

# Research Paper: Presence or Absence of the Object Marker “Râ” in the Speech of Aphasic Patients With Agrammatic Broca’s Aphasia



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## ABSTRACT

**Introduction:** The aims and the importance of the study: Regarding the importance of the object marker “râ” as one of the components of Persian sentences and its little investigation in aphasic Persian speakers, we decided to study its usage in the speech of aphasic patients with agrammatic Broca’s aphasia to know whether aphasic Persian speakers use “râ” in comparison to normal Persian speakers. The agrammatic aphasics are known for not using function words (like the object marker “râ”).

**Materials and Methods:** In this experimental-descriptive study, two groups were employed. In the first group, six Persian children with Broca’s aphasia participated as the experimental group. The general linguistic capabilities of these patients were evaluated with the Persian aphasic test by speech therapy specialists. In the second group, six Persian-speaking normal persons participated as the control group. Two similar tests were administered to the aphasic and control groups, inspired by Caplan et al. 's test, to know whether they use “râ”. As there was a difference between the two groups, 1-way ANOVA was utilized to see if this difference was statistically significant. To analyze linguistic data, the approaches of Garman, Saffran, Kolk, Friedman, and Dolfic and Fabijanić were applied.

**Results:** While the control group produced “râ” in all cases, the aphasic group never used it.

**Conclusion:** It seems that using content words (like “nouns and verbs”) may be more vital than using function words (like “râ”).

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## 1. Introduction

The Persian object marker “râ” has been studied thoroughly in the domain of sentence-level syntax. According to Shokouhi and Kipka [1], it can function as a definiteness marker, a specificity marker, a topicalization marker, and a discourse marker. Regarding its importance in Persian and overlooking its investigation among aphasic Persian speakers, we decided to study its usage in the speech of aphasic Patients with agrammatic Broca’s aphasia. In other words, the present study seeks to find the probable answer(s) to the following question of whether aphasic Persian speakers use “râ” in comparison to normal Persian speakers. The agrammatic aphasics are known for not using function words (like the object marker). In this experimental-descriptive study, six Persian-speaking patients with agrammatic Broca’s aphasia participated.

Traditionally, aphasia is considered as damage to central linguistic capability in the verbal area following a brain injury. Broca’s aphasia is a type of aphasia which results from damage to Broca’s area and neighboring areas in the brain and has the following characteristics:

A. Speaking is slow and not fluent, word syllables are produced problematically in an effortful manner. The patient’s speech is telegraphic, i.e., the total speech of the patient decreases and they do not produce small words or some word endings in their speech [2-4].

B. Written or spoken words are understood without any problem [2-4].

C. It is good to repeat a word, though with a great effort of the patient. However, words are repeated with difficulty, especially those accompanied by an auxiliary verb [2-4].

D. The patient has problems with writing (Garman, Saffran, Dolfić & Fabijanić) [2-4].

E. The patient has problems with naming different things [2-4].

F. The patient is aware of his or her problems and is usually depressed.

G. Most words used are content words (e.g. noun, main verb, and adjective), and prepositions, pronouns, function words, and auxiliary verbs are missing [2-4].

H. Agrammatism causes problems in sentences that are related to both reception and expression [5].

I. In agrammatism, the speech flow does not stop, but speech has disorders that are mostly related to the grammar or syntax of the language [2, 6].

### Literature review and theoretical background

We will divide the literature review and theoretical background into the two categories: 1. On “râ” in Persian; and 2. On aphasia.

### “râ” in Persian

Peterson [7] and Karimi [8] mentioned that “râ” characterizes topicalization and specificity is a basic requirement of topicalization. Karimi [8] upholds a contradictory standpoint and states if we assume that topicalization is associated with given information, it should be expected to be marked by “râ”. She also asserts that there are also topicalized constituents which do not accept “râ”, as is illustrated in the following example (1):

1. /gousht/ /behtare/ /be-g-i/ /na-xor-e/.

meat better SBJN-say-2SG NEG-eat-3SG

‘As for meat, it’s better for him not to eat’.

The example which illustrates the topicalized element, /gousht/, ‘meat’ is not accompanied by “râ”, conflicts with Peterson’s view. Nevertheless, the topical element here can occur with “râ” without causing ungrammaticalization which might happen when the speaker wants to contrast, say between /gousht/ (meat), and other types of food.

In case “râ” is considered a topicalization marker, Karimi [9] following Windfuhr [10] asserts that one of the discourse functions of “râ” could be that of a marker of topicality if the considered topic is (a) an argument which is reminiscent of some old information, (b) a pronominalizable, (c) to carry no stress and (d) to be specific. The topical argument with such characteristics can, therefore, take “râ”. In the following example (2), the topic which is expressed by the NP ‘Navid’ can be considered topical based on Karimi’s criteria.

2. /Navid/ /ra^/ /emrouz/ /sob/ /did-am/.

Navid RA^ today morning saw-1SG

‘I saw Navid this morning’.

However, as will be shown later, this sentence can be said even when Navid is not ‘given’ or is ‘old information’. the NP may be mentioned in (6) for the first time, once it is new yet identifiable; then, it is vivid that Karimi prefers to rely on specificity to explain the distribution of “râ”, although it is not fully convincing that this is a move in the right direction.

Dabir-Moghaddam [11], for instance, divides topicality into primary and secondary notions so that the former is the theme and the latter is the object which is marked with “râ”. After an extensive review of works on “râ”, he provided syntactic and discursal explanations for the use of this particle. He believed that it is the secondary topic taking “râ” as the sentence is divisible into three parts: primary topic, secondary topic, and comment.

(3a) primary topic (theme), secondary topic/comment (rheme)

/man/ /ketab/ /râ/ /xarid-am/.

I the book bought-1SG

‘I bought the book’.

(3b) primary topic (theme), comment (rheme)

/man/ /ketab-I/ /xarid-am/.

I book-IND bought-1SG

‘I bought a book’.

The first sentence, as Dabir-Moghaddam [11] believed, can be an alternative response to a question like ‘what did you do about the book?’ and the second one an answer to the question ‘what did you do today?’. Furthermore, he asserts the third possibility is the use of the indefinite noun together with “râ” as in the following sentence.

(4) /man/ /ketab-i/ /râ/ /xarid-am/.

I book-IND RA^ bought-1SG

‘I bought a book’

He is convinced this is widely acceptable to the hearer if the speaker adds something else to sentence (4) above and elaborates on it. It does not seem normal to have sentences ending this way. Phillott (1919), as asserted in Dabir-Moghaddam [11], believed that “râ” could also mark generic nouns. Hence, Dabir-Moghaddam con-

cluded that “râ” could not be a sign of specificity since it was not easy to find out the characterization of specificity which would ensure that the single book bought in sentence 3b was necessarily non-specific. Nevertheless, it seems inevitable that invoking topicalization sheds much light on the matter.

Shokouhi and Kipka [1] asserted that the discourse properties of “râ” play an indispensable role in any explanation of when this particle occurs. They believed that such an explanation should be sought using all available and independently motivated notions. Still, such an approach presupposes the availability of appropriate discourse data because constructed examples and single sentence constructed examples, in particular, may not truly show the full range and richness of available possibilities. Admittedly, as illustrated above, conflicting judgments about the acceptability of decontextualized examples are overt.

Darzi [12] believed that many linguists, including Karimi [8], Dabir-Moghaddam [11], and Ghomeshi [13] have studied on the Persian morpheme “râ”. He mentioned that “Karimi takes “râ” as the accusative case marker, the presence of which on subjects and objects of prepositions renders the sentence ungrammatical”. Although Ghomeshi [13] marks Determiner Phrases (DPs) functioning as VP-level topics, he believed that “Dabir-Moghaddam [11] considers “râ” as the secondary topic marker in the Halliday’s functional grammar framework”. Darzi continued “in none of these analyses, this morpheme appears on deep subjects [12]”. Then, he highlighted that ““râ” may also mark subjects, just in case it occurs in the right grammatical configuration”. “More specifically, Persian has the category of a small clause in which an NP marked with “râ” is the subject of the small clause rather than the object of the matrix sentence”. Darzi carried on “this is an unprecedented hypothesis in Persian linguistic literature [12]”. He also presents a minimalist account of the construction in question.

Hosseini Fatemi presents an analysis of the semantics of the Persian object marker “râ [14]”. Semantically, “râ” has been identified with definiteness marking, specificity marking, and presupposition marking. In the study, he challenged the assumptions presented in previous works and argued that while definiteness, specificity, and presupposition would capture important aspects of the meaning of “râ”, none of them adequately characterize its semantics. Specifically, he argued that a unified account could be given if we assumed that “râ” was a maximality operator which picks out the maximal member of the denotation of its argument following Link and Beck and Rullmann. The maximality proposal can

account for the appearance of “râ” on question words, contrastive topics, plurals, and indefinite which have remained unexplained in previous accounts of “râ”.

Bahrami and Rezai [15] believed that in object indexation, a clitic pronoun, co-referential with the free nominal object, would append to the verb. The optionality of indexation in Persian is the key to discover the role of pragmatic factors in its occurrence. Their study aimed at finding out the influence of information structure on direct object indexation in Persian. To fulfill that aim, the data of standard spoken Persian which included 540 cases were extracted from various resources and subsequently analyzed within the framework of Role and Reference Grammar. They uphold the conviction that the high frequency of topical direct object indexation proves the role of information structure in direct object indexation.

Therefore, through analyzing the few cases of focal direct object indexation, they argued that all cases of both topical and focal object indexations inevitably involve identifiable referents. Thus, the basic requirement in Persian direct object indexation is the identifiability of its referent. Considering that the syntactic position of the direct object in Persian clauses is interwoven with a strong overlap of topical and focal objects, the post-core slot only belongs to the topical direct object and the focal object cannot sit there. Therefore, to identify the pragmatic relations of the direct object in a clause, the context of the discourse should be considered.

### On Aphasia

In recent years, different researchers have conducted many studies in the area of aphasia. However, due to our limitations, we are going to review the most related studies in this section. There are two main theories on aphasia: localization and brain function holism. Gall is one of the main proponents of the localization or atomistic theory Aameri [16]. According to this theory, the brain is made up of separate organs each responsible for controlling an innate power or talent. That is, for each brain power or talent, some areas perform mental processing related to that power Caplan [17]. The proponents of this theory believe that the size of each brain area indicates the growth of power related to that area.

Regarding the brain function holism, different functions do not have a specific area in the brain, and the brain works as a whole Walsh [18]. The holistic school, in contrast to atomistic school, believes that the division of linguistic capabilities is unusual as mental activities are performed by larger parts of the brain. Walsh [18]

wrote that Jackson [19] was one of the pioneers of this school. By observing the behavior of patients who were unable to name and repeat words but used them unconsciously on some occasions, he concluded that the lexicon of an aphasic patient is not lost, rather, the patient loses their capability for using a given word for transferring information [19].

As it was mentioned in the introduction, one form of aphasia is agrammatism. Expressive agrammatism is less investigated compared to receptive agrammatism. The signs of expressive agrammatism are traditionally evaluated through spontaneous speech analysis [20]. Four signs are considered for expressive disorders in spontaneous speech [4, 21]: 1. A low variety of grammatical forms, i.e. if a sentence is expressed, it will have few dependent or subordinate clauses, and simple group structure; 2. Omission of grammatical words such as articles, pronouns, auxiliaries, prepositions, and definitive elements; 3. Omission of main verbs; 4 and Low speech speed.

Although these signs were first observed in the English language, they are also present in aphasic patients of other languages. Studies have been conducted to obtain information about the grammatical word structure and word order in agrammatism, as well. The complex factor is systematic differences between spontaneous speech and elicited speech. In particular, grammatical words are used less frequently in elicited speech, instead word relocation is more frequent [2, 22]. In elicited speech tests, the following signs are observed: the order of grammatical words is impaired [3, 23]; these words are impaired more in internal clauses than main clauses [24]; the patients cannot use relative clauses [4, 21]; inflection for tense is more difficult than inflection for agreement [4, 21, 25]; and production of sentences whose common order of semantic roles is not followed is more difficult than similar sentences with common order of semantic roles [26].

Kolk believed that patients suffering from agrammatism possess grammatical knowledge but are unable to use it for language production and comprehension in real time [26, 27]. Many researchers argue that brain damage in agrammatism reduces brain activity for syntactic operations. Accordingly, in agrammatism, the syntax area is impaired and activities of this area that are done automatically in the normal situation, occur with delay. This low speed adversely affects linguistic processing in these patients.

Nilipour [28] reported how the grammatical violations of a monolingual native speaker of Persian might be. In his study, the speaker had typical agrammatic characteristics: the tendencies to use less-marked forms, short

phrase length, slow speech rate, simplified or reduced syntax, and omission of free grammatical morphemes. The Persian verb, as the most morphologically complex item, was vulnerable to frequent disruption. The post-posed direct object marker “râ”, written as a free grammatical morpheme, also undergoes severe omission.

Nilipour's [29], moreover, analyzed the grammar of two right-handed monolingual Persian native speakers who became aphasic after left traumatic brain damage and compared them with the control data. According to assessment on the Farsi version of the Bilingual Aphasia Test and the CLAS I connected speech analysis procedures, he indicated that both patients met the clinical picture of Broca's aphasia and showed the general characteristics of agrammatical speech. He also investigated the “post position direct object marker” (“râ”). The first case did not use the direct object marker although there were 5 required contexts (Example 5). The control subject used it in 9 instances.

(5)

	širini			bar mi-dâr-ad		
baçe	širine	[râ]	[be-vasile]	sandali	ast (50)	
N	N	[postp]	[prep]	N	V	
kid	cookie	[OBJ]	[by]	chair	is	
(the)	kid	is	(the)	cookie	(the)	chair

The second case used the direct object marker neither in the spoken nor the written data. It was absent in one written and 4 obligatory spoken contexts (Example 6).

(6)

man	az	sar	pâ	[va]	dast	[majruh	šo-d-am/	(19)
pro	prep	N	[conj]	N	[N	aux]		
I	from	head	leg	[and]	hand	[injury	get-PAST-1SG]	
I	from	head,	leg		hand			

Both patients showed reliance on nouns and language simplification at all levels. Likewise, inflectional and derivational morphemes like other grammatical categories were not found in the first case's speech.

Nilipour's [29] data suggested that Persian agrammatism resembles the syndrome in other languages in having severe disruption of the verbs and more reliance on nouns than verbs. There were language-specificity and individual patterns of interest, notably the use of “is” as a completely general default verb by one subject and the tendency to omit NP-internal conjunctions. The present tense of the verb was also used as a default though it was longer than the corresponding past tense forms.

Aameri and Golfam [30] investigated the hypothesis that if the area of linguistic abilities in the brain is sepa-

rate and independent from other cognitive abilities, or if there is any relationship between linguistic abilities and other non-linguistic cognitive abilities. Their findings revealed a direct relationship between the ability to understand some syntactic structures and the ability to process cognitive sequences. They concluded that in contrast to the modularity theory of language, human's linguistic abilities could not be limited to an independent faculty in the mind, and it should be admitted that linguistic abilities and non-linguistic cognitive skills interact with each other.

Tafarroji-Yeganeh [31] investigated the impairments related to the production and comprehension of functional categories such as tense, agreement, aspect, and negation. Through using neuro-psychological methods, she studied three Kurdish-Persian bilingual cases who suffered from Broca's aphasia. She found out that their degree of impairment in the production of functional categories is much more than their impairment in the comprehension of such categories. Besides, among the categories investigated, the highest rate of impairment was related to tense indicating that this category was more vulnerable than others.

## Tests

Linguistic and non-linguistic tests were utilized in this research: Caplan et al.,'s test [2] and ANOVA (analysis of variance). Caplan et al.,'s test [2], as a language test, shows the results of three studies conducted on the reception of syntactic structures by aphasic patients. Their analyses showed the impact of syntactic structure on the correct interpretation of sentences. Caplan et al., believed that although some semantic features of the sentence could be obtained through word semantics, discourse limits, and pragmatics without the necessity of referring to sentence syntactic structure, in sentences which were not limited by semantics or pragmatics, semantic roles must be determined according to syntax. Also, they argue that much evidence shows the impact of syntactic structure on the comprehension and interpretation of sentences limited by semantics and pragmatics [2].

The main aim of the Caplan et al. study was to investigate different factors affecting a specific syntactic feature. In other words, they aimed to attribute semantic roles to noun phrases. They sought answers to questions such as whether syntactic structures affect determination or attribution of sentence semantic features, and in particular, semantic roles or not; and whether aphasics can be classified into special groups according to their ability in comprehension and interpretation of syntactic structures or not.

Their work was based on general linguistics and they did not consider any new specific theory in this area. In other words, Caplan et al. syntax test involved 9 main syntactic structures and 5 sentences for each type of structure. That is, the total number of sentences was 45. The 9 syntactic structures included in this test address 4 main features of syntactic structures, i.e., the linear order of categories; the hierarchical structure of categories; verb sub-categorical structure; and the role of function words and morphological elements.

In this test, 12 verbs and 5 animal names were used. Animals are in the form of puppets and the patient has to select them by hand and indicate which one is the agent, which one recipient, and which is the goal. The reason for using animal puppets was that in attributing semantic roles animals seem more natural than geometrical forms or other things used in the previous tests (Caplan et al. [2]). Also, the reason for using a limited number of animals and thus, words, is that most aphasics have problems in understanding single words, and if a larger number of animals and words were used, another problem would be raised. That is, patients might have problems in understanding the meaning of some names.

The second test was a widely-used statistical test called one-way ANOVA. In this test, the variance of the whole data is divided into two or more parts according to one or more variables. Based on variance analyses, groups can be tested for homogeneity or non-homogeneity.

Like many analytical tests, variance analysis requires a statistic with F distribution. This F-statistic measures the ratio of "between-group" changes to "within-group" changes. A large value of F rejects the null hypothesis, that is, the between-group variance is more than a with-

in-group variance. In this way, it can be concluded that the population is not homogenous. Since normal distribution and variance are considered fixed, the only factor that contributes to the difference between populations and groups is the mean value, so the null hypothesis which refers to equal means will be rejected. In the present study, ANOVA was used to compare the control and experimental groups to show if there was a statistically significant difference between them.

## 2. Materials and Methods

To investigate the use of "râ" as a direct object marker in aphasics, we used two types of statistical samples. In the first sample, 6 Persian speaking patients with Broca's aphasia participated (Table 1). Their mean age was 52.77 years and the mean education background was 11.82 years. In line with the research objectives, these individuals were selected from aphasic patients referring to speech therapy departments of Tehran's state hospitals. The general linguistic capabilities of these patients were evaluated with Persian Aphasic Test (Nilipour 1) by speech therapy specialists (Tables 2 & 3).

These patients were diagnosed as suffering from Broca's aphasia since they had fluent oral speech, normal to semi-normal linguistic comprehension limited to understanding single words and short sentences (Table 3). The correlation matrix of the aphasic test in Persian language was measured for each skill (Table 4). Then, the results were recorded carefully. In the next step, The relationship between language skills and aphasic type of patients in the aphasic test of Persian language was measured. Then, the mean and the standard deviation for each skill were recorded separately (Table 5).

**Table 1.** Demographic characteristics of 6 Persian-speaking patients with Broca's aphasia

Variables	Min	Max	Mean±SD	Standard Error
Age (y)	19	83	52.77±14.09	1.87
Education (y)	2	19	11.82±3.96	0.53
Time after injury (mo)	0	81	12.25±16.78	2.33

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**Table 2.** Internal consistency of language skills of 6 Persian-speaking patients with Broca's aphasia

Language Skills	Oral Comprehension	Oral Speech	Repetition	Vocabulary Size	Reading	Writing
Internal consistency	0.927	0.888	0.962	0.868	0.902	0.897

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**Table 3.** Internal consistency of sub-test of 6 Persian-speaking patients with Broca’s aphasia

Row	Sub-test	Contribution of the Subtest to Test Validity
1	Word recognition	0.930
2	Identifying body organs	0.931
3	Recognizing right and left in organs	0.931
4	Simple instructions	0.930
5	Understanding complex concepts	0.931
6	Understanding short stories	0.932
7	Speech fluency	0.933
8	Spontaneous speech	0.931
9	Rehearsal of rhythmic songs	0.936
10	Repeating words	0.931
11	Repeating phrases	0.930
12	Reading words	0.930
13	Single-word responses	0.929
14	Seeing and naming	0.930
15	Naming	0.933
16	Oral reading of sentences	0.931
17	Recognizing letters and words	0.931
18	Vocal association	0.931
19	Matching word with picture	0.931
20	Reading comprehension	0.932
21	Transcription	0.934
22	Spelling letters and words	0.931
23	Spelling sentences	0.933

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The second statistical sample was composed of 6 normal individuals considered as a control group. Their mean age was 44 years and their mean education time was 14 years (Table 6).

Two similar tests were administered to the aphasic and control groups. Inspired by Caplan et al. [2], a test was developed composed of 20 pictures where 4 animals (bear, lion, dog, and monkey) and 4 actions (eating, cuddling, hugging, and killing) were used. In each picture, an animal performs a completely clear action on another animal. The

participants were asked, for example: “what does the lion do with the monkey”. The participant’s response shows whether they use the object marker “rá”. The control group was compared with Broca’s aphasic group to see if there was any statistically significant difference between them. The significant alpha coefficient was set as 0.05.

A second test was administered to the aphasic group after one month like the first one, while the only difference was that in the one-month interval, specialized therapists trained the participants 4 sessions (treatment).

**Table 4.** The correlation matrix of the skills in Persian-speaking patients with Broca's aphasia

Variables	Comprehension	Oral Production	Repetition	Vocabulary Size	Reading
Comprehension					
Oral production	0.41*				
Repetition	0.51*	0.76*			
Vocabulary size	0.55*	0.63*	0.63*		
Reading	0.74*	0.48*	0.49*	0.59*	
Writing	0.53*	0.33	0.3**	0.37*	0.64*

\*Significance at  $P < 0.01$ ;\*\*Significance at  $P < 0.05$ .

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**Table 5.** The relationship between language skills and aphasic type of patients in six Persian-speaking patients with Broca's aphasia

Language Skill	Type of Aphasia	No.	Mean±SD					
			Oral Comprehension	Oral Production	Repetition	Vocabulary Size	Reading	Writing
	Broca's	36	52.84±5.4	37.62±6.72	49.45±7.99	49.72±7.17	51.03±7.05	51.53±8.23

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**Table 6.** Demographic characteristics of the control group

Variables	Minimum	Maximum	Mean±SD	Standard Error
Age (y)	18	70	44±12.02	1.05
Education (y)	10	18	14±3.01	0.5

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To analyze linguistic data of the aphasic group, the approaches of Garman, Saffran, Kolk, Friedman, Dolfić, and Fabijanić were utilized [3, 4, 21, 25, 26].

### 3. Results

In this section, the two groups are used. The goal is to investigate the presence or absence of the object marker "râ" in their speech. Some descriptive indices of the control group are presented in Table 7. Their mean age was 44 and the mean duration of their education was 14 years. About 50% of the patients were male and 50% female (Table 7).

Some descriptive indices of Broca's aphasic group are presented in Table 8. Their mean age was 52.77 and the mean education time was 11.82 years. About 50% of the patients were male and 50% female (Tables 3 & 4).

### Tests description

The tests used in this research were both linguistic and non-linguistic. The linguistic test included syntactic production tests administered at two stages. The first test was administered at the beginning of the study before training sessions. The second test was administered after the treatment to determine the effect of training on the patients' performance in the test. The non-linguistic test was one-way ANOVA through which the aphasic group was compared with the control group to see if there was any statistically significant difference between the two groups. The tests are described below.

#### Test of syntactic production for the control and experimental groups (stage 1 test)

In the first stage, a test was developed which was composed of 20 pictures where 4 animals (bear, lion, dog, and



**Table 7.** Characteristics of the control group and distribution of their age, gender, and education

Participants	Age (y)	Gender	Education (y)	Mother Tongue	Other Languages
1	18	Male	12	Persian	English
2	33	Male	10	Persian	English
3	39	Female	16	Persian	-
4	41	Male	16	Persian	English
5	63	Female	18	Persian	English
6	70	Female	2	Persian	-
Participants' mean age				44 (y)	
Mean of participants' education				14 (y)	
Participants' gender (%)		Male		50	
		Female		50	
Total				100	

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**Table 8.** Characteristics of the patients and distribution of their age, gender, and education

Participants	Age (y)	Gender	Education (y)	Mother Tongue	Other Languages	Time After Injury (mo)	Reason for Brain Injury
1	19	Male	12	Persian	English	1	Accident
2	25	Female	12	Persian	English	0	Falling
3	41	Female	14	Persian	-	16	Stroke
4	49	Male	16	Persian	English	3	Stroke
5	67	Female	12	Persian	-		Stroke
6	83	Male	2	Persian	-	81	Stroke
Participants' mean age						52.77 (y)	
Mean of participants' education						11.82 (y)	
Participants' gender (%)		Male		50			
		Female		50			
Total						100	

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monkey) and 4 actions (eating, coddling, hugging, and killing) were used. The test was administered first to the control group in an appropriate time and place determined by the participants. The pictures were shown to each participant and they were asked to tell a simple declarative sentence about each picture. Their responses were recorded in the answer sheet (Table 9). After 10 pictures, they had a 10-min break, and then the test was resumed.

The control group produced 120 sentences totally (each participant 20 sentences). In this paper, due to space limitations, some of them are presented and the necessary explanations are provided in Table 9.

/in/ /jir/ /maimun/ /ro/ /koft/ "This lion killed the monkey"

(participant 1, control group, 18 years old, normal)

**Table 9.** Presence of “râ” in the control group (the first test)

Participant	Frequency of “râ” in each Sentence	Representation of the Object Marker	Observing Subject and Object Position	Use of Demonstrative Pronouns	Grammatical Sentence	Grammatical Sentence
1	1	“ro1” and “o2”	√	√	√	-
2	1	“o”	√	√	√	-
3	1	“ro” and “o”	√	√	√	-
4	1	“ro” and “o”	√	√	√	-
5	1	“ro”	√	-	√	-
6	1	“ro” and “o”	√	√	√	-

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/ʃir/ /maimuno/ /mikoʃe/ “The lion is killing the monkey”

(participant 2, control group, 33 years old, second year high school)

/xers/ /sago/ /bæqæɫ/ /mikone/ “The bear hugs the dog”

(participant 3, control group, 39 years old, bachelor’s degree)

/xers/ /ʃiro/ /bæqæɫ/ /mikone/ “The bear hugs the lion”

(participant 4, control group, 41 years old, bachelor’s degree)

/xers/ /maimun/ /ro/ /mikoʃe/ “The bear kills the monkey”

(participant 5, control group, 63 years old, Master’s degree)

/in/ /ʃir/ /maimun/ /ro/ /mixoræd/ “This lion is eating the monkey”

(participant 6, control group, 70 years old, second year of primary school)

The second stage started with Broca’s aphasics. The researchers attended in one speech therapy session of each of the patients to get familiar with them. During those sessions, the goal of the test was explained to them. Then the time and place as suggested by the participants were selected and the test was administered after making sure that the patients were physically and mentally ready for the test. The pictures were shown to each participant one by one and they were asked to tell a simple declarative

sentence about each. Their responses were recorded in the answer sheet (Table 10).

The aphasic group produced 120 sentences in total (each participant 20 sentences). In this paper, due to space limitations, some of them are presented and the necessary explanations are provided in Table 10.

/...ʃir ...maimu... bæqæɫ/ “... lion ... mon ... hug ...”

(participant 1, aphasic group, 19 years old, diploma)

/... maimu... ʃi ...naz/ “... monk ... lio ... cuddle ...”

(participant 2, aphasic group, 25 years old, diploma)

(The agent and the patient are interchanged)

/...xers ...ʃir ... bæqæɫ/ “... bear ... lion .... Hug ...”

(participant 3, aphasic group, 41 years old, associate degree)

/...sæg ...xers... bæqæɫ/ “... dog ... bear ... hug ...”

(participant 4, aphasic group, 49 years old, bachelor’s degree)

(The agent and the patient are interchanged)

/...xers ... sæg/ “... bear ... dog ...”

(participant 5, aphasic group, 67 years old, bachelor’s degree)

(no verb)

/...xers ... sæg...xor.d/ “... bear ... dog ... ate”

(participant 6, aphasic group, 83 years old, send year of primary school)

Then, the control group was compared with the aphasics (Table 11, Figure 1). The control group produced the object marker “râ” in all cases, while the aphasics did not use it in any sentence. (‘p’ is abbreviated form of ‘participant’ and refers to the aphasic group)

The two groups were compared with 1-way ANOVA to see if there was any statistically significant difference between them. The alpha coefficient was set to 0.05 (statistical analysis 1). Persian syntactic production test for the Broca’s aphasics (Test 2).

After the first test was administered to Broca’s aphasics, it was arranged with the therapist to administer the second test after a 1-month training (treatment). It was decided that the aphasics would be trained one session a week by specialized therapists. After 4 sessions, they were tested in an appropriate place and time selected by themselves. Similar to the first test, 10 pictures were first shown to the subjects and they were asked to construct

a simple sentence about each picture. After a 10-minute break, the test was resumed (Table 12).

In the second test, a relative improvement was observed in the aphasic patients with regard to features like “observing the position of subject and objects” and “verb use”. Except for the fifth participant, other aphasic patients observed the position of the subject and object. All participants (even the fifth one) used verbs, though incompletely.

#### 4. Discussion

As can be seen in sentences 7 to 12 and Table 10, the speech of all 6 aphasic patients is short and telegraphic. These findings are in line with Garman, Saffran, Dolfić, and Fabijanić findings [2-4]. The utilized words are content words (e.g. subject, object, main verb). Again, these findings are consistent with Garman, Saffran, Dolfić, and Fabijanić results [2-4]. Contrary to Garman, Saffran, and Dolfić, and Fabijanić [2-4] approaches, pronouns are not used, while the control group used pronouns (Table 9). In line with Garman [2], the speech flow of the 6 aphasics is not fluent, and it has some disorders mainly related

Table 10. Presence of the object marker “râ” in the aphasic group (the first test)

Participant	Frequency of “râ” in Each Sentence	Observing Subject and Object Position	Use of Verb	Use of Demonstrative Pronouns	Grammatical Sentence	Grammatical Sentence
1	-	√	√	-	-	√
2	-	In some cases not observed	√	-	-	√
3	-	√	√	-	-	√
4	-	In some cases not observed	√	-	-	√
5	-	In some cases not observed	In some cases omitted	-	-	√
6	-	√	√	-	-	√

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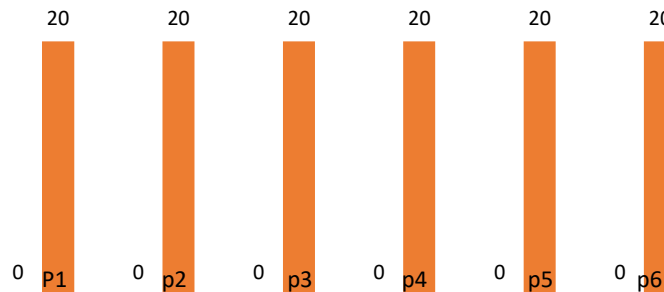
Table 11. Comparison of the presence of the object marker “râ” between the aphasics and control group

Participant	Presence of “râ” Case Marker (Control Group)	Presence of the Object Marker “râ” (Aphasic Group)
Participant 1	20	0
Participant 2	20	0
Participant 3	20	0
Participant 4	20	0
Participant 5	20	0
Participant 6	20	0

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### A comparison between the aphasic group and the control group



**Figure 1.** A comparison between the aphasic group and the control group regarding the presence of “râ”

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to the grammatical or syntactic problems that they suffer, yet the speech flow continues. Regarding structural and grammatical disorders, it should be mentioned that in most cases, the aphasic group used incomplete forms of subject-object-verb order. None of them used “/mi/” (a Persian progressive marker) (Table 10).

In sentences 7-12 and Table 10, their sentences are completely simple and usually involve subject, object, and verb. These findings agree with Friedman, Dolfić, and Fabijanić results [4, 21]. With all problems in production, except for aphasics 2, 4, and 5, the other participants observed the syntactic position of the subject, object, and verb which is in contrast to what Kolk [25, 26] proposed. He believed that aphasic patients possessed the grammatical knowledge of the language but could not use it for language production and comprehension in real time. It appears that most aphasics have cognitive

knowledge for production and know that in Persian, the subject appears in sentence initial position, the object in the next position, and the verb in the final position. This can prove that the area in the mind for linguistic abilities is not separated and independent from other cognitive abilities. Besides, there is a relationship between linguistic and non-linguistic cognitive abilities.

In contrast to the modularity theory, human’s linguistic abilities cannot be limited to an independent faculty in the mind. Perhaps, it can be acknowledged that linguistic and non-linguistic cognitive skills interact with each other. None of the aphasics used the object marker “râ” in their productions which are in line with Kolk’s finding [25, 26]. Then, the control group was compared with the aphasics (Table 11, Figure 1). The control group produced the object marker “râ” in all cases, while the aphasics did not use it in any sentence. The two groups

**Test 1.** Statistical analysis

Groups	Count	Sum	Average	Variance
Control	6	120	20	0
Aphasic	6	0	0	0

ANOVA						
Source of Variation	SS	df	MS	F	P	F crit
Between Groups	1200	1	1200	65535	#DIV/0!	4.964603
Within Groups	0	10	0			
Total	1200	11				

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statistical analysis (1) Comparison of the control group and Broca’s aphasic group through 1-way ANOVA ( $\alpha=0.05$ )

**Table 12.** The presence of the object marker “râ” in the speech of the aphasic group (second test)

Participant	Frequency of “râ” in Each Sentence	Observing Subject and Object Position	Use of Verb	Use of Demonstrative Pronouns	Grammatical Sentence	Grammatical Sentence
1	-	√	√	-	-	√
2	-	√	√	-	-	√
3	-	√	√	-	-	√
4	-	√	√	-	-	√
5	-	-	√	-	-	√
6	-	√	√	-	-	√

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were compared through one-way ANOVA to see if there was any statistically significant difference between them. The alpha coefficient was set at 0.05 (statistical analysis 1). A large value of “F” rejects the null hypothesis, that is, there is more between-group variance than within-group variances. Hence, one can argue that the population is not homogenous. F-value varies from 1-120. As can be observed in analysis 1,  $F=65535$  which is much greater than 1. Therefore, there is a significant difference between the two groups regarding the use of “râ”.

According to Table 12, we observed these findings: A. In line with Kolk’s findings [25, 26], the object marker “râ” has not been used; B. Contrary to Kolk’s ideas, in most cases, the syntactic positions of the subject, object, and the verb have been observed; C. Similar to Garman, Saffran, and Dolfić and Fabijanić [2-4], pronouns were absent in their sentences; D. In line with Friedman and Dolfić and Fabijanić [4, 21], the sentences were completely simple; E. Similar to Garman’s [2] findings, the speech flow did not stop, but it has many disorders that were mostly related to the grammatical or syntactic structure of the language.

Comparing Tables 11 and 12 reveals no difference between the results of test 1 and test 2 concerning the production of “râ”; thus, no statistical analysis can be employed.

Now we take a glance at what we reviewed in the literature. Nilipour [28] reported a post-posed direct object marker “râ”, written as a free grammatical morpheme, had to be omitted. Our findings support Nilipour [28]. Nilipour [29] also studied the “post-position direct object”. He argued that inflectional and derivational morphemes like other grammatical categories were not present in the first and second case’s speech. He showed that

“râ” was absent in their speech. Our findings support Nilipour’s findings, too [29].

As for the claim that “râ” is a topicalization marker, Karimi [9] stated that one of the discourse functions of “râ” could be that of a marker of topicality. Karimi considers specificity to explain the distribution of “râ”. As we saw, the distribution of “râ” is Karimi’s [9] concern yet not ours.

Dabir-Moghaddam proposes syntactic and discoursal explanations for the use of “râ”. He believed that it is the secondary topic taking “râ” if the sentence is divisible into three parts: primary topic, secondary topic, and comment [11]. As we saw, the distribution of “râ” and its discoursal behavior is Dabir-Moghaddam’s concern but not ours.

Shokouhi and Kipka [1] believed that the discourse properties of “râ” play a key role in the explanation of when this particle occurs. Again, the discoursal behavior of “râ” is not our concern.

Darzi [12] argued that “in none of these analyses, the morpheme “râ” appears on deep subjects”. Then, he highlights that “râ” may also mark subjects, just in case it occurs in the right grammatical configuration. More specifically, Persian has the category of the small clause in which an NP marked with “râ” is the subject of the small clause rather than the object of the matrix sentence. He also presented a minimalist account. As we see the syntactic and especially minimalistic behavior of “râ” is what took Darzi’s concern though it is not ours.

Hosseini Fatemi [14] presents an analysis of the semantic features of the Persian object marker “râ”. Se-

matically, “râ” has been identified with definiteness, specificity, and presupposition yet it is not our concern.

## 5. Conclusion

This study aimed to investigate the presence or absence of “râ” in the control and aphasic groups. It was found that the speech of the aphasics was short and telegraphic. Most words used were content words (e.g., subject, object, and verb). These findings are in line with Garman, Saffran, and Dolfić and Fabijanić [2-4] findings. Contrary to Garman, Saffran, and Dolfić and Fabijanić [2-4], the participants did not use pronouns. Their speech flow continued although it had many disorders mostly related to the grammatical or syntactic structure of the Persian language. This finding supports the findings of Garman [2]. Also, in line with Friedman and Dolfić & Fabijanić [4, 21], the sentences were simple.

The aphasics participating in the present study, with all problems in expression, observed the position of the subject, object, and verb (except for one participant in the first test). This finding contradicts Kolk’s finding [25, 26]. He believed that patients suffering from agrammatism possessed grammatical knowledge but could not use it for language production and comprehension in real time. It appears that in the present study, the aphasics had cognitive knowledge for production and did know that in Persian, the subject occupies the first position, the object comes next, and verb in the final position of the sentences.

This result can prove that the site for linguistic abilities in the mind is not separated and independent from other cognitive abilities and there is a relationship between linguistic and non-linguistic cognitive abilities. This finding supports the findings of Jackson, Walsh, and Ameri and Golfam [18, 19, 29]. None of the aphasics used the object marker “râ” in their sentences which is in accordance with the findings of Tafarroji Yeganeh [31] who proposed that the aphasics have more problems in the production of functional categories than in the comprehension of these categories.

The aphasic participants mostly recognized the position of the subject (agent) and object (patient) accurately which supports Kolk’s belief [25, 26]. According to Kolk, agrammatic aphasics possess grammatical knowledge though they are unable to use it for language production and comprehension in real time.

The aphasic participants omitted “râ” in all sentences. This finding is in line with Nilipour [27, 28] because ac-

ording to him, the post-posed direct object marker /râ/ [“râ”] is subject to severe omission.

The control group used the object marker “râ” in all cases, while the aphasics did not use it at all. Using One-way ANOVA, the control group was compared to the aphasic group to see if there was any statistically significant difference between them. In that test, the F-value was 65535 which is much larger than 1. This result indicates a significant difference between the two groups.

## Ethical Considerations

### Compliance with ethical guidelines

The research placed a significant weight on informed consent process such that the participants were provided with all the relevant information needed to be conveyed in a simple understandable language to enable them to take a voluntary informed decision to participate or not; moreover, to protect the right of the participants, the research stakeholders did all their responsibilities in order for the ethical guidelines to be met.

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### Authors' contributions

All authors contributed in preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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