Tense and Gender production in Arabic-Speaking Aphasics

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Abstract:

The current study aims at examining the tense and agreement patterns as produced by agrammatic Palestinian-Arabic speakers using sentence completion tasks. The participants were presented with two sentences and asked to work on them. The first sentence included an inflected verb for both tense and agreement. In the second sentence, the participants were requested to complete a missing verb, where the temporal adverb or the subject's person, gender, or number was changed. The findings revealed that the agrammatic speakers showed a significant dissociation between tense and agreement, whereby tense was significantly more impaired compared to agreement inflections. Similar results are reported from other languages. The results provide further evidence of Tree Pruning Hypothesis (TPH) that functional categories associated with upper nodes in the syntactic tree are more impaired than functional categories associated with the lower nodes of the tree. The selective deficits of the morpho-syntactic structures suggest that specific morphemes should be targeted in therapy programs.

Keywords: Palestinian Arabic (PA); Agrammatism; Aphasia; Tense and Gender; Tree Pruning.

1. Introduction

Agrammatism is a language disorder caused by the damage to the left hemisphere of the brain, particularly in the Broca's area (Zurif, 1995). It is manifested by the substitution and omission of free and bound morphemes and deficits in the production of certain functional categories (Friedmann, 2001; Goodglass, 1972). Several studies have indicated that people with agrammatism tend to convey their messages by relying on non-linguistic clues (Grodzinsky, 1984; Goodglass, 1972). However, many other studies have reported that agrammatic patients can retain the syntactic ability to maintain verbs-subject agreement and correctly using the object pronoun in some languages (Menn&Obler, 1990).

The selective nature of these syntactic deficits in which some syntactic structures were preserved while others were impaired in different languages suggests certain limitations of syntactic theories. For example, It has been reported that a hierarchical pattern of a deficit in which "complementizers were more impaired than verb tense inflections, and verb tense inflections were more impaired than verb agreement inflections" (Albustanji, Miliman, Foxi, &Bourgeois, 2013, p. 94). Tree Pruning Hypothesis (TPH) was originally proposed to assess the selective morpho-syntactic deficits across agrammatic speakers (Friedmann, 1998, 2002).

According to TPH, the syntactic tree may be “pruned at various structural levels; a pruned structural level necessitates impairments at all higher levels (Albustanji, 2009, p.5).

Many psycholinguistic studies have focused on gender-congruency, one of the most puzzling grammatical categories of a language (Friederici& Jacobsen, 1999; Schriefers&Jescheniak, 1999). Other studies have focused on gender deviations in aphasia and the neural correlates of gender processing (Miceli, Turriziani, Caltagiron, Capasso, Tomaiuolo, &Caramazza, 2002). Gender is defined as an inherent lexical property of nouns that plays a syntactic role and is partially related to the meaning and the phonological form of a noun (Caramazza, Miozzo, Costa, Schiller, &Alario, 2002)

Studies on both Dutch and German agrammatic subjects have highlighted the problems associated with the production of articles, including omissions and substitutions. Recent models of language production assume that gender is represented at an autonomous lexical level (Caramazza, 1997). However, aphasic studies have contradicted such assumptions by confirming the idea of different representations of gender and phonological information with different independent levels (Avila, Lambon, Parcet, Geffner, & Gonzales-Darder, 2001). Accordingly, the errors made by agrammatic patients confirm the distinction between gender as a stored lexical property and as a feature involved in inflectional processes.

Levelt (1999) suggested that gender information is selected in a sentential context, and the activation of the phonological representation of a word can be achieved without the need to access its syntactic features. However, such an assumption is questionable. Kulke and Blanken (2001) showed that the semantic paraphasias made by aphasic patients in picture-naming tasks present a form of preservation of the grammatical gender of target nouns. This suggests that information about nominal gender is always selected, even in bare noun production.

Friedmann et al. (2003) indicated that gender agreement in Hebrew-speaking aphasics when a paraphasia is produced generally corresponds to the partial knowledge of the speaker about the target word. Different studies on different languages have reported different results. For example, the grammatical gender of words in Italian, German, Hebrew, and Spanish languages is usually preserved in anomia and tip-of-the-tongue states. In Hebrew, no gender-agreement deviations were found, regardless of the type of the aphasic deficit (Friedmann& Shapiro, 2003). However, in a study on the production of articles in a picture-naming task in German- and Dutch-speaking patients with agrammatic Broca’s aphasia, the Dutch patients made almost exclusively omissions and the German patients made mainly substitution errors (Bastiaanse, & Van Zonneveld, 1998). Ritter (1993) interpreted gender as an intrinsic property of nouns that can be retrieved at the moment of lexical access and numbered as an intrinsic feature of the inflection. His preliminary finding indicated a clear dissociation between gender identification and phonological knowledge of the targeted word in paraphasias. As a result, in semantic deficits, aphasic patients demonstrated the gender preservation effect by detecting gender without relying on the phonological information. All

these observations support the view that grammatical gender tends to be preserved in the speaking performance of aphasic patients. However, this finding is questionable since a number of predictions in the sentence and phrase context should be empirically explored.

Since Arabic has a rich and distinct inflectional morphology, we have a good notion of inflection in agrammatism. After a deficit of the left cerebral hemisphere, the aphasic patients lose the ability to inflect verbs correctly for tense and use subject pronouns. However, they maintain the ability to inflect verbs for subject agreement, as shown in some studies (Friedmann, 2001).

Many theories have been developed in an attempt to give a syntactic characterization of such patients. The traditional view of agrammatism states that the syntactic abilities of agrammatic patients are completely lost, i.e., such patients depend on the non-linguistic strategies to concatenate words into sentences (Berndt & Caramazza, 1981). However, studies have reported that patients with Broca's aphasia have intact syntactic abilities, and the distribution of these findings differ according to the language features (Hagiwara, 1995; Lonzi & Luzzatti, 1993).

Arabic introduces a special pattern of verb inflection since the production of sentences requires the speaker to choose between three tenses—past, present, and future—in addition to twelve agreement forms: agreeing in gender, person, and number with subject. The performance of the agrammatic patients in producing verbs revealed that their speech displayed more errors with inflection for tense than with inflection for agreement. This finding is also true in Hebrew (Friedmann, 2000).

A number of studies have examined morpho-syntactic impairments in many languages, such as Hebrew (Friedmann, 2001; 2002; 1997), English (Milman, Dickey, & Thompson, 2008), German (Burchert et al., 2005), and Turkish (Yarbay, Duman, &Bastiaanse, 2009). Despite the agrammatic data being reported for different languages, less research has been done in Arabic languages: Palestinian Arabic (Friedmann, 2002), Algerian Arabic (Mimouni&Jarema, 1997), Moroccan Arabic (Diouny, 2010), and Jordanian Arabic (Albustanji, Y., Miliman, L., Foxi, R. & Bourgeois, 2013).

Palestinian Arabic serves as an excellent testing ground for verb inflections because of its morphological richness and relatively free word-order system, compared to English, which is characterized by a relatively fixed word order (Abdel-Jawad, 1986). Moreover, by investigating the agrammatic features in Palestinian Arabic, the similarities with other Semitic languages like Hebrew can be addressed.

The aims of the current study were to (a) examine the tense and agreement patterns as produced by agrammatic patients using the completion task and (b) evaluate whether the deviant patterns are comparable to other languages.

2. Method

2.1.Participants

Four male agrammatic Palestinians residing in the West Bank participated in the study(Adam, 2014). The participants were diagnosed with Broca's aphasics using the Jordanian Arabic version of the Bilingual Aphasia Test (Paradis, 1987). All participants were right-handed and presented with a left hemisphere lesion at least six months prior to testing. They revealed typical symptoms of Broca's aphasia, including non-fluent, effortful, and telegraphic speech. As shown in Table 1, the ages of the participants ranged from 47 to 55 years. The time post-onset ranged from one to eight years, and their number of educational years ranged from 10 to 15 years. Visual and auditory systems functioned to a degree sufficient to complete the experimental tasks of the study. Four native speakers with no language or speech deficits served as the control group.

Table 1
Patient Data

Aphasic Subjects	Age (in years)	Etiology	MPO	Gender
A1	47	CVA-L	12	M
A2	50	CVA-L	25	M
A3	51	CVA-L	74	M
A4	55	CVA-L	96	M

Patient data: (A: aphasic subject*;* CVA: Cerebrovascular accident; L: left hemisphere; MPO: months post-onset; M: male).

For this task, we adopted the procedures used by Friedman, 2000 and 2001. Accordingly, the participants were presented with two sentences. The first sentence includes an inflected verb for both tense and agreement. In the second sentence, the participants were requested to complete a missing verb, where the temporal adverb or the subject's person, gender, or number was changed. The agrammatic subjects were asked to give the correct form of verb inflection. In the tense inflection (example 1, Table 2) condition, tense was the only difference between the missing verb and given verb while in the agreement condition, agreement feature was the criteria that distinguished the missing verb from the provided verb (example 2, Table 2).

Table 2
Examples

(1) Tense: **Biruh**ʔilawala:dħalħienʕal madrasah. kamanimbari**h**ʔilwald……(Raħ) the boy **goes now** to school. **Yesterday** too the boy _____. (went)
(2) Agreement:

Biruħʔil**walad**ħalħienʕal madrasah. u kamani**Alwalad**halħeen ……(Biruħu) **the boy** goes now to school. The boys also _____. (go-plural)
(3) Tense and Agreement: ʔilbintbidhatukil. ʔilbintraħatʕalmatˁabax u _____ (aklat) The girl wanted to eat, so she went to the kitchen and_____ (ate-past, 3rd, fem, sg)

3. Results and Discussion

The purpose of the current study was to examine the production of inflectional morphemes including tense and agreement in Palestinian Arabic patients with agrammatism. The results revealed that the Palestinian Arabic agrammatic speakers showed a significant dissociation between tense and agreement. Table 3 clearly shows a significant deficit in tense and agreement inflections, whereby the tense was significantly more impaired compared to the agreement inflections. The agrammatic patients made tense errors in 70% of the productions and agreement errors in only 12% of the productions. Therefore, the current findings revealed that agrammatic patients performed better on agreement tasks than on tense tasks.

Table 3
Verb Completion Task

Arabic (n=4)	Tense errors	Agreement errors
Completion	70% (35/50)	12% (35/50)

The selective deficits associated with tense and agreement inflections are conducive with those found in the current finding that morph is consistent with results reported from other languages (Friedmann, 2001; 2002; Friedmann & Grodzinsky, 1997; Higiwara, 1995; Ouhalla, 1993). In fact, the intact agreement could suggest that not all grammatical morphemes are impaired in agrammatism. The finding that agrammatic patients showed a dissociation between tense and agreement provided evidence supporting the TPH predictions "that states that functional categories associated with upper nodes in the syntactic tree (e.g., TP) are more impaired than functional categories associated with lower nodes of the tree" (e.g., NegP and AgrP [AlBustanji, 2009, pp. 85]).

Similar results were also reported by Benedet et al. (1998), who examined verb-subject agreement in Spanish and concluded that subject agreement was found to be relatively preserved than tense inflection. Kolk (2000) also reported that Dutch and German patients displayed dissociation between the verb and subject-verb agreement by exhibiting better performance on subject agreement than on verb tense.

Our data clearly showed that the patients made substitution errors but relatively no agreement errors. Many scholars have reported that structural words and inflections get deleted in agrammatic speech. On the other hand, it seems that Arabic patients behave in the same way as Hebrew agrammatic patients. In this respect, it is not phonologically possible to omit verb inflections; as such, grammatical errors are substitutions rather than omissions whereas omission of verb inflections is widely observed in English-speaking agrammatic patients (Menn&Obler, 1990). Our observations from our subjects exhibited many forms of verb violations like:

1- Omission of verb prefixes leading to tense substitution.
2- Omission of verb prefixes causing tense and gender substitution.
3- Stem substitution leading to tense or gender substitution.

4. Conclusion

Our data showed that the patients made substitution errors but relatively negligible agreement errors. The complexity and the selective deficit of the morpho-syntactic structures suggest that specific morphemes should be targeted in the rehabilitation plans. For example, in Palestinian Arabic, as well as other languages, structures associated with tense morphological components were found to be significantly impaired compared to other morpho-syntactic elements. Thus, the findings of the current study may have important clinical implications, where these morphemes can be served as potential targets for therapy approaches.

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