THE RECOVERY OF SUBJECT CLITICS IN MILD AGRAMMATISM: A GENERATIVE APPROACH TO TREATMENT

Paolo CHINELLATO

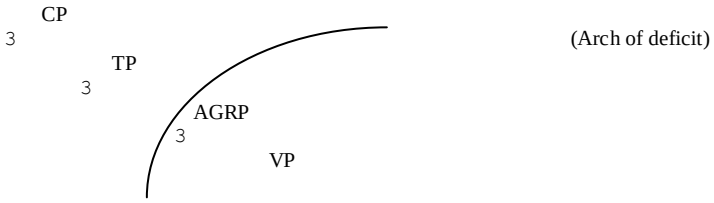
0. Introduction

Agrammatism is a language disorder in non fluent aphasia which is characterized by the traditionally known 'telegraphic speech': simplified sentence structure, omission and substitution of functional morphemes. According to Grodzinsky (2000, p.15), Broca's aphasics tend to omit inflections if they speak a language with a zero-inflectional morpheme; otherwise they tend to substitute it. The aim of this work is an experimental investigation within the generative framework of some rehabilitative strategies for production disorders in three cases of bilingual agrammatic aphasia (Italian, Vicentino)[1]. The topic of the investigation are pronominal subject clitics in their affirmative and interrogative form.

In the most recent literature on agrammatism, it has been demonstrated that all functional morphemes are not equally impaired and, as Guasti & Luzzatti (2000) argue, 'the patients' speech is at least partially constrained by the same rules that govern language in normal subjects' (p.1). In fact, Lonzi & Luzzatti (1993) first showed that the IP-layer is present in agrammatic aphasia. Friedmann & Grodzinsky (1997) and Friedmann (2000, 2001, 2002) found a dissociation between tense and agreement morphemes: tense agreement is impaired, but person agreement is spared. These findings lead to the formulation of the *Tree Pruning Hypothesis* which states that 'the consequence of this deficit is the pruning of the syntactic phrase marker of agrammatic patients, which impairs performance from the impaired node and higher'. Following the 'Split Inflection Hypothesis' put forth by Pollock (1989), the pruning of the syntactic tree is at TP, as it is shown in (1):

[1] The term 'bilingual aphasia' is intended in the sense of Fabbro & Frau (1997, 2001), Fabbro (2001)

(1)



Although there are still some empirical problems with this approach as several studies of agrammatic aphasia in other languages have shown[2], the *Tree Pruning Hypothesis* is quite interesting because the syntactic phrase marker is viewed as a model of syntactic processing. Moreover, it is also unique because it provides straight-forward predictions about treatment and recovery. In fact, a deficit in the higher nodes (the CP-layer) display a *mild* agrammatism, disorders at TP and CP display a *severe* agrammatism, whereas a *very severe* agrammatism is responsible for morphosyntactic disorders from AgrP to CP (via TP). In this work we assume Friedmann's (2001) view on the 'psychological reality of the syntactic tree representation' (p.87) in speech production. As for treatment, we partially follow Friedmann, Olenik and Gil (2000). Let us consider their results from a treatment study: a patient who was impaired in TP and CP (tense inflection, embedding and question production) received WH-question production treatment. In their own words, '*following this treatment, not only his Wh-questions significantly improved but also his ability to produce embedded clause as well as his ability to correctly inflect verbs for tense*'. Moreover, '*once the tree is established up to this node, an improvement of other structures that rely on lower nodes in the syntactic tree should follow*.'

The paper is organized as follows: in section 1 we will present the patients who participated this study (each patient is treated as a single case-study); in sections 2 and 3 the case studies and the experiment are presented; sections 4 and 5 discuss the data and the proposal for treatment; in section 6 a linguistic analysis is provided; section 7 concludes the work.

[2] The dissociation found between Tense and Agreement lead Friedmann & Grodzinsky (1997) to claim that the representation of Agreement is in a node lower than tense. However, cross -linguistic results in agrammatic aphasia are still not clear-cut. See Penke (2000) for German, Gavarrò (2002) for Catalan, Arabatzi & Edwards (2000) for English. See also the discussion in the Commentary of Grodzinsky (2000).

2. The Case Studies

Three agrammatic Broca's aphasics participated the study: LC, CR (see Chinellato 2002a-b, 2003b-c for a discussion), and GP. LC is a native speaker of Venetian whereas patient CR & and GP are agrammatic speakers of Scledense, a conservative variety of Northern Vicentino). All patients have a dissociation between the production of pronominal tonic subjects (spared) and pronominal subject clitics (impaired): in a sentence completion tasks the percentages of correct responses are the following: LC 0%, CR 3%, GP 5%. The impairment consisted in a constant omission of subject clitic pronouns:

(2) Target	Response
Ti te bevi (You you/*sub.clitic* drink)	Ti _ bevi

Other two dissociations have been noted: patients CR and GP showed a dissociation between the subject clitics (impaired) and the *A*-morpheme (spared). This morpheme is present only in Scledense, and it has described by Poletto (2000) as a vocalic subject clitic (but see Cardinaletti & Repetti 2000 and Chinellato 2003a for a different approach):

(3) Target	Response
A te bevi (*A*-morpheme you-*subj.clitic* drink)	A_bevi

Moreover, patient GP displays a spared interrogative enclitic form '**-ti**' which in Scledense is an optional form of the first person singular (contrast 4a with 4b and 4c):

(4) a Son-**ti**? , Gon-**ti**? (Am-I? , Have-I?)
b So-**i**?**,** Go-**i**?
c Son / So?, Go?

3. The Experiment

The treatment sessions consisted in batteries of tasks taken by Perfetti (1985) both for sentence comprehension (picture matching tasks) and for sentence production (picture naming task). As for questions production, the patient had to produce a question in order to guess which picture the therapist had chosen from a group of picture designated as the *common knowledge* for the task.

In this experimental program of treatment the aim was to train aphasic patients to produce sentences which require hierarchically high nodes (the CP-layer). If Friedmann, Olenik and Gil (2000) are on the right track the CP-layer will aid the impairments of lower nodes (TP, AgrP). This practical hypothesis is derived from the theoretical idea that aphasia involves pruning of the syntactic tree at various

levels. In this work another path will be followed: since these patients are 'mild agrammatics' in the TPH sense, differently from Friedmann, Olenik and Gil (2000) we started the program by their spared elements traditionally described by some linguist to be located in the CP-layer. By doing so, we will try to establish whether these elements can reactivate the impaired elements in the IP-layer and most importantly, whether linguistic theories can be improved by data taken from agrammatism (see Avrutin 2001 for a detailed discussion).

4. The Issue: Can CP reactivate IP? The Procedure.

As I said above, we started the program with the spared elements found in all patients. First affirmative and then interrogative sentences were investigated. The first battery of exercises concerned the production of sentences with tonic subjects (e.g. *Ti* te bevi). According with a tradition of studies on the subject position, referential subjects are located in a left-dislocated position, or more in general in the CP-layer (Alexiadou & Anagnastopoulou (1998), Poletto (2000), Paoli (2001) among others). The second battery consisted in production of sentences with the A-morpheme (only for CR and GP; e.g. *A* te bevi). According to some scholars the A-morpheme is located in the left-periphery (as a TOP head, see Benincà (1983)) or in the CP layer (Poletto 2000, Vai 2000).

As for interrogative sentences, the third battery concerns the production of Yes – No questions (Beve-lo? / Drinks-he *subj.clitic*). The inflected verb is taken to raise to the CP layer in order to incorporate with the interrogative clitic. The interrogative clitics belong to a another paradigm of subject clitics which are base-generated in the CP-layer (see, Poletto (2000) and Penello (2003), among others).

Finally, the production of Wh-questions (*Cossa* beve-lo?/ What drinks-he *subj.clitic*) involved the only spared element in the patients'production, namely the Wh-element *Cossa* (What).

5. Results

Our goal was to gain a consistent improvement in the production of production of subject clitics (both the one belonging to the 'declarative' and the one belonging to the 'interrogative' series). The therapy consisted in three sessions a week . One session lasted more or less one hour in which five groups of four pictures were analysed.

5.1. Recovery with elements higher than subject clitics

The first step of our experiment involved pronominal tonic subjects (June-September 2001). No therapy sessions took place for one month after the end of the battery administration (October 2001) while a check-up with non-treated material

ended each step of the experiment (check-up with tonic subject: November 2001). The second step was to train the patients (LC, GP) with the production of sentences with the A-morpheme, which has traditionally analysed as a CP element (November – January 2002; check-up March 2002). After this period of treatment, we started with a program of production of interrogative sentence, starting with lower structures (Yes-No questions, March –May 2002, check-up: July 2002) and then moving to Wh-interrogatives (July-September; check-up : November 2002).

5.1.1. Results

Table 1

Patient LC - Tasks	1st Step (correct clitics)	2nd Step (correct clitics)	3rd Step (correct clitics)	4th Step (correct clitics)
Treated Material (n=720)	0.83 (6)	1.80 (13)	2.91 (21)	86.25 (621)
Non treated Material (n= 720)	0.41 (3)	0.97 (7)	4.86 (35)	79.44 (572)
SCT for declarative clitics (n=100)	2	2	2	78
SCT for interrogative clitics (n=100)	3	3	3	70
$\mu;\sigma$	1,56; 1.17	1,94 ; 0.83	3.19 ; 1,19	78.42 ; 6,66

Table 2

Patient CR - Tasks	1st Step (correct clitics)	2nd Step (correct clitics)	3rd Step (correct clitics)	4th Step (correct clitics)
Treated Material (n=720)	1.38 (10)	2.91 (21)	4.58 (33)	70.83 (510)
Non treated Material (n= 720)	2.08 (15)	1.66 (12)	5.83 (42)	80.13 (577)
SCT for declarative clitics (n=100)	3	4	5	75
SCT for interrogative clitics (n=100)	4	3	4	85
$\mu;\sigma$[3]	2.61 ; 1.13	2.89 ; 0.95	4.85 ; 0.76	77,74 ; 6,15

[3] μ = average ; σ= standard deviation.

The data obtained from tables can lead us to the following claims:

1. Only Wh-questions activated the subject clitics (declaratives and interrogatives in a systematic way (contrast steps 1-3 with step 4).

1.2 Neither tonic subjects, nor the *A*-morpheme nor yes-no questions helped the activation of subject clitics in declarative sentences.

We will go back to this issues in section 6.

5.2. A third patient (GP)

While with patients LC and CR we started the treatment with the affirmative sentences and then the interrogative ones with a 'bottom-up order' of the steps (Tonic Subject and then the A-morpheme for the affirmatives; Yes-No questions and then Wh-questions for interrogatives), we trained patient GP with the reverse order: first the interrogative modality and the affirmative. The goal of the treatment was the same: the production of subject clitics, both the declaratives and and the interrogatives at the same time. GP is another agrammatic aphasic whose percentage of correct clitics before the treatment was around the 5%. The results of his treatment are given in table 3:

Table 3

Steps	Treated Material % correct ($\mu;\sigma$)
1. Yes-No ?	4.21 ; 0.71
2. Wh- Elements	85.21 ; 5.12
3. Tonic Subject	83.21 ; 6.13
4. A-morpheme	84.19; 6.56

As we can see from Table 3, only step 2 (Wh-phrases) reactivated the clitics (declaratives and interrogatives). The production of subject clitics remained constant during the other steps of treatment.

6. The Analysis

So far, we have seen that subject clitics can be reactivated in the production of aphasics and this has been possible with exercises which involved Wh-elements. Now, a linguistic analysis is needed in order to see whether some linguistics theories can be revised by these data. Before doing so, let us summarize the verbal conjugation and the clitic-system in the dialects under analysis, namely Venetian and Scledense:

Table 4

Venetian (LC)[4]		Scledense (CR, GP)	
Declarative	Interrogative	Declarative	Interrogative
1. Mi ∅ go (I have)	∅ go?	Mi go (I have)	go? / (go-**i**) / (gon-**ti**)[5]
2. Ti **te** ga (you have)	**Te** ga? /(gas-**tu**) / (gas-**to**)[6]	Ti **te** ghe (you have)	ghe-**to**?
3. Iù / Eo (**el**) ga (he has)	**El** ga? / Ga-**ˡo** ?	Lu / Elo (**el**) ga (he has)	ga-**lo**?
3. Ea (**ˡa**) ga (she has)	**ˡa** ga? / Ga-**ˡa** ?	Ela (**la**) ga (she has)	ga-**la**?
4. Noialtri ∅ gavemo	∅ gavemo ?	Noialtri ∅ gavemo (we have)	gavemo?
5. Voialtri ∅ gavé	∅ gavé?	Voialtri ∅ gavì (you have)	gavì-**o**?
6. Iori (**i**) ga	**I** ga? / Ga-**i**?	Lori (**i**) ga (they have)	ga-**i**?
6. Iore (**e**) ga	**E** ga? / Ga-**e**?	Lore (**le**) ga (they.f.have)	ga-**le**?

6.1. The pathological production during the treatment

Let us now consider what happened during the treatment from a qualitative point of view, namely what patients really produced:

6.1.1. Step 1: Tonic Subjects

In the production of sentences with Tonic subjects the regular pattern of response was a constant omission of clitics as you can see in (5):

(5) Target: Ti te bevi (You you-clitic drink)
Response: Ti _ bevi

What is worth noting is that the syntactic order (SV) remained intact.

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[4] The variety of Venetian spoken by LC is the one spoken in the hinterland of Venice (Marocco).

[5] The interrogative clitics of the first person singular are optional in Scledense.

[6] The interrogative clitics are apparently optional in this variety since they have a special semantics (see Chinellato 2000 for a discussion).

6.1.2. Step 2: The A-morpheme

The same has to be said for the exercises with the A-morpheme (the context given in order for the A-morpheme to be produced were exclamative contexts; see Benincà 1983, 1996 for a discussion): the omission of subject clitics was the only pattern of response:

(6) Target : A te bevi!
Response: A bevi!

6.1.3. Step 3: Yes-No questions

A different behaviour was found with Yes-No questions among patients even if omission was the first pattern of response (as you can see in 7),

(7) Target: Beve-lo el vin? (Drinks – he the wine?)
Response: Beve __ el vin?

During the treatment all patients started to substitute the third person subject clitic with a tonic form (*elo* in Scledense; *eo* in Venetian, see table 4):

(8) Target: Beve-lo el vin? (Drinks – he the wine?)
CR: ♠Elo beve el vin? (He drinks the wine?)[7]
LC: ♠Eo beve el vin? (He drinks the wine?)

Orders like (9) and (10) were never found

(9) *Beve elo /eo el vin?
*Elo el vin beve?

No other substitution with other tonic subjects have been found.

6.1.4. Step 4: Wh-Questions

While they were producing Wh-questions patients displayed an interesting pattern of substitutions:

6.2. Patients CR & GP

In Wh-questions CR and GP inserted a tonic subject between the Wh-element and the verb, as they did in Yes-No questions:

(11) Target : Cossa beve-lo Response : ♠Cossa elo beve?
(What drinks-he?) (What he drinks?)

[7] The symbol ♠ means aphasic production.

Note that only the pronoun *elo* has been produced wheras the form *lu* or a referential DP as in (12) – (14) were never found:

(12) *Cossa lu beve?
(What he drinks?)

(13) *Cossa Paolo beve?
(What Paolo drinks)

(14) WH + other pronouns + verb

6.3. Patient LC

LC behaved as CR and GP by inserting his tonic form *eo* (which is the Venetian counterpart of Scledense *elo*, see Table 4) between the Wh-element and the verb:

(15) Target : Cossa beve-o? Response : ♠Cossa eo beve?
(What drinks-he?) (What he drinks?)

Substitution with tonic subject 'iù' or with a referential DP were never found:

(16) *Cossa iù beve?
(What he drinks?)

(17) *Cossa Paolo beve?
(What Paolo drinks?)

Differently from CR and GP, patient LC inserted also a tonic subject of first and second person singular:

(18) ♠Cossa mi bevo?
(What I drink?)

(19) ♠Cossa ti bevi?
(What you drink?)

7. Scledense 'elo' and Venetian 'eo'

Consider now the syntactic nature of these two forms, which are in distribution with another third person singular pronoun, namely *lu* (Scledense) and *iù* (Venetian):

7.1. Elo

In many varieties of Vicentino (e.g. Valdagno) '*elo*' is the only tonic subject for the third person sigular masculine. In other varieties of Western Paduan (such as

Carmignano di Brenta) *elo* and *lu* have the same distribution[8]. However, in Scledense '*elo*' alternates with '*lu*'. The pronoun *elo* is submitted to some syntactic restrictions which are the ones outlined for 'weak' pronouns by Cardinaletti & Starke (1999). To be more precise, my proposal is the following: in Scledense, *elo* is the weak and *lu* is the strong pronoun of the verbal conjugation. In fact *elo* cannot occur:

- in his base (θ)-position:

(20) *Riva elo / √ Riva lu.
(Arrives he)

- in a dislocated position:

(21) *Elo /√ lu, el pan, lo ga compà
(He, the bread, it-obj.clitic has bought)

- in isolation

(22) Chi riva? * Elo. / √Lu.
(Who arrives? He)

- can neither be c-modified nor coordinated

(23) Solo *elo / √ lu me ga dito tuto
(Only he me-told everything)

(24) Mi e *elo / √ lu ghemo na casa
(I and he have a house)

- cannot appear before a parenthetical

(25) El fato che *elo / √ lu , secondo mi, gabia da vignére…..
(The fact the he, according to me, has/subjunctive to come…)

- the third person clitic (el) cannot occur with *elo*.[9]

(26) a. Elo (*el) ga magnà tuto
b. Lu (el) ga magnà tuto
(He (he-clitic) has eaten everything)

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[8] Thanks to Nicoletta Penello (p.c.) who drew up this fact to my attention.

[9] Since the resumptive clitic pronoun is not possible with the weak pronoun *elo*, we can concldue that it is not in a left-disclocated position as we can see the distribution with the scene-setting adverb 'domàn' (tomorrow) in (i):
(i) Elo doman compra na casa
(He tomorrow buys a house)
See Benincà & Poletto (2003) for a discussion.

The same syntactic distribution is displayed by Venetian *eo* and *iù* (in speakers who distinguish by the two) .

8. Subjects and Wh Questions

We have seen that the three patients can insert a 'weak' subject pronoun between the Wh-element and the verb. In Italian overt subjects cannot occur in this position and differ from English and German (Rizzi & Roberts (1989) and Rizzi's (1996) Wh-Criterion, but see Cardinaletti 2001 for a different approach ; data in (27)-(29) are taken from Cardinaletti 2003, p.43):

(27) a. * Chi Gianni ha invitato?
whom Gianni has invited?
b. *Chi egli ha invitato?

(28) a. Who did John / he invite?
b. Wen hat Hans / er gestern eingeladen?

(29) a. Gianni chi ha invitato?
Gianni whom has invited
b. Gianni quando l'hai visto?
Gianni when [you] him have seen?

In Caribbean Spanish (data from Ordoñez and Olarrea 2000) a 'weak' pronoun can intervene between the Wh- and the verb, whereas the DP subject cannot:

(30) a. Quand tu pars?
when you leave?
b. Qui il a vu?
whom he has seen?

(31) a. *Qué José quiere?
what José wants
b. Qué tú quieres?
what you want

In the agrammatic production analysed in this work the patients treat the 'weak' pronoun *elo* as the one in Carrabean Spanish, whareas it seems that in interrogative contexts *elo* has the same behaviour of the italian 'weak' pronoun 'egli'[10]:

[10] See Cardinaletti & Starke (1999) for a complete analyisis of 'egli' which is different in distrubution from the French 'weak' pronouns, e.g. it behaves like a strong pronoun in contexts like (34a).

(32) a. *Cosa [$_{SubjP}$ **Egli** [$_{AgrSP}$ magna$_i$ [$_{VP}$ t$_i$]]] (Italian)
b. * Cossa [$_{SubjP}$ **Elo** [$_{AgrSP}$ magna$_i$ [$_{VP}$ t$_i$]]] (Scledense)

In this work we follow the approach of multiple subject positions in the IP-layer proposed by Cardinaletti (1994, 1997). The Subject Phrase hosts DPs and strong pronouns (but also Italian *egli* and Scledense *elo*) whereas AgrS hosts weak pronouns. These positions are in the IP-layer. As for the ungrammaticality of (32), Cardinaletti (2001) claims that:

(33)
'*Only the subjects in specSubjP are excluded from occurring between the wh-phrase and the verb in wh-questions, whereas subjects in specAgrS are ruled in*.' (p.12).

Thus, the generalization in (33) explains data from agrammatic aphasia:

- In yes /no questions CR and GP make use of the third person singular DP pronoun in its weak form (*elo*) but cannot cliticize it onto the verb, since cliticization at this stage is impaired.
- In Wh- question LC extends the use of weak pronouns also in the first and sencon person singular.

Data from agrammatic aphasia follow the same distribution. This is constistent with Grodzinky (1990) who claims that every 'aphasic production' must be a possible structure among languages.

9. Conclusion

The data found during the recovery are consistent with Friedmann, Olenik & Gil (2000): the CP-layer can activate the IP-layer. In fact, we have seen that only the syntactic structure with a Wh-element (in the CP-layer) reactivated the production of subject clitics. Moreover, as for tonic subjects (DPs and pronouns), data are consistent with theories that consider subjects to be placed in the IP-layer (Cardinaletti 1994, 1997, Benincà 2001 among others). As for the A-morpheme, data are consistent with theories that consider vocalic morphemes to be generated in the IP-layer as well as in the CP-layer (e.g. De Crousaz & Shlonsky 2000 for Franco-provençal, Cardinaletti & Repetti 2000 for Piacentine, Chinellato 2002a, 2002b, 2003a) for Scledense).

In addition, no dissociation has been found between interrogative clitics (Bevi-to /drink-you) and declarative clitics (Te bevi / you drink), neither before nor after the therapy: data do not seem to be consistent with theories that distinguish between two separate paradigms of clitics (interrogative and declarative, see Poletto 2000 and Penello 2003 among others). In our approach, we follow the hypothesis that the verb always remains in the IP-layer and does not raise to C°. (Kayne 1994: 44 for French, Cardinaletti & Repetti 2000 for Piacentine, Cardinaletti 2001 for Italian).

Finally, in the final Check Up of the fourth step (wh-questions) CR improved the production of subject clitics, except for the enclitic interrogatives –**ti /i** (1st person singular and plural) and –**o** (2nd person plural):

(35) So-**i** / Son-**ti** in giardìn? (Am I in the garden?)

(36) Bevì-**o** el caffè? (Drink- you.pl the coffee?)

This is probably due to the different nature of the element: we consider –ti as a lexicalised form stored form the lexicon with the verb. As for the vowels –i and –o, they are probably no longer subject clitics in Scledense. Neurolinguistic evidence supports the idea that the very nature of these elements must be left open to future research.

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