

Morphosyntactic aspects of agrammatism in Palestinian Arabic: Findings from a Semitic language

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Abstract. The present study uses a spontaneous speech task to investigate the production of morphosyntactic elements in Palestinian Arabic agrammatism (PA). Eight Palestinian-Arabic-speaking individuals with agrammatism (6 males and 2 females), diagnosed with mild to severe Broca's aphasia, and 8 age- and gender-matched healthy speakers participated in the study. A speech sample of 100 words from each participant was transcribed and analyzed. Findings showed that substitutions, omissions, simplified sentence structure, and tense inflection errors mostly characterized Palestinian Arabic agrammatism. As for tense and agreement, the speakers with agrammatism showed more tense inflection impairments than agreement inflections. The results suggest that the individuals of PA with agrammatism had marked dissociations in producing certain types of specific morphosyntactic structures, confirming previous findings, mainly from Hebrew and Jordanian Arabic.

Keywords: Agrammatism; Morphosyntax; Palestinian Arabic; Semitic languages.

[es] Aspectos morfosintácticos del agramatismo en el árabe palestino: Conclusiones acerca de una lengua semítica

Resumen. El presente estudio analiza el habla espontánea de distintas personas para investigar la producción de elementos morfosintácticos en el agramatismo del árabe palestino (AP). Los participantes eran hablantes de árabe palestino con agramatismo (6 hombres y 2 mujeres), diagnosticados de afasia de Broca de leve a grave y 8 hablantes sanos de la misma edad y sexo. Se transcribió y analizó una muestra de habla de 100 palabras de cada participante. Los resultados mostraron que las sustituciones, las omisiones, la estructura simplificada de las frases y los errores de flexión de tiempo caracterizaban mayoritariamente el agramatismo árabe palestino. En cuanto al tiempo y la concordancia, los hablantes con agramatismo mostraron más deficiencias en la flexión de tiempo que en la concordancia. Los resultados sugieren que las personas hablantes de AP con agramatismo presentaban marcadas disociaciones en la producción de ciertos tipos de estructuras morfosintácticas, lo que confirma hallazgos anteriores, principalmente del hebreo y del árabe jordano.

Palabras clave: Agramatismo; Árabe palestino; Morfosintaxis; Lenguas semíticas.

Sumario: Introduction. Aims and rationale of the study. Methodology. Participants. Speech sample. Statistical analysis. Results. Tense errors. Tense errors. Article errors. Prepositions errors. Discussion. Conclusion. References.

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Introduction

Agrammatism is a multi-dimensional deficit, often associated with Broca's aphasia, involving syntactic, morphological, and semantic factors of language production (Gilmore et al., 2019; Idrissi et al., 2021). One main feature of this deficit is grammatical simplification represented in the omission and/or substitution of grammatical morphemes, whether in spontaneous speech or constrained tasks (Yarbay, Kurada, & Aydın, 2020; Darshan & Goswami, 2020; Roberts et al., 2021). Bound grammatical morphemes, such as noun and verb inflections, were most likely substituted compared to omissions of free grammatical morphemes, such as determiners and conjunctions (Klopfenstein, Bernard, & Heyman, 2020). Therefore, agrammatic speech is commonly described as 'telegraphic.'

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Several studies have shown that such impairment in speakers with agrammatism is selective, where subject–verb agreement is relatively intact compared to severely impaired tense (Gordon, 2020; Castro, Stella, & Siew, 2020; Garraffa, & Fyndanis, 2020). Friedmann & Grodzinsky (1997) found that agrammatic subjects could not correctly inflect verbs for time, but their ability to inflect adjectives and nouns is relatively spared. Friedmann (2001) studied the morphosyntactic elements in agrammatic Hebrew and Palestinian Arabic-speaking individuals. The findings showed that tense inflections were impaired while agreement morphemes were almost intact. However, German counterparts did not display tense–agreement violations (Friedmann, 2001).

As grammatical morphemes behave differently depending on the language studied, features of agrammatism are present in different manifestations (Grodzinsky, 1990; Menn & Obler, 1990). For example, Benedet et al. (1998) investigated grammatical morphology in six Spanish- and English-Speaking agrammatic patients. The results showed that their Spanish-speaking participants performed better on the subject-verb agreement (63.8%) than on verbal tense (5.5%). On the other hand, the English-speaking agrammatic subjects produced correct responses (42%) for agreement, while showed 15% correct responses for tense. Using an elicitation and a sentence repetition task, Ferreiro (2003) examined the inflectional productions of seven Catalan, seven Galician, and seven Spanish-speaking agrammatic subjects and found more impaired tense marking for all speakers in all the languages. Similarly, Stavrakaki and Kouvava (2003) present data from Greek agrammatism, and they reported that patients, as a group, made more errors in tense than in agreement.

Aims and rationale of the study

Agrammatism in Palestinian Arabic has been under-studied compared to other Arabic varieties, such as Algerian Arabic (Mimouni, 1997), Moroccan Arabic (Diouny, 1997; Qorchi & Bouchara, 2017), Hijazi Arabic (Safi-Stagni, 1992), and Jordanian Arabic (Albustanji et al., 2013). For example, Albustanji and colleagues (2013) examined the production of tense and agreement morphology in 15 agrammatic Jordanian Arabic speakers. The findings showed a dissociation between tense and agreement, confirming findings from previous studies (Friedmann, 2002). Qorchi and Bouchara (2017) examined in a picture description and repetition task the morphosyntactic features of negation, tense, aspect, person, number, and gender in Moroccan Arabic-speaking agrammatic subjects. The findings showed that bound morphemes were almost spared.

To the best of the author's knowledge, no previous study has examined agrammatism in Palestinian Arabic separately using a relatively larger sample size of 8 participants. Rather, previous studies (Friedmann, 2001; 2002) had included 2 Palestinian Arabic-speaking agrammatic subjects compared to 13 Hebrew speakers with agrammatism, which may not allow for drawing more definitive conclusions regarding PA agrammatism or any related language-specific variations.

As stated earlier, agrammatism in Palestinian Arabic has been under-researched relative to other Arabic varieties. This study, therefore, contributes towards filling this knowledge gap. In addition, PA has a relatively free word order and a highly rich inflectional system (Alsaidat & Almomani, 2010) compared to English. As such, studying agrammatism in Palestinian Arabic can provide more insights into the underlying deficits of agrammatism cross-linguistic studies. Furthermore, the findings can be compared with those reported from comparable Semitic languages such as Hebrew (Friedmann, 2002) and Jordanian Arabic (Albustanji et al., 2013). Therefore, using a spontaneous speech sample, the present study aimed to:

- (a) Survey the morphosyntactic errors of grammatical morphology in PA agrammatism
- (b) Determine whether the errors undergo omission and/or substitution and whether there are any statistically significant differences between groups of speakers and error types.
- (c) Check for possible areas of similarities and differences reported from other languages.

Methodology

Participants

Eight Palestinian Arabic speakers with agrammatism (6 males and 2 females) participated in the study. They are native speakers of Palestinian Arabic residing in Palestine and Kuwait. In addition, eight healthy speakers (6 males and 2 females; years of education: $5.9 = SD = 1.8$; age: mean = 60.40 and $SD = 14.120$). The speakers with agrammatism were between 47 to 70 years old (mean = 62.25 and $SD = 15.297$). There is no significant ($p > 0.05$) difference between the speakers with agrammatism and the control group on age or level of education. The agrammatic subjects were right-handed and had been suffering from a single left hemisphere lesion for at least six months before testing. Table 1 presents the data of the speakers with agrammatism.

Following Albustanji et al. (2013), the Bilingual Aphasia Test, Arabic, Jordanian (BAT; Paradis & Libben, 1987) was used to diagnose agrammatism. A clinical rating determined the severity of the speakers with

agrammatism based on the results taken from subsets of the short version of the BAT (Paradis & Libben, 1987): spontaneous speech, pointing, simple and semi-complex commands, verbal auditory discrimination, syntactic comprehension, synonyms, antonyms, repetition of words, repetition of sentences, series, naming, sentence construction, semantic opposites, and listening comprehension. As shown in Table 1, of the 8 participants, 2 were rated as severe, 4 as moderate, and 2 as mild. The speakers with agrammatism reported normal hearing with no visual impairments. Apraxia of speech (AOS) and dysarthria were evaluated by an external speech-language pathologist and found to be non-existent.

Table 1. Participant data of PA speakers with agrammatism

Subject	Gender	Age	Education Years	Handedness	M. P. O	Hemiplegia	Severity results
A1	M	69	12	Right	112	Right	Severe
A2	M	76	9	Right	30	Right	Severe
A3	M	48	13	Right	42	Right	Moderate
A4	M	47	8	Right	34	Right	Moderate
A5	M	53	14	Right	120	Right	Moderate
A6	M	66	10	Right	13	Right	Moderate
A7	F	69	11	Right	210	Right	Mild
A8	F	70	5	Right	70	Right	Mild
Means		62.25	10.25		78.87		

A: agrammatic speaker; Gender (M=Male; F=Female); Education years; Handedness; MPO: Months Post Onset; Hemiplegia; Severity as determined by clinical results obtained from aphasia test (Paradis & Libben, 1987).

Speech sample

The study examined the production of morphosyntactic elements in spontaneous speech. Spontaneous speech was used as it provides important diagnostic information about the nature of agrammatism (Gordon, 2020). The examiner asked the patients to talk about their daily activities, previous jobs, hobbies, family issues, and similar personal topics to elicit the participant's responses. An experienced speech-language pathologist collected the speech samples. The first 100 words, including 10 utterances from each participant, were transcribed, and analyzed. Then, a second rater randomly selected and analyzed 25% of all transcripts to assess interrater reliability. Interrater reliability was 0.91 for segmentation. The data was collected from Palestinian participants with Broca's aphasia at Bethlehem Arab Society for Rehabilitation (BASR) in Palestine and Al-Nour Center for Speech Pathology in Kuwait. The recording was done in a quiet room using a high-quality microphone (AKG Perception 120 USB) around 20 cm from the participant's mouth. No time limit was imposed on the recording session as it was case-based, and the duration of the speech varied across the participants. The procedures were an adaptation of methods carried out by Qorchi and Boucharas (2017) and Albustanj et al. (2013).

Statistical analysis

One of the main objectives of the current study was to determine whether there were any statistically significant differences between groups of speakers (PA speakers with agrammatism vs. control subjects) and between various types of errors (tense vs. agreement; substitutions vs. omissions). However, due to the relatively small number of participants, nonparametric approaches were adopted to increase accuracy and account for non-normalities. Therefore, comparisons between the groups were analyzed using the Mann-Whitney U test.

However, for the comparison between errors, we adopted the Wilcoxon signed-rank tests. This nonparametric test checks the median difference in paired data. Furthermore, the study chooses this test over the Student t-test because it does account for the assumption of normality compared to the Student t-test, which is less sensitive for small samples of the population with uncertain distributions (Martínez-Ferreiro, 2009), as the case in the current study. A statistical significance level of 0.05 was used.

Results

Tense errors

Statistical analysis of between-group comparisons (Speakers with agrammatism vs. Control group) showed that tense errors in PA speakers with agrammatism were significantly higher than in the control group (Mann

Whitney test: $Z = -3.17$, $p < .01$). Additionally, gender errors were higher for the PA speakers with agrammatism than the control subjects (Mann Whitney test: $Z = -2.98$, $p < .01$). Furthermore, in-group comparisons showed that the PA speakers with agrammatism performed significantly worse on the tense agreement (Wilcoxon test: $Z = -2.35$, $p < .05$). As expected, the control group showed no evidence of this difference (Wilcoxon test: $Z = -0.31$, $p > .05$). Within-group comparisons also showed that the PA speakers with agrammatism performed significantly better on gender agreement (Wilcoxon test: $Z = -2.34$, $p < .05$). Importantly, the control group showed no significant difference (Wilcoxon test: $Z = -.31$, $p > .05$).

Table 2. Tense and agreement errors as displayed by the speakers with agrammatism

Agrammatic Subjects	Percentage of correct tense	Percentage of correct agreement
A1	32%	68%
A2	30%	70%
A3	34%	66%
A4	36%	64%
A5	36%	64%
A6	33%	67%
A7	38%	62%
A8	32%	68%
Controls	100%	100%

The following dialogue between the examiner (SLP) and one of the speakers with agrammatism illustrates some aspects of this error.

Tense errors

- (1) Aphasic production
ħut^s Ka:sih t^ʕa:wlih
 put glass table
 Correct production
ħuweħ biħut^s ʔilKa:sih ʕalat^ʕt^ʕa:wlih
 He is putting the glass on the table
 ‘He is putting the glass on the table’

For example, the subject “A2” dropped the aspect marker /bi-/ , denoting present progressive along with the person marker /ħuweħ/. However, deleting the aspect and the agreement markers resulted in an imperative mood (Put/ ħut^s) rather than a progressive one. Furthermore, the example demonstrates that the subject “A2” dropped the preposition [ʕala] (meaning [on]) and the definite article / ʔal/.

Article errors

Arabic has only one article [ʔal-], which is prefixed to both nouns and adjectives, and it does not share gender, number, and case, as shown below:

- ʔal-kita:b
 (2) The Book
 b. ʔal-kita:b ʔal-mufi:d
 The book-the interesting

The incidence of article violations was evaluated based on whether the article was produced (correct or incorrect), omitted, or substituted. The percentages of errors in article production, including omission and substitution errors, were provided, as shown in table 3. Statistical analysis showed significant differences between PA speakers with agrammatism and the control group (Mann-Whitney test: $Z = -3.65$, $p < 0.01$). However, PA subjects with agrammatism demonstrated significantly higher article omissions than article substitutions (Wilcoxon test: $Z = -2.96$, $p < 0.01$).

Table 3. Errors in the production of the definite article by the PA speakers with agrammatism

Correctly used	Substituted	Omitted
14%	34%	52%

While only 34% of the definite article substituted, 52% of the productions were omitted. Interestingly, despite such individual differences among the PA speakers with agrammatism reported in the present study, which might be related to severity levels of the agrammatic deficit of the subjects, the definite article was randomly accurately produced.

Table 4. Article production errors

The SLP	Min we:n ?inta Where are you from?
The patient	a...xalil Instead of ?alxaliil (Hebron)

The article in Arabic has no markedness; it bears no case, gender, and number, unlike, for example, German, in which the article is marked for gender, number, and case (Burchert, Swoboda-Moll, & De Bleser, 2005). Accordingly, when used in the singular form, different determiners are selected in German for the feminine, masculine, and neutral nouns. For example, in the nominative case, the determiners are, respectively, *der*, *die*, and *das*, as in *der Mann* [‘the man, mas], *die Frau* [the woman, fem], and *das Buch* [the book, new]. For Arabic speakers, however, there is no gender congruency effect. Furthermore, the findings provided no evidence for violations of morpheme order, for example, by placing an article postnominally rather than pronominally.

- (3) Walad -?al
?al- walad (correct use)

Table 5. Article omission errors

The Patient	Ewla:di bet “My sons home“ Correct Production: ?iwla:di fi ?albajt My sons are at home
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Prepositions errors

Between-group comparisons showed that PA speakers with agrammatism produced significantly fewer prepositions than the control subjects (Mann-Whitney: $Z=-2.721$, $p=.009$). Furthermore, comparisons showed that preposition substitutions among PA speakers with agrammatism were significantly lower than omissions (Wilcoxon test: $Z=-2.811$, $p=.009$).

Table 6. Prepositions omission

Erroneous form	Correct form	Translation
?ana ...dukaan	?ana ruhut ?ala dukaan	I went to the grocery
Wlad ...bet	?alawlaad fi ?albajt	The young are at home

However, in some cases, the aphasic speakers correctly used the prepositions, as shown below:

Table 7. Correct use of prepositions

The Patient	walad....fi iltaxit “boy in bed“ Correct Production: ?ilwald nayem fi ?attaxit The boy is sleeping in bed
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Furthermore, PA speakers with agrammatism exhibited difficulties in producing abstract concepts of prepositions. For example, they had problems with sentences such as [ʔna ʔtatʕalaʔu ʔilaa ʔalhuraya] [I am looking for freedom]. In contrast, they produced prepositions with a concrete meaning, such as [ʔal kitaab fug ʔaltʕaawilah] [the book is on the table]. Table 8 below presents the percentage of preposition errors displayed by the speakers with agrammatism.

Table 8. Percentages of preposition errors displayed by the speakers with agrammatism.

Correct Use	Substitution	Omission
12.29	31.57	56.43

Discussion

The present study surveyed some aspects of morphosyntactic elements in PA agrammatism based on spontaneous speech samples. The results showed that omission and/or substitution of grammatical morphemes were mainly characterizing speech of PA speakers with agrammatism, confirming recent studies on agrammatism and its correlates (Darshan & Goswami, 2020; Nerantzini et al., 2020; Yarbay, Kurada, & Aydın, 2020).

Furthermore, the analysis showed that article omission was a predominant error. However, in some cases, the PA speakers with agrammatism produced the article correctly. Such variability in article production suggests that the morphosyntactic elements in the speakers' speech with agrammatism were partially recovered. Our results provide strong evidence to support the zero-morphology account proposed by Grodzinsky (1984), particularly as the article in Arabic is a zero prefix and does not bear number, gender, or case; hence, omissions are predominant. This pattern, however, is inconsistent with articles in German, for example, that carry a high "information load" about gender, case, and number (Hanne et al., 2015). Thus, they were omitted less frequently.

Concerning the production of prepositions, the PA speakers with agrammatism showed two patterns of deficits: preposition omissions and substitutions. Omissions were notably more frequent compared to substitutions. However, some prepositions were correctly used. This pattern is consistent with agrammatism's hypothesized selectivity and variability, whereby not all morphosyntactic elements are lost (Yarbay, 2020).

Regarding the tense agreement, the present findings showed that tense inflections were more impaired than agreement inflections. Thus, the results suggest a dissociation between tense and agreement inflections, confirming, for example, studies of Malay (Aziz et al., 2020), French (Ishkhanyan et al., 2017), Hebrew (Friedmann, 2002), German (Wezlaff & Clahsen, 2004), Greek (Nerantzini et al., 2020), Algerian Arabic (Mimouni, 1997), Jordanian Arabic (Albustanji et al., 2013), and Moroccan Arabic (Qorchi, & Bouchara, 2017). On the other hand, the present analysis showed that tense inflections were not always impaired. For example, the below statement shows how these morphosyntactic elements are retained in the output of our PA speakers with agrammatism: (Kastuh+ possessive pronoun) = meaning his glass, or when he said: "bidi" (the verb want + presents tense and the first person singular), and also in "nilbis" (verb wear + morphemes of tense and plural).

The present study has clinical implications. Reduction in the production of morphosyntactic elements is another agrammatic clinical manifestation of agrammatism that can be used for diagnosis and intervention.

Conclusion

The present study examined some aspects of PA agrammatism using spontaneous speech samples. The individuals with agrammatism displayed classic manifestations of grammatical morphemes errors, such as substitutions and omissions, in addition to simplified sentence structure. Furthermore, PA speakers with agrammatism showed selective deficits, particularly in morphosyntactic elements. The analysis also suggests a dissociation between tense and agreement, where tense was impaired compared to agreement. The results are consistent with those reported from studies into Hebrew speakers and Jordanian Arabic, among other Arabic variations. However, the findings also support language-specific features determining the pattern of omissions and substitutions in individuals with Broca's aphasia reported in cross-linguistic studies.

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