LEFT PERIPHERY IN AN APHASIC PATIENT

CHIARA ZANINI

0. Introduction

I would like to present some data coming from a single case study of a fluent aphasic patient.

The main goals of this study[1] are two. From a neurolinguistics point of view this study shows that even in fluent aphasia syntactic errors might occur, which has been noticed only a few times in the literature (among others Edwards 2001, 2005). In neurolinguistics it is traditionally thought that fluent aphasia is characterised above all by lexical-semantical problems. However, recent discussions on the clinical validity of the Boston School tassonomy has highlighted that it is no longer possible to make use of such categories as Broca and Wernicke aphasia or agrammatism and paragrammatism. In this sense, the linguistic analysis of errors becomes crucial for both the diagnosis and the rehabilitative therapy.

This last point leads us to the second goal reached in this study, namely the new contributions to a linguistic theory. Neurolinguistics can give a contribution to linguistics only under two conditions: i) the linguistic theory adopted has to give a complete mapping of the structure in order to determine where -that is, with which constructions- patients have problems; ii) neurolinguistics can contribute to the theory when the corpus of data is statistically relevant, that is, when a strong trend in data can be detected.

In this article, I will focus mainly on the presentation of how the research was lead and on how the results were reached, hinting only briefly at the new contributions to the linguistic theory that the data could give (for more on this point, see Cognola and Zanini 2009).

In what follows, after a brief introduction to neurolinguistics (1), I will present the case study describing how data were collected and giving a first

analysis of them to be developed further on. The section is structured in the following way: in 2 I present the case study introducing the subject involved in it (2.1) and how the research was carried out (2.2). In 2.3 I come to the exposition and comment of the quantitative results. In 2.4 I deal with the special tasks made in order to test clitic pronouns in left dislocation (henceforth LD); in 2.4.1 the results of the quantitative analysis are summed up. In 3 I present the qualitative analysis of the collected data, in particular I will consider the clitic production (3.1) and LD (3.2); in 3.3 I will examine the errors made with LD and clitics. In 4 I will sum up the conclusions reached in the study and I will hint at possible aspects to be developed in further research.

1. A brief introduction to neurolinguistics

It is well known that language is codified in certain areas of the cerebral cortex and understanding how this codifying happens is important for neurolinguistics and for all linguistic theories as well. There are at least three research areas that help us in making hypothesis about how this happens: a) analysis of data from normal speech comprehension and production; b) analysis of data from language acquisition and learning and c) analysis of data from language pathology as aphasia.

The study I am presenting here belongs to this last research area and constitutes an attempt to analise the production of a fluent aphasic patient focusing on constructions involving the left periphery. In order to do so, I will start from the structure of the left periphery proposed in the cartographic framework by Rizzi (1997), Benincà (2001, 2006), Benincà and Poletto (2004). The choice of this framework and of the structures proposed in it is not arbitrary, but is a consequence of the need to have a structure as more articulated as possible in order to analyse the aphasic production, as I said above in the introduction.

Before showing how this research was lead, two words on aphasia and neurolinguistics are needed. Aphasia is defined as an acquired language disorder that arises as a consequence of a brain damage (for example after a stroke) and involves one or more components of the processes which allow to produce and comprehend language. According to the tassonomy proposed by the Boston School, aphasia can be split up into two big subtypes: fluent and non-fluent aphasia. Among the types of fluent aphasia the most common is the Wernicke aphasia; among non-fluent aphasias the most common is the Broca aphasia. Traditionally, Wernicke aphasia is thought to involve the Wernicke area corresponding to BA 22 and the posterior region of the superior temporal gyrus, i. e., BA 21 - 42. In this type of aphasia, speech is

fluent but meaningless and parafasic. Patients suffering from this kind of aphasia show problems in lexical-semantical retrieval, have severe damaged hearing comprehension and problems in repetition tasks. Moreover, they are not aware of their impairment and do not respect talk turns, which renders rehabilitative therapy really hard. Broca aphasia, instead, involves the so-called Broca area, i. e., BA 44 - 45. Speech is non-fluent and telegraphic. While hearing comprehension is quite spared, production is impaired, especially at the morphological and syntactic levels.

Two kinds of grammatical deficits are thought to be associated with aphasia: agrammatism and paragrammatism. The former identifies a speech characterised by the omission of functional words like articles, prepositions, auxiliaries and morphemes, which gives the impression that words are simply put one after the other. The latter is used to identify a juxtaposition of ungrammatical sequences, determined, for example, by the incapability to choose the right verb aspect or the right prepositions.

This classification has been criticised by many neurologists and aphasiologists. Most recently, research is trying to face the questions of a) the clinic validity of categories like fluent vs. non-fluent, b) agrammatism vs. paragrammatism, c) the concept of syndrome which characterises the Boston School tassonomy, d) what kind of errors really define Wernicke and Broca aphasia and e) the presumed possibility of locating cerebral sites responsible for semantic and syntactic aspects of language. In this respect, neuroimagining has provided evidence that in the codifying of language more sites are involved than traditionally thought, such as cerebellum and ganglions. Moreover, recent analysis of fluent aphasic speech have revealed some syntactic deficit, which is an unexpected result. Since we lack a detailed map of celebral sites where language is codified, the analysis of data from language pathology is very important for aphasiology, especially as a starting point for rehabilitative therapies.

In what follows, I will present the case study describing how data were collected and a first analysis of them to be developed further on. The section is structured in the following way: in 2.1 I present the case study considering the subject involved in it (2.2), how the research was lead (2.3). In 2.4 I deal with the special tasks made in order to test clitic pronouns in LD; in 2.4.1 the results of the quantitative analysis are summed up.

2. The case study

2.1 Case description

This is a single case study involving a highly educated (university degree and specialization) 69-year-old man, that we will call Mr Polo.

In 1996 he suffered a celebro-vascular accident. The lesion was located in the posterior perisylvian regions of the left hemisphere. The first neurological examination in the medical centre where he had his treatment dates back to 1999; the diagnosis revealed a mild fluent aphasia together with a deficit in attention and short term memory. He was administered the E.N.P.A. battery (Capasso R. & G. Miceli 2001) for the assessment of aphasia.

Two subjects of the same age, town, and school degree as Mr Polo served as controls for this study. They performed at ceiling in all tasks.

2.2 Materials, methods and tasks

A number of preliminary tasks was administered in order to assess if Mr Polo was a good patient for the object of this research. Screening concerned three structures: i) passive structures; ii) wh-interrogatives and iii) ClLD structures. All these structures are argued to involve movement: it is worth noticing that Mr Polo is able to rearrange a non-marked clause as the tasks given many times by the logopedist show. What is more, an anagram task composed of 20 sentences was given at the end in order to verify that no problems with unmarked sentences were present. The result was that he performed well in 65% of the cases and in 35% of the cases he produced a sentence with a focus, but crucially the sentence was grammatical.

In what follows, we will discuss the results of the screening tests on the left periphery in the aphasic patient, taking into consideration all constructions tested.

2.3 Screening tests

In what follows I will present the results of the screening test.

In the first part of the screening test an anagram task and a completition task on passive structures were given in order to check if the patient had any problem concerning thematic roles assignment. As for the anagram task, three cards were prepared: one for the subject, one for the verb, one for the complement as illustrated in (1). Mr Polo was asked to turn

over the cards previously mixed, to read aloud what was written on them and to put them in order until he obtained a sentence he judged as grammatical.

(1)   LA MELA
the apple
É MANGIATA
is eaten
DA GINO
by Gino
'*The apple is eaten by Gino*'

I considered the task ended when Mr Polo seemed to be satisfied with his performance. Mr Polo did not show any particular difficulty at least in assigning thematic roles: he was correct on 8/10.

In the completition task Mr Polo showed some problems in deriving the past participle from the verb given in brackets (1/10 correct), although he was aware of the fact that an infinitive form was ungrammatical in this context. Nonetheless, he was able to inflect the auxiliary verb *to be*. After this, I provided some oral stimuli to Mr Polo as "Now Mary kiss by Gino. Is it right? And Mary kisses by Gino? And what about Mary is kissed by Gino?". In this case Mr Polo always performed well (10/10 correct).

In the second part of the test, an anagram task and a repetition task were given in order to test wh-main interrogative clauses. As for the anagram task, there were as many cards as the constituents of each corpus sentence, as in (2); the card with the question mark was already on the desk.

(2)   DOVE
where
VOLETE
want
ANDARE
go
'*Where do you want to go?*'

Mr Polo did not show any problem with wh-movement: he performed 7/10 correct and 8/10 correct in the two tasks respectively. The mistakes were made in both tests with wh-phrases: (3a,b) were proposed in both tests and the patient produced an ungrammatical sentence; (3c) was also given in both tests but a mistake was made only in the anagram task.

(3)   a. *Chi puoi andare da?*
who can-2ps go to
'To whom can you go?'
b. *Chi hai parlato con?*
who have-2ps talked to
'Con chi hai parlato?'
c. *Hai fatto cosa?*
have done what
'What did you do?'

The last part of the screening test was designed in order to test LDs and an anagram task made up of ten items was given. Each item was a sentence with a left-dislocated direct object, a doubler proclitic and another dative proclitic. On the table there were as many cards as the constituents of each sentence, isolating each clitic from the verb as illustrated in (4). Mr Polo was asked to turn over the cards previously mixed, to read aloud what was written on them and to put them in order until he obtained a sentence he judged as grammatical. No instructions were given with respect to the discourse-related features of the construction, in particular no indication on the type of dislocation (LD or right dislocation, RD) was given. The patient always produced LDs.

(4)   IL LIBRO
the book
TE
Dat-Cl
LO
Acc-Cl
DO
give
DOMANI
tomorrow
'*I am giving you the book tomorrow*'

Mr Polo was only correct on 3/10. Three kinds of error occurred: a first kind consisting of clitic - verb inseparability violation (ex. *il nonno presta i soldi ce li*). Sometimes Mr Polo rearranged proclitic in enclitic position (ex. *l'auto volentieri presto ve la*) or inverted the order of clitics in Italian dative-accusative (ex. *il televisore oggi portano lo me*). Anyway he succeeded in dislocating half of the direct objects proposed.

2.3.1 Partial conclusions

Some interesting problems arise: as passive structures are concerned, Mr Polo did not show any particular difficulty at least in giving thematic roles. However, in the completition task, he was not able to derive the past participle from the infinitive form given in brackets, although he judged ungrammatical the infinitive form. Whether this fact should be analysed as either a lexical or a syntactical impairment depends on the theory adopted. However, at this stage, other tests would be required.

Mr Polo did not show any problems with tasks involving wh-interrogatives either. He made a few interesting errors, though: wh-elements were not moved from their base generation position and modal verbs were not moved leftward correctly. Again, other tests would be needed. Nevertheless, I can rule out any problem concerning wh-movement.

On the other hand, the striking result -as far as LD structures are concerned- forced a further investigation of LD in the aphasic patient and, consequently, a new dedicated test was designed. The results are discussed in the following section.

Table 1: Results of the screening test

	Anagram task	Repetition task	Completition task
Passive structures	80%		100%
Wh-main interrogatives	70%	80%	
LD structures	30%		

2.4 Proclitic pronouns test

In this section I present the results of six different tasks concerning the properties of proclitic pronouns in Italian in order to find out what problems Mr Polo shows.

The first one was a delayed-repetition task of clitic clusters. A test consisting of 30 sentences with a verb and a sequence formed by two clitics were given, as illustrated in (5).

(5)   *Te lo do*
        Dat-Cl Acc-Cl give-1ps
        'I give it to you'

Short term memory impairment did not affect this task because of the exiguous number of elements in each sentence: Mr Polo performed at ceiling.

Then Mr Polo was asked to judge 20 sentences, among which ten were ungrammatical. Each sentence contained a left-dislocated direct object, a doubler proclitic and another dative proclitic. As for ungrammatical sentences, violations concerned clitic – verb inseparability and the order of dative and accusative clitics.

Mr Polo was not able to distinguish between grammatical sentences and ungrammatical: on the contrary, he always expressed a positive judgement.

Subsequently, an anagram task composed of 4 parts was given. All sentences of the anagram tasks were given in the correct order in a reading task.

Two anagram tasks of 10 items each were carried out. Each item was a non-marked sentence (null Topic) with one clitic pronoun (dative/IO or accusative) and a null subject. On the table there were as many cards as the constituents of each sentence, isolating the clitic from the verb as illustrated in (6). Mr Polo was asked to turn over the cards previously mixed, to read aloud what was written on them and to put them in order until he obtained a sentence he judged as grammatical.

(6)   TI
        Dat-Cl
        REGALO
        give
        UN LIBRO
        a book
        '*I give you a book*'

Mr Polo was correct on 9/10 when dative/IO clitics were involved and 10/10 when accusative clitics were involved. In the reading task he performed at ceiling.

In the third anagram task Mr Polo was asked to reorder ten sentences involving left-dislocated DOs. Each sentence involved a null subject, a left-dislocated direct object and one clitic doubler. On the table there were as many cards as the constituents of each sentence, isolating the clitic from the verb as in (7). Mr Polo was asked to turn over the cards previously mixed, to read aloud what was written on them and to put them in order until he obtained a sentence he judged as grammatical.

(7)   IL LIBRO
        the book
        LO
        Acc-CL
        COMPRO
        buy
        DOMANI
        tomorrow
        '*I am buying the book tomorrow*'

        Mr Polo was correct on 3/10. Two kinds of error occurred: a first kind consists of clitic - verb inseparability violation (ex. *porto il vino in cantina lo*), a second one the rearrangement of proclitic in enclitic position (ex. *il libro compro lo domani*). Anyway, he succeeded in dislocating a lot of direct objects (9/10).
        In the reading task he performed at ceiling.

The last anagram task was made up of 10 marked sentence involving left-dislocated PPs. On the table there were as many cards as the constituents of each sentence: one for the PP, one for the clitic, one for the verb, one for the complement (or the subject), as illustrated in (8). As usual, Mr Polo was asked to turn over the cards previously mixed, to read aloud what was written on them and to put them in order until he obtained a sentence he judged as grammatical.

(8)   A MARIO
        to Mario
        GLI
        Dat-Cl
        PARLO
        speak
        DOMANI
        tomorrow
        '*I am speaking to Mario tomorrow*'

        Mr Polo was correct on 5/10. Two kinds of errors occurred: a first kind consists in clitic - verb inseparability violation (ex. *parlano di Piero ne bene*); a second one, in the rearrangement of proclitic in enclitic position (ex. *di pianoforti tre ho ne*). He succeeded in dislocating only 4/10 PPs.
        Interestingly, in the reading test given after this anagram task, he omitted the preposition in 70% of the cases and in 60% he produced a hanging-topic, making a pause between the bare DP and the concrete

sentence. This was made with argumental PPs (9a) and semiargumental PPs such as goal PPs (9b).

(9)   a. *Mario, gli parlo domani*
        Mario-DAT CL speak-1ps tomorrow
        'I am speaking tomorrow to Mario'
        b. *Concerti, ci vado di rado*
        concerts, LOC-CL go-1ps seldom
        'I go seldom to concerts'

The patient did not omitt the preposition with a semiargumental locative PP; an example is given below (10).

(10)   *Nel cassetto ci metto i libri*
       in the drawer LOC CL put the books
       'I put the books into the drawer'

These data are particularly relevant especially in the light of the data coming from the E.N.P.A. score: it emerged that the patient had no problem in the reading skill while he omitted the prepositions in spontaneous speech. So, sentences like those in (9), but not those in (10), were so difficult for the patient to the extent that his problem with the prepositions surprisingly caused him to perform bad in the reading task.

2.4.1 Results

If data from all anagram tasks involving clitic production are matched with the average of right answers by control subjects (100%), it is possible to discard the null hypothesis:

H_0: there is no difference in clitic production between the fluent-aphasic patient and control subjects

Therefore, data take statistical significance, i. e.: $t(4) = 6.52$; $p < 0.005$. Secondly, if data from all anagram tasks involving LD are matched with the average of correct answers given by control subjects (100%), once again it is possible to discard the null hypothesis:

H_0: there is no difference in LD production between the fluent-aphasic patient and control subjects

Data take statistical significance, i.e.: $t(2) = 3.66$; $p < 0.05$.

Table 2: Results of the proclitic pronouns test

	Anagram task	Reading task	Repetition task	Judgement task
Clitic clusters			100%	
LDs and Cl-cluster				0%
Null Topics +IO clitics	90%	100%		
Null Topics +DO clitics	100%	100%		
LDs of DOs	30%	100%		
LDs of PPs	50%	30%		

In what follows, I will analyse the data just exposed from a qualitative point of view.

3. Qualitative analysis and general discussion

3.1 Clitic pronouns

As for clitics, three kinds of mistakes were made in the tasks: i) clitic-verb inseparability violation; ii) proclitic rearranged in enclitic position and iii) violation of the order dative-accusative for clitics. For each kind of mistake I report below all negative performances.

i) Proclitic rearranged in enclisis position:

(11)   a. *L'auto volentieri presto ve la*
       the car with pleasure lend DAT CL ACC CL
       'I lend you the car'
       b. *I soldi ve do li io*
       the money DAT CL give ACC CL I
       'You can borrow the money from me'
       c. *Il televisore oggi portano lo me*
       the television today bring ACC CL DAT CL
       'They bring me the television today'
       d. *Un risotto cucina ci*
       a risotto cooks DAT CL
       'He cooks us a risotto'
       e. *Il libro compro lo domani*
       the book buy ACC CL tomorrow

'I buy the book tomorrow'
f. *La musica ascolta la sempre*
the music listens ACC CL always
'He always listens to the music'
g. *I vetri lavo li con l'aceto*
the windows clean ACC CL with vinegar
'I clean the windows with vinegar'
h. *I libri porto li domani*
the books bring ACC CL tomorrow
'I bring the books tomorrow'
i. *Le congratulazioni al signor Polo faccio le*
the congraturations to Mr Polo make ACC CL
'I congratulate with Mr Polo'
l. *Di pianoforti tre ho comprati ne*
of pianos three have I bought
'I bought three pianos'

These results seem to confirm previous studies on non-fluent aphasia (Rossi and Bastiaanse 2005) which showed that enclitic pronouns are more often spared than proclitics.

ii) Clitic-verb inseparability violation:

(12)   a. *Il nonno presta i soldi ce li*
the grandfather lends the money DAT CL ACC CL
'I borrow the money from my granfather'
b. *Raccontiamo dopo ce lo*
tell afterwards DAT CL ACC CL
'Let's speak about that afterwards'
c. *L'hanno presentata Maria ieri me*
ACC CL have introduced Mary yesterday DAT CL
'I was introduced into Mary yesterday'
d. *Maria l'ha raccontata la storia me*
Mary ACC CL has told the story DAT CL
'Mary told me the story'
e. *Il vino porto in cantina lo*
the wine bring to the cellar ACC CL
'I bring the wine down into the cellar'
f. *Il medico prescrive la ricetta la*
the doctor prescribes the prescription ACC CL
'The doctor prescribes the prescription'
g. *Parlo domani a Mario gli*
speak tomorrow to Mario DAT CL
'Tomorrow I will speak to Mario'
h. *Parlano di Piero ne bene*

speak of Piero PART CL well
'They speak well of Piero'
i. *Mangio poche di paste ne*
eat few of cakes PART CL
'I have few cakes'
l. *Faccio ascoltare a Elena le Mozart*
make listen to Elena DAT CL Mozart
'I have Elena listen to Mozart'

The first sentence in (12) was really hard for Mr Polo: when I showed him the correct order, he kept on ordering the sentence as show in (12a).

iii) Violation of the order of the clitic cluster:

(13)   a. *Il televisore oggi portano lo me*
        the television today bring ACC CL DAT CL
        'They bring me the television today'
        b. *L'hanno presentata Maria ieri me*
        ACC CL have introduced Mary yesterday DAT CL
        'I was introduced to Mary yesterday'
        c. *Maria l'ha raccontata la storia me*
        Mary ACC CL has told the story DAT CL
        'Mary has told me the story'

3.2 Analysis of LD production

I report all LDs produced by Mr Polo in tasks that required a dislocated complement (I do not consider here the order of clitics in the cluster).

(14)   a. *Il libro domani te lo do*
        the book tomorrow DAT CL ACC CL give
        'I give you the book tomorrow'
        b. *I soldi ve do li io*
        the money DAT CL give ACC CL I
        'I give you the money'
        c. *L'auto volentieri presto ve la*
        the car with pleasure borrow DAT CL ACC CL
        'I borrow you the car with pleasure
        d. *Il televisore oggi portano lo me*
        the television today ACC CL DAT CL
        'They bring me the television today'
        e. *La colomba a Pasqua te la regalo*
        the dove for Eastern DAT CL ACC CL give

'I give you the cake for Eastern'
f. *Il libro compro lo domani*
the book buy ACC CL tomorrow
'I buy the book tomorrow'
g. *Il pollo lo mangia volentieri*
the chicken ACC CL eat with pleasure
'He likes to chicken'
h. *La musica ascolta la sempre*
the music listens ACC CL always
'He always listens to the music
i. *Le rose le regalo a Elena*
the roses ACC CL give to Elena
'I give Elena the roses'
l. *I vetri lavo li con l'aceto*
the windows clan ACC CL with vinegar
'I clean the windows with vinegar'
m. *Il pianoforte lo suono di pomeriggio*
the piano ACC CL play in afternoon
'I play the piano in the afternoon'
n. *I libri porto li domani*
the books bring ACC CL tomorrow
'I bring the books tomorrow'
o. *Le congratulazioni al signor Polo faccio le*
the congratulations to Mr Polo make ACC CL
'I congratulate with Mr Polo'
p.*Di spartiti ne ho moltissimi*
of music books PART CL have lots
'I have lots of music books
q. *Ai concerti di rado ci vado*
to the concerts seldom LOC PART go
'I rarely go to concerts'
r. *Di pianoforti tre ho ne*
of pianos three have PART CL
'I have three pianos'

It is worth noticing that, when Mr Polo dislocated a complement, he never parted clitics from the verbal form, while the choice between enclitic or proclitic position seems to be at a chance level (47% of clitics in proclisis).

In regard to the two anagram tasks involving the LD of a direct object, Mr Polo was able to dislocate a high percentage of complements (50% and 90%) in spite of his impaired clitic production (30% in both test). The difference is even clearer in the second task in which only one clitic is

involved. Moreover, the second task was given one month later than the first one and there is evidence that Mr Polo found it easier to perform the second task. These data are apparently contradicted by those coming from the anagram task involving sentence with a dislocated PP: here the percentage of correct clitic production is 50% but the percentage of left-dislocated PPs is 40%.

I suppose that Mr Polo deficit with prepositions played a role, as E.N.P.A. examination reveals. On the other hand, while Mr Polo always read the sentences with the correct order, he omitted the prepositions of PPs, turning them into hanging topics. Nonetheless, it seems important that Mr Polo was able to produce a marked structure.

To conclude, it seems quite clear that Mr Polo has access to the left periphery since he was able to produce an hanging topic, which is thought to be base-generated in CP (Benincà 2001, Benincà and Poletto 2004), and he did not have problems with wh-elements and focalised XPs. What seems to be difficult for Mr Polo, instead, is to order a structure involving both clitics and LD.

3.3 Errors involving clitics and LD

In the two anagram tasks involving non-marked sentences with one clitic (dative or accusative) and a *pro* subject, Mr Polo performed very well: percentages of clitics correctly produced are very high, 90% and 100% respectively. Moreover, Mr Polo was quicker than in other tasks and showed no hesitation in putting the card with the clitic pronoun in initial position. The only mistake he made was the violation of the inseparability of clitic-verb, that is, he sometimes put the complement between clitic and verb.

I will now consider one of the three anagram tasks involving LD, rouling out tasks involving sentences with a left-dislocated direct object and a clitic cluster because of what we saw above (see 3.2), and tasks involving left-dislocated PPs because of Mr Polo's deficit with prepositions. Therefore, I will take into consideration the anagram task involving a direct object to be dislocatd and a clitic doubler: here the percentage of clitics correctly produced is low (30%) but the one with left-dislocated objects is very high (90%). How these data are to be made sense of, is very difficult to say; below I will tentatively give an explanation, being of course aware of the fact that further research is needed.

As for the two anagram tasks involving only the clitic (without a lexical doublee), one might think that ordering a non-marked structure is easier than ordering a marked one. In this case, Mr Polo did not leave clitics in the verb complement position, as he did many times in other tests. What is

more, the presence of the clitic suggests in general that the XP to which the clitic refers is already known by the hearer, and is in this sense a sort of "null Topic" (Belletti 2008). The awareness of the presence of a sort of null Topic in these sentences seems to be spared in Mr Polo.

If we look at the task involving both doublee and clitic doubler, we could argue that ordering a non-marked structure is easier than ordering a marked one. Mr Polo, though, was able to understand that in 90% of the times the output required was a marked structure. Once again, I might assume that Mr Polo matched the clitic with an already known referent. This time the clitic referent was phonologically realized, so Mr Polo moved leftward the latter. It is no clear why in this case Mr Polo was not able to correctly reorder clitics in proclitic position; it is worth noticing, though, that the presence of a left-moved topic "blocks" its clitic doubler in an enclitic position while in sentences involving a null Topic the clitic correctly shows up in proclisis.

In what follows, I will try to sketch a linguistic account of Mr Polo's impairment basing on the analysis so far developed.

4. General conclusions

This case study shows that, differently from what is generally assumed, syntactic errors might occurr even in fluent aphasia. Data from the screening test reveal no problems with thematic-roles assignation, wh-movement and left periphery access. So, my data do not corroborate Edwards' (2001, 2005) results.

However, Mr Polo's clitic production is impaired, especially when both the doublee and its clitic doubler are involved: a syntactic deficit is responsible for these problems, at least to some extent. Hence, data from this study are all in line with studies pointing out that statistically significant syntactic impairment may play a role in fluent aphasic production.

Moreover, fluent aphasic speech shows interesting syntactic phenomena as far as linguistic theory is concerned. First of all, it is worth noticing that when the patient was asked to reorder a sentence involving a clitic doubler and its doublee, no instruction were given with respect to the discourse-related features of the construction. In particular, no indication on the type of dislocation (LD or right dislocation, RD) was given. However, the patient always produced LDs. This result opens the question of why LD is easier than RD, i. e., the question of the semantics of LD and RD. Benincà (1988) and Benincà and Poletto (2004) argue that the XP showing up in LD can be present in the shared knowledge of the speaker and the hearer without showing up in the linguistic context; they call it Topic. On the oder hand the

XP showing up in the RD has to be present in the immediate linguistic context and they call it Theme. It seems plausible to assume that RD needs a more marked context to show up and this would be why the patient always produced LDs. This fact lead us to conclude that Mr Polo has a spared pragmatic competence, at least in the tests here considered.

Secondly, data seem to reveal something often ignored by analysis of clitic pronouns. It is worth noticing that Mr Polo was able to derive a marked structure by matching the clitic with a phonological realized referent and, in addition, he was able to understand that clitics involve a referent already known to the hearer. Thus, it seems that the presence of a clitic pronoun implies the presence of a null Topic. In this sense, these findings seem to be in line with Belletti's (2008) idea that the "presence of a pronoun implies presence of a silent pronominal topic". Belletti's hypotesis assumes that structures such as ClLD, HT and sentences invoving a pronoun have to be derived in the same way, at least in the first steps of the derivation: in all these structures, the presence of a pronoun would imply a doubled topic and the derivation would start out from a configuration doubler+doublee. The difference relies on the fact that the doubled topic can remain silent when found at the edge of the clause; in other words the possibility for topics to remain silent depends on when the topic is spelled out. Such a derivation, though, seems not to provide a valid explanation for the variation in patient's production; as shown in (15), infact, the patient produced different types of sentences, and even produced grammatical sentences in certain syntactic contexts (15b).

(15)   a. *Il libro compro lo domani*
         the book buy ACC CL tomorrow
         'I will buy the booh tomorrow'
         b. *Lo porta al concerto*
         ACC CL brings to the concert
         'He brings it to the concert'
         c. *Il nonno presta [i soldi ce li]*
         the grandfather lends the money DAT CL ACC CL
         'I borrow the money from my granfather'

The pattern shown in (15) is not expected under Belletti's account since the position of the clitic changes according to the syntactic structure of the sentence: this is unexpected if one starts out from the assumption that all constructions involving a doubler are derived in the same way.

(15c) represents a very interesting example for a theory of the derivation of LD, since the patient consistentely produced a configuration XP+clitic intwo syntactic context: sentences beginning with an NP subject

and a left-dislocated DO and sentences involving a left-dislocated PP. This is exemplified below.

 (16)   a. *Il nonno presta [i soldi ce li]*
         the grandfather lends the money DAT CL ACC CL
         'I borrow the money from my granfather'
         b. *Parlano [di Piero ne] bene*
         speak of Piero PART CL well
         'They speak well of Piero'

This configuration recalls what Cecchetto (2000) and Belletti (2006, 2008) call "big DP": these autors derive LD in terms of movement of a bigger category (big DP) base generated in any sentence and made up of a doubled topic DP and a (clitic) pronoun doubler. Again, this analysis seems unable to account for the variation in the patient's production if sentences in (15) are matched with sentences in (16). Why did the patient produce "big DP" (and "big PP") only in certain cases? And if the patient's problems were with the syntax of clitics, why did Mr Polo perform at ceiling in sentences involving a null Topic, that is, why does the clitic always correctly show up in proclitic position? In Cognola and Zanini (2009), a plausible answer to these questions is given; for the purposes of this article, it should be only noted that if the patient has a spared pragmatic competence (see above) and shows no problem with the syntax of clitics (at least in the tests here considered), then the deficit would be found in the syntax-discourse interface (for more on this see Avrutin 1999; 2000; 2004).

To conclude, data from the present study seem to show that a "big DP"or, better, a configuration XP+clitic[1], is really involved as a first step of the ClLD derivation, as assumed in Belletti (2006, 2008) and Cecchetto (2000). This configuration, though, does not seem to be always given but it is produced only when the context of a LD is created. Data seem to provide evidence also in favor of Belletti's (2008) intuition that "presence of a pronoun implies presence of a silent pronominal topic". On the other hand, ClLD structures and sentences with null Topics are possibly to involve a different derivation at different layers of the syntactic structure in order to make sense of the patient's production.

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[1] I do not discuss here the existence of a "big PP" (see Cognola and Zanini 2009 for a detailed discussion); contrary to Cecchetto's (2000) claim, though, the patient produced a sort of configuration "PP/IO+clitic doubler". Thus, I prefer to label the relation to be found between clitic doubler and its doublee more generally as "configuration XP+clitic".

In Cognola and Zanini (2009), the data presented in this study are put together with those of Mòcheno (Cognola 2008, in this volume), and a new proposal on the derivation of LDs is put forward. In particular, it will be argued that the low left periphery plays a crucial role in the derivation of ClLD and that the patient's impairment is not to be found in troubles with movement or with the syntax of clitics, but rather with the low left periphery. In this sense, these findings are consistent with those illustrated above.

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Chiara Zanini
Dipartimento di Discipline Linguistiche, Comunicative e dello Spettacolo
Via Beato Pellegrino, 1
35137 Padova
chiara.zanini.2@unipd.it