

# Agrammatism in Adult Persian Broca's Aphasia: A Case Study

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**Abstract**—The grammar of a right-handed monolingual adult native speaker of Persian who suffered from Broca's aphasia following a left hemisphere frontal lobe lesion subsequent to CVA was analyzed, discussed, and compared with control data. The spontaneous speech and descriptive speech were designed and performed. The data suggested that Persian agrammatism appears like this syndrome in other studied languages; there are severe impairments in the verbs and patients rely more on nouns than on verbs. The patterns of omissions and substitutions of grammatical morphemes seem show extreme variations in different patients, both in terms of the occurrence of errors in different grammatical morphemes as and in terms of the occurrence of omissions versus substitutions. There were also some language-particular patterns.

**Index Terms**—Broca's aphasia, agrammatism, grammatical morpheme, substitution, omission, Persian

## I. INTRODUCTION

Damage to the left inferior frontal lobe generally terminates in so-called Broca's aphasia; a pattern of performance which is characterized by asyntactic comprehension and agrammatic production. Agrammatic speech the patient represents omission or misuse of bound and free grammatical morphemes and has a tendency to omit or nominalize verbs, leading to incomplete, fragmented sentences (Balaguer, et al. 2004, p. 212). The main feature of agrammatism as stated by Lee and Thompson (2004) is slow, effortful and non-fluent speech, which is frequently accompanied by an evident reduction in syntactic complexity and phrase length (Lee & Thompson, 2004, p. 315).

As cited in Wenzlaff and Clahsen (2004), a great number of studies of the last decades have indicated that in agrammatism, not all functional elements are equally affected. For example, conjunctions are comparably well preserved (e.g. Goodglass, 1976; Menn & Obler, 1990), and English-speaking aphasics face less difficulty in regular noun plurals compared to possessive marking (Gleason, 1978).

According to Bastiaanse et al. (2002) the speech of Broca's aphasics has often been featured by the substitution and/or omission of both free and bound grammatical morphemes (Bastiaanse et al., 2002, p. 241). However Chiat and Law (2003) believe that in any language, no error type is common to all aphasic patients with agrammatism; although there do exist general tendencies and patterns, few errors (if any) are found in all patients. Furthermore, a particular type of error which is frequent in one language, is not necessarily observed in other languages, even when the opportunity exists (Chiat & Law, 2003, p. 4).

## II. METHODOLOGY

### A. Subjects

A right-handed agrammatic patient in stable neurological condition, without disorders of "consciousness," with a history of acute disturbance language functions, and who had received a formal education for 8 years was considered in the present study. She didn't have a history of prior psychiatric disorders, learning disabilities, neurological disease, developmental speech/language disorders, drug or alcohol abuse, or hearing deficits.

A control subject, roughly matched for age, gender, language, handedness and education to the aphasic patient, was asked to collaborate in the study. The essential biographic information and lesion data for the patient and her control subject is presented in Table 1. The subjects are indicated by their initials.

TABLE 1  
ESSENTIAL BIOGRAPHICAL INFORMATION ON THE PATIENT AND HER CONTROL

Subject	Gender	Language	handedness	Age at Onset	Years of formal education	Etiology	Lesion site	Time Post onset
SE	female	Persian	Right-handed	16	8	CVA	Frontal lobe	3 years
EM	female	Persian	Right-handed		12			

*B. Procedure*

The speech corpora analyzed for this paper were collected by asking our subjects to produce the following narratives: a) spontaneous speech via describing her history of illness, Family members, vacations; b) descriptive speech by the description of the Cookie Theft picture, Thief, Farmer and Raining picture (Goodglass & Kaplan, 1972). The examiners asked the patient (and her control subject) to produce a given narrative.

Speech samples were tape-recorded on high-quality cassettes and were collected over several sessions. Then the tapes were independently transcribed by the authors.

*C. Scoring*

Agrammatic speakers generally produce fragmented speech, i.e., word strings in which the intended grammatical structure cannot be reconstructed. To analyze this feature of our aphasic patient's speech, the words she produced in her fragmented utterances were calculated. The quantitative prevalence of fragmented speech is defined as the ratio of the number of words produced without a recoverable grammatical structure to the total number of words in the sample (produced either correctly or incorrectly). The mean length of utterance (MLU) was measured and preserved after eliminating fragmented speech, according to the lexical criteria (MLU-Lexical). MLU-Lexical correlates to the number of major-class items the patient produces in an uninterrupted, syntactically correct string (Miceli & Silveri, 1989, p. 449-450).

III. LANGUAGE ASSESSMENT

Connected Discourse Analysis

**1. SE's Linguistic Performance**

SE's seven speech samples led to 44 utterances comprising 277 words, with an overall MLU of 6.3. Her production of selected utterances and also grammatical morphemes in the obtained narrative speech and word errors, with their distribution is shown in Table 2 and Table 3.

TABLE 2  
SE'S GRAMMATICAL MORPHEME ERRORS AND DISTRIBUTIONS

	Items	Correct		Incorrect		Omission		Total N	Control Subject's Data
		N	%	N	%	N	%		
1	def. art	19	100	0		0		19	0
2	indef. art.	0		0		0		0	16
3	Preposition	7	50	2	14.3	5	35.7	14	22
4	postp. /ra/	0		1	14.3	6	85.7	7	4
5	LINK morph.	1	33.3	0		2	66.6	3	27
6	POSS. morph.	9	75	3	25	0		12	12
7	Pronoun	39	84.7	1	2.2	6	13	46	32
8	DER morph.	7	100	0		0		7	15
9	INTER. CL. conj. /va/	0		0		0		0	10
10	PL. morph	25	2	50	4	25	2	8	13
11	infin. Marker	0		0		0		0	1
12	PST. morph.	2	40	3	60	0		5	4
13	inflect. morph.	91	81.3	12	10.7	9	8	112	104
14	PROG. /mi-/	24	80	1	3.4	5	16.6	30	20
15	IMP. /be-/	7	50	3	21.4	4	28.6	14	6
16	NEG. morph.	2	66	1	33	0		3	5
17	Aux	5	100	0		0		5	7
18	EXTER. CL. conj.	4	57.1	3	42.9	0		7	5
	Total	219	75.1	34	11.6	39	13.3	292	323

TABLE 3  
COMPARISON OF SE'S LINGUISTIC PERFORMANCE WITH THAT OF EM, THE CONTROL SUBJECT

No.	Narrative	No of Utt.		Total words		MLU		Total Function Words		Substitution		Omission	
		SE	EM	SE	EM	SE	EM	SE	EM	C.W	F.W	C.W	F.W
1	Family Members	4	6	27	22	6.7	3.6	5	7	3	1	0	1
2	Journey	3	4	34	55	11.3	13.7	8	24	8	1	0	1
3	Cookie theft	6	5	33	45	5.5	9	8	19	1	3	0	4
4	Thief	5	5	30	45	6	9	7	16	3	0	0	2
5	Farmer	7	5	43	40	6.1	8	16	3	4	1	1	1
6	Raining	12	3	70	43	5.8	14.3	23	16	29	1	0	8
7	Family Picture	7	5	40	46	5.7	9.2	14	3	4	0	4	4
8	Total	41	33	277	250	6.3	7.6	81	108	52	7	5	21

As shown in Table 3 there were more than two times as many substitutions as omissions (52 vs. 21) in SE's connected speech sample. About 88% of word substitution errors were content words, and about 81% of word deletion errors were function words.

We can describe SE's linguistic deficits as follows:

She has difficulty in the use of Verb Phrases and access to lexical items.

Her grammatical violations may be classified into 5 different types:

**- Omission of obligatory free morphemes (prepositions and postposition /ra/)**

The omitted morphemes are enclosed in the bracket.

For example:

1. /bæʔd ʔin doxt\* zæn-e [be] pesær-eš kot\*\* -goft-eš .../  
 Adv pro N N-art [prep] N-Poss PAST-tell-3SG-pro  
 then this girl woman [to] son-her told

2. /ʔin telefon [ro] bær-mi-dar-e .../  
 pro N [postp] take: PROG: 3SG  
 this telephone take

\*Paraphasia for 'doxtær' (girl)

\*\*Paraphasia for 'goft' (told)

**- Substitution of obligatory free morphemes**

For example:

3. /bæʔd mi-ge [ʔin-o] vase mæn be-gir/  
 Adv say-PROG: PRES-3SG [Pro-postp] prep pro IMP-get: 2SG  
 then says [this] for me get

\* 'Vase'(for) is a preposition which is substituted for "'æz' (from).

4. /næ! hævas- ešun\* nist hæst/  
 Adv N-POSS NEG-be: PRES-3SG PRES-be-3SG  
 no attention-their isn't is

\*The possessive pronoun 'šun' (their) is substituted for the possessive pronoun 'š' (her).

**- Subject-verb disagreement**

For example:

5. /baba-m či sær-e kar ne-mi-ræn\* /  
 N-POSS pro N-LINK N NEG-go: PRES-3PL  
 father-my what to work doesn't go

\*The 3<sup>rd</sup> person plural verb 'ne-mi-ræn' (don't go) is substituted for the 3<sup>rd</sup> person singular verb 'ne-mi-re' (doesn't go). It should be noted that in formal and polite version of Persian, the 3<sup>rd</sup> person plural verbs such as 'ne-mi-ræn' (don't go) are also used for the 3<sup>rd</sup> person singular 'ne-mi-re' (doesn't go). According to Saeed (2013), Speakers of many European languages make distinctions between familiar and polite pronouns and verbs. They are committed to revealing their calculations of relative intimacy and formality to their addressees (Saeed, 2013, p. 197). But SE didn't use this form of verb to show politeness and this is considered a subject-verb disagreement.

**- Substitution of the verbal element in complex verbs with another verbal element**

For example:

6. / bæʔdæn hæh hæge zud-tær peyda mi-kærd  
 Adv pro pro -comp Adj-sup beyda [šun] šod\* /  
 then who who earlier find become -PAST-3SG  
 became

\*The verb 'šode' (has become) is substituted by 'mi-kærd' (was doing).

**- Reconstruction of verb inflectional markers or substitution of bound or free morphemes**

Some patients consistently change the inflectional endings of the verbs in each sentence. For example they constantly alter the verb inflection from present to past tense and also drop the negative morphemes. In Persian the past tense of the verb is structurally simpler than present and more similar to the infinitive form (Nilipour, 2003, p. 118). For example:

7. /bæʔd ʔofta -d\* .../  
 Adv fall-PAST-3SG  
 then fell

\*The past tense verb 'ʔoft-ad' (fell) is substituted for the present tense 'mi-ʔoft-e' (falls).

8. / bæʔd ʔin doxt zæn-e [be] pesær-eš kot-eš  
 Adv pro N N-art [prep] N-POSS tell-PAST-3SG-pro  
 then this girl woman to son-her told

be-de  
 [ke] čæt be-m dad\* /  
 [comp] N prep-pro give-PAST-3SG  
 that umbrella give gave

\*The past tense verb 'dad' (gave) is substituted for the imperative verb 'be-de' (give).

9. /ʔin bozorg šo-d [-e] /  
 pro Adj become -PAST-3SG  
 this old became

bærænde  
 10. /...værænde\* šod\*\* /  
 Adj become-PAST-3SG  
 winner became

\*Phonemic paraphasia for 'bærænde' (winner)

\*\* The simple past tense verb 'šod' (became) is substituted for the past progressive verb 'mi-šod'.

11. /... čunke\* ʔesraf næ-kon-e\*\* /  
 conj N NEG-do-3SG  
 because lavishment doesn't do

\* The conjunction 'čunke' (because) is substituted for the conjunction 'væli' (but).

\*\* The negative verb 'næ-kon-e' (doesn't do) is substituted for the verb 'mi=kon-e' (does).

baftæn-i mi-baf-e  
 12. /baspæzi\* mi-ndaz-e \*\*  
 N PROG-throw:PRES-3SG  
 weaving throws

\* Paraphasia for 'baftæni'

\*\* The verb 'mi-ndaz-e' (throws) is substituted for 'mi-baf-e' (weaves).

**- Deletion of dependent clauses**

13. /ʔin telefon [ro] bæar-mi-dar-e ke [zæŋg be -zæn-e] /  
 pro N [postp] take:PROG: 3SG conj [N SUB-ring- 3SG]  
 this telephone takes to [call]

**2. Morpheme Errors and Distributions**

Each lexical item or grammatical morpheme is scrutinized in Table 2 considering whether it was correctly used, incorrectly substituted, or deleted. The contexts in which there was a dropped or substituted morpheme, were recognized and the patient's utterances were reconstructed as a healthy native speaker would have produced them.

SE omitted around 13.4% of the grammatical morphemes in her utterances, in which about 75.3% of these morphemes were correctly used and the remaining 11.3% were incorrectly uttered.

**Definite and indefinite articles:** In Persian nouns, definite ones are mostly unmarked, while indefinite nouns are either marked with the suffix /-i/ or used with the word 'yek' (one) or its informal version 'ye'. A noun functioning as a direct object may also be followed by the specific direct object marker /ra/ (Nilipour, 2003, p. 27). SE didn't use the indefinite article at all, but her control subject, EM, used it 16 times which was marked with the suffix /-i/. On the other hand, SE used the definite article 19 times, but her control subject never used it. SE didn't omit the definite article in any of the contexts.

**Prepositions:** 9 prepositions were produced out of 14 required contexts, 7 correct and 2 *incorrect*.

**Postposition direct object marker:** SE rarely used the direct object marker /ra/. She produced the informal form of /ra/ (i.e. /-o/) in just 1 out of 7 required contexts, which was incorrect. She deleted the other 6 cases. For example:

1. /ʔin	ʔin	či-ye	ha	zorræt	zorræt	mæn	zorræt
pro	pro	pro-V		N		N	pro
this	this	what-is	yes	corn		corn	I
	ha	zorræt-o	zorræt	zorræt	zorræt	zorræt-e/	
Adv		N-postp	N	N		N	N-V
yes		corn-is	corn	corn		corn	corn-is

**Izafe (linking morpheme):** "The *izafe* morpheme /-e/ is used to link a head noun to its complements or modifiers" (Nilipour, 2003, p. 29). This morpheme was correctly used just once and was missing once in SE's speech. But her control subject provided it in 27 instances. For example:

2. /pesær-e	pesær-e	væræG	væræG	gereft[-e]	bæray[-e	ʔin]ke
N-art	N-art	N		N	buy- PAST-3SG	prep [-LINK pro]
boy-the	boy-the	paper		paper	bought	for that
baba-š	be-xun-e					
N-POSS	SUB-read-3SG					
father-his	read					
3. /ʔin	tæmam[e]	væs	væsaye[-a-š	..../		
pro	Adv[-LINK]	N	N	N-PL-POSS		
this	all	means		means-his		
4. / baba-m	či	sær-e	kar	ne-mi-ræn		
N- POSS	pro	N-LINK	N	NEG-PROG-go:PRES-3PL		
father-my	what	to	work	doesn't go		

**Possessive Morpheme:** SE produced the possessive morphemes 12 times: 9 correct and 3 incorrect. Her control subject, EM, also used them in 12 instances.

**Pronouns:** SE used pronouns 46 times: 39 correct, 1 incorrect and 6 omitted. EM used them 32 times. For example:

5. /mæn noh ta xahær-im.../  
 pro Num N-V  
 I nine sister-are

Here the 1<sup>st</sup> person singular pronoun 'mæn' (I) is substituted for the 1<sup>st</sup> person plural pronoun 'ma' (we).

6. /bæʔdan hærike hæge zud-tær peyda mi-kærd  
 Adv pro pro-comp Adj- SUF Adj-[pro] become- PAST-3SG  
 then who who earlier find[them] became

Here the 3<sup>rd</sup> person singular verb 'šod' (became) is substituted for the 3<sup>rd</sup> person singular verb 'mi-kærd' (did).

**Derivational morphemes:** These morphemes were used 7 times which were correctly used. The control subject provided them in 15 instances.

7. /pesær-e širn-i širn-i mi-xa-d bo-xor-e  
 N-art N N AUX SUB-eat-3SG  
 boy-the cookie cookie wants eat

**Conjunctions:** No coordinate conjunction 'væ' (or its informal equivalent /o/) (and) was used, but EM used it 10 times.

**Plural morpheme:** 6 plural morphemes were used in SE's speech: 2 correct and 4 incorrect. In 2 of the required contexts, the plural morpheme was missing. The control subject used 13 instances of it.

8. /ʔin mašin bæraye bæra hæmin zoræt[-ha] zoræt[-ha] [ʔæst]  
 pro N prep prep pro N[-P] N[-PL] [V]  
 this machine for for this corn[s] corn[s] [is]  
 pul

9. / pul-a-š-æm bun\* mi-gir-e /  
 N:PL-POSS-Adv N PROG-get:PRES-3SG  
 money-his money gets

10. /ʔin tænum[-e] væs- væsayel-a-š mi-dozd-e /  
 pro Adv[-LINK] N N-PL-POSS PROG-steal:PRES-3SG  
 this all means-his steals

\*'Bun' is phonemic paraphasia for 'pul' (money).

**Infinitive marker:** No infinitive marker was used in the patient's speech sample. EM used it just once.

11. /væ pedær-e xunevade hæm dær-heyne sigar kešid-æn/  
 conj N-LINK N Adv Adv N smoke-PAST-infm  
 and father family too while cigaret smoking

**Past tense morpheme:** Of 5 instances of the use of past tense morpheme by SE, 2 were correct and 3 were incorrect. EM provided it in 4 instances.

12. /mi-xas-t mi-ʔoft ʔofta-d-e ʔofta-d mi-xast bi-ʔoft-e/  
 AUX PROG-fall V: PASTP fall-PAST-3SG AUX SUB-fall-3SG  
 wanted falls has fallen fell wanted fall

**Progressive verb prefix /mi-/:** The obligatory prefix /mi-/ which indicates progressive aspect on simple present and past continuous tense was used 25 times by SE: 24 correct, 1 incorrect and 5 missing.

**Imperative and subjunctive verb prefix /be-/:** It has been produced 10 times out of 14 required contexts, 7 correct and 3 incorrect.

13. /bæʔd čætr čætr[ro] bær-mi-dar-e  
 Adv N N [postp] SUB-throw-3SG  
 then umbrella umbrella throw

\*The subjunctive verb 'be-ndaz-e' (throw) is substituted for the present tense verb 'bær-mi-dar-e' (takes).

**Relative clause marker complementizer /ke/:** SE provided it in 7 instances: 4 correct and 3 incorrect. EM used it 5 times as the control subject.

14. /ʔin zæn-e ʔab dar-e mi-riz-e čonke \* ʔesraf næ-kon-e\*\*  
 pro N-art N AUX PROG-pour- PRES-3SG conj N NEG-do-3SG  
 this woman-the water is pouring because lavishment doesn't do

\*The conjunction 'čonke' (because) is replaced for the conjunction 'væli' (but).

\*\*The negative verb 'næ-kon-e' (doesn't do) is replaced for the present progressive verb 'mi-kon-e' (is doing).

**Negative morpheme:** SE used it 3 times: 2 correct and 1 incorrect. EM provided it in 5 instances.

**Auxiliary:** It was correctly used in 5 instances by SE. Her control subject used it 7 times.

### 3. Token-type ratios of SE's major lexical items

Token-type ratios of SE's major lexical items are given in Table 4.

TABLE 4  
SE'S MAJOR CLASS LEXICAL ITEMS (TOKEN-TYPE RATIO)

No.	Narrative	Nouns		Verbs		Adjectives		Adverbs	
			SE		SE		SE		SE
1	Family members		15		2		0		2
2	vacation		7		5		3		8
3	Cookie theft		7		13		0		2
4	Thief		13		7		0		5
5	Farmer		20		7		1		1
6	Raining		40		16		2		6
7	Family picture		17		11		1		5
8	Ratio (total)		119		61		7		29

**Nouns:** The nouns were the most frequent category in SE's speech: 119 of the 199 content words in her speech were nouns. All were singular except for 2 plurals. There were several preservations, as well as phonemic and semantic paraphasias. Nouns were less susceptible to omission than verbs in this patient's speech samples.

**Verbs:** The verbs which are inflected for person, number and tense, were the most disrupted lexical category in SE's speech. They were omitted in 3 required contexts. In her control data, 39 lexical verbs were used.

**Adjectives:** SE used a few adjectives in her speech. She totally produced 7 adjectives.

**Adverbs:** The number of adverbs in the patient's speech samples was 34. She produced the same number of adverbs as what the control subject did.

**4. Summary of SE's Linguistic Performance and that of the Control participant**

A summary of the general characteristics of SE's performance and that of EM in tasks is indicated in Table 3. It shows some differences at the syntactic and lexical levels between their linguistic performances. The overall number of utterances and words elicited from SE were more than her control subject (277 versus 250 and 44 versus 33). But SE's MLU is less than EM's MLU (6.3 versus 7.6). This table shows that SE has less access to function words in comparison to EM (81 versus 108), so she has a simpler syntax.

The Table 2 indicates that the number of grammatical categories in EM's speech is more than SE's except for definite article, pronouns, progressive prefix /mi-/ and imperative verb prefix /be-/. SE had a poor access to indefinite article, prepositions, izafe (linking morpheme) /-e/ and the plural morphemes which are necessary for the production of complex noun phrase structures.

**Tense and aspect:** SE produced fewer utterances than her control subject for the description of her family members (4 versus 6), but she used more words in this task (27 versus 22). She used the simple present tense in this case, except for two instances which were present progressive. SE has used past tense for the description of her journey, but in the cookie theft task she has used different tenses. The use of progressive aspect instead of a non-progressive one seems logical. In her description of the thief picture, SE has used the present progressive tense in most of the utterances, except for one instance where she has used the present perfect. In her description of the farmer picture, SE has used the present progressive tense, except in one utterance where she has used the simple past tense and 2 of the utterances in which the verb is missing. In describing the raining picture; the patient has used various tenses. In her description of the family picture, SE has first used the present progressive and then she has switched to the simple present, simple past and the subjunctive mood. It has been reported that the control subjects favor the present tense for much of their narratives (Menn & Obler, 1990, p. 137).

**Pronominal/ Nominal Reference and the Use of Definite and Indefinite Articles**

**The use of noun versus pronoun:** SE has less inclination for the substitution of nouns by pronouns, which shows that she prefers to use the nouns where they are required. SE has never used indefinite article before the definite article. Menn & Obler (1990) believe that the explanation for the use of the definite article on first mention is probably pragmatic: as Gee points out (in personal communication), the use of the definite article in referring to a character in a picture which is visible both to the speaker and the hearer can be considered a deictic use of the article, because the establishment of the referent takes place in the real world, not within the discourse (Menn & Obler, 1990, p. 140). In telling a popular story which the speaker knows that the hearer knows, the actors can be treated as already known by a narrator who does not wish to maintain the convention that he/she is telling the story as 'news' (ibid).

TABLE 5  
COMPARISON OF SE'S VS. CONTROL SUBJECT'S RATES OF PRODUCTION

No.	Task	Total Words		Time (seconds)		Speech Rate Words Min.	
		SE	EM	SE	EM	SE	EM
1	Family Members	27	22	31	14	52.2	94.3
2	Journey	34	55	27	30	75	110
3	Cookie Theft	33	45	50	21	39.6	128.6
4	Thief	30	45	91	20	19.2	135
5	Farmer	43	40	100	24	25.8	100
6	Raining	70	43	97	17	43.2	151.8
7	Family Picture	40	46	115	17	20.4	162.3
	Total	277	250	511	143	32.4	126

### Production Parameters

**Speed:** This patient has been chosen so that she has the phonological features associated with Broca's aphasia. So her speech is relatively slow and her MLU is shorter than the control participant. Her spontaneous speech is more rapid than her descriptive speech. She has the most speed in describing the raining picture than describing the other picture.

**Mean length of utterance (MLU):** SE's MLU in describing her journey is more than her other samples of spontaneous speech. In her descriptive speech samples, she has the most MLU in describing the thief narrative and the least MLU in describing the raining picture.

### IV. CONCLUSION

There are various grammatical violations in SE's speech samples which can be classified as:

1. Omission of obligatory free morphemes (prepositions and postposition /ra/)
2. Substitution of obligatory free morphemes
3. Subject-verb disagreement
4. Substitution of verbal element in complex verbs with another verbal element
5. Reconstruction of verb inflectional marker or substitution of bound morphemes

Our findings are in line with the data provided by Nilipour (2003) who believes that in Persian, verb and grammatical morphemes are more vulnerable to disruption than other categories (Nilipour, 2003, p. 43). SE didn't use complex structures and made syntactic simplifications. She tended to omit the free grammatical morphemes and substitute the inflectional morphemes with other morphemes. She had less inclination for the substitution of nouns by pronouns, which shows her preference to use the nouns where they are required.

The performance of the patient studied in this research demonstrates some certain universal and language-specific features of agrammatism. Among universal features, the data show syntax simplification, more dependence on canonical forms, leading to less syntactic variation, and less accessibility of verbs compared to nouns. These general features are parallel to results reported from other languages (Nilipour, 2003, p. 21).

The present data demonstrate that verb phrases (VPs) are more vulnerable compared to noun phrases (NPs). The deficits in NP production appear in the omission of the ezafe linking morpheme /-e/ and also the deletion of the clause-internal conjunction /væ/, which results in a simplified NP. Among free grammatical morphemes, the most vulnerable items to omission were prepositions and the direct object marker /ra/.

According to Berndt (1988), it has been claimed that "verbs are more complex than nouns, (as) they are harder to remember, more broadly defined, more prone to alteration in meaning when conflict of meaning occurs, less stable in translation between languages, and slower to be acquired by children than nouns" (in Lesser & Milroy, 1993, p. 87).

We might expect to find a high incidence of deictic terms in the discourse of relatively fluent aphasic speakers, simply because they offer the speaker a means of producing relatively intelligible well-formed utterances with reduced processing costs (Wepman and Jones, 1996). However, the non-fluent aphasic in this research appeared to prefer nouns to pronouns. As Lesser and Milroy (1993) believe, pronouns are classified with the grammatical morphemes which are frequently omitted in agrammatic speech, which seems to suggest that the use of pronouns may impose a greater syntactic processing cost (*ibid*, 123).

The data elicited in the present article is also in line with Early and Van Demark (1985) who reported that aphasic speakers use the indefinite article considerably less than normal speakers to mark newness of information. This pattern is generally reported in the literature with specific reference to agrammatic patients, but may also occur in the paragrammatism associated with fluent speech (*ibid*, 127).

#### Are all function words equally impaired?

As cited in Bastiaanse & Grodzinsky (2000), studying the aphasia deficits, it seems that not all of the grammatical morphemes are impaired equally in agrammatic production. Several (nonlexical) elements have already been reported to be spared in agrammatic production: among them case (Menn and Obler, 1990), coordination conjunctions (Menn and Obler, 1990; Friedmann, 1998), and negation markers (Lonzi and Luzzatti, 1993). "Even in the domain of inflections, not all inflections are equally impaired" (Bastiaanse & Grodzinsky, 2000, p. 153). The present study also showed similar findings in Persian agrammatic speech.

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