropsychol.* 2000; 17(8):665-82.
4. Ardila A. Grammar in the brain: Two grammar subsystems and two agrammatic types of aphasia. *J Neurolinguistics.* 2021; 1: 58-70.
5. Piazza G, Calabria M, Semenza C, Poletto C. Processing of semantic and grammatical gender in Spanish speakers with aphasia. *Aphasiology.* 2021; 30:1-22.
6. Salis C, Martin N, Reinert L. Sentence Recall in Latent and Anomic Aphasia: An Exploratory Study of Semantics and Syntax. *Brain Sci.* 2021;11(2):230-242.
7. Koukouloti V, Stavrakaki S, Konstantinopoulou E, Ioannidis P. Time reference, morphology and prototypicality: tense production in stroke aphasia and semantic dementia in Greek. *Clin Linguist Phon.* 2020. 34(9):791-825
8. Edwards S, Garman M, Knott R. The grammatical characterization of aphasic language. *Aphasiology.* 1993;7(2):217-20.
9. Boye K, Bastiaanse R. Grammatical versus lexical words in theory and aphasia: Integrating linguistics and neurolinguistics. *Glossa.* 2018;3(1): 1-12.
10. Pritchard M, Hilari K, Cocks N, Dipper L. Reviewing the quality of discourse information measures in aphasia. *Int J Lang Commun Disord.* 2017;52(6):689-732.
11. Dietz A, Boyle M. Discourse measurement in aphasia: Consensus and caveats. *Aphasiology.* 2018;32(4):487-92.
12. Martínez-Ferreiro S, Ishkhanyan B, Rosell-Clarí V, Boye K. Prepositions and pronouns in connected discourse of individuals with aphasia. *Clin Linguist Phon.* 2019;33(6):497-517.
13. Rider JD, Wright HH, Marshall RC, Page JL. Using semantic feature analysis to improve contextual discourse in adults with aphasia. *Age (in years).* 2008;73(55):62.
14. Gorno-Tempini ML, Dronkers NF, Rankin KP, Ogar JM, Phengrasamy L, Rosen HJ, Johnson JK, Weiner MW, Miller BL. Cognition and anatomy in three variants of primary progressive aphasia. *Annals of Neurology.* 2004;55(3):335-46.
15. Harris Wright H, Capilouto GJ. Considering a multi-level approach to understanding maintenance of global coherence in adults with aphasia. *Aphasiology.* 2012;26(5):656-72.
16. Beeke S, Johnson F, Beckley F, Heilemann C, Edwards S, Maxim J, Best W. Enabling better conversations between a man with aphasia and his conversation partner: Incorporating writing into turn taking. *Res Lang Soc Interact.* 2014;47(3):292-305.
17. Korpjaakko-Huuhka AM, Lind M. The impact of aphasia on textual coherence: Evidence from two typologically different languages. *J Interact Res Commun Disord.* 2012;3(1):47
18. Zhang M, Geng L, Yang Y, Ding H. Cohesion in the discourse of people with post-stroke aphasia. *Clin Linguist Phon.* 2021;35(1):2-18.
19. Armstrong E. Aphasic discourse analysis: The story so far.

- Aphasiology. 2000;14(9):875-92.
20. Cummings L. On making a sandwich: Procedural discourse in adults with right-hemisphere damage. In *Further Advances in Pragmatics and Philosophy: Part 2 Theories and Applications 2019* (pp. 331-355). Springer, Cham.
 21. Jaecks P, Hielscher-Fastabend M, Stenneken P. Diagnosing residual aphasia using spontaneous speech analysis. *Aphasiology*. 2012; 26(7):953-70.
 22. Andreetta S, Marini A. The effect of lexical deficits on narrative disturbances in fluent aphasia. *Aphasiology*. 2015; 29(6):705-23.
 23. Cummings L. Narrating the Cinderella story in adults with primary progressive aphasia. In *Further Advances in Pragmatics and Philosophy: Part 2 Theories and Applications 2019* (pp. 301-329). Springer, Cham.
 24. Behrns I, Ahlsén E. Cohesion in narratives written by participants with aphasia. In *Presentation at the ICPLA conference, Cork, Ireland 2012*.
 25. Linnik A, Bastiaanse R, Höhle B. Discourse production in aphasia: A current review of theoretical and methodological challenges. *Aphasiology*. 2016; 30(7):765-800.
 26. Elman RJ. Multimethod research: A search for understanding. *Clinical Aphasiology*. 1995;23:77-81.
 27. Halliday MA, Hasan R. *Cohesion in English*. Routledge; 2014.
 28. Young R. Conversational styles in language proficiency interviews. *Language Learning*. 1995;45(1):3-42.
 29. Glaser BG. The constant comparative method of qualitative analysis. *Soc Probl*. 1965;12(4):436-45.
 30. Sherratt S, Bryan K. Discourse production after right brain damage: Gaining a comprehensive picture using a multi-level processing model. *J Neurolinguistics*. 2012;25(4):213-39.
 31. Leiwo M, Klippi A. Lexical repetition as a communicative strategy in Broca's aphasia. *Aphasiology*. 2000;14(2):203-24
 32. Rogalski Y, Altmann LJ, Plummer-D'Amato P, Behrman AL, Marsiske M. Discourse coherence and cognition after stroke: A dual task study. *J Commun Disord*. 2010;43(3):212-24.
 33. Martínez-Ferreiro S, Ishkhanyan B, Rosell-Clarí V, Boye K. Prepositions and pronouns in connected discourse of individuals with aphasia. *Clin Linguist Phon*. 2019;33(6):497-517.