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NON-CANONICAL SENTENCES IN AGRAMMATISM: THE CASE OF GREEK PASSIVES

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Περίληψη

Αυτό το άρθρο μελετά την κατανόηση των αναστρέψιμων Παθητικών Προτάσεων από αφασικούς φυσικούς ομιλητές της Ελληνικής με μη ρέοντα λόγο (αγραμματικούς). Χορηγήθηκαν δύο πρωτόκολλα αξιολόγησης (με και χωρίς την Προθετική Φράση/Ποιητικό Αίτιο) και βρέθηκε ότι, αν και η απόδοση των αφασικών ήταν χαμηλότερη απ' ό,τι στις αντίστοιχες Ενεργητικές, ή από την ομάδα ελέγχου, ήταν επιτυχείς σε ιδιαίτερα υψηλό επίπεδο (μεγαλύτερο από 90%), σε αντίθεση με προβλήματα που βρέθηκε να έχουν ως προς την παραγωγή ρημάτων σε παρελθοντικό χρόνο και την παραγωγή κλιτικών αντωνυμιών αντικειμένου. Αποδίδουμε την καλή απόδοση στις Παθητικές Προτάσεις στον τρόπο με τον οποίο αυτές σχηματίζονται στην Ελληνική.

Keywords: Passives, agrammatism, Past reference, object clitics

1. Introduction

Individuals with agrammatic aphasia are known to suffer from a deficit regarding sentences with *non-canonical* word order, of which (reversible) verbal passives constitute an important subset. A prominent account of the deficit on such sentences has been known as the Trace Deletion Hypothesis (TDH), Grodzinsky (1990, 1995, 2000). This proposal holds that structures that involve syntactic movement do not always leave a

trace in Broca's aphasia, as a consequence of which it is impossible to compute the thematic roles (*th*-roles) of the argument noun phrases and provide the correct interpretation of the corresponding sentence. Such sentences are considered to be interpreted by agrammatics via a strategy which assigns the thematic role of the *agent* to the first noun phrase (DP) of the sentence, hence, the problems of Broca's aphasics with passives follow from the fact that the first DP does not bear the agent *th*-role. The DP in <brackets> below shows from where the first DP of the passive sentences has started, a position at which it was clearly given the patient *th*-role.

(1) The boy is pushed <the boy> by the girl

Grodzinsky (2006) acknowledges that passives are not impaired the same crosslinguistically and distinguishes between two types of languages: those like English, Spanish, and Hebrew, in which passives are indeed impaired in agrammatism, and those like Dutch and German, in which they do not seem to be. He proposes that this split can be explained via the interaction of the moved object, which is always to the left of the verb, and in subject position, in passives, and the directionality of *th*-role assignment of the verb to its object, which differs across languages. Since German and Dutch are Subject-Object-Verb (SOV) languages, the patient argument precedes the verb in active sentences, and this is also where it moves with respect to the verb in passives. The non-impaired performance of German (and Dutch) agrammatics on such sentences is thus due to the fact that the verb can still assign the patient *th*-role to the DP that has moved to its left, hence, the sentence can be interpreted correctly.

(2) The boy is pushed <the boy> by the girl
English (Spanish, Hebrew)

(3) Der Junge wurde von dem Mädchen <der Junge> geschubst. German (Dutch)

Greek is a VO language and the abilities of agrammatics on passives have not been investigated thoroughly. There are only two published studies on the topic (Fyndanis 2012, Fyndanis et al. 2012) to which we will return, but they do not offer sufficient or conclusive information. We also know that Greek-speaking children do not do well on passives up to a rather old age (Terzi et al. 2014). With the above in mind, we set

off to investigate how Greek-speaking non-fluent Broca's aphasics do on reversible passive sentences.

2. Background

2.1. The language

Greek passive sentences are formed via specific inflection on the verb, rather than the use of an auxiliary.

(4) Η Μαρία σπρώχνεται
the Mary push-3s-non.act
'Mary is pushed.'

As in several other languages, the same morphology is used for a number of non-active forms of the verb, such as reflexive, (5), middle and reciprocal (see Alexiadou & Anagnostopoulou 2004, Zombolou 2004, a.o.). A test that is employed to distinguish passive from reflexive verbs is the use of the prepositional phrase *apo monos/moni tu/tis* 'on his/her own', which is possible in (5), but not in (4) (Alexiadou & Anagnostopoulou 2004, Papangeli 2004).

(5) Η Μαρία χτενίζεται.
the Mary comb-3s-non.act
'Mary combs herself.'

When a *by*-phrase is present in (5), the sentence is still grammatical, but it has a passive interpretation, e.g. *Mary is combed (by the hairdresser)*. This clarification is relevant for the first passive task we administered.

2.2. The participants

18 individuals participated in the study, all native speakers of Greek. 6 were non-fluent Broca's aphasics and 12 were their controls. There were two controls for each aphasic, matched on age, gender and education. The 6 individuals with Broca's aphasia were as-

sessed via the Greek version of the Boston Aphasia Battery (Papathanasiou et al. 2008). Aspects of their profile appear in Table 1, while more details of them can be found in Terzi and Nanousi (submitted).

	Age	**Education**	**Gender**	**Type of lesion**	**Lesion site**
P1	48	12	M	Left CVA	Left inferior frontotemporal
P2	56	12	M	Left CVA	Left inferior frontotemporal
P3	51	10	M	Left CVA	Left inferior frontotemporal
P4	65	12	M	Left CVA	Left inferior frontotemporal
P5	71	9	M	Left CVA	Left inferior frontotemporal
P6	53	6	M	Left CVA	Left inferior frontotemporal

Table 1 | Profile of agrammatic participants

All aphasics were diagnosed as non-fluent Broca's aphasics by an experienced speech-language pathologist on the basis of their spontaneous speech. Their spontaneous speech was non-fluent, and consisted of short and simple sentences, verbs almost exclusively in the present tense and some omission of determiners. Two production of morphosyntax tasks were administered in addition to the passive tasks, which we present immediately below.

2.3. The Morphosyntax tasks

2.3.1. Past reference elicitation task

The Past elicitation task was a sentence completion task consisting of 51 pairs of sentences. 21 of them contained various categories of real verbs and the other 30 contained novel verbs (pseudoverbs) that were based on them. The experimenter read to the participants a sentence, e.g. (6a), and started the sentence they had to complete in the past, (6b). The task was a slightly modified version of Koutsoubari and Varlokosta (2006), see also Varlokosta and Nerantzini (2015).

(6) a. Η γάτα αρπάζει το ψάρι.

the cat grabs the fish.

b. Χτες ξαφνικά, η γάτα _____
yesterday, suddenly, the cat _____

Target response:

(7) άρπαξε (το ψάρι)
grabbed-3s the fish

2.3.2. Clitics production task

The clitics production task that was administered employed the protocol of Chondrogianni et al (2015). Participants were first shown a picture that introduced two animals, (8a), and were subsequently shown the same animals involved in an action, while being asked what the first animal did to the second, (8b). The target response has to include an object clitic, (9).

(8) a. Εδώ έχουμε ένα λύκο και μια γάτα.
here have-2p a wolf and a cat.

'Here we have a wolf and a cat.'

b. Τι κάνει ο λύκος στη γάτα;
what does the wolf to.the cat
'What is the wolf doing to the cat?'

Target response:

(9) Τη φιλάει.
her kiss-3s
'(He) is kissing her.'

Ten sentences and corresponding sets of pictures were given, with 4 eliciting a masculine clitic, 3 eliciting a feminine clitic, and 3 eliciting a neuter clitic. Figure 1 is an example of a pair of pictures used.

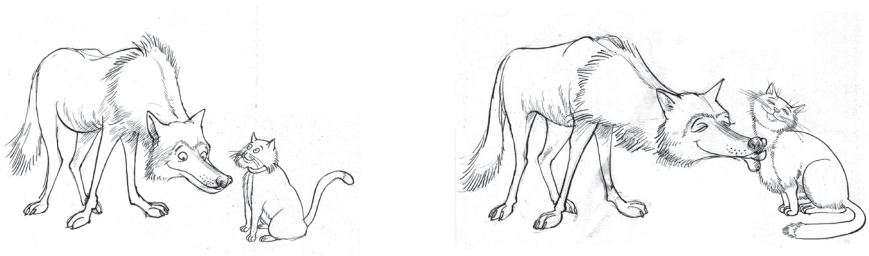

Figure 1 | *Clitics elicitation protocol*

2.3.3. The Passive tasks

2.3.3.1. Short passives

Participants were administered a protocol that was testing comprehension of non-active sentences (along with binding of reflexive and personal pronouns). The protocol consisted of 36 sentences, 18 of which contained short sentences with non-active verbs, i.e., sentences without a *by*-phrase, falling into three categories: 6 with passive verbs, (8a), 6 with reflexive verbs, (8b), and 6 with reflexive verbs which were only given the option of a passive interpretation in the task, (8c). The same protocol had been administered to children with ASD and their typical controls in the study of Terzi et al. (2014).

(8) a. Η Μαρία σπρώχνεται. Passive
Mary is being pushed
b. Ο Γιώργος ντύνεται. Reflexive
George is being dressed
c. Ο Κώστας λούζεται. Reflexive (w. Passive Interpret.)
Kostas is being shampooed.

These sentences were tested via a picture selection task, in which each slide contained three pictures. See figure 2 for (8a).

2.3.3.2. Long passives

Another protocol assessed comprehension of long passive sentences, that is, of passive sentences with the *by*-phrase. This protocol contained passive sentences, (9), along with

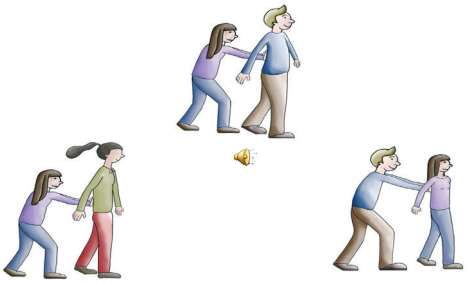

Figure 2 | Short Passives protocol

the corresponding actives, (10), as well as subject and object relative sentences (see Terzi and Nanousi, submitted, for the latter). There were 24 sentences in each condition.

(9) Ο γαμπρός φωτογραφίζεται από τη γιαγιά. Passive
The groom is photographed by the grandmother

(10) Η βασίλισσα ακολουθεί τη κυρία. Active
The queen is following the lady

Comprehension of long passives was tested via a picture verification task as well, in which each slide contained three pictures. See figure 3 for the slide that assessed sentences such as (9). All passive sentences were recorded by two female native speakers of Greek, so that all participants heard them in exactly the same manner.

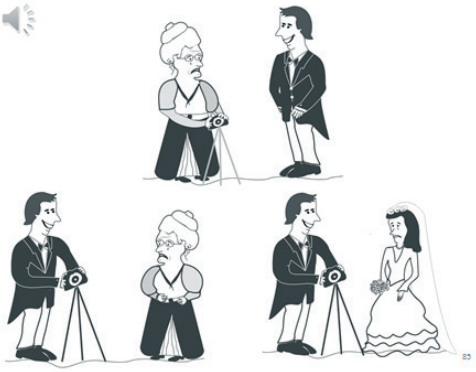

Figure 3 | Long Passives protocol

3. Results

3.3. The Morphosyntax tasks

3.3.1. Past reference elicitation task

We consider as target answer a verb in the Past with either perfective or imperfective aspect. This is why we label the task Past reference (rather than Past Tense) task.

We analyzed the results of the 18 out of the 21 real verbs, because the remaining three belonged to the class of verbs that form the Past with a suppletive stem, e.g., τρώω/*troo* 'eat' – έφαγα/*efaga* 'ate' and, since these are verbs of very high frequency, target performance on them is not telling. We also analyzed the 30 novel verbs that were based on the real verbs. The results and breakdown of the target answers on both types of verbs appear in Table 2 below. There were a few Agreement errors in the target forms of real verbs: P2 had 3 Agreement errors, P3 had 2 Agreement errors, and P5 had 1. Moreover, as we see in the Table, P3 did not respond in two instances and P4 in 1.

Table 2 also shows that the overall performance of four of the aphasic participants, P2, P3, P4 and P5, was very low. These four participants gave no answers in very many instances, and when they answered, most of the time they gave the Past Tense of a verb that was phonetically similar to the one they had to give (see column 'Substitution with Real Verbs'). There were also a few Agreement errors in the target forms: P4 and P5 had one Agreement error each, substituting 3rd person singular with 1st person singular. The Agreement errors on the real verbs were of the same type. One is tempted to think that these may not constitute true Agreement errors, but they were the outcome of the participants' effort to find the form of the verb in the Past out of context (since the lemma of the Greek verb is the1st person singular). Nevertheless, healthy controls performed at ceiling on the task, in the sense that they answered all items and they always gave Past reference (with either perfective or imperfective aspect).

We conclude that the aphasic participants's performance on Past reference, in particular, the performance of P2, P3, P4 and P5, illustrates what is already known in the literature via Friedmann and Grodzinsky (1997) and subsequent work, and has been accounted for via their Tree Pruning Hypothesis, or via Nanousi et al. (2006) who have considered it the result of the formal features involved, or, more recently, via Bastiaanse et al. (2011) and Bastiaanse (2013), where it is treated as a problem with reference to the Past. In short, the performance on Past reference is much typical of agrammatic aphasics.

	Real Verbs		Novel Verbs		
	Target Answer	**No Answer**	**Target Answer**	**Substitution with Real Verbs (target)**	**No Answer**
P1	18/18	0/18	28/30	5/28	0/30
P2	14/18	0/18	9/30	2/9	7/30
P3	15/18	2/18	12/30	12/12	15/30
P4	11/18	1/18	6/30	6/6	19/30
P5	15/18	0/18	5/30	5/5	17/30
P6	18/18	0/18	26/30	2/26	1/30

Table 2 | *Past Reference Elicitation*

3.3.2. Clitics elicitation task

Table 3 contains the results of the clitics production task. This is an area in which the performance of all six aphasic participants, even of P1 and P6 who did considerably well on the Past reference task, was remarkably low. Table 3 shows that the overall performance was around chance.

	Target Answer	**Gender Errors**	**Omissions**	**Other**	**No answer/ Don't know**
P1	8/10	2/8	2/10	0/10	0/10
P2	4/10	¼	2/10	2/10	2/10
P3	6/10	2/6	2/10	2/10	0/10
P4	3/10	0/3	2/10	5/10	0/10
P5	5/10	1/5	4/10	1/10	0/10
P6	6/10	3/6	3/10	1/10	0/10
Total	32/60 (53,3%)	9/32 (28%)	15/60 (25%)	11/60 (18,3%)	2/60 (3,4%)

Table 3 | *Clitics Elicitation*

The majority of the errors involved omissions. The 'other' type of errors include answers such as 'down', 'bam-bam', 'hugs', 'the hair', etc., while there was no answer in which a full DP was used instead of the corresponding clitic. We suspect that the noun 'hugs', which was used erroneously, was used instead of 'gives hugs', a possible periphrastic form of the verb 'hug' in Greek, hence, it does not count as a substitution for a DP. Note that there were also a few gender errors.

A few days after the test was administered we returned to the aphasic participants, read to them the sentences on which they erred, along with their responses, and asked them to judge their responses. No one was able to find an error. In the few instances they corrected themselves they did so by answering 'this one Verb this one', namely, they used demonstratives with the target verb while pointing at the characters of the picture. We concluded that they did not seem to fully understand the necessity or the role of object clitics. Healthy controls performed at ceiling on this task as well.

3.3.3. The Passive tasks

3.3.3.1. Short passives

There were hardly any errors on short passives, and both aphasics and their controls commented that the task was very easy. Participants P4 and P6 committed 1 error each, out of the 6X6=36 passive sentences of this protocol. Hence there were two errors in total, namely, a target performance of 94%.

Twenty 6-and-a-half-year-old typically developing children in the study of Terzi et al. (2014) gave only 70% correct responses on the passive sentences of the very same task. If anything, this tells us that the task per se was not trivial for some other non-typical population.

3.3.3.2. Long passives

Performance of the aphasic participants on the second task was not flawless, but, still target performance on long passives was very high. In particular, the total number of errors was 14 out of the 144, that is, an error rate of 9,7%, and errors were distributed from one 1 to 3 across the 6 participants. Aphasics performed extremely high on the active sentences, while the control group performed at ceiling on active sentences and had an error rate of 2,1% on passives. Results per participant appear on Table 4 below.

Agrammatics	Passives	Actives		Controls	Passives
P1	21/24	24/24		C1 (2)	47/48
P2	22/24	24/24		C2 (2)	48/48
P3	21/24	24/24		C3 (2)	48/48
P4	23/24	24/24		C4 (2)	46/48
P5	21/24	24/24		C5 (2)	46/48
P6	22/24	22/24		C6 (2)	47/48
	130/144 (90,3%)	142/144 (98,6%)			282/288 (97,9%)

Table 4 | *Target Comprehension of Long Passives*

We believe the above results leave no doubt that the Greek-speaking non-fluent Broca's aphasics we tested had no serious trouble with passive sentences, despite the fact that performance on other areas of grammar, such as Past reference of verbs, or production of clitics was much lower.

There are only a handful of studies investigating the reversible passive sentences of Greek-speaking agrammatics. A case study by Fyndanis (2012), found that the individual he assessed did very well on passives, that is, he had a 94% target performance, with 94% target performance on active sentences as well. The protocol that was used contained 18 active and 18 passive sentences, and the slide for each sentence containing 4 pictures.

The other study that has been preoccupied with passives sentences, along with other aspects of the grammar of Greek-speaking agrammatics, is the study of Fyndanis et al. (2013), which investigated three individuals. The protocol utilized for passives was the same as in Fyndanis (2012), and one of the three individuals was the same, hence his performance was 94% accurate on both actives and passives. The results of the other two participants were substantially different however: while accuracy on comprehension of passives was 39% and 50%, accuracy on actives was also very low to be considered unimpaired, that is, 56% and 70% respectively. Hence, although the performance of these two aphasics on reversible passives was certainly lower than on actives, their performance on the latter argues that the deficit is not limited to passives. Taking the above findings together with our results, we are led to conclude that there is no indication that Greek-speaking agrammatics have serious problems with reversible passive sentences.

4. Discussion

This study was undertaken in order to investigate how Greek-speaking non-fluent Broca's aphasics with agrammatism behave on reversible passive sentences. Various reasons instigated this interest: first, passives constitute an area of grammar that has been found to cause serious trouble to agrammatics crosslinguistically, but the picture for the Greek-speaking individuals on this domain was not known. Our study demonstrates that reversible passives do not seem to pose particular difficulties for Greek-speaking agrammatics. This is not to say that all non-canonical sentences are trouble-free in Greek: the very same individuals did badly on object relative sentences, with around chance performance. This is an issue discussed in detail in Terzi and Nanousi (submitted), but we refer to it here so that we give an idea of the overall linguistic profile of our participants.

Why is it then that the agrammatics of our study did so well on passives? This is not something that is predicted by the run-off-the-mill TDH Grodzinsky (1990, 1995, 2000), neither by the amendments to it offered in Grodzinsky (2006) that we presented in the Introduction. Since Greek is not an OV language, the moved underlying object that surfaces before the verb in passives presumably cannot receive the patient *th*-role of the verb, just like it cannot in English. Yet, English-speaking agrammatics are known to fall seriously behind on passives.

It is worth checking whether the good performance of the individuals with agrammatism that we assessed on passives can be explained in terms of levels of impairment along the syntactic tree, as suggested by Friedmann (2005). Friedmann reports that there are agrammatics whose sentence is impaired all the way up to the very beginning of the sentential structure, i.e., the CP domain, while others, with milder impairment, may not have access to C, but Tense and the functional categories in the IP area are still good. Friedmann (2006) further entertains the idea that impairments along the syntactic tree, namely, the Tree Pruning Hypothesis approach, which was originally meant to deal with problems in production, can extend to comprehension. Hence, it is possible, for instance, that someone understands passives, which implicate lower parts of the syntactic tree, but not *wh*-questions or relative clauses, which involve the (higher) CP area. The opposite picture is not expected to exist, and to our knowledge it has not been reported until now.

Our own findings on object relative clauses, on which the very same agrammatic individuals did not do well, and the detailed presentation of their performance on two

tasks of passive sentences here, suggest at first glance that the Tree Pruning scenario Friedmann (2006) extends to comprehension in agrammatism offers a reasonable explanation at first glance: the participants of the present study may have a milder impairment, according to which the lower area of the syntactic tree, which is implicated in passives, is not impaired. Object relative clauses are problematic, but they implicate a higher area of the sentential structure. Unfortunately, this reasoning does not offer a complete answer. Tense does not implicate the CP area, yet, it is impaired, at least for participants P2, P3, P4 and P5. Besides, all agrammatic participants had serious problems with clitic pronouns, which involve lower parts of the tree, at least in terms of where they adjoin. Hence, the answer should presumably be searched elsewhere.

We believe that the key to understanding why comprehension of passive sentences is not seriously impaired in Greek is to be found in the way via which the language forms passives. This is an idea that has to be worked out, but it should be noted that, unlike the languages investigated so far, see Grodzinsky (2006) for a review, Greek passives are synthetic, that is, all information one needs in order to interpret their argument structure is coded on the morphology of verb. It may be the case, for instance, that, as proposed by Dickey at el. (2008), what is affected in agrammatism is not syntax proper but morphological insertion. Presumably morphological insertion is not affected in the case of our participants, and, since syntax is arguably intact, they should do well on passives - which they indeed do. We should add that the same participants also performed extremely well on a judgment task of Agreement morphology in the verbal and nominal domains (Subject-Verb Agreement and Adjective-Noun Agreement), supporting the view that morphological insertion is intact.

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