Research Article

Selective Impairment of Verb Tense in Mazandarani-Speaking Agrammatic Patients

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ABSTRACT

Introduction: Among many grammatical problems affecting agrammatic patients, those of inflectional morphology, specifically tense, stand at the forefront. This study aimed to analyze tense properties in Mazandarani-speaking Broca patients to see which aspects of this inflectional system were more negatively affected.

Materials and Methods: Utilizing inclusion/exclusion criteria, we chose 10 patients (mean age 47 years) in this descriptive-analytical research. To select our participants, some criteria including the results of the Persian aphasia test, monolingualism, and magnetic resonance imaging reports were considered which corroborated the involvement of the anterior frontal lobe, inferior anterior parietal lobe, Perisylvian, and Broca's areas as well as inferior frontal gyrus. To monitor our patients' performance in three separate tenses of present (progressive), future, and past (simple past, past perfect, and past continuous), we administered written sentence completion and sentence-to-picture matching tests. To investigate whether our patients' performance in diverse verb tenses was significantly different, we utilized Wilcoxon statistics to analyze our data.

Results: The results demonstrated a significant difference between the performance of the patients in past progressive tense compared to other tenses (P=0.02). Furthermore, a significant difference was observed between the mean responses to past tenses and present-future tenses.

Conclusion: Mazandarani-speaking agrammatic demonstrated selective poor performance in the past tense inflection. Regarding the crucial role of tense properties in verbal communication, specifically past tense, to talk about past events and memories, more attention is needed by clinicians and speech therapists to reinforce tense properties enhancing agrammatic communication capabilities.

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Introduction

Human beings are the only species capable of producing and understanding grammatical structures. The syntax of a particular language controls the production of grammatical rules whereby humans can create well-formed sentences. The syntactic structure, by itself, is a sub-branch of a more generalized system called grammar whereby humans can even, on one hand, produce and understand an infinite number of well-formed sentences, and on the other hand, detect ill-formed structures very easily [1]. Every disruption either in production or comprehension modes of grammar can affect negatively people's capability to impart well-formed utterances. In this regard, Broca's aphasics are a class of patients who suffer from the loss of syntactic knowledge. Broca's aphasia is one of the most widespread types of aphasia possessing some vivid features including non-fluent discourse, effortful discourse, and the production of concise and brief utterances. In other words, their speech marks the characteristics of a telegraphic speech composed of main lexical categories like nouns and verbs lacking grammatical features like inflections, articles, prepositions, and conjunctions. So, their speech is usually known as agrammatic speech [2, 3].

From a traditional standpoint, agrammatism is defined as the result of syntactic simplicity as these patients would find this strategy the most convenient way of communication. Also, free or bound morpheme reduction or substitution plays a role in linguistic disruption. Consequently, traditional scholars mainly assign agrammatism to problems in linguistic production [4]. For example, in a separate study, it was asserted that Broca's aphasics had lots of challenges in producing functional morphemes compared to object and noun naming [5]. The other line of studies has also emphasized that Broca's aphasics would generate fewer verb tenses in their spontaneous speech [6]. Generally, our survey of past studies on agrammatism revealed that all components of functional categories are not uniformly affected yet verb tenses might selectively be affected negatively [7]. The study of tense properties in these researches meant the scrutiny of the time on which a specific activity has been carried out. This feature could be detected by the verb morphology in most Indo-European languages.

On the other hand, modern scholars have attempted to propose different explanations for agrammatic patterns. The first category of scholars included those favoring processing accounts for agrammatism. They claim that a deficit in the underlying processing mechanism would impede agrammatics to manipulate and sort out the grammatical information properly leading to their poor performance [8, 9]. However, the second group of scholars assigned agrammatism to the representational level [2, 10, 11]. In these studies, it was asserted that telegraphic speech demonstrates a reduction in agrammatic syntactic knowledge. In this regard, more recent theories have utilized syntactic tree diagrams to explain the productive deficits of patients. For instance, Hagiwara [12] proposed that those functional categories in the lower positions (determiner phrase and complementizer phrase) are less prone to disruption than those standing in the higher positions (inflection phrase, noun phrase, and tense phrase). In this regard, researchers like Reznik [13] modified Rizzi's claims saying that those functional categories possessing some contents are better preserved because they exist both in the phonetic form (PF) and logical form (LF). In another study, different stages of sentence planning were proposed, and any deficit in grammar was assigned either to the functional processing level in which open class categories like nouns and verbs are presented or to the situational level in which initially free and bound morphemes are configurated and then phonological features of words are manifested [14]. Friedmann and Grodzinsky concluded that tense and agreement should be dissociated in a tree diagram. Proposing the tree-pruning hypothesis, they asserted that a deficit in the tense node would culminate in the disruption of the whole tree, thus preventing the creation of additional nodes [15]. In another separate study, two main reasons for verb inflection errors were suggested [16]. The first reason, in their viewpoint, was a pre-phonological deficit in which patients were incapable of selecting or executing diacritical features related to verb tense. The second reason was disrupted affixation during phonological coding. However, they declared that the first hypothesis would sound more logical. Noteworthy to mention, in a more recent view on agrammatism, known as minimalism, Chomsky did not believe in the hierarchical order of tense and agreement in the tree diagram, however, he placed them under the same grammatical node [17].

A glimpse of previous studies that have analyzed tense properties in agrammatics demonstrated that past tense and more generally any tense with more enriched morphology is more negatively affected than other tenses [5, 18, 19]. In Mazandarani or Tabari, a northwestern branch of Iranian languages that belongs to the Caspian language family, three main tenses including past, future, and present can be envisaged. In this language, verb tense properties could be manifested in the verb morphological structure as clitics which demonstrate the subject

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grammatical role. However, the enclitic pronoun which is common in Persian, has no place in Mazandarani. Because in the latter, the present perfect merges with preterite. This feature makes the Caspian language family unique among the Iranian families because, in Persian, the present perfect is created from the past participle.

Our major objectives for this research were multifold. First, considering the importance of the agrammatic speech specifically tense properties in these patients, we could analyze the manifestations of tense in yet another less studied language, that is, Mazandarani with unique typological characteristics. Despite the crucial effect of cross-linguistic comparison in divulging the nature of tense deficit, there was a gap in the literature. Because, as of now, only a few studies have tackled the issue, and to the best of our knowledge, no study in Iran has particularly scrutinized tense patterns in Mazandarani among aphasic patients. More importantly, in Mazandarani, which is endowed with idiosyncratic morph-phonological features of verbs, and typological characteristics, we could detect some linguistic features that might affect aphasic patients' performance differently compared to the linguistic pattern that might be observed in Persian-speaking aphasic patients. Some of these outstanding features are as follows. For instance, we can observe a certain degree of variance in person markers among Mazandarani varieties. More specifically, in the variety spoken in Amol, the third person plural is reduced to (ənenə). Also, in Mazandarani, we could observe a distinction between non-past and past stems of the verbs while there are so many stems in which you might not observe overt synchronic agreement such as "ʃor-: ʃoss- "wash" or xəs-: xət- "sleep" [20]. We can also find alternate past forms, as in "kâr- "kârəss~kâʃt- "sow". Furthermore, the morph-phonological features of the person markers demonstrate a large category, because both the ending and the present stem may alter depending on the final sound of the stem. For example, whenever the stem ends in either "r" or "l", these liquids would assimilate to the nasal consonant of the second and third singular endings, e.g. van-ne "he carries". Second, any sentence could be regarded as the most pivotal unit of communication and information exchange, and in doing so, tense plays a crucial role in shaping the information structure of the sentence as well as expressing and imparting a speaker's intention. Our major goal in this study was to demonstrate our participants' performance regarding the generation and comprehension of different verb tenses in the Mazandarani language and to see whether their linguistic behaviors regarding diverse verb tenses were similar. In doing so, as our secondary goal, we attempted to investigate whether these agrammatic aphasics demonstrate selective impairment in the generation and comprehension of verb tense inflection. We might also be tempted to hypothesize that tense is a homogeneous category in the Mazandarani language which could be uniformly affected in aphasic patients. The findings of this study could be utilized by clinicians and speech therapists to improve the communicative needs of agrammatic patients. As a result, these patients, quality of life, and also their hope for life could increase.

Materials and Methods

Study design

The present research is a descriptive-analytical study and was conducted at speech therapy clinics of Imam Reza Hospital as well as Welfare and Rehabilitation Centers in Amol, Iran, at the period of August 6, 2021, to February 8, 2022.

Study subjects

We utilized a cross-sectional descriptive-analytical method to analyze the performance of 10 participants. As access to our patients was difficult, we chose a convenient sampling method for the selection of our patients. Noteworthy to mention, a written consent form verifying patients' satisfaction to participate in the study was taken from all participants. In this regard, we utilized an inclusion/exclusion strategy to choose our target patients. Our inclusion criteria were monolingualism (Mazandarani as their mother tongue), lack of other neuropsychological and neuropsychiatric diseases except for Broca, intact audio-visual capabilities, lack of anxiety and depression (as patients should have eagerly participated in communicative interactions), and demonstration of unilateral brain lesion at least two years after the onset of the disease.

The age range of our participants varied from 41 to 53 years with a mean age of 47.4. Furthermore, to neutralize the effect of education on the performance of participants, and as our patients' success in the structured and controlled tests was closely related to their educational level, we also controlled this variable. So, we chose our participants from among those individuals who had already obtained their bachelor's degrees. In doing so, we excluded patients suffering from severe depression, and poor audio-visual capabilities as well as those reluctant to participate in the study. Having translated and modified the bedside version of the Persian western aphasia battery (P-WAB-1) [21] to Mazandarani, we examined its reliability and validity for screening our subjects' apha-

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Table 1. Patients' demographic information

Patient	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10
Age (y)	43	46	51	45	50	41	53	48	46	51
Gender	Male	Female	Male	Male	Female	Male	Female	Female	Male	Female
Language	Mazan-darani	Mazan-darani	Mazan-darani	Mazan-darani	Mazan-darani	Mazan-darani	Mazan-darani	Mazan-darani	Mazan-darani	Mazanda-rani
Handed-ness	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right
Educa-tion	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA
Lesion site	AFL	AFL	IAPL	IFG	PBrA	IAPL	PBrA	IAPL	IFG	PBrA
Onset	Feb 2022	Jan 2022	Dec 2021	Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Aug 2021	Sep 2021

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Abbreviations: AFL: Anterior frontal lobe; IAPL: Inferior anterior parietal lobe; PBrA: Perisylvian and Broca's areas; IFG: Inferior frontal gyrus.

sia type. The stimuli we had selected for our test were based on faithful translation and content validity index (CVI) from the expert panel of 50 consecutive brain-damaged patients referring to different university clinics for rehabilitation in Mazandaran, 25 healthy subjects as standards, and 30 age-matched epileptic patients as the control group. The results demonstrated an internal consistency of (0.82) and a CVI of 0.91 which meant the test had excellent psychometric properties. Furthermore, a review of the neuroradiology of patients corroborated our evaluation, demonstrating the accurate classification of patients. The lesion sites of these patients included the anterior frontal lobe, inferior anterior parietal lobe, Peri-sylvian and Broca's areas as well as the inferior frontal gyrus. The common characteristics of all these patients were their fruitful, telegraphic, ungrammatical speech, and relatively intact syntactic comprehension capabilities.

Ultimately, based on the results of the CT scan, magnet-ic resonance imaging, and Persian aphasia test, we chose the best candidates for participation in the study from among those patients who had referred to Amol Imam Reza Hospital and Welfare and Rehabilitation Centers over 6 consecutive months. In Table 1, the demographic characteristics of our participants were summarized.

Instrument

We used a completion test composed of two sections of sentence completion and sentence-to-picture completion to evaluate patients' performance regarding diverse verb tense inflections. We had already confirmed the reliabil-ity as well as the validity of the test before its conduction.

In doing so, utilizing the Cronbach α, we evaluated the internal consistency of the test. The outcome of statisti-cal analysis demonstrated 0.95 proving excellent consis-tency of the stimuli. Having asked a group of linguists with a specialty in psycholinguistics about the content of the questions, we assessed the content validity of the test, and a CVI of 0.86 corroborated the excellent valid-ity of the test, and demonstrated its suitability with the objectives of the research. Henceforth, the validity and reliability results corroborated that the test had excel-lent psychometric properties. Our major rationale for the selection of the structured test was because, as pre-vious studies had already emphasized, structured tests compared to their spontaneous counterparts could better diagnose and describe inflectional and syntactic charac-teristics [19, 22, 23].

Cloze and sentence-to-picture completion test was composed of 40 sentences that were not completed. Of these 40 sentences, 20 belonged to the cloze (written) completion section, and the same number was related to the sentence-to-picture completion section. All the sen-tences belonged to the simple declarative positive cate-gory. Noteworthy to mention, we provided the necessary linguistic context (co-text) and recruited some linguistic markers like time adverbs or adjuncts to assist the reader (listener) grasp the meaning of the sentences more easily. For example, in the sentence "ĵəmə ʃu memun dâymi" rendered as "Friday night, we'll have a guest", the time adverb " ĵəmə ʃu " meaning " Friday night " could have assisted the reader (listener) to fathom out that the main (logical) tense of the verb was future. All the sentences embraced all major categories of past tense including

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simple past, present perfect, past perfect, past continuous, present progressive, and future tense. Specifically, for each verb tense, 4 sentences for the cloze section and 4 sentences for the sentence-to-picture matching section were designed. To familiarize the patient with the test in each section, a supplementary explanation about the test along with one example was presented to the participant. Noteworthy to emphasize, as in the Mazandarani language, belonging to the northern branch of Iranian languages, only a written variety exists, we utilized the modern Persian alphabetical system to formulate the test.

Procedure

In the sentence completion section, an imperfect sentence without a verb followed by three alternatives, each representing the probable verb tense, were shown to the patients. Having read the imperfect sentence, the patient was expected to choose the correct verb from among three alternatives. When needed, the examiner himself read the sentence for the patient. Likewise, in the sentence-to-picture section of the test, the participant should have read the imperfect sentence and chosen the correct picture corresponding to the target verb. In this section, again, where needed, the examiner himself read the imperfect sentence for the patient. Whenever needed, we also utilized nonlinguistic elements like emphatic stress to guide the participant to understand the meaning of the structures more easily. For statistical analysis, wrong and unanswered responses were coded with 0, and correct responses were coded with 1.

Henceforth, for example, in the cloze section of the sentence completion test for the past perfect tense, the maximum grade that each participant could have obtained was 4, and the minimum grade was 0. Ultimately, we calculated the mean grades of our participants. Furthermore, to investigate whether our patients' performance in different verb tenses was significantly different, we utilized Wilcoxon statistics to analyze our data.

Results

There was no significant difference between the mean correct responses of the patients in both the picture and cloze section of the completion test (P>0.05). So, we should reject the effect of the task on our participants' performance. In Table 2, the mean correct responses of patients to diverse verb tenses were presented.

As Table 3 demonstrates, the within tense comparison corroborated a significant difference between past progressive and simple past (P=0.005), and between past perfect and simple past on the other hand (P=0.018). However, there was no significant difference between past perfect and past progressive (P=0.36).

As mentioned previously, the major objectives of our study were the comparison of correct responses of patients to diverse verb tenses as well as the determination of probable disrupted tenses. Regarding these objectives, in Table 4, the mean correct responses of aphasics regarding main verb tenses were demonstrated.

As the results of Table 4 demonstrated, there was a significant difference between past and present tenses (P=0.012). Also, a significant difference between past and future tenses was observed (P=0.005); however, the difference between present and future tenses was not significant (P=0.18). In Table 5, the general performance of our agrammatic aphasic patients in the main verb tenses was presented using inferential statistics.

Discussion

Our major goal in this study was to investigate manifestations of tense in Mazandarani-speaking agrammatics. Even though in the majority of previous studies, the analysis of inflectional properties in standard varieties had geared researchers' attention, the investigation of non-standard varieties and regional languages had not been adequately

Table 2. Mean correct responses of patients to different tenses in total cloze and written section of the completion test

Verb Tense	Mean±SD
Simple past	2.86±0.82
Past progressive	1.02±0.86
Past perfect	1.65±0.58
Present progressive	3.65±0.64
Future	3.12±0.7

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Table 3. Within tense comparison of aphasics' performance

Binary Tense Comparison	P
PP vs SP	0.005
PPer vs SP	0.018
PPer vs PP	0.36
PP vs Pre	0.004
PPer vs Pre	0.015
PP vs Fut	0.003
PPer vs Fut	0.035

Abbreviations: PP: Past progressive; SP: Simple past; PPer: Past perfect; Pre: Present; Fut: Future.

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tackled by most scholars. Belonging to the north-western branch of Iranian languages, Mazandarani as a Caspian variety is endowed with idiosyncratic morph-phonological and inflectional patterns. So, we predicted that parsing inflectional tense in this language by agrammatics might be different from that occurring in many Indo-European languages. Interestingly, the analysis of aphasics' performance demonstrated selective balanced impairment of our aphasic patients in both productive as well as comprehension modes. Furthermore, unlike the study conducted in Persian [24], our results showed that past progressive was the most challenging verb tense. This finding demonstrated that the performance of agrammatic aphasics would escalate more as they were compelled to parse inflectional systems in languages with enriched morph-phonological characteristics and different typologies like Mazandarani.

Our findings again corroborated the unanimously agreed theoretical stance that telegraphic and effortful speech, as well as violation of prosodic features, should be considered the most defining features of this syndrome [2, 3]. Although we utilized some non-linguistic cues like stress on time adverbs, our patients still confronted with lots of challenges parsing verb affix endings. Also, our results shed more light on the general belief that constant loss of function words and inflectional affixes should be considered as the most notorious characteristics of agrammatics [2, 3, 22].

As the results of our research indicated, Mazandarani-speaking Broca patients had lots of challenges in answering structures that could be completed with past verbs. This observation could be plausible as in colloquial Ma-

Table 4. Mean number of correct responses of participants to past, present, and future tenses

Verb Tense	Mean±SD	Minimum	Maximum
Present	3.65±0.64	3.3	4
Future	3.12±0.7	2.24	4
Past	2.003±0.71	1.42	2.58

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Table 5. Overall performance of agrammatic aphasics in main verb tenses

Binary Tense Comparison	P
Past vs present	0.012
Past vs future	0.005
Present vs future	0.18

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zandarani, the frequency of the present tense is more than that of the past tense, and people would normally talk about their routine affairs using the present tense. Consequently, this phenomenon could be observed in the everyday communication of the patients. Another interesting observation was the lack of difference between the performance of the patients in present and future tenses. Relatively similar performance of patients in both present and future tenses could be explained as Mazandarani-speaking individuals having two parallel structures to talk about future events. The first structure is a formal one based on which the base form of the verb "khastan" followed by an inflectional affix is attached to the main verb. For example, "khame bakherem" rendered as "I want to eat". In the second structure, Mazandarani-speaking individuals sometimes use the present tense to talk about future events. In this situation, adjuncts and adverbs, that is linguistic context or co-text would assist the listener (reader) who (what) is talking about. For example, in the sentence "ferda daneshga shume" rendered as "Tomorrow, I'll go to university", the time adverb "ferda" meaning " tomorrow" would assist the reader (listener) to fathom out that the main (logical) tense of the verb is future, though the verb "shume" is present.

Generally, when our patients' responses to the present tense were compared with their responses to the past tense, a significant difference was observed as our patients had significantly more challenges in the past tense compared to the present tense (P=0.005). Within-tense comparison of the past tense also demonstrated a hierarchy of deficits in which patients had lots of problems in the use of past progressive, past perfect, and simple past, respectively. We could interpret these findings as the more people are exposed to a specific verb tense, the less they face deficits related to that tense. Consequently, we could regard the frequency of use of occurrence as an important parameter that would protect Broca's patients from verb atrophy.

Our findings about verb tense deficit in Broca's agrammatic patients are in agreement with those of other researchers conducted in different languages [5, 15, 18]. The common emphasis of the above-mentioned research is that they would consider deficit to verb as a determining feature of agrammatic speech. Also, they stressed that verb tense compared to agreement was more severely disrupted in these patients, a finding which was also corroborated in our research in a less-known language. So, our results rectified those of other researchers who asserted that inter-lingual as well as intra-lingual research all confirm that the use and understanding of tenses are more problematic for agrammatic patients than agreement properties for these patients [25].

Noteworthy to mention, we should distinguish between the performance of the patients and that of children. Children gradually boost their linguistic knowledge by passing through different stages cooing/babbling, one-word, holophrastic, two-word, and the stage of the enriched system of morphology as well as the syntax [26]. Henceforth, concerning the performance of children in each stage, we have a separate linguistic system with its unique interactive function which could satisfactorily be utilized by children to meet their communicative demands. However, concerning Broca's agrammatic patients, we are dealing with an imperfect system which is the outcome of the brain lesion. This issue has also been rectified by previous researchers [9, 25]. All these researchers have emphasized that we have a disrupted linguistic system in agrammatic patients which is different from that of children. More particularly, they assigned agrammatic problems to a specific disruption in one stage of syntactic tree arrangement [27]. Consequently, it could better be asserted that the agrammatic and systematic performance of children is qualitatively different from the disrupted linguistic performance of Broca agrammatics.

Regarding past tense, we observed that the most challenging ones included past progressive followed by past perfect and simple past- a pattern which was different from the hierarchy of Mehri et al. [24] in which past perfect surpassed present progressive tense as the most problematic tense. The poor performance of our patients in past progressive and past perfect could be interpreted as our patients had more problems in verb tenses which possessed more enriched morphology and auxiliaries. That is, the structures of past progressive becomes complex in Mazandarani due to the existence of the past participle of "dashtan", for example", dashtemeh", and the past participle of the main verb "khordan", for example, "khordeme" resulting in the form "dashteme khordeme" rendered as "I was eating". This complexity is also reached in the past perfect via the past participle of the main verb "khordan", for example, "bakhorde" followed by the linking verb of "budan", for example, "beme" creating the past perfect of " bakhorde beme" rendered as "I had eaten". The same observation was also rectified by other researchers who asserted that agrammatic patients were confronted with lots of problems in the production of complex tenses as they tend to delete auxiliary [5, 13]. Likewise, our participants had rather better performance in the production and comprehension of simple past because its morphological structure is composed of only the base form of the verb followed by the past ending without any particular auxiliary. So, these results were not in agreement with those of other scholars [24] who

had concluded that these patients had more problems in the use of past perfect compared to other past forms while in our study, the topmost verb tense in the hierarchy belonged to the past progressive. Also, their participants' preference to use the infinitive form as the pattern of verb tense was disrupted in these patients. Also, our results were in line with those of Nillipour [28] who had asserted that agrammatic Broca patients had more propensity to either substitute bound morphemes in the morphological structure of verb tense or substitute more complex verbs with simpler ones. Sometimes, they also tended to delete inflectional affixes.

The overall comparison of the three major verb tenses indicated that our patients had more problems in the past tense compared to the future and present tenses. This finding vividly corroborated the results of previous researchers who had already confirmed that past tense malfunction is a predominant characteristic of agrammatic Broca patients [22]. In contrast, our findings were different from those of Kolk [9] who concluded that present tense compared to future tense was more disrupted while in our study, the opposite pattern was observed. The delicate insignificant difference between the responses of these patients in the future and present rectified better performance of these patients in the present compared to the future. The fact that our patients performed more poorly in the future tense compared to the present might better be explained via the semantic system of these two tenses as the present tense possesses the characteristics of "immediacy". So, talking about present events and individuals might be comprehensible more easily for these patients. In contrast, a future tense that possesses the characteristics of "remoteness" might be more cumbersome for the patients to comprehend as these patients might not be able to talk about irreal and remote events which have not yet taken place. Another explanation might be the high frequency of occurrence of the present tense in everyday interactions as well as its automaticity. So, we could predict that agrammatic patients would have fewer problems in producing and understanding these structures. As mentioned, the fact that present verb morphology could also be utilized in Mazandarani to talk about future events corroborates the higher frequency and automaticity of the present tense. So, whenever speakers manage to speak, they can recruit appropriate present verb tense by resorting to the least mental effort.

As mentioned, the verbal morphology of the past tense was the most challenging one for our patients because Mazandarani like Modern Persian, we have a range and continuum of verbal systems within past tense with nuance differences including past perfect, past progressive,

and simple past. For this reason, as the recognition and differentiation of different past verb tenses might be problematic for the patients, they would have more challenges in using structures possessing these tenses.

Regarding the cloze and picture-matching sections of our completion test, we did not observe any significant difference between participants' responses to different tenses. This finding is in agreement with that of other Persian scholars who had not observed any significant difference between the performance of the patients in the two written and picture-matching sections of the completion test [24].

We also utilized some linguistic clues like adverbs and adjuncts as well as paralinguistic cues like stress in our cloze test. For example, in the sentence "ferda daneshga khame burem" rendered as "tomorrow, I will go to the university", whenever needed, we repeated the sentence while pronouncing " ferda" with emphatic stress to assist our participants in fathoming out the tense property of the verb "khame burem" rendered as "I will go". Despite utilizing all these linguistic and paralinguistic cues, our participants had yet had some problems in selecting appropriate responses in the cloze section.

However, the rather similar performance of our participants in both cloze and picture matching sections is not in agreement with the findings of other researchers as they stressed the dissociation between the production as well as the comprehension of nouns and verbs [4, 6, 9]. That is, their participants exhibited more problems in the production mode while demonstrating fewer challenges in the comprehension mode. Regarding the picture-matching section of the test, we should emphasize that although non-linguistic clues like images, the existence of harmony between the performing action and the specific adverb, and the designed situational context all could have assisted the patients in the picture-matching test, they had yet performed approximately as poorly as they had done in the cloze section, specifically in the past tense.

Furthermore, our findings supported the representational account of agrammatism. In the representational theoretical framework, this syndrome is regarded as a deficit in one or more modules of grammar [10-12]. On the other hand, as our patients' performance in both productive and comprehensive modes was similar, and we did not observe any dissociation between these two modes, processing accounts of agrammatism do not sound plausible [4, 11]. More specifically, our results confirmed those of Kean [2, 11]. Supporting the phonological account of agrammatism, these scholars em-

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phasized that phonological clitics as cloze categories that encompassed affixes, prepositions, and articles are more prone to disruption compared to open phonological words like adjectives that have semantic content.

Conclusion

If this research had been conducted with a larger sample size, the generalizability of our findings would have increased and sounded more plausible. Furthermore, the use of different methodologies accompanied by diverse online and offline tasks could have culminated in different results. As the investigation of tense properties of less known languages and dialects, specifically, in Iran, has not yet been comprehensively tackled by researchers, it would sound more logical to conduct diverse studies in regional dialects and languages with diverse typological characteristics. In doing so, provided that all the above-mentioned criteria are met, the pattern of verb tenses in agrammatic patients could better be scrutinized.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were free to leave the study whenever they wished, and if desired, the research results would be available to them.

This study was approved by the Ethics Committee of the University of Gonabad (Code: IR.UOG.REC.1401.701).

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Conflict of interest

The author declared no conflict of interest.

References

[1] Chomsky N. The development of grammar in child language: Formal discussion. Monographs of the Society for Research in Child Development. 1964; 29:35-9. [DOI:10.21236/AD0616323] [PMID]

[2] Kean ML. Agrammatism: Edited treatise. Cambridge: Academic Press; 2008. [Link]

[3] Lapointe SG. Some issues in the linguistic description of agrammatism. Cognition. 1983;14(1):1-39. [DOI:10.1016/0010-0277(83)90025-2] [PMID]

[4] Druks J, Carroll E. The crucial role of tense for verb production. Brain and Language. 2005; 94(1):1-18. [DOI:10.1016/j.bandl.2004.11.003] [PMID]

[5] Stavrakaki S, Kouvava S. Functional categories in agrammatism: Evidence from Greek. Brain and Language. 2003; 86(1):129-41. [DOI:10.1016/S0093-934X(02)00541-2] [PMID]

[6] Kim M, Thompson CK. Patterns of comprehension and production of nouns and verbs in agrammatism: Implications for lexical organization. Brain and Language. 2000; 74(1):1-25. [DOI:10.1016/S0093-934X(03)00147-0] [PMID] [PMCID]

[7] Lee M, Thompson CK. Agrammatic aphasic production and comprehension of unaccusative verbs in sentence contexts. J Neurolinguistics. 2004; 17(4):315-30. [DOI:10.1016/S0911-6044(03)00062-9] [PMID] [PMCID]

[8] Caramazza A, Capasso R, Capitani E, Miceli G. Patterns of comprehension performance in agrammatic Broca's aphasia: A test of the trace deletion hypothesis. Brain and Language. 2005; 94(1):43-53. [DOI:10.1016/j.bandl.2004.11.006]

[9] Kolk H. A time-based approach to agrammatic production. Brain and Language. 1995; 50(3):282-303. [DOI:10.1006/brln.1995.1049] [PMID]

[10] Grodzinsky Y. A restrictive theory of agrammatic comprehension. Brain and Language. 1995; 50(1):27-51. [DOI:10.1006/brln.1995.1039] [PMID]

[11] Kean ML. Agrammatism: A phonological deficit? Cognition. 1979; 7(1):69-83. [DOI:10.1016/0010-0277(79)90012-X] [PMID]

[12] Hagiwara H. Nonagentive predicates and agrammatic comprehension. Metropolitan Linguistics. 1993; 13:127-42. [Link]

[13] Reznik M. Functional categories in agrammatism. Brain and Language. 1995; 50(1):117-33. [DOI:10.1006/brln.1995.1042] [PMID]

[14] Mitchum CC, Berndt RS. Cognitive neuropsychological approaches to diagnosing and treating language disorders: Production and comprehension of sentences. Language Intervention Strategies in Aphasia and Related Neurogenic Communication Disorders. 2001; 4:551-71. [Link]

[15] Friedmann N, Grodzinsky Y. Tense and agreement in agrammatic production: Pruning the syntactic tree. Brain and Language. 1997; 56(3):397-425. [DOI:10.1006/brln.1997.1795] [PMID]

[16] Faroqi-Shah Y, Thompson CK. Semantic, lexical, and phonological influences on the production of verb inflections in agrammatic aphasia. Brain and Language. 2004; 89(3):484-98. [DOI:10.1016/j.bandl.2003.12.006] [PMID] [PMCID]

[17] Chomsky N. The minimalist program. Cambridge: MIT Press; 2014. [Link]

[18] Wenzlaff M, Clahsen H. Tense and agreement in German agrammatism. Brain and Language. 2004; 89(1):57-68. [DOI:10.1016/S0093-934X(03)00298-0] [PMID]

[19] Kolk H. Disorders of syntax in aphasia: Linguistic-descriptive and processing approaches. In: Stemmer B, Whitaker HA, editors. Handbook of neurolinguistics. Cambridge: Academic Press. 1998. [DOI:10.1016/B978-012666055-5/50020-4]

[20] Borjian H. Mazandarani: A typological survey. In: Korangy A, Mahmoodi-Bakhtiari B, edotors. Essays on typology of iranian languages. Berlin: De Gruyter Mouton; 2019. [DOI:10.1515/9783110604443-005]

[21] Nilipour R, Pourshahbaz A, Ghoreyshi ZS. Reliability and Validity of bedside version of persian WAB (P-WAB-1). Basic and Clinical Neuroscience. 2014; 5(4):253-8. [PMID] [PMCID]

[22] Novaes N, Braga M. Agrammatic aphasia and aspects. Brain and Language. 2005; 95(1):121-2. [DOI:10.1016/j.bandl.2005.07.065]

[23] Grossman M, Powers J, Ash S, McMillan C, Burkholder L, Irwin D, et al. Disruption of large-scale neural networks in non-fluent/agrammatic variant primary progressive aphasia associated with frontotemporal degeneration pathology. Brain and Language. 2013; 127(2):106-20. [DOI:10.1016/j.bandl.2012.10.005] [PMID] [PMCID]

[24] Mehri A, Tahan Zadeh B, Jahani Y. [Use of tense in Persian agrammatic Broca's aphasia (Persian)]. Bimonthly Audiology. 2010; 19(1):78-85. [Link]

[25] Benedet MJ, Christiansen JA, Goodglass H. A cross-linguistic study of grammatical morphology in Spanish- and English-speaking agrammatic patients. Cortex. 1998; 34(3):309-36. [DOI:10.1016/S0010-9452(08)70758-5] [PMID]

[26] Field J. Psycholinguistic. A resource book for students. London: Routledge; 2003. [Link]

[27] Arabatzi M, Edwards S. Tense and syntactic processes in agrammatic speech. Brain and Language. 2002; 80(3):314-27. [DOI:10.1006/brln.2001.2591] [PMID]

[28] Nilipour R. Task- specific agrammatism in a Farsi- English bilingual patient. Journal of Neurolinguistics. 1989; 4(2):243-53. [DOI:10.1016/0911-6044(89)90016-X]

Azad O. Loss of Verb Tense in Mazandarani Agrammatics. JMR. 2024; 18(2):152-161.

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