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Topic and Focus: effects of the Left Periphery in neglect dyslexia.

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Introduction

The aim of this study is to investigate whether manipulations of the syntactic structure of sentences affect reading performance of individuals with acquired left neglect dyslexia[1]. More specifically, sentences that include Topic and Focus structures are explored within the neglect dyslexia reading deficit.

Neglect dyslexia may constitute a window to explore whether and how stored syntactic knowledge modulates the exploration of visual verbal stimuli. Neglect dyslexia is, indeed, a reading disorder that impairs visual processing of information from the contralesional hemi-field. In most cases, it is the left hemifield which is impaired, since neglect dyslexia often results from a right-brain damage. In the present study, we will report the main characteristics of neglect dyslexia. The phenomenon on which we concentrate is the unconscious processing of the linguistic input. Thus, linguistic information coming from the neglected side of the visual field is processed in absence of awareness.

We decided to investigate Topic and Focus structures because of their syntactic characteristics. To be more specific, as far as Topics are concerned, we chose Clitic Left-Dislocation structure. On the other hand, we chose Contrastive/Corrective Foci, which involve the fronting of the focalized element.

Clitic Left-Dislocations and Foci were chosen because of their common features. Indeed, in both Topic and Focus projections, a constituent is not found in its canonical position. In Clitic Left-Dislocations, the constituent which is left-dislocated may be the object, the dative complement, the locative complement or the partitive complement. Thus, the dislocated constituent, is found at the beginning of the clause, rather than in its usual position.

Focalized elements are subjected to the same phenomenon. Even though Focus movement is syntactically different from Clitic Left-Dislocation's movement, assuming that they are moved and not base-generated, the result is the same in both structures. Hence, a constituent is found on the left, at the beginning of the sentence.

Hence, we decided to investigate these structures in left neglect dyslexia to test whether dyslexics patients' attention is driven by dislocated constituents. The prediction is that sentences with Clitic Left-Dislocation and Focus are less impaired in reading

[1] "Left neglect dyslexia" and "neglect dyslexia" will be used without distinction to describe the same syndrome, that consists in an impairment to the left visual field.

performance of individuals with neglect dyslexia, since both Left-dislocations and Foci involve the presence of a constituent on the left-hand side of the sentence. The crucial factor that must be reminded is that constituents found on the left do not occupy their canonical position.

The present study is articulated as follows: Chapter 1 is dedicated to the syntactic frame of Topic and Focus structures. Different types of Topics are explored, especially Clitic Left-Dislocations. Then, Focus projection is examined. This chapter also draws a comparison between these structures from a syntactic point of view. Then, we report the main proposals of projections' order within the Left Periphery.

Chapter 2 is dedicated to neglect dyslexia. The first section contextualizes neglect dyslexia within the more general framework of Unilateral Spatial Neglect syndrome. Then, neglect dyslexia as a spatial and attentional reading impairment is explored in details. In the following section, lexical, morphological and semantic effects on reading in neglect dyslexia are described, with reference to the main studies on this topic. Syntactic effects in neglect dyslexia are explored in a separate section. Unconscious reading phenomenon is then explained, also by mentioning other syndromes that involve processing of information without awareness.

At the end of the chapter, we contextualize neglect dyslexics' error patterns within Caramazza and Hillis' model of visual word recognition (Caramazza and Hillis, 1990)

Chapter 3 describes the experiment conducted in the present study, concerning processing of Clitics Left-Dislocations and Foci in neglect dyslexia. In this chapter, all the crucial information about experimental design is given. Then, a detailed analysis of all errors made by the participants is reported.

Chapter 4 is dedicated to the discussion of the results. We compared the results obtained with the general hypothesis. We will observe that the results are consistent with the initial predictions. Therefore, the hypothesis that sentences containing Clitic Left-Dislocation and Focus are less impaired than other syntactic structures that do not involve these projections is finally validated.

I. Chapter 1: Topic and Focus.

In this chapter, Topic and Focus syntactic structures are analysed. After a brief introduction about the extended Left Periphery proposed by Rizzi (1997), Topic and Focus projections are described in details. A separate section is dedicated to cleft structures and to the shape of clefts' CP.

A concise discussion on TopP and FocP projections' order and position within the Left Periphery is reported. Then, the main proposals about movement or base-generation of topicalized and focalized elements are described.

I.1. CP and the extended Left Periphery[2]

There are three main layers in the representation of sentence structure: Verb Phrase (VP), Inflectional Phrase (IP) and Complementizer Phrase (CP). The VP layer is the syntactic place in which the connection between semantics and the arguments of the verb is implemented. In this layer, theta assignment takes place. IP is a functional layer in which argumental features are specified. This layer contains features about verbal tense, case and agreement of the arguments. Pollock (1989) suggested to split IP into *Tense Phrase* (TP) and *Agreement Phrase* (AgrP).

The Complementizer Phrase is the highest layer of sentence structure and it represents the interface between the clause and both its linguistic and non-linguistic context. CP is related both to the outside and the inside of the clause, expressing the clause type and, simultaneously, encoding the relation between the higher portion of the structure and the content of the rest of the clause.

CP is known also as the Left Periphery of the clause. Left periphery is a field to which elements are moved and it is present only when activated. In general, movement is always motivated by the satisfaction of some requirements of heads, according to Rizzi (1997) and following the *last resort* (Chomsky, 1993).

In his seminal paper, Rizzi (1997) traces a series of hierarchically organized functional projections, mainly taking into account four elements typically appearing in the left

[2] In this chapter we will refer to the split CP and the extended left periphery proposed by Rizzi (1997) and further developed in Benincà (2001) and Benincà and Poletto (2004). Actually, Benincà (1995) sketched out a first map of a split CP, in which were located some positions of complementizers, left-dislocated DPs and interrogative and exclamative *wh*-.

periphery: interrogative and relative pronouns, Topics and focalized elements. Left periphery in its globality hosts different kinds of elements that refer to both structural and pragmatic information.

Considering the relationship between CP and the rest of the clause, the main information that CP contains is about the finiteness of the verb in VP, expressed by the lowest projection FinP. Finiteness system is so defined by Rizzi (1997):

(1) The second kind of information expressed by the C system faces the inside, the content of the IP embedded under it. It is a traditional observation that the choice of the complementizer reflects certain properties of the verbal system of the clause, an observation formalized, e.g., by "agreement" rules between C and I, responsible for the co-occurrence of that and a tensed verb, of for and an infinitive in English (Chomsky and Lasnik, 1977), etc. (…) So, it appears that, at least in these language families3, C expresses a distinction related to tense but more rudimentary than tense and other inflectional specifications on the verbal system: finiteness.

Finiteness is not only a domain of verbal morphology, it must be conceived otherwise as a cluster of formal and functional properties. For instance, it establishes word order in languages like German, subject agreement and finite - non-finite constructions more in general.

The other aspect concerns "the outside", and it consists in the extralinguistic context. The dedicated projection is Force phrase, that delimits the system upward. This is the definition of Force system given by Rizzi (1997).

(2) Complementizers express the fact that a sentence is a question, a declarative, an exclamative, a relative, a comparative, an adverbial of a certain kind, etc., and can be selected as such by a higher selector. This information is sometimes called the clausal Type (Cheng, 1991), or the specification of Force (Chomsky, 1995). (…) Force is expressed sometimes by overt morphological encoding on the head, sometimes by simply providing the structure to host an operator of the required kind, sometimes by both means.[4]

Force P contains the features regarding the type of the clause and its illocutionary connotation. In this layer it is specified whether the clause is a declarative, an exclamative

[3] Rizzi (1997), p. 284. In this passage, Rizzi refers to Germanic and Romance languages.
[4] Rizzi (1997), p. 283.

or a relative clause. Consequently, in the Spec of ForceP we find relative operators, exclamative wh-s, while Force° can be occupied by declarative *that*.

I.2. The central projections of the Left Periphery: TopP and FocP

In this section we will analyse some projections of the left periphery, considering Topic and Focus more in detail than the others in order to better understand what is involved in the experiment presented in this study.

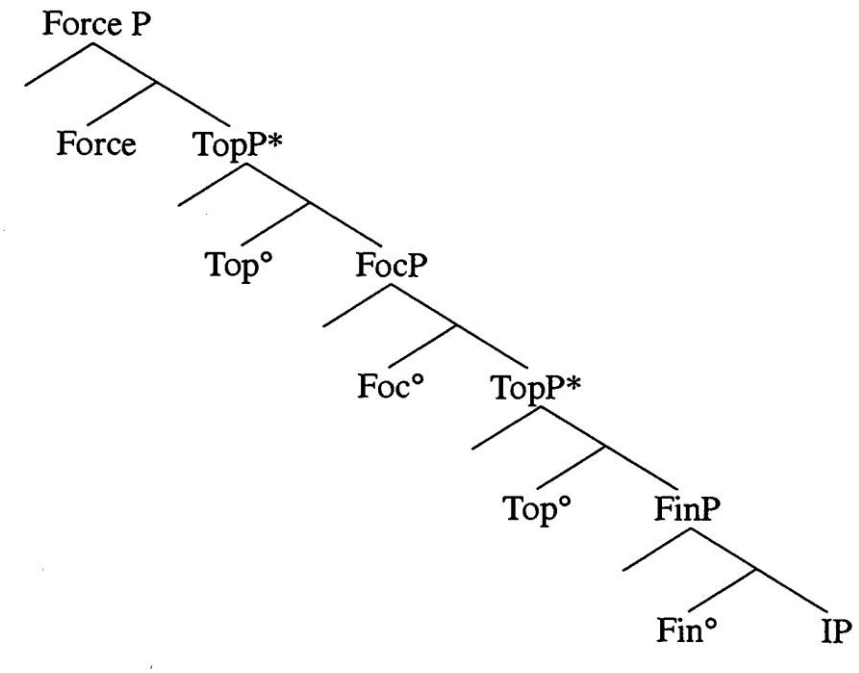

Figure 1 'The fine structure of the Left Periphery' (Rizzi, 1997)

Topic and Focus are the most representative interfaces between pragmatics and syntax. The concept of *Information Structure* (Chafe, 1976) is crucial to understand this interaction. First of all, Information Structure (IS) is connected to the idea of packaging the information conveyed in a sentence. Packaging can be achieved, looking at our interest, with alterations of the syntactic structure.

Informative content is distinguished in new and given information. Given information belongs to the common ground, either because it has already been mentioned or because it is inferred as part of general knowledge, while new information is something that is going to enhance knowledge.

In Italian, for instance, in the topic-comment articulation, we can observe a topicalization of the given knowledge, placed at the beginning of the clause and followed by the comment in which new information is contained.

(1) a. Il libro, lo dimentico sempre a casa.
The book, it I forget always at home
'I always forget my book at home.'
b. Mario, non sento parlare di quel ragazzo da molto tempo.
Mario, not I hear talk about that boy since a lot of time
'It's been a long time since I haven't heard someone talking about Mario.'
c. All'idraulico, (gli) telefonerò domani.
The plumber, (to him) I will phone tomorrow
'I will phone the plumber tomorrow.'

I.2.1. Topic

In Italian there are two main Topic constructions: Left Dislocation and Hanging Topic. (1a) is an example of Clitic Left Dislocation (CLLD), in which the entire constituent is left-dislocated and a resumptive clitic is present. Resumptive clitics are obligatory in Left Dislocation of direct objects (1a) and partitives (1d). In Italian, the pronoun agrees with the noun for gender, case and number.

d. Di gelato, ne mangerei un chilo.
Of ice cream, of it I would eat a kilo
'I would eat a kilo of ice cream.'

In contrast, they are optional in Left Dislocations of datives (1c) or locatives (1e).

e. A Milano, (ci) tornerò presto.
To Milan, (there) I will come back soon
'I will come back to Milan soon.'

It is reasonable to further distinguish two cases of CLLD on the basis of the dislocated phrase. It is possible to left-dislocate both a PP or a DP.

f. Le mele, Carlo le ha già comprate.
The apples, Carlo them has already bought
'Carlo has already bought apples.'
g. Al supermercato, Carlo ci va dopo.
To the supermarket, Carlo there is going later
'Carlo is going to the supermarket later.'

These two possibilities will be analysed later, when it will be discussed if left-dislocated elements are generated in the Left Periphery of if they are moved from an IP-internal position.

Sentence 1b is an instance of Hanging Topic (HT). There are consistent differences between these two realizations of Topic.

(A) The first difference between HT and LD is that HT can only express an *Aboutness Topic*, while LD may convey either *Aboutness, Contrastive, Familiarity,* or *Shift Topics.*
(B) The second important distinction is that LD resumes the case of the constituent through the preposition, whereas HT does not. In fact, in HT structure only number and gender are expressed in the obligatory resumptive pronoun/nominal epithet.
(C) Another interesting difference concerns recursion. LD can be recursive in a sentence (1f); contrarily, this is impossible[5] for HT. The possibility of iteration is due to the aforementioned description about the kinds of Topic that we can find in a LD.

f. A mia sorella, domani, questa storia gliela devo raccontare.
To my sister, tomorrow, this story to her it I have to tell

[5] This is true for Italian and most of Romance languages but not, for instance, for French. French allows recursive Hanging Topics, as we can see in this example from Delais-Roussarie et al (2004):
Pierre, sa voiture, cette idiot ne s'occupe pas d'elle correctement.
Pierre, his car, this idiot does not treat it properely
'Pierre, who is an idiot, does not treat his car properely.'

'Tomorrow I'll have to tell my sister this story.'

I.2.2. Focus

Moving on to the other projection analysed in this dissertation, Focus is linked to prosodic aspects such as intonation and pitch, as well as semantic perspectives like the presentation of a choice among some alternatives (Krifka, 2008). There is a consistent literature on classifications of Focus on prosodic parametres. In this study I will confine myself to mention Gussenhoven's work (Gussenhoven, 2007) on classification of kinds of Focus from a prosodic point of view and Poletto and Bocci (2016) for a detailed analysis of the prosodic correlates of Focus.

From a syntactic point of view, Focus has at least two structures[6]: in the first one, contrasted information is fixed at the beginning of the clause through an operation of fronting and it is pursued by the background (2a); in the second, Focus appears *in situ* such as in 2b.

(2) a. AL CINEMA voglio andare stasera (non a teatro!)
To the CINEMA I want to go tonight (not to the theatre!)
b. Chi hai visto ieri? Ho visto CARLO.
Who did you see yesterday? I saw CARLO.

The two sentences exemplify two types of Focus: Contrastive Focus (2a) and Informational Focus (IF) in 2b. To make a distinction between these two kinds I will refer to É. Kiss' study (É. Kiss, 1998).

The first criterion to distinguish Contrastive Focus (called *Identificational Focus* É. Kiss, 1998) from Informational Focus (also called *Presentational Focus* in literature) is the semantic-communicative role in the sentence. Contrastive Focus expresses exhaustive identification, while Informational Focus presents a non-presupposed information. The distinction between exhaustive and non-exhaustive identification is sometimes used to distinguish different types of Foci. Exhaustive identification implies the uniqueness of

[6] The third type is cleft structure, and it will be treated in a separate section because of its semantically and syntactically different nature.

the focalized element. Thus, Contrastive and Corrective Focus represent this uniqueness, while Informational Focus do not.
It is important to note that an IF can be present in every sentence.

Another characteristic that has to be considered is syntactic movement. Later we will explore the two main hypotheses on this point, but for the time being we only want to point out that the focussed constituent in Contrastive Focus moves to the LP of the clause from his original position.

Informational Focus, instead, remains *in situ* and does not involve any movement. It may appear an obvious consideration, but some approaches do not use this criterion to make a fair distinction[7].

We saw that Informational Focus receives prosodic highlighting and it is usually placed after the verb. Actually though, in some languages such as Sicilian, a southern Italian variety, it can appear also in the Left Periphery as shown in 2c.

c. Chi sei? MARIO sono.
Who are you? Mario I am
'Who are you? I'm Mario.'

Contrastive Focus is so defined because of his semantic property of comparing two possibilities, choosing one and excluding the other. This can be clearly seen in 2a, where it is stated that the cinema is the place where the subject wants to go and, simultaneously, that the subject does not want to go to any other place. This construction is very interesting, both semantically and syntactically.

I.3.Clefts

In the previous section we saw that Focus can be expressed through a fronting of the focalized constituent or it can be expressed by in situ constructions.

In addition, Focus can be realized through cleft constructions. Clefts are complex sentences in which the focalized constituent is found between a copula and the complementizer (*che*), which is invariable.

[7] I'm referring to a study on Greek mentioned in É. Kiss (1998). It is not my intention to criticize the mentioned study, I only want to underline the importance of the criterion.

(*be*) X *che* DEPENDENT CLAUSE

There is extensive literature on these structures, because clefts are interesting constructions from different perspectives. Indeed, clefts are complex syntactic structures with simple semantics. They appear in a bi-clausal configuration but they express mono-propositional meaning (Roggia, 2009).

(2) d. È Francesca che ha comprato la torta.

It is Francesca that has bought the cake.

In sentence 2d, different constitutive elements can be isolated. We can isolate the copula (*è*), the cleft element (*Francesca*), which represents the Focus, the matrix clause (*è Francesca*) and the dependent clause (*che ha comprato la torta*).

An important distinction within clefts is between subject cleft (2e) and object/non-subject cleft (2f).

(2) e. È Carlo che ha parlato

It is Carlo that has spoken

f. È Carlo che Maria ha visto.

It is Carlo that Maria has seen.

A subject-cleft can function as an answer to a question about new information, while object/non-subject cleft cannot (Belletti, 2012)

The classification proposed by Roggia (2009) includes three main types of declarative clefts[8] in Italian: Identifying cleft, Presentative cleft and Mixed cleft. This distinction is based on a functional criterion.

Identifying cleft structures isolate (identify) the focused element from the common ground, represented by the rest of the clause, which is presupposed. 2g is an example of identification cleft from Roggia (2009).

(2) g. È la nebbia che mi fa paura.

[8] There are two main groups of clefts: declarative clefts and interrogative clefts. In this section we will not include the second one, but we will confine us to review declarative structures.

It is the fog that scares me.

Presentative clefts introduce a new focused element, the cleft element, which is involved in a new ground, not mentioned or presupposed. These structures can be defined as *Broad Foci.* In these sentences the Focus is not limited to an isolated constituent but it is extended to the entire clause. In the matrix of these constructions it is possible to find both the verb *to be* and the verb *to have*.

(2) h. Ho il piede che mi fa male
I have my foot that hurts me.

Mixed clefts share characteristics of both the first and the second type of cleft structures. Indeed, these sentences introduce a new referent like Presentative clefts, in a context which is pragmatically presupposed, as in Identification clefts.

Further classifications would be needed, but since the aim of this section is to give a brief introduction of clefts, we will stop here. We address to Roggia (2009) for an exhaustive classification of different subtypes.

I.3.1. CP of clefts.

Several studies have been conducted on shape of CP of clefts. From these studies, two main theories have been developed: mono-clausal analysis and bi-clausal analysis. We will refer to Frascarelli and Ramaglia (2013) for a mono-clausal analysis, and to Belletti (2008, 2012, 2015) for a bi-clausal analysis.

Frascarelli and Ramaglia (2013) studied clefts from a syntactic, prosodic and semantic point of view.

The authors proposed that the CP of clefts is substantially similar to the CP of Contrastive/Corrective Focus realized through phrase fronting. Indeed, the cleft element would be moved from a low position in the sentence to FocP. As a consequence, the structure is analysed as mono-phrasal. In this proposal, the copula is seen as a grammaticalized element.

In her studies on CP of clefts, Belletti (2008, 2012, 2015) proposed a bi-clausal analysis: the structure of clefts consists in a main copular clause and a dependant pseudo-

relative clause. In these configuration, the copula selects a "small CP" as sentential complement. In this analysis it is assumed that the CP of clefts is reduced since only some of the projections of the Left Periphery are present. Thus, it is named Small CP.

According to Belletti, the complementizer of clefts lacks at least the highest ForceP layer (Belletti, 2008) and the Topic Phrase as well (Belletti, 2012). At this point, the left peripheral focus position is the highest head of the small clause complement of the copula.

An important step in Belletti's studies was the insertion of a new projection in the LP, labelled *PredP*. The main assumption is that predication is realized within the small clause in clefts.

The lowest projection of the LP, FinP, is preserved since its head hosts the complementizer *che*.

In her analysis, Belletti (2008) made a crucial distinction between subject clefts and object/non-subject clefts, since subject clefts can be new information Foci while object clefts can only be Contrastive/Corrective Foci. These two kinds of structures have two different derivations and hence two different target positions for the cleft element. The conclusion is that the focalized element of subject clefts occupies a *low focus* position (a vP peripheral focus) through an A movement, while the focalized element of non-subject clefts can move to the Spec of FocP through an A' movement.

In this analysis, small CP is compared to the CP of pseudo-relative clauses of sentences as 2i (Belletti, 2015).

(2) i. Ho visto Maria che parlava con Gianni.

I have seen Maria that spoke to Gianni.

Our aim is not to agree with one of these theories, but only to clarify that the syntactic structure of clefts is very different from the ones seen for other cases of Foci (cfr. 2.1.2.)

I.4.Comparison between Topic and Focus

There are some important differences between Focus and Topic as syntactic constructions in the Left Periphery. In this section we will mainly refer to Rizzi (1997) and Benincà (2001) and Benincà and Poletto (2004) and other studies as background.

The most evident distinction is that Topic does not display Weak Crossover effect, while Focus does. WCO constraint is a manifestation of *Binding Theory* and it concerns restrictions of coreference. Evidence from Italian can be found in Benincà and Poletto (2004):

(3) a. Gianni$_i$, suo$_i$ padre l$_i$'ha licenziato. (LD)

Gianni$_i$, his$_i$ father has fired him$_i$

'Gianni has been fired by his own father.'

b. *GIANNI, suo$_i$ padre ha licenziato (Foc)

GIANNI$_i$, his$_i$ father has fired t$_i$

In 3a *Gianni* is the object and the possessive *suo* corefers with *Gianni*. The sentence is perfectly grammatical and the coreference of these two elements does not trigger any Weak Crossover effect.

In 3b, the focalization of *GIANNI* is inconsistent with the coindexation of the possessive *suo* and the sentence is ungrammatical. The conclusion of this consideration is that a lexical anaphor in subject position is permitted if bound by a left-dislocated antecedent, but not by a focalized constituent.

We have already seen that CLLD and HT require resumptive clitics, and if pronouns are not required by the specific type of structure, they are allowed anyway. In Focus structure inclusion of a resumptive clitic in not permitted.

(4) a. Un gelato, adesso lo vorrei.

An ice-cream now it I would like

'I would like an ice-cream now'

b. *UN GELATO lo vorrei, non un panino

*an ice-cream it I would like, not a sandwich

A resumptive clitic is obligatory in cases in which the direct object is left-dislocated as in 4a, but it is inconsistent with a focalized constituent as in 4b.

If we consider the possibility of left-dislocating or focalizing a Quantificational element in Italian, we immediately note an important difference between Left Dislocation and Focus. The following examples are found in Rizzi (1997).

(5) a. *Nessuno, lo ho visto
No-one, him I saw
b. *Tutto, lo ho fatto
Everything, it I did

(6) a. NESSUNO ho visto
No-one I saw
b. TUTTO ho fatto
Everything I did

If quantifiers are not associated to a lexical element, they cannot be left-dislocated (5a and 5b), whereas quantificational elements can be focalized without creating any inconvenience.

Recursion is another phenomenon that is useful to divide Focus and Topic both structurally and theoretically. In fact, a clause can contain several positions occupied by Topics (7a), but only one s tructural position for Focus. As we are going to see, both Left Dislocation and Focus can appear in a clause at the same time.

(7) a. La mia cara macchina, A MIA ZIA, non gliela vendo.
My beloved car, to my aunt, not to her it I sell
'I won't sell my beloved car to my aunt.'

I.5.On position and order of TopP and FocP

In the cartographic representation sketched by Rizzi (1997) we find a TopP position, followed by a FocP and a lower TopP (* indicates recursion):

ForceP *TopP FocP *TopP FinP

Rizzi bases his analysis on these types of sentences:

(8) a. Credo che a Gianni (Top), QUESTO (Foc), domani (Top), gli dovremmo dire.

I think that to Gianni, this, tomorrow, to him we should say.

b. Credo che domani (Top), QUESTO (Foc), a Gianni (Top), gli dovremmo dire.

I think that tomorrow, this, to Gianni, to him we should say.

Benincà and Poletto (2004) claimed that there is no Topic projection lower than Focus and that the projection labelled as lower Topic is actually an extension of the Focus field (Inferior Focus). In the mentioned paper, these sentences are brought as evidence that only one order between TopP and FocP is possible:

(9) a. *A GIANNI, un libro di poesie, lo regalerete.

To Gianni, a book of poems, it you will give

b. Un libro di poesie, A GIANNI, lo regalerete.

A book of poems, to Gianni, it you will give

'You will give a book of poems to Gianni.'

It can be noticed that the order Focus Phrase (*A Gianni)* – Topic Phrase (*un libro di poesie*) is ungrammatical (9a), while Topic followed by Focus (9b) is grammatical. By using examples from non-standard Italian varieties, Benincà and Poletto (2004) demonstrated that sentences like 8b are not relevant examples to support Rizzi's proposal. In fact, the temporal adverb analysed as left-dislocated element is actually different from left-dislocated DPs and PPs. Temporal adverbs are part of Scene setting, and their position is between Hanging Topic and Left Dislocation. They can occupy this position only in main clause, but not in embedded context. Through these considerations we should admit that there is a further split in the Topic field: Frame field and the field occupied by real Left Dislocations. Moreover, if a lower Topic exists, it must be insensitive to Weak Crossover.

(10) a. A MARIA, Giorgio, sua madre presenterà.

To Maria, Giorgio, his mother will introduce

'His mother will introduce Giorgio to Maria.'

b. *A MARIA, Giorgio, sua madre presenterà.

To Maria, Giorgio, her mother will introduce

'Her mother will introduce Giorgio to Maria.'

c. *A MARIA, Giorgio, sua madre lo presenterà.
To Maria, Giorgio, his mother him will introduce
'His mother will introduce Maria to Giorgio.'

Through the analysis of these sentences from Benincà and Poletto (2004) we can state that the presumed lower Topic (*Giorgio*), actually behaves as a Focus, since it is sensitive to Weak Crossover. Further evidence is given by the impossibility of the insertion of a resumptive clitic (10c).
The assumption of the presence of another Focus implies that more than a Focus can be present. It seems to be contrary to what we stated earlier in the comparison between TopP and FocP, but, as a matter of fact, it is not. FocP should be conceived as a 'field' in which contiguous projections encode different types of focalized elements.

d. A GIORGIO, questo libro, devi dare.
TO GIORGIO, this book, you must give
'You must give this book to Giorgio.'

Entering into the Focus field, in sentence 10d we can identify two focalized elements: *A Giorgio* and *questo libro*. The first phrase is a Contrastive Focus, while the second is defined by Benincà and Poletto (2004) as an Informational Focus. We previously saw that Informational Focus (IF) can be found in the Left Periphery in some non-standard Italian varieties such as Sicilian. This is an analogous case of Informational Focus moved to the Left Periphery, and in this way it is should be conceived according to Benincà and Poletto's proposal.

The paper that we are dealing with contains a further distinction. We discussed earlier the articulation of the two main different types of topicalized elements inside TopP: Hanging Topic and Left Dislocation (with and without obligatory clitic). We fixed the order in HT-LD. The final outcome of Benincà and Poletto (2004) evaulation is:

(3) [[HT][[Scene setting][[LD][[LI][[Contr Focus][[Inf Focus]]]]]]]

It must be added that we have not dealt with List Interpretation (LI) only because this category of Topic is not relevant for the study in which this chapter is included. Nonetheless, it seems reasonable to spend some words on this subfield.

(11) a. La torta la porto io, il vino lo porta Sara.
The cake it brings I, wine it brings Sara
'I bring the cake, Sara brings wine.'

In this type of topicalization there is a known set of items, and two or more items are listed and contrasted simultaneously. For instance, in 11a the context is a birthday party at my friend's house and I know that my friend has bought all the necessary, except for the birthday cake and the wine. At this point it is reasonable that I utter 11a. It is clear that the resumptive clitic is obligatory.

At this juncture we can conclude that the portion of the Left Periphery consisting in TopP and FocP, from the semantic and syntactic point of view, is articulated as follows:

(4) |_____FRAME_____| | THEME | |____ FOCUS _____ |

Returning to Information Structure, Frame and Theme layers include given information. Frame is positioned higher than Theme because it contains information about temporal and spatial context through temporal and locative adverbs and, pragmatically, it is reasonable that it should precede Theme layer. This is the order and the fine structure of the Left Periphery that we accept in this work.

I.6.CLLDs, HTs and Foci: Moved or base-generated?

The issue whether focalized and topicalized elements are moved or base-generated is still hotly debated, especially as regards Topic. It has been already reminded that movement must be triggered by satisfaction of requirements. Applying this criterion to Focus construction, if a constituent bears a [Focus] feature, it must move (A'-type movement) to the specifier of a Focus projection, similarly to wh-movement. Further evidence of the analogy between these types of movement is given by the incompatibility

of wh-items and foci in main clauses. There is general consensus on movement of the fronted constituent in Focus, while the issue of Topic is more controversial.

Cinque (1977) already pinpointed two topicalized constructions, differentiated in their origins. One of them is seen by Cinque as a result of a copying operation, while the other is conceived as a base-generated topic.

Lasnik and Saito (1994), studying scrambling in Japanese, treated topicalization as an XP adjunction to IP. It has been proposed that Topic is another kind of A'-movement. The explanation is that, following Chomsky (1981), adjunction is an instance of A' movement.

Frascarelli (2000) proposes that topicalization is a *Merge* operation. Specifically, a Topic is base-generated in the TopP projection, therefore excluding movement approach. In Frascarelli's analysis, one of the first arguments in favour of base-generation is that Topics are not Operator-like constituents, regardless of their location, so they cannot be connected with a trace in argument position. A further interesting observation is that multiple Topics (even if we have discussed it as different types of Topics from a cartographic point of view) imply a 'trigger problem', since movement must be triggered by the checking of features.

Currently, there is general agreement on the fact that Hanging Topics are base-generated and Foci reach the Left Periphery through an A'-movement, but there is no real consensus on Clitic Left Dislocations.

An interesting approach is found in Cecchetto and Chierchia (1999) and in Cecchetto (2000). Cecchetto assumes the movement hypothesis if the left-dislocated constituent is a DP, while if the constituent concerned is a PP, it is base-generated. The main argument is that a left-dislocated DP must receive a structural case and therefore it must be generated in an IP-internal position where it can receive case, and only after case assignment it can be moved to the Left Periphery. A PP, otherwise, does not need structural case assignment, therefore it can be directly inserted into a TopP projection.

(12) a. Qualche compito, Gianni lo assegna a ogni studente.
Some homework, Gianni it gives to every student
'Gianni assigns some homework to every student.'
b. In qualche aula, Gianni ci manda ogni studente.

In some classroom, Gianni there sends every student
'Gianni sends every student to some classroom.'

These sentences from Cecchetto and Chierchia (1999) serve to illustrate the authors' proposal of different origins for dislocated DPs and PPs. In 12a, the left-dislocated quantificational DP, assuming the copy theory of traces (Chomsky, 1995), is treated as if it was originated in internal-IP position and then moved to the LP. Otherwise, the dislocated PPs has no copy in the corresponding position in IP projection. Beyond this lack of scope reconstruction in PPs, Cecchetto and Chierchia focussed on the non-obligatoriness of the clitic with PPs.

The authors' focal point is the Clitic Doubling. They sustain that clitic and double are in a Spec-Head configuration into a "Big DP" phrase, which is the complement of the verb. When the double moves to the Left Periphery (Spec of TopP), it leaves a trace in the Spec of the mentioned "Big DP". As regards PPs, they assume that they are generated in the Spec of TopP. In this configuration, clitic and verb move to the head of TopP, creating a Spec-Head configuration between topicalized PP and the clitic pronoun. If the clitic pronoun is absent, there is an element in the theta grid of the moved verb coindexed with the PP.

This seems to be a reasonable analysis even though it is not in the purpose of the present study to adopt one of these hypotheses to draw a veil over the discussion on this topic.

II. Chapter 2: Neglect Dyslexia

In Chapter 2 neglect dyslexia reading deficit is analysed. This chapter is organized as follows: after a brief contextualization of neglect dyslexia (from now on, also ND) within the frame of Unilateral Spatial Neglect impairment, there is a review on the literature on ND in general, both in a historical and a synchronic perspective. After this section, neglect dyslexic bisection performance on words and sentences is examined.

In the following section, lexical, morphological and semantic effects on neglect dyslexics' reading performance are discussed. After this, syntactic effects in ND are considered, mainly reporting Friedmann's study on syntactic manipulations in left neglect dyslexia (Friedmann et al., 2011).

Then, phenomena involved in unconscious reading are investigated, exploring pathologies and impairments that involve a dissociation between perception and awareness. The following section concerns different types of reading errors in ND: omissions, substitutions and additions. To this end, some examples are reported both from the literature and from the experiment reported in Chapter 3 of this study.

The aim of the last section is to contextualize different patterns of impairment of neglect dyslexic within Caramazza and Hillis' model of word recognition (Caramazza and Hillis, 1990).

II.1. Unilateral Spatial Neglect

The reading deficit named Neglect Dyslexia is often associated with Unilateral Spatial Neglect (USN) syndrome (Vallar, 1998). Individuals with USN tend to fail to attend and explore stimuli presented in the space contralateral to the brain damage (Heilman, Bowers, Valenstein, & Watson, 1985) and this failure cannot be attributed to either sensory or motor deficits. Cases of ipsilateral neglect have been described in literature (Kwon and Heilman, 1991) but the condition involving a right-brain damage and neglect of the left visual field is much more prevalent.

The most frequent anatomical correlate of USN is damage to the inferior parietal lobule, at the temporo-parietal junction. Lesions involving the premotor cortex or subcortical structures may be associated to USN (Vallar, 2001).

Several explanations have been advanced by neuropsychologist to account for ND underling deficit. Heilman (1985) proposed that after a brain damage, the damaged

hemisphere is hypoaroused and thus fails to process the incoming information. Kinsbourne (1987) advanced the hypothesis of the lack of co-working between the two hemispheres after brain damage resulting in loss of equilibrium and communication between them. The effect of the loss of equilibrium, according to Kinsobourne, is the attentional shifting to the ipsilesional field. Posner (1987) advanced a specific spatial attention impairment. The mechanism responsible for selecting between different stimuli is damaged and systematic neglect of left-side stimuli is the result.

In copying drawings, patients with USN may omit lines on the left, even if the configuration is well-known and the missing lines are symmetric to the lines drawn. People with USN may show selective impairments in performing actions in the left portion of both extra-personal space and internal representation of space. For instance, neglect can concern the body (Vallar and Mancini, 2010), internally generated images (Bisiach and Luzzatti, 1978), physical objects (Guariglia et al. 1993; Ortigue et al. 2006). It can concern the horizontal dimension but also (less frequently) the altitudinal dimension. All these dissociations suggest that the psychological and neurological representation of space is segregated.

Neglect can affect both real visual field and imaginary visual field. In a famous study, Bisiach and Luzzatti (1978) asked two patients with USN to imagine being in Piazza del Duomo in Milan, their native city, and to describe the buildings and characteristics of the square. They had to imagine that they were standing on the steps, with the cathedral behind their back. They described perfectly all the features on the right but gave a very poor description of what was on the left. At that point, they were asked to imagine standing on the opposite side of the square, facing the cathedral. The side of the square that had been neglected previously, was then on the right-hand side and they described it in details. All the details were in their memory, but they were unable to have access to them.

Furthermore, neglect can be related to the stimulus, such as written linguistic material. As we mentioned above, this kind of impairment is called Neglect Dyslexia. ND can be associated to USN or appears as the sole symptom of the spatial-attentional deficit. The fact that ND can occur independent of NSU suggest that it arises from a damage to specific visuospatial representational/attentional systems supporting reading (Vallar, 2010).

II.2. Left neglect dyslexia

Neglect dyslexia, thus, is a reading disorder that impairs the contralesional hemi-field. Although several seminal studies on ND are relatively recent (from the mid '80s), the syndrome was first described a long time ago. For a brief historical account, we will refer mainly to Vallar (2010).

Arnold Pick (1898) described a patient with a left hemianopia who omitted the first word on the left of each line; a post-mortem analysis revealed a right thalamus damage. Pick described another patient who showed the tendency to ignore objects located on the left hemi-field.

Kinsbourne and Warrington (1962) defined the characteristics associated with neglect dyslexia describing six right-brain damaged patients. These patients substituted and, much less frequently, added letters or words on the left side of sentences or isolated words. In their seminal paper, Kinsbourne and Warrington found out that these patients are often unaware of their ND. This condition is called anosoagnosia.

Starting by these seminal studies, visuo-spatial impairment in information processing has been interpreted as an attentional deficit. For years authors have debated whether selective attention plays a role in early processing of visual information or if it acts in later. From this debate two hypotheses arose: the early-selection hypothesis and the late-selection hypothesis.

Early selection theory (Treisman, 1969; LaBerge and Brown, 1989) generally assumes that selection occurs early in processing the stimulus, before the identification and the semantic processing. In this view, low-level features are responsible for the selection, such as the position in the space and the colour of the stimulus.

Late selection theory (Deutsch, 1963; Norman, 1968; Shiffrin and Schneider, 1977; Pashler and Badgio 1985) holds that selective attention occurs after stimulus identification. Late selection hypothesis is based on high-level features, such as meaning and stimulus type. According to this view, attentional impairment appears after the stimulus has been processed at high-level stages.

Behrmann et al. (1990) reported two patients who showed a double dissociation on effects of high-level and low-level manipulations. Both subjects were impaired in detecting elementary stimulus features on the left side of the visual field. The first subject

showed a sensibility to structural manipulation of physical properties of stimuli, such as position and vertical-horizontal orientation. His reading performance was not affected by intrinsic characteristics of words. The other subject was sensible to high-level information. For instance, his performance was affected by lexical and morphological status of the word, but not by physical-spatial changes. Even though it has not been established with general consensus, late selection theory is currently the most accepted.

Primativo et al. (2013) recorded eye movements during reading tasks of people with USN with ND (ND+) and without ND (ND-) and of a control group with a right-brain damage but without USN (USN-). The prediction was that neglect errors in reading were due to impaired eye movements. Differently from ND- and USN-, ND+ patients showed a distorted eye movement pattern in a reading aloud task and a non-verbal saccadic task. Indeed, during reading the total number of fixations was higher in ND+ patients independently from the visual hemifield and most fixations were inaccurate. ND+ patients were impaired in performing even simple saccadic task on the horizontal meridian. Results of this study seem to confirm the hypothesis that the difference between ND+ e ND- is due to the inability to execute correct eye movements of dyslexic subjects.

II.3. Setting the midpoint

To understand the mechanisms by which people with ND set the midpoint of a word or a sentence, it is useful to investigate the interaction between language and space.

Fischer (1996), studying word length representation, found that neurologically unimpaired participants showed a slight leftward deviation in bisecting orthographic material. This deviation is known as pseudo-neglect and it is shown for words, pseudowords, letter strings and even symbol strings.

Through eye-movement tracking, Rayner (1979) found that spatial behaviour of eyes during reading is systematically biased. Eyes fixate words indeed slightly more on the left than their real midpoint. This phenomenon is present both in sentence reading and in single words reading and it may reflect the importance of the beginning of the word for identification and lexical access.

Pseudo-neglect seems to be affected by reading direction habits. Chokron and Imbert (1993) show that Hebrew readers, who read from right to left, tend to bisect a line at the right of the objective center. On the contrary, French subjects (Jewell and McCourt,

2000), whose reading is directed from the left to the right, tend to bisect lines slightly on the left of the objective midpoint.

Line bisection is a widely used task for clinical and experimental investigation. In line bisection neglect dyslexic patients show a rightward deviation compared to the physical centre of the line (Bisiach et al., 1983; Daini et al., 2002). Performance on this task is influenced by stimulus length as demonstrated by Bisiach et al. (1983). Right deviation is indeed proportional to length in lines and linguistic material.

Reinhart et al. (2013) investigated the correlation between sentence and line bisection in patients who showed both ND and USN. Sentences and lines are similar stimuli since they are horizontally aligned, they are long stimuli and they have a left-to-right orientation. They have indeed a defined beginning on the left and a defined end on the right. Results of this study indicated that line bisection errors predict the presence and the severity of neglect dyslexia.

Veronelli et al. (2014a, b) investigated the role of linguistic factors in sentence bisection. They found out that in manual sentence bisection the activation of a basic linguistic mechanism led participants to reduce their rightward bias. Patients showed indeed a greater leftward shift of the midpoint on sentences rather than on lines and meaningless letter strings. These findings support the role of linguistic processing during visuo-spatial tasks since the neglect patient's bias was modulated by stimulus type, decreasing from lines to letter strings and to all types of sentences.

Furthermore, the study found that lexical information located in the right part of the word, such as lexical stress position, may act as a cue for bisecting. Both unimpaired participants and patients with neglect tended to set the midpoint of words stressed on the penultimate syllable more rightward than for words stressed on the antepenultimate syllable. On the other hand, no differences were found in bisecting different types of sentences in which the right side contained obligatory linguistic information or not.

What emerges from these studies is a confirmation of the fact that reading performance and even the individuation of the midpoint of words and sentences are modulated by linguistic factors which play a crucial role in conceiving orthographic information.

II.4. Lexical-morphological-semantic effects in ND

Studying how lexical and morphological variables affect reading performance in neglect dyslexia offers the opportunity to investigate the interaction between visuo-spatial attention and lexical access.

Ellis et al. (1987) studied sensibility to the lexical status of the word in subjects with ND. The authors found out that subjects were not sensible to lexical variables. The subjects' reading performance was exactly the same on words and non-words reading. Subbiah and Caramazza (2000) supported these results showing that no lexical effect was present in ND. Indeed, patients performed equally on abstract-concrete words, high-low frequency words and regularly-irregularly spelled words.

On the contrary, Làdavas, Paladini and Cubelli (1993) reported a case-study on a subject with left visual neglect who showed an associative priming in the neglected space. The patient's response in the right visual field was faster if the word was preceded by a semantically associated word, briefly presented in the left visual field. There was a priming effect, even if the word wasn't recognized consciously. If explicitly requested, the patient wasn't able to detect the presence of the word in the left visual field.

Làdavas, Umiltà and Mapelli (1997) found a dissociation between direct and indirect tasks too. The task of their study was threefold: reading aloud words, lexical decision (word vs non-word), semantic decision (living vs non-living item). Subjects with ND performed very poorly in reading aloud, while they were almost unimpaired in lexical and semantic tasks.

Arduino, Burani and Vallar (2002) carried out a further study on lexical effect in Italian patients with ND. They demonstrated that in most cases performance was influenced by lexical variables, except for two patients who did not show lexical effects. The two exceptions were explained through the high severity of the impairment.

Semenza et al. (2011) studied compound words reading in Italian ND patients. The authors aim was to assess whether the head-modifier distribution within compounds had an influence on reading performance. The head of a compound bears syntactic, semantic and morphological properties. The result was that left-headed compounds were read more correctly that right-headed compounds. The conclusion was that subjects' attention was captured by the position of the head after the whole word had been implicitly-unconsciously read.

An important study on morpho-syntactic processing in ND was carried out by Arcara et al. (2012). In this study irreversible binomials processing was investigated. Binomials ("hit and run" for instance) are collocations whose meaning cannot be derived compositionally by the meaning of words that constitute it. Less omission and substitution errors were made on irreversible binomials rather than on simple pairs of words. These findings show a clear lexical effect and suggest that in ND orthographic information is easier to process when related to salient linguistic material.

In the same perspective, Reznick and Friedmann (2015) investigated how morphological structure of words affected reading in ND. They compared words in which an affix was part of the root and words in which the affix was present but it was not part of the root. The result was that root graphemes on the left side of the word were never omitted, while affixes were often neglected. Semantic and lexical factors did not influence the performance. These findings indicate that early morphological decomposition of words to their root and affixes occurs before semantic and lexical processing. Consequently, in the orthographic-visual analysis, morphological decomposition appears at previous stages (Marelli and Luzzatti, 2012; Arcara, Semenza and Bambini, 2014).

II.5. Syntactic effects in ND

Individuals with neglect dyslexia omit words on the left side of a sentence. Very few studies have been conducted on manipulation of syntactic structure rather than words in ND.

Kartsounis and Warrington (1989) reported a case-study of a man affected by ND whose reading performance was modulated by properties of the sentence he was reading. If the sentence made sense, he omitted fewer words on the left side than if the sentence was semantically implausible. Semantic sentence manipulation affected his reading. This patient's performance was thus related to the meaning of the sentence.

Karnath and Huber (1992) also reported a case of a man with ND whose reading performance was dependent on the meaning. In reading a story, the patient omitted the first word of the line if the semantic acceptability of the sentence remained untouched in 80% of cases.

Friedmann et al. (2011) made an important study on effects of syntax in ND. Contrarily to the mentioned papers, this study had the specific aim of testing syntactic structures

manipulations. The language of the study was Hebrew, which is read from right to left. They tested eight different syntactic conditions.

First, the authors compared reading performances on sentences with obligatory complements, required by the verb, and optional adjuncts in sentence-final position. Results showed that adjuncts as optional elements were omitted significantly more than complements of the verb. This show a tendency to maintain the grammaticality of the sentence.

The second section of the study focused on pronouns. In Hebrew, pronouns can appear in sentence-final position when they are the obligatory complement of the verb, as simple object pronouns. A pronoun can appear in sentence-final position even if it is optional, as resumptive pronouns in object relatives. In other words, it is possible to not pronounce anything after a verb in an object relative or to insert a resumptive clitic. Friedmann compared results obtained in these two conditions in which the same lexical items could be both optional and obligatory, finding that in the first case pronouns were omitted considerably more often. In sentences in which the pronoun was the obligatory object of a verb, it was seldom omitted. This means that the omission of an item could depend on its syntactic role.

The following section concerned the comparison between adjective and verb, meaning that they used sentences in which the verb could be interpreted as adjectives (making the complement unnecessary) and sentences in which the verb could only be a verb, and thus the complement was obligatory. Present tense in Hebrew can be interpreted as an adjective, exactly as the participle in Italian and other languages. Omission rates of the object were compared. Findings indicate that objects were more frequently omitted in the present tense by each participant. In this task, pairs of sentences were identical except for one letter, so the result is only syntactically influenced.

The fourth section of the experiment concerned questions. In Hebrew, questions do not always include a verb. For instance, it is possible to have nominal Wh-questions such as “where Mary?” with the verb being unexpressed. In this section the authors compared two categories of Wh-questions: one including an obligatory verb in final position, the other allowing optional verb in final position. Results were in accordance with the previous findings and showed that the final verb was omitted more frequently when it was optional rather than when it was obligatory.

The fifth section concerned the comparison between embedded vs coordinated clauses, in which only two of the participants showed a tendency to omit final constituents in coordinated clauses more frequently rather than in embedded ones. This was due to dependency bounding between main and embedded clauses.

The sixth section investigated the contrast of words sequences and simple declarative sentences. As expected, results indicated a clear difference in reading performance between meaningless sequences of words and sentences. Sentences were read indeed considerably better than words.

The following section of the study was on punctuation, specifically on question marks. To test whether question marks served as an anchor to encourage participants to read to the end of the sentence or not, the authors compared sentences with and without question marks. Results indicated that punctuation did not serve as a cue in reading performance since there was no difference between the two conditions (i.e. including and not including question marks).

The last section concerned the influence of sentence structure and meaning on the setting of the neglect point in text-based neglect dyslexia. In other words, the aim of this experiment was to assess whether participants stopped reading at a point that create a grammatically and semantically well-formed sentence until the stop point ('happy end'). In reading texts, patients with ND usually join the right sides of the lines to create a sentence. Two short texts were presented for reading aloud. Results showed that not only sentence reading but also text reading seems to be guided by syntactic and semantic considerations.

In conclusion, the whole study seems to be consistent with the proposal of syntax as a guide in reading in neglect dyslexia since it demonstrates that syntactic information is crucial in determining of errors in reading performance.

In a section of their study on sentence bisection, Veronelli et al. (2014b) presented different types of sentences to neglect dyslexic patients. Four types of sentence structures were presented: Wh-interrogative sentences with a questioned subject, Wh-interrogative sentence with a questioned object, declarative sentences with a full stop at the end and the previous declarative sentences transformed in interrogative sentences (*La mamma smarrisce il portafoglio – La mamma smarrisce il portafoglio?*). Two remaining types of stimuli were unreadable letter strings and lines.

The patients showed the same performance on all types of sentences, with no difference between interrogatives and declaratives. The aim of this study was not to assess whether syntactic structure affected reading but only whether it affected manual bisection.

II.6. Unconscious reading

The main contribution of the aforementioned studies is that they demonstrate a preservation of visuo-spatial information on the left side of letter strings. Thus, stored lexical-morphological knowledge interfere with defective visuo-spatial processing and to compensate, at least partially, for the attentional problem.

Neglect dyslexia is not the only syndrome involving a dissociation between perception and awareness of perception. Blindsight is a well know phenomenon. It occurs in people with hemianopia, whose primary visual cortex or neighbouring regions were damaged or even completely destroyed. It consists in detecting some characteristics of a stimulus in the blind field. Patients with a damage to the primary visual cortex can move their eyes to the direction to the location of a light presented in the blind part of visual field (Poppel, Held and Frost, 1973). A patient with this type of damage can detect some features of an object even if it is impossible for him to see it. Weiskrantz, Sanders and Marshall (1986) demonstrated that some patients could detect movement of the unseen stimulus and that they were able to perceive its spatial orientation. Furthermore, they were able to discriminate between categories of shapes.

Prosopagnosia is a face-specific disorder. It consists in the inability to recognize human faces as a consequence of bilateral occipitotemporal lesions. Some patients with prosopagnosia show covert recognition (Bauer, 1984; Tranel and Damasio 1985), meaning that they can retain some knowledge about a face, even if they cannot recognize it. These considerations suggest that these pathological subjects are able to use representations they cannot use overtly. This creates a dissociation between face perception and face memory. In covert recognition, stages of visual analysis of faces at the perceptual level are preserved, and consequently face perception occurs. In a reaction time study, De Hann, Young and Newcombe (1987) found evidence that photographs of faces evoked semantic knowledge about the depicted person, even if patients were unable to report any knowledge when directly asked.

Dissociations between perception and awareness is present in pure alexia, an acquired reading disorder. Faced with their reading impairment, alexic patients perform letter-by-letter reading strategy and the time taken to read a word is directly related to the number of graphemes. Despite this, their performance is controversial. Some alexic patients are indeed able to access lexical information after a brief presentation of a word (Coslett and Saffran, 1989). These patients are sensible to the lexical status of the stimulus, showing word-superiority effect in reading words instead of non-words (Bub, Black and Howell, 1989) despite their letter-by-letter reading. Shallice and Saffran (1986) investigated the preserved semantic abilities of an alexic patient. On a binary semantic classification task on words he could not read explicitly, the patient performed correctly on some categories and poorly on others. Since this type of patients are rarely able to report the stimulus, this phenomenon has been classified as implicit-unconscious reading.

There are at least three main proposals concerning the underlying causes of unconscious reading in ND. It has been proposed (Farah, 1994) that in ND information processing system is preserved, but it has been disconnected from the other brain systems. For this reason, information is perceived but the mechanism responsible for the explicit awareness is defective. The second proposal (Shackter et al., 1988) is that there may be two brain systems responsible of the processing of visual information. These two systems process relevant incoming input, but only one of them is engaged in explicit recognition. Young (1994), studying face recognition, advanced a third explanation for the origin of the dissociation between perception and awareness. The author underlines that non-conscious mechanisms have relatively automatic functions, while conscious mechanisms and recognition support intentional action. Young proposed that there is a single mechanism which processes visual input, and in dissociation cases this system is partially damaged. Consequently, the system acts defectively on non-conscious processing.Currently, “unconscious”, “implicit”, “covert” processing of the neglected information in neglect dyslexia is widely accepted.

II.7. Error type in ND: omissions, substitutions and additions.

As already seen, subjects with neglect dyslexia produce errors in the contralesional part of the word, sentence or line they are reading. Letters or words can be omitted, substituted or added with other letters. Through the analysis of reading errors in neglect

dyslexia it is possible to investigate the relationship between attentional, perceptual and lexical components.

Errors are classified as substitutions if one or more letters are changed on the left side of the word. For instance, the target word *albero* can be read as *pobero* (Arduino et al., 2002). In this example, the first syllable has been substituted, creating a non-word. Often, the misreading of first letters may give raise to an existing word as reported by Ellis et al. (1987). The target word *boat* indeed can be read as *coat* in which only the first letter is substituted. In Ronchi et al. (2016) there are more examples of substitution errors. For instance, the input word *parrocchia* created the output *vecchia*, *inviare* was read as *avviare* and the adjective *ruvido* was read as *livido*. In the experiment conducted for this dissertation, some substitution errors were made. For instance, the target word *torta* was read as *porta* because of substitution of the first letter, and *ascoltando* was read *raccontando* with the substitution of the first two syllable by patient CG. Patient CG, who made several subtitutions, read also *birreria* instead of *liberia* and *maggio* instead of *saggio*. Subject OL read the target word *spesso* as *adesso* and BP read *fertorio* instead of *territorio*. These and other data were collected for the experiment that will be described in the following chapter. Later in this study we will investigate whether the number of syllables and syllable structures that are substituted are specular in the input word and the output word.

According to Hillis and Caramazza (1990) substitution errors (defined in their study as "backward completion errors") may be classified conforming to a criterion stating that "the response may be identical to the target by at least two letters from the right end, it may include at least one unshared letter on the left and it may not contain two or more letters in the same relative order left of the shared portion".

Omissions are the most frequent type of errors in ND. Patients may omit letters, words and whole constituents on the left side of the sentence. As reported by Hillis and Caramazza (1990) omission errors are the pure neglect errors. Omissions produce responses identical to the target word on the right but omitting all letters to the left of the shared portion.

The following examples are from Ronchi et al. (2016). The target word *polmonite* was read as *nite* because of the omission of the first two syllables and *missile* was read as *sile*. The output of the target word *matita* was *tita* and *sindacato* was read as *dacato*.

In the present study, several omission errors were found. For instance, the patient CG read target word *prete* as *rete*, changing the article preceding it from *il* to *la*. This is an interesting phenomenon because the article was substituted in gender agreement with the misread word, generating another constituent with internal agreement between article and noun.

This is not an isolated case. Subject BP indeed read the target word *cuscino* as *uscino*, omitting the first letter and modifying the article from *il* to *l'*. The input was therefore *il cuscino* and the output was *l'uscino*.

As reported by Arduino et al. (2002), neglect errors usually found in Italian neglect dyslexic are mainly characterised by omissions rather than substitution errors. This predominance was documented by single-case studies (Cubelli and Simoncini, 1997; Vallar et al., 1996) and group studies such as the already mentioned study conducted by Làdavas, Umiltà and Mapelli (1997). The percentage of substitution and omission errors varies across subjects and groups. In Làdavas, Umiltà, Mapelli (1997) patients made 91% omission errors and only 9% substitutions.

Substitution errors may reflect the patient's ability to encode the position of neglected letters. This suggests that, in case of substitution errors, the spatial bias is less severe. Omission, on the other hand, indicates the unencoded presence of neglected letters and may reveal a more severe impairment (Ellis et al., 1987).

Addition errors are less frequent and they are characterised by the addition of one or more letters on the left side of the word or the sentence. For instance, the target word *luna* may produce the output *moluna* (Arduino et al., 2002). In the data collected for the present study very few addition errors were made. However, one addition was reported since patient OL read *sconta* in place of *conta.* This productive type of error is uncommon, and probably it is the result of a compensation strategy based on guessing the neglected portion of the word starting by the syllable on the right.

In Arduino et al. (2002) the authors found, inter alia, a correlation between substitution errors and the presence of lexical effects in reading and a correlation between omission errors and the absence of lexical effects.

Typically, all these types of errors have been considered to depend on a single mechanism. Instead, Martelli, Arduino and Daini (2011) proposed that substitution and omission errors were due to different mechanisms. Their study was conducted on Italian

patients and analyse their reading errors in function of modified letter spacing. This method would increase omissions because part of the string was moved in the unattended space. In addition, substitution errors would have decreased because integration processing was restored. Non-words were used as stimuli to avoid any lexical effect. Results indicated that the two types of errors are differently affected by this manipulation. In particular, a visuo-spatial mechanism would be responsible for omission errors while substitution errors would be due to a perceptual integration process.

Ronchi et al. (2016) examined whether there was an association between error patterns and other symptoms in patients with both ND and USN. The authors investigated a group of patients who showed perseverations and a group of patients who did not. Perseveration is a productive behaviour, in which patients add characteristics to the unidentified side of the object. For instance, patients may add irrelevant drawings on the paper sheet in a copying task (Rusconi et al., 2002; Vallar et al., 2006). One typical sign of perseveration is the presence of repetitive marks on the same target in cancellation tasks. Results showed an association between recurrent motor perseveration in target cancellation tasks and substitution errors in word reading tests. Perseverant patients produced indeed more substitution reading errors than omissions or additions. Data showed that perseveration and omission are two independent disorders. Furthermore, these findings further support the hypothesis of the independence of the mechanisms whose disruption cause omissions on the one hand, and substitutions on the other hand.

II.8. Neglect dyslexia and early stages of visual word recognition

In this section we will report the model of visual word recognition proposed by Caramazza and Hillis (1990). The aim of this section is to contextualize within this model different patterns of impairment seen in previous sections and to understand which stage of recognition is biased in different kinds of reading performances of neglect dyslexics.

According to Caramazza and Hillis (1990), three levels of representation are involved in visual word recognition: retino-centric feature representation level, stimulus centred letter shape level and word-centred grapheme level. The authors focused on early stages of word recognition, before lexical access or grapheme/phoneme conversion. These levels reflect a progressive development of cognitive description of the stimulus, starting with

the physical stimulus until an abstract representation of a word or a letter string. The assumption on which the model is based is that words are a special class of objects.

The retino-centric feature level contains the representation of features of letters and other classes of objects. This level is analogous to the first stage of the object recognition model proposed by Marr (1982), in which vertical and horizontal lines, curves, single details are described and identified at this stage. These features are represented as individual units, hence it is impossible to meet an identification at this first level. Spatial information about the stimulus is encoded, such as location and spatial orientation and these characteristics are defined with reference to his position on the retina.

The stimulus-centred is the second level. In it information extracted in the previous level is contextualized with shapes. At this stage, letter shape and the position within letter strings are described with reference to the stimulus. The physical appearance of letters is maintained even if they are mirror-reversed. Boundaries are represented by the first and the last letter of the letter string instead of the retina.

The word centred grapheme level contains abstract representations of letters. At this stage, graphemes are identified not only as components of letter strings but as basic unit of analysis in orthographic representation. Since this stage precedes letter naming o lexical access, all the characteristics of letters are processed. The letter position is normalized and put in ordinal position, independently from the orientation in which it is presented.

Haywood and Coltheart (2000) outlined the features of neglect dyslexia obtained with a deficit at each of the three levels. Obviously, neglect dyslexic may have impairment at more than one level. These predictions are made considering both theory context and patients' data.

An impairment at the retino-centric level concerns the retinal image and it is restricted to the hemi-field affected. Errors are made on the first letters of words presented in the left visual field. If a word is presented in the right hemi-field, no errors are made since the impairment includes only the retinal image on the left. Words presented on the left hence are read correctly. Hillis and Caramazza (1990) proposed that the error rate on the left side of words is proportional to the distance (on the left) of letters from the central point of fixation. The more distant are letters from the centre, the more errors are made. This means that, at this level, word length is a crucial factor and by this prediction it is

possible to explain word length effect in data from neglect dyslexics. On the other hand, if the patient fixates the same letter position of words of different lengths ("the A in CAT and the C in SCRATCH[9]") the identification of letters on the left is not impaired because of the same proportional distance from the fixation point. Words presented vertically do not show neglect errors since no letters are present in the left hemi-field.

According to Caramazza and Hillis (1990) features of impairment at the stimulus-centred level are relative to stimulus characteristics and not to its position or orientation in space. For instance, neglect errors can be made equally if the word is presented vertically or horizontally, since the position on the retinal field is irrelevant. Actually, vertical neglect is a subcase of stimulus centred impairment since generally, if the bias concerns the left side of stimuli, no vertical effect is observed. Vertical neglect can affect either the top or the bottom of the stimulus. In most cases, the first letter on the left of items is neglected. If two items are presented one near the other, the first letter of both is misread ("Mariavittoria" may have the M misread, while in "Maria Vittoria" both M and V are vulnerable to bias). The number of neglect errors is proportional to the distance of letters from the centre of the word, rather than from the fixation point. The first letter of longer words is more likely misread than he first letter of a short word. Furthermore, if letters that compose the word are spaced ("M A R I A V I T T O R I A"), more errors are made on first letters than on an unspaced word, since the distance from the centre increases.

If the grapheme level is impaired, the error rate is proportional to the distance in terms of graphemes. Graphemic representation does not involve spaces, for instance. Hence, the same number of errors can be made on a spaced word and an unspaced word. As this level concerns abstract representation, if the first letter of a word is misread in canonical, horizontal, left-to-right orientation, it will be misread even in mirror-reversed presentation. Interestingly, impairment at this level can result in a left neglect in spelling, in writing to dictation and in spontaneous writing. Not only orthographic material, but the string representation in general is indeed affected. However, this condition is very infrequent.

As we already mentioned, it is common to find cases in which more stages are involved in the impairment. However, it is also true that several cases can be categorized as

9 Example from Haywood and Coltheart, 2000.

affecting one single level of the visual-word recognition model. Caramazza and Hillis (1990) reported several cases of patients whose reading performance could be csuategorized into the three mentioned stages. For instance, patient NG made the same number of errors on stimuli presented in horizontal, vertical and mirror-reversed form. Identical results were obtained in spelling tasks. This case was classified as an impairment at the grapheme representation of words and fitted with predictions of the multi-stage model.

Subbiah and Caramazza (2000) reported a case of a patient who neglected the left side of words, letter strings and objects in a variety of reading and naming tests, regardless of where they were presented in the visual field. The patient's pattern of performance provided evidence for impairment at the stimulus-centred level.

These and other cases seems to provide evidence for the validity of visual word recognition model.

III. Chapter 3: Experimental study

III.1. CLLDs, Foci, Wh-questions in neglect dyslexia

We anticipated in the Introduction to this study that the basic aim of this experiment is to test whether manipulations of syntactic structure affect reading in neglect dyslexia. Since left neglect dyslexia impairs the left visual field, we decided to test sentences with Clitic Left-Dislocations (from now on, "CLLDs") and Contrastive Foci (from now on, "Foci").

We believed that it was interesting to investigate these two syntactic projections of the Left Periphery[10] in acquired neglect dyslexia because their structure implies phrase left dislocations and frontings. There are many differences between CLLDs and Foci, but similarities between them are most important.

To design the experiment, we decided to compare performance on CLLDs and Foci with performance on a group of sentences with other structures, such as simple SVO declarative sentences, passive sentences, clefts and sentences with possessive adjectives or demonstratives in subject position (i.e. on the left of the sentence)

Actually, in the beginning we decided to test the two central projections of the Left Periphery rather than other projections. The first reason was that in these structures a constituent is fronted or dislocated at the beginning of the clause, meaning that a constituent does not occupy his canonical position but it is found at the beginning of the sentence.

In Chapter 1, section I.6, we discussed whether both CLLD and Focus should be considered as moved or not, but it is not crucial to establish it for the aim of the experiment. The starting point was that a constituent, either a DP or a PP, is found in first position of a sentence and not in his canonical position, namely after the verb. Through argument fronting and left-dislocation, the left side of the sentence becomes extremely important from an informative and syntactic point of view.

Additionally, with regard to CLLD, besides DPs and PPs, resumptive clitic pronouns are present. We believe that neglect dyslexic may perceive resumptive clitics as cues to read the left part of the sentence shifting their attention.

[10] Rizzi, 1997. Cfr. Chapter 1 of this dissertation.

The second reason we decided to investigate CLLDs and Foci in neglect dyslexia is their relation to pragmatic role in communication. Indeed, a constituent is fronted when there is the intention of underlining it. A constituent may be fronted for two main reasons:

- because it represents the new information, as in Focus
- because it represents a mentioned topic that the speaker wants to highlight at the moment of the speech act.

Previously, w mentioned Information Structure frame and the concept of packaging the linguistic content through syntactic structure. We predict that this phenomenon will play a role in sentence reading in neglect dyslexia.

The general prediction is that both CLLD and Focus structures may drive dyslexic's attention to the constituent on the left side of the sentence. As we have already seen in section II.5, Friedmann et al. (2011) demonstrated that patients' reading performance is modulated by the presence of obligatory constituents which are located in the neglected space.

Indeed, neglect dyslexics show the general tendency to read constituents on the left more often when they play a crucial role to preserve syntactic acceptability. In CLLD and Focus the dislocated constituent is very important to preserve the saturation of the valence of the verb which is located on the right side. Indeed, as we dealt with dislocations of object, of dative and of locative complement, the omission of the constituent would leave verb syntactically unsaturated.

Secondly, attention shift to the left may be due to the subjects' sensibility to the informative status on the dislocated constituent. We predict that even in absence of consciousness of the neglected space, the status of the dislocated constituent may allow subjects to shift their attention to it.

In conclusion, research question consists in testing whether sentences with Clitic left-dislocations and Foci yield different patterns of reading performances in patients with neglect dyslexia. This should provide information on the mental representation of such syntactic constructions and how such representations modulate the allocation of attention.

III.2. Experimental design

In the first phase of experimental design, we created a list of 155 sentences, divided into two main groups: the first group contained Foci, Left-dislocations of the object, of the dative and of the locative, as well as Wh-questions; the second group included sentences with other syntactic structures, generally simple SVO sentences as it will be explained soon.

In the second step, 52 sentences were excluded since we decided to consider only sentences including at least 4 words and 19 graphemes for the purpose of data analysis, since the presence of shorter sentences could unbalance the analysis. The mean number of words was 4,870 for the first group of sentences and 5,065 for the second group. The mean number of graphemes was 23 for the first group of sentences and 24 for the second group. These differences were not significant. As far as frequency is concerned, the frequency of each word was controlled on the itWac corpus and the two groups were balanced on such parameter.

First of all, we designed the list which contained CLLDs and Foci. The CLLDs list was composed by 31 sentences. Sentences showed the clitic always expressed, even in locative dislocations (see. examples 70 and 96 below) and in dislocations of the indirect object (26, 31, for instance). In these sentences the clitic pronoun would be optional but we decided to include it in every case, to test if its presence may act as a cue, compared to performance on Focus structures which do not include clitics.

No commas have been inserted after the dislocated constituent to avoid corrupting the reading task. More in general, no punctuation was included, except for question marks in Wh-questions. All reported sentences are stimuli created for the experiment. List of all stimuli is reported in the Appendix.

26. Il meccanico lo chiameremo.

We will phone to the mechanic.

31. Al tuo amico gli hai mentito.

You lied to you friend.

70. Alla conferenza ci vengo solo io.

No one will come to the conference but me.

96. Su quel divano ci sta spesso.

He often lies on that sofa.

We also included Left-dislocations of partitive complements. In these partitive structures, resumptive *ne* is obligatory in order to preserve sentence grammaticality. In Italian this CLLD structure is very frequent. We included three sentences with dislocation of the partitive complement:

43. Di tempo libero ne ho molto.
I have a lot of free time.
75. Di problemi ne avete due.
You have two problems.
121. Di biscotti ne mangio tre.
I'm eating three cookies.

In direct object dislocation, clitic pronouns are always obligatory and may never be omitted. Sentences with dislocations object and dative dislocations are the most present in this experiment. Dislocated DPs are generally composed by an article and obviously by the noun which is sometimes accompanied by possessives or qualifiers.

58. Il vino rosso lo bevo poco.
I rarely drink red wine.
93. Al mio fidanzato gli faccio un regalo.
I'll give a gift to my boyfriend.
41. Il suo cancello lo aggiusto io.
I will fix his gate.
88. La lampadina la cambi dopo.
You have to change the lightbulb later.

The last condition we decided to include within CLLDs was the one with clitic clusters. Few of them have been included in the experiment but we thought it would have been interesting to compare results on clusters and on simple resumptive pronouns. To create

this sub-group, we clustered resumptive clitics of indirect and direct objects (*glielo, gliele* etc.).

6.Il libro di storia gliel'ho venduto
I sold my history book to him.
68. Il mazzo di fiori glielo restituisco.
I will return the bouquet to him.
113. Queste scarpe gliele venderei.
I would sell her these shoes.

As far as Foci are concerned, we created a list of 31 sentences. In Focus structure, a focalized constituent is moved to Left Periphery from his canonical position. Hence, a constituent is moved at the beginning of the sentence. We used Contrastive and Corrective Foci in which the fronted constituent was either a DP or a PP.

7. Alla ragazza regala un fiore (, non alla mamma)
He gives a flower to his girlfriend (, not to his mother)
33. In Spagna vorrei tornare (, non in Grecia)
I would like to go back to Spain (, not to Greece)
76. Tua sorella ho salutato (, non tuo nonno)
I greeted your sister (, not your grandfather)
128. Il quaderno avevo perso (, non il libro)
I had lost my notebook (, not my book)
152. Il vino bianco bevo spesso (, non il vino rosso)
I often drink white wine, (not red wine)

We are aware that sentences with Foci would have needed a brief contextualization to be completely understood in their pragmatic perspective. However, this was impossible to do in the reading task that we designed because of two reasons.

The first was that contextualization needs a lot of time and the task was already quite long for patients. Even if it was not extremely long, the test required participants a lot of attention to be completed. Indeed, we tried to avoid stressing participants exceedingly.

The second reason was that the test consisted in a reading task and examiners did not give any additional cue during the test. The idea of giving a prosodic or pragmatic context to sentences containing Foci would have been suitable for a decision task. Indeed, if we had decided to give a context for Foci, we might have given a brief description of the context for every sentence and the reading task would have been useless. In addition, the processing of pragmatic and prosodic correlates of sentences was subordinate to syntactic processing in the present study.

Continuing, four Wh-questions are included in the test. At first, these sentences were designed as fillers, but we observed that their behavior was similar to the pattern of Foci and Left-dislocations. Hence, we decided to consider these sentences within dislocation group, although they are different under several points of view.

10. Dove sei stato fino ad ora?
Where have you been?
90. Chi deve scrivere il saggio?
Who has to write the essay?
95. Che cosa hai visto passare?
What have you seen passing?
105. Cosa stai ascoltando?
What are you listening to?

The second group was composed by 32 sentences including mainly simple structures composed by a subject, a verb and a complement.

12. Matteo adora i suoi amici.
Matteo loves his friends.
16. Giulia cercava il suo cane.
Giulia was looking for her dog.
122. Il postino suona il campanello.
The postman rings the bell.

In some sentences, the subject is unexpressed. This is very frequent in Italian, since Italian is a pro-drop language.

117. Ha comprato uno zaino nuovo.
He bought a new backpack.
109. Mangiamo spesso al ristorante.
We often eat at the restaurant.
85. Trascorro molto tempo in libreria.
I spend a lot of time in the bookshop.
39. Bevo tanto caffè durante il giorno.
I drink a lot of coffee during the day.

Moreover, we decided to include sentences with participles on the right side of the sentence which are in agreement with the subject which is positioned at the beginning of the sentence (i.e. on the left).

100. I criminali si sono pentiti.
The criminals repented.
114. I passeggeri sono atterrati.
The passengers have landed.
150. I libri di Paolo sono caduti.
Paolo's books fell down.
148. Le mie amiche sono arrivate.
My friends have arrived.

We thought that it would have been interesting to check if agreement in number and gender between the noun at the beginning of the sentence and the participle, at the end of the sentence would give a cue to attentional shift.

Finally, five cleft structures were included. In Chapter 1 section I.3, we introduced that clefts are realizations of Focus, even though they present a completely different structure. We included clefts within stimuli but we decided to consider these structures

as an independent group. As type of clefts, we decided to include object/non- subject clefts to preserve the dislocation/fronting of the argument.

22. È una barca che ha preso.
It is a boat that he bought.
79. È una sorpresa che mi hai fatto.
It is a surprise that you got me.
89. È a Milano che devi andare.
It is to Milan that you have to go.
102. È la polizia che lo cerca.
It is the police who is looking for him.
154. È un cucciolo che ho adottato.
It is a puppy that I adopted.

As we already mentioned, we had to exclude 52 sentences from the list of stimuli. The main reason was that we decided to consider stimuli with a minimum length of 19 graphemes to have a more homogeneous task. The reason why we chose 19 graphemes as minimum length is that some patients, those with text-based dyslexia and not with word-based dyslexia, are unimpaired in reading short sentences but they have a canonical neglect performance on longer sentences.

Another reason to exclude some sentences was that during the phase of experimental design we did not realize that some sentences might have been ambiguous. We tried to be sure to avoid syntactic ambiguity among sentences.

For instance, we decided to exclude sentences like number 143: “Te lo dicevo che non sarebbe arrivato”, in which the concurrency of a *pro* subject, of the dislocation of the dative and of the dislocation of the clitic object may have created some ambiguity for the classification of the sentence into a group. Indeed, this sentence had a “mixed” structure that actually was not suitable for the aim of this test.

III.3. Materials

We created a list of 103 sentences with different syntactic structures, divided into Group 1, composed by 66 sentences and Group 2 composed by 37 sentences. We

mentioned in the previous section that Group 1 was composed by Clitic Left-dislocations, Foci and Wh-questions, while Group 2 included control sentences with different syntactic characteristics. We resume here each syntactic condition involved in the experiment:

(A) 31 Sentences including Clitic-left Dislocation of:
    - Direct object.
    - Dative complement.
    - Locative complement.
    - Partitive complements.

(B) 31 Sentences with Contrastive and Corrective Focus.

(C) 4 Wh-questions

(D) 5 Cleft structures

(E) 32 Control sentences including different kinds of structure (see Chapter 3, section III.2)

Group 1 included sentence types A, B, C, that is to say the kind of sentences we decided to investigate, while Group 2 was composed by D and E structures. We remind (see Chapter 3, section III.2) that we decided to consider clefts within "control structures group" because of their singular nature which make these sentences different from other dislocations.

We included clefts within Group 2 for their superficial structure, composed by a copula at the beginning of the sentence, followed by the cleft element and the complementizer. They appear in a bi-clausal configuration but they express mono-propositional meaning (Roggia, 2009). These structures appear ambiguous even if they are theoretically included within Foci. Since this investigation has precise structural restrictions, we decided to consider clefts as different from Foci.

All sentences were balanced for length and frequency of words included (see Chapter 3, section III.2). Frequency of words was matched on the itWac corpus. Mean frequency of words included in sentences of Group 1 was 108,784. Mean frequency of words included in sentences of Group 2 was 115,018.

III.4. Methods

All participants were asked to read aloud the mentioned 103 sentences. They were tested individually in a quiet room and no time limit was imposed. Patients could stop the test whenever they needed to. The test was given to patients by psychologists[11] working in San Camillo Hospital. No cues were given during the test.

Stimuli were presented in the middle of a horizontal page, printed in Arial font size 26. Each page contained five stimuli. During the test, sentences which followed the one that was read in that moment were hidden. Hence, only one sentence at time was presented in patient's visual field.

The average duration of the test was 30 minutes, but it varied from individual to individual. All patients read all sentences in one session.

III.5. Participants

Five Italian-speaking subjects with acquired left neglect dyslexia participated in the study, three males (MG, CG, OL) and two females (BP, GG). All participants were recruited from the inpatient population of IRCCS Ospedale San Camillo, Lido di Venezia (Venice, Italy). They were aged between 49 and 76 (mean age= 63,4).

Table 1 Demographic data of the participants

Participant	**Male/Female**	**Age**
MG	M	57
BP	F	76
GC	M	72
OL	M	49
GG	F	63

[11] We would like to thank Dr. Francesca Meneghello, Dr. Laura Passarini and Dr. Daniela D'Imperio for their precious and valuable help.

All participants were native Italian-speakers. Participants had pre-morbidly control of written and spoken Italian. Visuo-spatial neglect and/or neglect dyslexia were assessed through all the neuropsychological tests that are included in the Appendix of the present study.

Individuals with too severe neglect dyslexia were excluded, since errors were made equally on every word and every sentence, with no distinction. In a separate section, we will discuss the case of two patients that we had to exclude for reasons other than extremely severe neglect.

All participants to the study were right-handed. None of the participants had developmental reading disorders and no history of previous neurological diseases or psychiatric disorders.

III.6. Data analysis

During the testing session, every response that differed from the target sentence was written in detail by the examiner. Omitted words and segments were marked with a cross, while substitution responses were written next to targets. Auto-corrections were reported with AC+. Sentences read correctly were scored with a plus sign.

Only errors made on the left side of the sentences were classified as neglect errors. Both omissions and substitutions were analysed and included in error rate. We classified as omission both omission of whole words and omission of some syllables on the left of words. We considered also errors followed by auto-correction in data analysis.

Errors made either in the middle or on the right of the sentence were excluded from the analysis.

III.7. Statistical analysis

At first, we calculated the percentage of errors made on every single group of sentences (i.e. group A, B, C, D, E) by summing the number of sentences containing omissions and substitutions and then dividing this number for the total number of sentences included in the group. This passage was made on each group on sentences.

For instance, patient BP misread 4 sentences included in Group A, making both substitution and omission errors on the left side of the sentence. Group A was composed by 31 sentences. Hence, patient BP made 4/31 = 12,903% of errors in Group A. Since this percentage is relative to errors made on each single type of sentences, we will not

consider Group C and Group D separately because these two groups include only 4 and 5 sentences.

Secondly, we calculated the percentage of errors relative to Group 1 and Group 2, adding errors from, respectively, Groups A, B, C for Group 1 and errors made on sentences contained in Groups D and E to obtain percentage relative to Group 2. Then, we compared results.

All these stages of analysis will be reported in a following section, patient by patient.

III.8. Results

This section is organized as follows: we will report error rates on single groups of sentences A, B, C, D, E (see above) for each participant. For each participant, then, we will consider data within the two main groups; Group 1 and Group 2. After patient by patient analysis, we will compare results obtained on the two main conditions involved in the experiment: the one containing CLLDs, Foci and Wh-questions and the second containing control sentences. Data discussion will follow. Both quantitative analysis and qualitative analysis will be made in parallel.

III.8.1. Patient 1: MG

MG is a 57 years-old right brain-damaged male with left ND. He made 22 errors on all the 103 sentences included in the test.

Table 2 Patient 1, MG: Rates of errors on the two main groups of sentences.

Groups of sentences	**Groups included**	**Error rate (%)**
GROUP 1	A, B, C	**18,182%**
GROUP 2	D, E	**27,027%**

On Group A, which contained CLLDs, MG made 4 errors on a total of 31 sentences. It means that he misread 12,903% of sentences containing a Clitic Left-dislocation and read 87,097% of sentences correctly.

The first error on Group A was on sentence 8 and it was classified as omission error. The patient omitted the preposition of the dislocated PP at the beginning of the sentence and read the following words correctly.

The second error was on sentence 28 and it was classified as substitution error. Indeed, the patient read the preposition of the PP *Nella camera* as it was a definite article. The output was *La camera*. The third error was made on sentence 96. The participant omitted the preposition *Su* but then he stopped reading and auto-corrected the omission.

The fourth and last error on Group A was the most interesting, since sentence 118 (Al supermercato ci vado domani) was read as *Al mercato ci vado domani* and it was classified as an omission error. In this case the omitted element is not the preposition, but the prefix *super.*

Interestingly, the preposition which preceded the omitted half word was preserved. It means that the bisecting point has been positioned exactly between the prefix and the root, while the preposition which was found before this complex word (i.e. more on the left) was read correctly. It would be interesting to further explore these types of error since they are an evidence of morphological decomposition during reading in neglect dyslexia[12].

Patient MG made 6 errors on sentences containing Foci (Group B). The first error was on sentence 11, where the initial preposition was omitted. The participant did not auto-correct himself.

The second and the third errors were on sentences 18 and 21. In both sentences the initial preposition was substituted by a definite article. Sentence 18 was read as *Il treno salgo subito*, without auto-correction. On the contrary, in sentence 21 the patient auto-corrected himself.

The fourth error was made on sentence 38 and it was classified as a substitution. The patient substituted the initial indefinite article *una* with the definite article *la*.

The fifth error was on sentence 65, where, again, the omitted word was a preposition. The sixth error was on sentence 76, where the possessive pronoun *Tua* was substituted with another possessive pronoun, but at first person singular, *Mia*.

[12] Morphological decomposition in reading has not been accepted with total agreement by all authors. Indeed, some studies seem to provide evidence in favor of decomposition (Friedmann et al., 2015; Semenza et al., 2011; Arcara et al., 2012) but other studies reject influence of morphological structure on reading in neglect dyslexia (Làdavas et al. 1997; Ellis et al., 1987) cfr. Cap. 2 on ND.

On sentences included in Group C, patient MG made two errors on Wh-questions. On sentence 90 he omitted the interrogative pronoun *chi* producing the output *(/) deve scrivere il saggio?* which is a grammatical output, since Italian is a *pro drop* language. The second error was on target sentence 95: *Che cosa hai visto passare?* was read as *(/) cosa hai visto passare?*. The output is a grammatical sentence in Italian.

On Group D, the patient made 3 errors. Errors made on cleft sentences, which are included in this group, were very frequently omission errors. In all three cases, sentence 22, sentence 79 and sentence 102, the omitted element was the copula, which was positioned at the beginning of the sentence. On the other hand, cleft elements were always preserved. Only in one case, patient MG autocorrected himself (sentence 102, AC+).

The last group considered was Group E. Patient MG made 7 errors on this group which included control sentences. We remind that Group E included different syntactic structures (see Chapter 3, section III.2).

The first error was made on sentence 13 and it was classified as an omission error. In this sentence, *La nonna gioca con le sue carte*, the whole DP *La nonna* was omitted. Omission of entire constituents has not been reported yet on sentences within previous groups.

The second error was made on sentence 37 and it was classified as omission error, as well. The omitted element was a personal pronoun in dative case. The third error was on sentence 39, in which a whole word was omitted. In this sentence, subject was not expressed and the first words was verb *(pro) Bevo*, which was not read by patient MG. This sentence is marked with AC+. Sentence 56 contained the fourth error included in Group E. This case is analogous to the one that we have just described. Namely, subject was not expressed and the initial verb was omitted. Target sentence was: *(pro) Devono telefonare ai loro genitori* and the whole verb *devono* was omitted.

In Chapter 4, section IV.2 we will analyze the difference between omission errors within Group E in general, in which whole words and, sometimes, whole constituents were omitted, and omission errors within the other groups, in which only functional words were omitted.

It is interesting to analyze error number 5, made on sentence 85. The target sentence was *Trascorro molto tempo in libreria* and the output was *Corro molto tempo in libreria*.

We can notice that the omitted half-word was the prefix, since *trascorro* is a complex word composed by a prefix (*tras*-) and a root word (-*corro*).

The sixth error was on sentence 111 and it was also classified as omission error. In this case, the omitted element was the subject pronoun *io*.

The last error made in patient MG's reading performance was made on sentence 136. The quantifier *Tutti* at the beginning of the sentence was entirely omitted. All errors made within this group of sentences were omission errors.

In conclusion, patient MG made a total of 22 errors. The number of omission errors is considerably higher than number of substitution as far as Patient 1.

Table 3 Distribution of substitution and omission errors made by patient **MG** among groups of sentences

	Substitution errors	**Omission errors**
Group A	1	3
Group B	4	2
Group C	0	2
Group D	0	3
Group E	0	7
GROUP 1	5	7
GROUP 2	0	10

It is interesting to compare the distribution of omissions and substitutions among Group 1 and Group 2. In general, omission errors are more frequent that substitution. Indeed, 5 errors were classified as substitutions, while 17 were classified as omissions. No addition errors were reported.

In the analysis of the internal distribution of omission and substitution errors within Group 2, we observe a significant difference, since no substitution has been reported, in contrast with the high number of omissions. Within Group 1, instead, distribution of substitutions and omissions is quite balanced.

III.8.2. Patient 2: BP

Participant number 2, BP, was a 76 years-old female who had an ischaemic stroke due to the occlusion of the middle cerebral artery. She made a total of 35 errors on the 103 sentences included in the test.

Table 4 Patient 2, BP**: Rates of errors on the two main groups of sentences.**

Groups of sentences	Type of sentence	Error rate (%)
GROUP 1	A, B, C	**30,303%**
GROUP 2	D, E	**40,541%**

On Group A, patient BP made 9 errors. The first was classified as omission error and was made on sentence 6. The omitted element was the definite article *Il*. The second error consisted in the substitution of the target preposition *Al* with the definite article *Il* at the beginning of sentence 8.

The third error was made on sentence 58. The target sentence was *Il vino rosso lo bevo poco* and the output has been *(/) rosso lo bevo poco*. Both the definite article and noun were omitted. This error is marked with AC+.

The fourth error was on sentence 66 in which the preposition *Al* was substituted with the definite article *Il*. The fifth error was on sentence 68, which contained a clitic cluster. On this sentence, the patient made more than one error, although only the omission of the definite article can be classified as a "real neglect error". We report both input and output for clarification.

The target sentence was *Il mazzo di fiori glielo restituisco.* Patient BP gave two outputs. She started reading the sentence omitting the definite article *Il*, hence, from the word *mazzo*. Then, she auto-corrected herself reading *Il mazzo di fiori gliel'ho restituito*, namely she changed verbal tense from present to past. Since we classified as neglect errors only omissions and substitutions made on first words, we did not consider verbal tense change as error. However, we decided to report it in this analysis to show that patients' performance is various and multifaceted.

The sixth error was an omission of the preposition *Alla* at the beginning of sentence 70. It was marked with AC+. Error 7, made on sentence 77, was a mixed error. Indeed, the patient omitted the initial DP *I mobili* and substituted the following preposition *della* with another preposition (*nella*). Hence, this sentence contained both an omission and a substitution.

The eighth error was made on sentence 84. It was classified as omission and it involved both the articulated preposition *Al* and the possessive adjective *mio*. The sentence was read as *(/) cameriere gli do la mancia*, without auto-correction.

The last error was a substitution error of a very frequent type, consisting in reading a definite article (*il*) instead of a preposition (*al*). It was made on sentence 93.

On Group B, which contained sentences with Focus fronting, patient BP made 8 errors. The first two errors were made on sentences 4 and 7 and both errors consisted of omission of the initial preposition, *In* and *Alla* respectively. Both omissions were marked with AC+. The third error was a substitution error in sentence 18, in which the preposition *Sul* was substituted with the definite article *Il.*

The fourth error was classified as a substitution since the indefinite article *un* was substituted with the definite article *l'* in sentence 21. This sentence was marked with AC+, as well. Error number 5 was made on sentence 24, in which the preposition *A* was omitted without auto-correction. Output of this misreading is *suo cugino dice una bugia*, which is a simple SVO sentence. The grammaticality of the output may be the reason why no auto-correction is present on this sentence.

Error number 6 was made on sentence 30. This error, as it is often the case, consisted in the substitution of definite article instead of the preposition. The sentence was read as *L'idraulico do un assegno* and then it was re-read *All'idraulico do un assegno* (AC+). A substitution of the same kind was made in error number 7 (sentence 51), which was marked with AC+, as well.

The last error made on Foci consisted in the omission of the quantifier *Alcuni* in sentence 55. This sentence was also marked by AC+.

On Wh-questions (Group C), patient BP made 3 errors. The first error was the omission of Wh-element *Dove* in sentence 10. No auto-correction was reported. At the end of this sentence there is a question mark and the fact that the patient did not correct herself after

reading question mark seems to be a further evidence of the lack of influence of punctuation in ND. The question mark, thus, did not act as a cue.

The second error made on Group C was on sentence 90. Again, this error consisted in the omission of the Wh- pronoun at the beginning of the clause. Omitted pronoun was *Chi* and the outcome was *deve scrivere il saggio?* and no AC was reported, as well.

The third and last error made on these sentences was on sentence 95. Target sentence was *Che cosa hai visto passare?*, while the output was *cosa hai visto passare?*, which was, however, a grammatical sentence, despite omission of *Che*.

In the cleft group, patient BP misread 4 of the 5 sentences included in the test. All four errors consisted of omission of the copula *È*, which is always positioned at the beginning of the sentence. Errors were made on sentences 22, 79, 102 and 154. All sentences were marked with AC+.

Only one case differed from the others. Indeed, in sentence 79 both the copula and the indefinite article were omitted, and not just the copula as in the other 3 cases. Then, when the patient auto-corrected the sentence, she read *Una sorpresa che mi hai fatto*. Hence, she included the article in the correction, but she excluded again the copula *È*.

On Group E, patient BP made 11 errors, the highest number of errors made on a single group. These data are interesting both quantitatively and qualitatively.

The first error was made on sentence 2, in which the definite article was omitted. The outcome was *nostra zia legge la rivista*. In Italian, this structure without definite article is more frequent that the one involving the article. When family names are included in a DP, in most cases definite/indefinite articles are not present, since possessive adjectives act as determinant.

The second error was on sentence 13, in which the whole constituent *La nonna* was omitted. This was one of rare cases in which not only function words were omitted, but also content words. Sentence was marked by AC+.

The third error was made on sentence 25. This error consisted in the omission of possessive adjective *Mio*. Then, it was auto-corrected and the omitted element was read.

The fourth error was on sentence 37. The patient read *Ti conto tutto domani* instead of *Ti racconto tutto domani*. This error was classified as omission, even if the omission of half of the word resulted in an existent verb “contare”.

The fifth error is found in sentence 48 and it consisted in the omission of the proper noun *Marta*. The sentence was read as a *pro-drop* sentence: *parla con Giacomo spesso* and no auto-correction was reported.

The sixth error was made on sentence 73. This is a further case in which whole words were omitted. Indeed, the sentence was bisected nearly in the middle and the initial words *I capelli di* were entirely omitted. Despite this considerable initial omission, the sentence was marked with AC+, since the patient re-read the whole sentence correctly.

Error number 7 is found in sentence 85, in which the first syllable of the verb *Trascorro* was omitted and verb was read as *scorro*.

Error number 8 was made on sentence 92 and consisted in the omission of the definite article *il*.

Error number 9 is found in sentence 111 and it was classified as an omission. The omitted element was the subject pronoun *Io* at the beginning of the sentence.

Error number 10 was made in sentence 114 and it was classified as an omission. The target sentence was *I passeggeri sono atterrati* and both the definite article and the initial syllable were omitted. Hence, the output was *(/)seggeri sono atterrati* and no auto-correction was reported.

The eleventh and last error is found in sentence 117, in which the auxiliary verb *Ha*, positioned at the beginning of the sentence, was omitted and no auto-correction was reported.

In conclusion, patient BP made 35 errors. General discussion of results will be reported in the next chapter (see Chapter 5). In the following table we summarize the distribution of omission and substitution errors made by patient BP.

Table 5 **Distribution of substitution and omission errors made by patient** BP **among groups of sentences**

	Substitution errors	**Omission errors**
Group A	3	6
Group B	4	4
Group C	0	3
Group D	0	4
Group E	0	11

GROUP 1	7	13
GROUP 2	0	15

In general, we can observe that the number of omission errors is considerably higher than substitutions errors. Substitution errors were made only in first two groups, A and B, namely in groups containing CLLD and Focus. No substitution was reported on sentences with cleft structure, Wh-questions and control sentences.

As far as omissions are concerned, there is a variety of cases among groups. Indeed, omissions made within sentences included in Group A and Group B concerned only function words. On the contrary, whole words and constituents were omitted in sentences contained in Groups C, D and E. The patient's performance varied according to the group. These results already suggest that different syntactic structures give rise to different reading patterns in ND.

Overall, comparison between the number of errors made in Group 1 and the number of errors made in Group 2 are consistent with the results shown by the previous patient, MG. Indeed, error rate of Group 1, which included CLLDs, Foci and Wh-questions is 30,303%, while error rate of Group 2, which included clefts and control sentences, was 40,541%.

III.8.3. Patient 3: CG

The third participant to the experiment, CG, was a 72 years-old male who had an ischaemic stroke that damaged the frontal, parietal and temporal lobes in the right hemisphere. CG made a total of 27 errors on the 103 sentences included in the test. Percentage figures on groups of sentences are reported in Table 6.

Table 6 Patient 3, CG**: Rates of errors on the two main groups of sentences**

Groups of sentences	**Type of sentence**	**Error rate (%)**
GROUP 1	A, B, C	**22,727%**
GROUP 2	D, E	**32,432%**

In Group A, patient CG made 8 errors.

The first error was on sentence 15, in which the preposition *Da*, positioned at the beginning of the sentence, was omitted. No auto-correction was reported.

The second error consisted in the omission of the definite article *Il* at the beginning of sentence 26. This error was not the only one made within this sentence, even though it was the only one that we could consider as a neglect error. Indeed, as well as the omission of the article, the patient changed the subject of the verb on the right-hand side of the sentence. Specifically, the target sentence 26 was: *Il meccanico lo chiameremo*, while the output produced by patient CG was: *(/) meccanico lo chiamerò,* in which the verb's subject was modified from first plural person to first singular person. We think that this kind of errors may be due to an economy of effort-kind strategy. Indeed, the patient may read the first syllables of a word and then immediately guess the final ones, without reading accurately.

The third error is found on sentence 31, in which a preposition is replaced with the definite article. In this specific case, the preposition *Al* was substituted for the definite article *Il.* This sentence is marked with AC+, meaning that the patient provided an auto-correction.

The fourth and the fifth errors (made on sentences 75 and 96 respectively) were quite similar to each other, since they both included the omission of initial prepositions. In the first case, the preposition *Di* was omitted, while in the second case (in sentence 96) the omitted element was the preposition *Su.*

The sixth error was made in sentence 103 and consisted in the omission of the first syllable of the complex preposition *Nella*, which was bisected into two syllables. The first syllable, *Nel,* was omitted, while the second (*la*) was preserved.

Error number 7 was consisted in the omission of the initial preposition *Di* in sentence 121. .

The eighth and last error made on Group A was classified as an omission error. The omitted element was the preposition positioned at the beginning of sentence 149 (*In*).

In Group B, which included Focus structures, 7 errors were reported. The first two errors consisted in the omission of the initial preposition included in the fronted Prepositional Phrase. These two errors were made in sentences 4 and 24.

The third error was classified as a substitution error. Indeed, in sentence 30 the initial preposition *All'* was substituted with the definite article *L'*.

The fourth error was made in sentence number 33, where the patient first omitted the preposition *In* but then re-read the sentence including it (AC+).

The fifth error is found in sentence 38 and it was classified as substitution. This substitution concerned the initial indefinite article *Una*, which was replaced with the definite article *La*.

Sentence 76 contained the sixth error of Group B, where the possessive adjective *Tua* was omitted and the output *(/) sorella ho salutato* was not marked with AC+.

The seventh and last error is found in sentence 131, in which the definite article *Il* was omitted. It is not a frequent error, since we observed that articles are often substituted, but they are almost never omitted.

In Group C, no errors were reported and all Wh-sentences were read correctly. This is the first case in which all sentences included in a group were read without errors. We should remind, though, that Group C and Group D included very few sentences compared with other groups. This was the reason why we did not report individual percentages of errors made in these groups in tables.

In Group D, which included cleft sentences, 4 out of the 5 sentences were misread. Errors were all of the same type in reported cases. Namely, the copula *È* was omitted. Errors are found in sentences numbers 22, 79, 89 and 102.

Since the cleft structure is: (*be*) X *che* DEPENDENT CLAUSE (see Chapter, section I.3), the omission of copula (*be*) gives rise to a structure consisting of: cleft element + complementizer + dependent clause. The output of a sentence in which the copula is omitted is, apparently, a relative clause. This might be the reason why patients did not correct themselves after omitting the initial element.

In Group E 8 errors were made. The first error reported was on sentence 12 and it was classified as a substitution error. The substituted element was the verb *adora* which was substituted with *onora*. This is actually an interesting error, since the syllable replaced was the first syllable of this word, which linearly was found in the second position. The substitution was made on a VC (Vowel + Consonant) syllable and the patient replaced it with a syllable with the same internal structure.

One might argue that this participant could have implemented a strategy to compensate his reading impairment. Namely, patient CG may have read the last syllable and then re-built target words with a guessing strategy.

Actually, analysing the next substitution errors made by patient CG, we will see that internal syllabic structure is usually preserved in substitution errors. For this reason, we will report the next substitution errors sequentially, without respecting sentences' order.

The second substitution is found in sentence 32: in this sentence, the target word was *sapere*, but the patient read *vedere*. Phonologically, these two words are very similar. Firstly, lexical stress is positioned in both cases on the penultimate syllable (and on the same vowel [e]). Secondly, both the output and input have the same syllabic structure (CV+CV+CV). This means that there is a tendency to preserve internal phonological structure of words. This point deserves further investigation. As far as we know, this aspect of substitution errors in ND has not been investigated yet.

Another substitution error is found in sentence 52. The target sentence was *Il prete fuma la pipa* and the outcome was: *La rete fuma la pipa*. Likely, in this case the first letter of the target word *prete* was omitted and then patient CG adjusted the gender of the word with the gender of the definite article (*La*).

The fourth error was made on sentence 76. This was a canonical omission error, in which the omitted element was the plural definite article *I*. The sentence was not marked by AC+.

The fifth error is found on sentence 85, in which the prefix (*Tras-*) of the complex word *Tras-corro* was omitted, producing the output: *-corro*. The same error was made by patient BP (see patient 2, BP).

The sixth error was made on sentence 92. This error was classified as substitution error since the definite article *Il* was substituted by the preposition *Al*. Usually, the opposite pattern is found. Indeed, the definite article is usually substituted by a preposition.

Error number 7 was made on sentence 111, in which the subject pronoun *Io* was omitted.

The eighth and last error is found in sentence 145. In this sentence, the plural definite article *Gli* was omitted, but then AC+ mark is reported.

In conclusion, patient CG made 27 errors during this reading task.

Table 7 summarizes the distribution of substitutions and omissions errors.

Table 7 Distribution of substitution and omission errors made by patient CG **among groups of sentences**

	Substitution errors	Omission errors
Group A	1	7
Group B	2	5
Group C	0	0
Group D	0	4
Group E	4	4
GROUP 1	3	12
GROUP 2	4	8

Patient CG made 20 omissions and 7 substitutions in total. We can observe that the number of omission errors is considerably higher than the number of substitution errors. Despite the small number of substitutions, we previously mentioned that reported substitutions made by patient CG were very interesting.

These data on substitutions are too exiguous to be investigated properly, but the tendency to preserve internal syllabic structure seems to be sure at least for this participant.

Observing Table 7, we can notice that no substitution errors were made on sentences included in Group C and Group D. General discussion of data will be reported in the next chapter (Chapter 5).

III.8.4. Patient 4: OL

The fourth participant to the experiment was patient OL, a 49 years-old male who had an ischaemic stroke that damaged the frontal, parietal and temporal lobes in the right hemisphere. Patient OL made a total of 14 errors on the 103 sentences included in the test.

Table 8 Patient 4, OL: Rates of errors on the two main groups of sentences

Groups of sentences	Type of sentence	Error rate (%)

GROUP 1	A, B, C	**12,121%**
GROUP 2	D, E	**16,216%**

In general, this patient made few errors and showed quite peculiar patterns. Indeed, many errors were made on the righthand side of the sentence. We did not consider these errors in data analysis, but it interesting to report them. A significant amount of errors on the right half of sentences is not a frequent phenomenon in neglect dyslexia. A further peculiarity is that most of these errors were substitutions.

Since this analysis is both quantitative and qualitative, we decided to report some of these errors in the analysis below, only for scientific interest.

The patient made 3 errors in sentences included in Group A.. The first was on sentence 70, in which the initial preposition *Alla* was omitted. The patient made another error in this sentence but it cannot be considered as a neglect error since it is found in the middle of the sentence. The error consisted in the omission of the locative clitic pronoun *ci*. Hence, the target sentence was: *Alla conferenza ci vengo solo io* and the output was: *(/) conferenza (/) vengo solo io*. No auto-correction was reported.

The second error was made on sentence 84. The target sentence was *Al mio cameriere gli do la mancia*, but the patient read: *(/) mio cameriere gli do una mancia*. We can observe that the initial preposition was omitted and then the definite article (*la*) was substituted with the indefinite article (*una*). Obviously, this error was not included in quantitative analysis, since it is found on the right side of the sentence.

The third and last error was made on sentence 96. Also in this case, the initial preposition was omitted. As we will see during the errors report, auto-corrections are not frequent in this patient's performance.

Errors made on the right-hand side of sentences included in Group A were not considered in quantitative analysis. The first, on sentence 26, was made on the last word *chiameremo*, which was read *chiamerò*. This substitution modified number feature. In sentences 103 and 104, resumptive clitics, which were positioned almost in the middle of the sentence, were omitted. Target sentence 108 (*Al concerto ci verranno*) was read *Al concerto ci vedremo*. Hence, the first words on the left were read correctly, while the words on the right were misread. In sentence 149, the final adverb was substituted. Target

sentence was: *In macelleria ci vado spesso* and was read as *In macelleria ci vado adesso.* This sentence was marked with AC+ sign.

In Group B, 5 errors were reported.

The first error was made on sentence 11 and it was classified as an omission error. The omitted element was the initial preposition *All'*. No auto-correction was reported.

The second error was made on sentence 24 and it was of the same type of the previously described error. Indeed, patient omitted the preposition (*A*) and did not correct himself. However, unlike the previous sentence (number 11, see above), in this sentence the omission of the preposition gives rise to a grammatical sentence, since it includes the possessive adjective *suo* before the family noun. Hence, the output was *(/) suo cugino dice una bugia*, in which the DP "*suo cugino"* can be interpreted as the subject of the sentence.

The third error consisted in the omission of the initial preposition (*All'*) in sentence 30.

The fourth error was classified as substitution error. In sentence 82, the initial preposition *Al* was replaced with the definite article *Il*. The patient read *Il concerto andremo tutti* and did not correct himself later.

The fifth and last error was made on sentence 134 and consisted in the omission of the quantifier *Tutti*, positioned at the beginning of the sentence. No auto-correction is reported.

On Group C, no errors were reported, meaning that all Wh-questions were read correctly. This is the second case in which all Wh-sentences were read without making mistakes.

In Group D, 2 errors were made, respectively on sentences 22 and 154. The errors are always of the same type and consist in the omission of the copula (*È*).

On sentences included in Group E, 4 errors were made. The first error was on sentence 48. In this sentence, both the initial proper name *Marta* and the following verb *parla* were omitted. A significant omission, as the one we reported, is very interesting within this patient's performance. Indeed, patient OL show "light neglect" in most errors, since in the sentences analyzed until this point, only function words were omitted and only rarely. In addition, few errors were generally made, whereas this kind of error would be expected in patients who generally show severe neglect. Ù

This, however, is not the only interesting error in this group. Indeed, the second error was classified as an addition error. It was made on sentence 49 and it involved the second word of the sentence. The target verb was *conta* which was read as *s+conta*. We can observe that one letter was added at the beginning of the word. Output sentence was *Giuseppe sconta i suoi soldi*. No auto-correction was reported.

The third error was made on sentence 100 and it was classified as an omission error. Indeed, in sentence 100 (*I criminali si sono pentiti*) the reflexive pronoun was omitted.

The fourth error was on sentence 136, in which the initial quantifier *Tutti* was omitted and no auto-correction was reported.

The fifth and last error was made on sentence 145 and it was classified as an omission error. The omitted element was the plural definite article (*Gli*) at the beginning of the sentence.

In conclusion, patient OL made 14 errors, which can be regarded as a small number. Indeed, this patient generally shows a "light neglect", since he made few errors, which involve only a few letters (except in sentence 48, see above).

The difference in error rate of Group 1 and Group 2 is not as significant as in the other cases (see Table 8). However, more errors were made on sentences included in Group 2 (16,216%) than on sentences included in Group 1 (12,121%)

Table 9 compares the data on substitution and omission errors.

Table 9 Distribution of substitution and omission errors made by patient OL among groups of sentences

	Substitution errors	**Omission errors**	**Addition errors**
Group A	0	3	0
Group B	1	4	0
Group C	0	0	0
Group D	0	2	0
Group E	0	3	1
GROUP 1	1	7	0
GROUP 2	0	5	1

Comparing these data, we observe a significant difference in the total number of substitutions and omissions. Indeed, only one substitution error was reported, while there were 12 omissions in total. Omissions, in general, are more frequent that substitutions in ND, but in this case substitutions are almost absent.

An interesting feature is that this is the only case in which an addition error is reported. This productive type of error is very rare, since patients show the tendency to omit and substitute, but not to add letters (Arduino, 2002).

III.8.5. Patient 5: GG

The fifth participant, MG, is a 63 years-old female who had an ischaemic stroke that damaged the right frontal and parietal lobes. Patient GG made a total of 14 errors on sentences included in the test.

Table 10 Patient 5, **GG**: Error rates on the two main groups of sentences

Groups of sentences	**Type of sentence**	**Error rate (%)**
GROUP 1	A, B, C	**10,606%**
GROUP 2	D, E	**18,919%**

In total, patient GG made only a few errors, though her error patterns are similar to the ones described for previous patients.

On Group A, the patient made 3 errors.

The first error was on sentence 31 and it was classified as substitution error. Indeed, the initial preposition *Al* was substituted with the definite article *Il*. We observed that this kind of error is very common among patients. In this sentence there is also an omission error, even though it was not considered as neglect error. The patient omitted the resumptive clitic *gli*, which was in the middle of the sentence. The patient later corrected herself.

The second error was also a substitution error and it was made on sentence 96. In this case, the preposition *Su* was substituted with another simple preposition (*In*). Hence, the

target sentence was: *Su quel divano ci sta spesso*, the outcome was: *In quel divano ci sta spesso*, which is acceptable in Italian.

The third error was on sentence 113 and it was classified as a substitution error. In this sentence, the demonstrative adjective (*Queste*) was replaced with the definite article (*Le*). Thus, the target sentence (*Queste scarpe gliele venderei*) was read: *Le scarpe gliele venderei*. In most cases we observe a general tendency to substitute different elements (prepositions, possessive adjectives, demonstratives, as in the last case) with definite articles. A discussion on this phenomenon will be reported in Chapter 4.

In Group B, patient GG made only one error. The only error reported was made on sentence 36 and it was classified as an omission error. The omitted element was the initial preposition *Ai* and the sentence was read: *(/) bambini leggo un libro* but then the patient corrected herself, re-reading the sentence and also including the preposition.

In Group C, patient GG made 3 errors. All three errors were classified as omission errors.

The first was made on sentence 10 and the omitted element was the Wh-pronoun (*Dove*). This sentence is marked with AC+.

The second error was made on sentence 90. The omitted element was, also in this case, the Wh- pronoun (*Chi*). The target stimulus was *Chi deve scrivere il saggio?* and the output was: *(/) deve scrivere il saggio?*. The patient did not correct herself. The reason why the patient made an auto-correction on the first error (sentence 10) could be that the omission of *Dove* produced an ungrammatical sentence, while the omission of *Chi* in sentence 90 produced a grammatical sentence. Indeed, in sentence 90, the omission of the Wh- element produced a sentence in which the subject could be a *pro*.

The third error was slightly different from the two that we have reported. It was made on sentence 95 (*Che cosa hai visto passare?*) and the omitted element was *Che*, but the Wh- element *cosa* was preserved. Also in this case, no AC+ is reported.

In sentences included in Group D, 3 errors were made. The first error was made on sentence 22 and it was classified as an omission error. The omitted element was the copula *È*. The patient did not correct herself.

The second error was made on sentence 102. This was classified as an omission error and it involved a significant part of the sentence. Indeed, the target sentence was: *È la polizia che lo cerca* and, at first, the output was *(/) che lo cerca*. We can observe that the

cleft element was omitted. Then, the patient re-read the sentence as *(/) la polizia (/) lo cerca*. Both the copula and the relative pronoun were omitted in the second reading.

In sentences included in Group E, 4 errors were made.

The first error was classified as an omission and it was made on sentence 2. The omitted element was the definite article *La* and the sentence was read as *(/) nostra zia legge la rivista*. This output was grammatical since family nouns can be preceded by a possessive adjective without the definite article. No AC+ mark was reported.

The second error was made on sentence 25. This error was classified as omission error and it involved the entire first half of the sentence. The target sentence was: *Mio figlio studia medicina* and the output was: *(/) studia medicina*. The patient corrected herself.

The third error was in sentence 39 an it was classified as a substitution error. The target sentence was: *Bevo tanto caffè durante il giorno* and the output was: *Quanto caffè durante il* giorno. This was an interesting error since the verb at the beginning of the sentence was omitted and the quantifier (*tanto*) was substituted. No auto-correction was reported.

The fourth and last error was made on sentence 73 and it was classified as a substitution error. The target sentence was *I capelli di Laura sono bellissimi* and the output was *Quelli di Laura sono bellissimi.* In this sentence, target word *capelli* was substituted with *quelli*.

In conclusion, patient GG made 14 errors on the 103 sentences included in the test.

Table 11 reports the distribution of omission and substitution errors made by patient GG.

Table 11 Distribution of substitution and omission errors made by patient **GG** among groups of sentences

	Substitution errors	**Omission errors**
Group A	3	0
Group B	0	1
Group C	0	3
Group D	0	3
Group E	2	2
GROUP 1	3	4
GROUP 2	2	5

III.8.6. Excluded participants

Two participants were excluded from the study. The first participant showed completely different reading patterns on sentences included in Group 1 and Group 2. The patient's errors were, indeed, randomly distributed and there was no possibility to give an interpretation of her performance. Then we controlled her clinical presentation and we noticed that her neglect dyslexia was diagnosed as very mild.

On the contrary, the second participant had a too severe neglect dyslexia. Hence, the patient neglected the left half of every sentence included in the test. In some sentences, the patient read only the last word and ignored all words that were on the left. Some sentences were not read at all. Obviously, his performance was impossible to analyse.

IV. Chapter 4: Overall analysis and Discussion

In this chapter, we will discuss the results obtained in the present study. First, we will consider the general performance of the participants on the two groups of sentences that we intended to investigate (Group 1 and Group 2).

Secondly, we will make a comparison between variables that were present within different groups, such as the presence/absence of clitic pronouns, the presence of *pro* subjects, the presence of a copula as first word of the sentence and so on.

We will then proceed to examine the relation between the presence of auto-corrections and the grammaticality of the outputs. The following section is dedicated to a qualitative analysis of substitution errors and it is followed by some comments about the preservation of internal structure of words. In the last sections we will discuss the status of cleft sentences.

IV.1. Comparison between results on Group 1 and Group 2

The data obtained from the five participants were statistically analysed, comparing the performance on sentences included in Group 1 (sentences containing CLLDs and Foci) and sentences included in Group 2 (sentences including other syntactic structure as control).

The percentage of errors of each participant, for each group (A, B, C, D, E), was entered as score. Results are resumed in the table below.

Table 12 Results of the experiment

	Total errors	**Error rate Group 1**	**Error rate Group 2**
MG	22	**18,182%**	**27,027%**
BP	35	**30,303%**	**40,541%**
CG	27	**22,727%**	**32,432%**

OL	14	**12,121%**	**16,216%**
GG	14	**10,606%**	**18,919%**

We observed a significant difference between performances on Group 1 and Group 2. Mean percentage of errors made on Group 1 is 18,788%, while percentage of errors made on sentences included in Group 2 is 27, 027%. Hence, the error rate on sentences that do not include CLLDs and Foci is significantly higher. Statistical significance was checked with both Sign test ($z= 2.236068$, $p<.025$) and t-test ($t= -7.55$, $p<.001$).

Results, thus, are consistent with the predictions: sentences including Left-dislocation and Focus fronting are less impaired in the reading task than sentences not including these structures.

In addition, sentences included within Group 2 were, in general, syntactically simpler. From a formal perspective, sentences included in Group 2 were, almost in every case, constituted by the subject (expressed or not expressed), the verb and a complement. Hence, the syntactic structure was very elementary in these sentences.

On the other hand, sentences included in Group 1 were syntactically manipulated. The result was a syntactically more complex structure. Indeed, further projections (i.e. those included in the Left Periphery) were activated and filled by left-dislocated and fronted elements. The syntactic outcome of the presence of left-dislocated and fronted elements is a longer and more elaborate syntactic tree.

Despite this increased complexity, sentences included in Group 1 involved less errors than sentences included in Group 2. Since sentences with CLLD and Foci are statistically less impaired, the initial hypothesis is confirmed.

In addition, we compared the mean number of graphemes included in sentences containing errors with the mean number of graphemes included in sentences which were read correctly. The reason why we decided to make this further comparison is that one might argue that shorter sentences are read with less impairment than longer sentences.

Observing the table below, we note that the reason why sentences with CLLDs and Foci are less impaired in reading performance of subjects with ND is exclusively a syntactic factor, since there are no significant differences between mean number of graphemes of misread sentences and the number of sentences read correctly. Mean

numbers are reported in the table below, in which we observe that in some cases the mean number of graphemes of sentences containing errors was bigger than the one of sentences read correctly. In other cases, mean number of graphemes of sentences read correctly was bigger than the one of sentences containing errors.

This means that number of graphemes is not an influencing variable in our experiment.

Table 13 Mean number of graphemes of sentences containing errors and of sentences read correctly

	Sentences containing errors	**Sentences read correctly**
MG	23,182	23,296
BP	24,371	22,657
CG	22,741	23,461
OL	23,867	23,140
GG	23,571	23,225

Having assumed that the effect of CLLDs and Foci on reading abilities of individuals with ND is completely due to the syntactic structure of the sentences, we should explain the reasons of this effect.

On the basis of the considerations reported in Chapter 2, we assumed that neglect dyslexia is an attentional impairment. Hence, the explanation that we give is that, since a constituent is not found linearly in its canonical position, the patients' attention can be shifted to the position to which the constituent moved (or, at least, to the position in which it is found, if some type of CLLDs are base-generated).

Through the qualitative analysis of results, reported in Chapter 3, we observed different reading patterns on Group 1 and Group 2. Indeed, as far as types of errors are concerned, significant omissions in sentences included in Group 2 were more frequent than omissions in sentences included in Group 1. Indeed, we saw that in some cases

sentences included in Group 2 were bisected almost in the middle and all the left part was neglected. Sometimes, entire constituents were omitted in reading sentences of Group 2 (see Results, Chapter 3, section III.8).

This phenomenon was not reported for sentences included in Group 1. Indeed, most of the times, the omitted element of sentences in Group 1 was a preposition or an article, while the dislocated/fronted element was preserved. On the contrary, in many cases, either the subject or the verb, were omitted in sentences in Group 2.

IV.2. Substitutions vs. omissions

Globally, a significant difference in the number of omissions and number of substitution is observed. Indeed, a total of 25 substitution errors and 86 omission errors is reported. These data are consistent with the literature on errors in neglect dyslexia. Indeed, Caramazza and Hillis (1990) reported that omissions are "pure neglect errors" and it is reasonable that their number should be considerably higher than the number of substitutions. The results are consistent also with Arduino et al.'s study (Arduino et al., 2002), in which the authors found that Italian neglect dyslexic's errors are mainly characterised by omissions rather than substitutions. In general, the distribution of these two types of errors varies across groups and subjects.

Ellis et al. (1987) suggested that the presence of substitution errors may reveal that the spatial bias is less impaired. Indeed, substitutions are the result of the encoding of spatial position of letters. In these cases, however, spatial information is encoded but, at the same time, it is impossible for patients to recognize letters.

The results reported suggest that all the participants to this study have an impairment that is not too severe (since a lot of sentences are read correctly and there are substitutions), but it can be classified as pure neglect dyslexia.

IV.3. Performance on CLLD and Focus

During the design of the experiment, we thought that there would be a difference in performance on CLLDs and Foci. Actually, observing the data, no differences were found in reading sentences with CLLD and sentences with Focus structures.

In Tabel 14, we can observe that the mean number of errors is exactly the same on CLLDs and Foci.

Table 14 Mean number of errors on sentences including CLLD and Focus

	Clitic-Left Dislocation	**Focus**
Mean number of errors	5	5
Error rate (%)	16,129%	16,129%

The reason why we expected to observe differences between results on CLLDs and Foci was the presence of the resumptive clitic in CLLDs. We thought that clitics could act as cues for the attentional impairment. Indeed, we thought that the presence of the clitic would lead the patients to shift their attention on the constituent which was resumed by the clitic pronoun.

This prediction was not confirmed by the data, as we previously observed. The fact that this expectation is not validated actually corroborates the main thesis of this study. Indeed, since resumptive clitics do not act as cues, both CLLDs and Foci are processed in the same way. The fact that both these structures are processed in the same way suggests that what is salient is the linear position of the constituent (i.e. on the left).

A further distinction could have been the one between sentences including obligatory clitics and sentences which included optional clitics (that were, however, made explicit). Sentences with obligatory clitics were those with left-dislocation of the object and those which included partitive element-dislocation. Sentence with optional clitics were those involving left-dislocation of the dative and the locative complement.

Results showed that the patients' performance was not affected by neither by the presence of obligatory clitics nor by the presence of optional clitics. This is an interesting data, since Friedmann et al. (2011) demonstrated that the patients' performance was modulated by the presence of optional/obligatory elements. It is important to consider that in the mentioned study, optional/obligatory elements (such as adjuncts and obligatory complements) were positioned at the end of the sentence, since Hebrew, the language of the study, is read from right to left. In the present case, on the contrary, clitics were positioned in the middle of the sentence. Hence, no different patterns were showed because of their position within the sentence.

IV.4. Relation between outputs and auto-correction

In Chapter 3 we reported all cases of auto-corrections. From the analysis of reported features, an interesting characteristic comes out, namely the relation between the grammaticality-ungrammaticality of the output and the absence-presence of auto-correction.

Indeed, we observed that when an omission error was present, the patient corrected or did not correct himself/herself on the basis of the grammatical acceptability of the output. When the omission simply produced a *pro drop* sentence, the sentence was grammatical even if the subject was omitted and the patients did not correct themselves.

On the contrary, when the outcome of an omission error was an unacceptable sentence (i.e. it was not well-formed from a grammatical point of view), the patients showed the tendency to re-read the sentence and make an auto-correction.

For instance, when patient BP read sentence 48 as *(/) parla con Giacomo spesso* no auto-correction was reported. Then, when the patient read sentence 58 as *rosso lo bevo poco*, she corrected herself. This is one of the many cases reported in Chapter 3.

As far as substitution errors are concerned, the direct relation between auto-correction and grammaticality of the output is not described. The auto-correction distribution among sentences seems to be less related to the status of the output.

This is a qualitative distinction between omission errors and substitution errors (we investigated in the previous chapter the quantitative differences between omissions and substitutions in all the five participants' performance).

IV.5. Substitution errors analysis

In Chapter 3, all substitution errors were reported and the general tendency to replace prepositions with articles was described. At this point we resume the results reported to make some considerations. First of all, many left-dislocated constituents were PPs (i.e. *Prepositional Phrases*) and hence, their dislocation caused the presence of a preposition at the beginning of the clause.

All the participants to the study showed a regular bias with prepositions positioned at the beginning of the clause. Indeed, prepositions were often omitted or substituted. No difference was described between simple and articulated preposition.

When prepositions were omitted, sometimes the participants corrected themselves re-reading the sentence. Instead, when prepositions were substituted, the outcome was often maintained and no auto-correction was reported.

The interesting phenomenon was that prepositions were often substituted with definite articles and the result was that the first constituent was interpreted as the subject of the sentence.

- Prepositions *Alla/Nella* were substituted with the definite article *La*
- Prepositions *Su/Al* were substituted with the definite article *Il*
- Plural prepositions were substituted with plural definite articles.

The substituted element was always in agreement with the following noun. The substituted element could belong to another morphological category, but gender and number were always preserved. Thus, in general, a tendency to definiteness is shown by patients with neglect dyslexia.

IV.6. Processing of internal structure of words.

Some cases of morphological and phonological decomposition of words during reading are reported in the previous chapter. We decided to report these cases in this section to give a homogeneous frame of word decomposition, both morphologically and phonologically.

From a morphological point of view, we observed that there have been some cases in which the bisection point was placed exactly between a prefix and the root word, and only the prefix was omitted. For instance, we reported the reading error made by patient MG in which the word *super-mercato* was read as *mercato* and the prefix was omitted. Another case was the one made by the same patient, MG, on the word *Tras-corro*. In this case too, the omitted element was the prefix and the output was: *corro*.

The interesting data is that three out of the five participants made this type of error. These reported cases seem to provide further evidence to "morphological decomposition effect" in reading in ND. In Chapter 2, we reported the main studies that investigate this phenomenon. We observed that Semenza et al. (2011) reported the decomposition effect in reading compounds, discovering the head's role in driving attention, while Reznick

and Friedmann (2015) investigated different reading patterns modulated by the presence of affix or root words at the beginning of sentences.

As far as internal phonological structure is concerned, in Chapter 3 we reported patient CG's performance. The patient made peculiar substitution errors. Indeed, the patient's trend was to preserve the internal structure of substituted elements. For instance, if internal syllabic structure of a target word was CV+CV+CV, the patient substituted the target with a word with identical structure (for example, *sapere* was substituted with *vedere* and a*dora* was substituted with *onora*).

We think that this phenomenon would deserve future investigation. It would be interesting to compare words with various syllabic structures, as well as words with different lexical stress. As far as lexical stress is concerned, we reported a study by Veronelli et al. (2014b) in which the authors showed that lexical stress was a cue for bisecting words.

This leads us to conclude that, just like morphological and syntactic information is encoded and produces different patterns, also the phonological internal structure of words is stored.

IV.7. Performance on clefts

In Chapter 3 we reported all errors made on cleft structures. We observed that, very frequently, clefts were subjected to omission errors. In the vast majority of cases, the omitted element was the copula, which was positioned at the beginning of the sentence. Almost all patients made errors on at least 50% of cleft sentences included in the experiment.

In Chapter 1 we mentioned the controversial status of clefts, also in theoretical syntax. Indeed, there is no consensus on their syntactic description, i.e. whether clefts must be considered as mono-clausal structures or bi-clausal structures.

Obviously, since this experiment concerned the role of syntax in driving attention, we cannot add any evidence neither to the mono-clausal nor to the bi-clausal theories. What we can state is that cleft structures show completely different reading patterns compared to Focus structures.

Indeed, it must be reminded that clefts are classified as Foci in syntactic theories, but their status is very different to the one of Focus, both in driving attention in reading and in syntactic description.

Conclusions

In conclusion, the hypothesis that sentences including Clitic Left-Dislocation and Focus are less impaired in reading performance of individuals with neglect dyslexia is confirmed. We demonstrated, that the validation of the hypothesis is exclusively due to the syntactic characteristics of CLLDs and Foci, rather than to other variables, such as frequency of included words or number of graphemes.

In order to reach this conclusion, we first explored the two syntactic projections that we intended to investigate. Indeed, in the first part of Chapter 1 we reported the main studies on the internal articulation of Left-Periphery, and, in the second part of the chapter, we reported the main studies on the two projections considered: TopP and FocP. What was important to us was to explain in which way Clitic Left-Dislocations and Foci were formed. Thus, we compared CLLDs to Foci and then we discussed how they were originated.

Then, we explored the reading impairment that we intended to investigate: acquired left neglect dyslexia. Then, in Chapter 2, we explained the main correlates of this reading disorder. Then, we tried to further investigate some interesting aspects. Indeed, we dedicated a section to the "unconscious reading" phenomenon. Unconscious processing is a key aspect for the validation of our hypothesis. Indeed, we argue that syntactic structure is processed, even though, in most cases, sentences are misread.

In this same chapter, we analysed the effects that both morphology and semantics have on reading performance of patients with ND. Then, we explored the interaction between syntax and attention, through the study made by Friedmann et al. (2011), which was the only study on syntactic effects in neglect dyslexia.

Then, we described the experiment designed and conducted in the present study. After reporting all the details about materials, method and participants, we described all the errors made in the test by every patient.

In the last chapter (Chapter 4) we discussed all the results and we demonstrated that our initial hypothesis was validated. Namely we demonstrated that sentences including CLLDs and Foci are less impaired by the spatial-attentional deficit involved in neglect dyslexia than sentences including other syntactic structures.

There are still many open questions about syntactic processing in neglect dyslexia. We hope that several other studies will be conducted on this topic in order to clarify what role syntax plays in driving attention in neglect dyslexia.

We suggest to test other syntactic structures that involve movements to the left of the sentence. It would be interesting, for instance, to properly explore Wh-movement in Italian Wh-questions in ND. We think, more in general, that studies on syntactic processing in ND would be fundamental to understand the underlying mechanisms of this reading disorder.

Appendix

Table I Lists of all the stimuli included in the experiment

Number	SENTENCE	STATUS
1	AL MAESTRO GLI PARLERÒ	EXCLUDED
2	LA NOSTRA ZIA LEGGE LA RIVISTA	OTHER
3	AL SUO MEDICO TELEFONA DOMANI	FOC
4	IN QUESTA STRADA ABITO DA MOLTI ANNI	FOC
5	IL CAMINETTO HA ACCESO	EXCLUDED
6	IL LIBRO DI STORIA GLIEL'HO VENDUTO	CLLD CLUSTER
7	ALLA RAGAZZA REGALA UN FIORE	FOC
8	AL VETERINARIO GLI PARLI TU	CLLD
9	NEL QUARTIERE CI ABITIAMO	CLLD
10	DOVE SEI STATO FINO AD ORA ?	WH
11	ALL'AVVOCATO DICE LA VERITÀ	FOC
12	MATTEO ADORA I SUOI AMICI	OTHER
13	LA NONNA GIOCA CON LE SUE CARTE	OTHER
14	LA BICICLETTA LA COMPRERÀ	CLLD
15	DA CASA TUA CI PASSO DOPO	CLLD
16	GIULIA CERCAVA IL SUO CANE	OTHER
17	IL GIORNALE LO LEGGERÒ	EXCLUDED
18	SUL TRENO SALGO SUBITO	FOC
19	AL MERCATO CI VA MARTA	EXCLUDED
20	AI MIEI NONNI DO UN REGALO	FOC
21	UN ESEMPIO HANNO FATTO	FOC
22	È UNA BARCA CHE HA PRESO	CLEFT
23	CHE COSA HAI VISTO?	EXCLUDED
24	A SUO CUGINO DICE UNA BUGIA	FOC
25	MIO FIGLIO STUDIA MEDICINA	OTHER
26	IL MECCANICO LO CHIAMEREMO	CLLD
27	IL QUADRO LO VEDETE	EXCLUDED
28	NELLA CAMERA CI DORME POCO	CLLD
29	LA POLITICA CAPISCO POCO	EXCLUDED
30	ALL'IDRAULICO DO UN ASSEGNO	FOC
31	AL TUO AMICO GLI HAI MENTITO	CLLD
32	VORREI SAPERE CHI È ARRIVATO	OTHER
33	IN SPAGNA VORREI TORNARE	FOC
34	QUEL BAR LAVORA MOLTO	OTHER
35	LA PROPOSTA HO SPEDITO	EXCLUDED
36	AI BAMBINI LEGGO UN LIBRO	FOC

37	TI RACCONTO TUTTO DOMANI	OTHER
38	UNA MACCHINA HO ACQUISTATO	FOC
39	BEVO TANTO CAFFÈ DURANTE IL GIORNO	OTHER
40	NON SO CHE COSA DICI	EXCLUDED
41	IL SUO CANCELLO LO AGGIUSTO IO	CLLD
42	AL DIRETTORE LASCIO UN PACCO	EXCLUDED
43	DI TEMPO LIBERO NE HO MOLTO	CLLD
44	LE SCARPE LE ADORA	EXCLUDED
45	IL FUOCO HA ACCESO	EXCLUDED
46	AL CINEMA VADO STASERA	FOC
47	ALLA CENA ARRIVO TARDI	FOC
48	MARTA PARLA CON GIACOMO SPESSO	OTHER
49	GIUSEPPE CONTA I SUOI SOLDI	OTHER
50	LA LAMPADA LA SPENGO	EXCLUDED
51	ALLA MAESTRA PARLERÒ DOPO	FOC
52	IL PRETE FUMA LA PIPA	OTHER
53	A BERLINO TORNO LUNEDÌ	FOC
54	DI MONETE NE HO POCHE	EXCLUDED
55	ALCUNI AMICI HO INCONTRATO	FOC
56	DEVONO TELEFONARE AI LORO GENITORI	OTHER
57	AL MIO BAMBINO GLI DO UN BACIO	CLLD
58	IL VINO ROSSO LO BEVO POCO	CLLD
59	IN QUESTA CASA VIVIAMO INSIEME	EXCLUDED
60	DEI REGALI COMPRERANNO	EXCLUDED
61	IL PROGETTO LO FAREMO	EXCLUDED
62	GIORGIA VENDE I SUOI LIBRI	OTHER
63	LA TUA STORIA SAPPIAMO BENE	EXCLUDED
64	MIO MARITO CERCA LE SUE SCARPE	OTHER
65	IN PASTICCERIA VADO SPESSO	FOC
66	AL DOTTORE GLI TELEFONO	CLLD
67	LA CAMICIA BLU INDOSSA OGGI	FOC
68	IL MAZZO DI FIORI GLIELO RESTITUISCO	CLLD CLUSTER
69	COSA PENSI DI FARE?	ESCLUSA
70	ALLA CONFERENZA CI VENGO SOLO IO	CLLD
71	LA MATITA GLIELA PASSO	EXCLUDED
72	UNA TORTA HO CUCINATO	EXCLUDED
73	I CAPELLI DI LAURA SONO BELLISSIMI	OTHER
74	IL TERRITORIO LO CONOSCE	EXCLUDED
75	DI PROBLEMI NE AVETE DUE	CLLD
76	TUA SORELLA HO SALUTATO	FOC
77	I MOBILI DELLA CASA LI VOGLIO CAMBIARE	CLLD

78	ALLO STADIO VADO SABATO	FOC
79	è UNA SORPRESA CHE MI HAI FATTO	CLEFT
80	COSA MANGI DOMANI?	EXCLUDED
81	LA CASA LA LAVO	EXCLUDED
82	AL CONCERTO ANDREMO TUTTI	FOC
83	IL PRESIDENTE LO ODIAVANO	CLLD
84	AL MIO CAMERIERE GLI DO LA MANCIA	CLLD
85	TRASCORRO MOLTO TEMPO IN LIBRERIA	OTHER
86	LA RICHIESTA MANDEREI ORA	EXCLUDED
87	A MIA SORELLA LE SPIEGO	EXCLUDED
88	LA LAMPADINA LA CAMBI DOPO	CLLD
89	è A MILANO CHE DEVI ANDARE	CLEFT
90	CHI DEVE SCRIVERE IL SAGGIO?	WH
91	L'OROLOGIO COMPRERAI	EXCLUDED
92	IL PROFESSORE SPIEGA LA SUA TEORIA	OTHER
93	AL MIO FIDANZATO GLI FACCIO UN REGALO	CLLD
94	LO SPETTACOLO LO VEDREMO	CLLD
95	CHE COSA HAI VISTO PASSARE?	WH
96	SU QUEL DIVANO CI STA SPESSO	CLLD
97	IL TITOLO SCRIVO IO	EXCLUDED
98	IL DOLCE LO VUOLE	EXCLUDED
99	AL MINISTRO GLI SCRIVO	EXCLUDED
100	I CRIMINALI SI SONO PENTITI	OTHER
101	LA CITTÀ CONOSCE BENE	EXCLUDED
102	è LA POLIZIA CHE LO CERCA	CLEFT
103	NELLA PISCINA CI NUOTA SEMPRE	CLLD
104	IL CELLULARE LO HA ROTTO	CLLD
105	COSA STAI ASCOLTANDO?	WH
106	A FRANCESCO SPIEGO DOPO	EXCLUDED
107	IL DISEGNO HO PORTATO	EXCLUDED
108	AL CONCERTO CI VERRANNO	CLLD
109	MANGIAMO SPESSO AL RISTORANTE	OTHER
110	DI VINO BIANCO NE BEVE TROPPO	ESCLUSA
111	IO VADO SPESSO AL CINEMA	OTHER
112	AL GIUDICE GLI DICO TUTTO	CLLD
113	QUESTE SCARPE GLIELE VENDEREI	CLLD CLUSTER
114	I PASSEGGERI SONO ATTERRATI	OTHER
115	GLI ATTORI LI AMMIRIAMO	EXCLUDED
116	IL CANCELLO GLIELO APRO	EXCLUDED
117	HA COMPRATO UNO ZAINO NUOVO	OTHER
118	AL SUPERMERCATO CI VADO DOMANI	CLLD

119	IN GERMANIA ABITO DA MESI	EXCLUDED
120	LA FINESTRA LA LAVA SARA	EXCLUDED
121	DI BISCOTTI NE MANGIO TRE	CLLD
122	IL POSTINO SUONA IL CAMPANELLO	OTHER
123	ELEONORA NON LA VEDO DA MOLTO	EXCLUDED
124	GLI SPAGHETTI LI MANGIAMO	CLLD
125	IL NEGOZIO CHIUDE ALLE SETTE	OTHER
126	A MILANO CI TORNO	EXCLUDED
127	ALL'UFFICIO DEVO TORNARE	FOC
128	IL QUADERNO AVEVO PERSO	FOC
129	AL DIRIGENTE CHIEDO NOTIZIE	FOC
130	AL CINEMA CI ANDRò	EXCLUDED
131	LE FOTOGRAFIE SONO STATE COMPRATE	OTHER
132	AL RISTORANTE MANGIO DOMANI	FOC
133	IN ITALIA CI ABITO	EXCLUDED
134	TUTTI I VESTITI ABBIAMO SISTEMATO	FOC
135	AL POSTINO APRI LA PORTA	EXCLUDED
136	TUTTI I PROBLEMI SONO SPARITI	OTHER
137	AL MERCATO ANDIAMO DOPO	FOC
138	NON TI RICORDI COSA TI AVEVO DETTO?	EXCLUDED
139	IL NUOVO AUTISTA GUIDA LA MACCHINA	OTHER
140	GLI APPUNTI GLIELI PRESTO	EXCLUDED
141	IN FRANCIA CI VIVREI	EXCLUDED
142	NEL NEGOZIO ENTRIAMO DOPO	FOC
143	TE LO DICEVO CHE NON SAREBBE ARRIVATO	EXCLUDED
144	IL PAVIMENTO HO LAVATO	EXCLUDED
145	GLI STUDENTI SONO ENTRATI	OTHER
146	IL TUO GATTO LASCIO FUORI	EXCLUDED
147	VORREI TANTO SAPERE CHI HAI VISTO IERI	EXCLUDED
148	LE MIE AMICHE SONO ARRIVATE	OTHER
149	IN MACELLERIA CI VADO SPESSO	CLLD
150	I LIBRI DI PAOLO SONO CADUTI	OTHER
151	IL CUSCINO HA SPORCATO	EXCLUDED
152	IL VINO BIANCO BEVO SPESSO	FOC
153	A SCUOLA CI ENTRIAMO	EXCLUDED
154	è UN CUCCIOLO CHE HO ADOTTATO	CLEFT
155	FRANCESCA LEGGE MOLTE RIVISTE	OTHER

Table II Frequencies of words included in Group1 (itWac)

WORD	FREQUENCY
medico	133,615
strada	328,114
libro	293,071
storia	595,502
ragazza	87,236
veterinario	13,221
avvocato	53,847
casa	556,810
treno	47,671
mercato	433,345
nonni	11,472
esempio	559,986
cugino	8,997
meccanico	14,707
camera	69,057
idraulico	6,536
amico	148,644
Spagna	75,658
bambini	331,096
macchina	127,141
cancello	8,486
tempo	1,288,414
libero	149,021
cinema	137,789
cena	48,877
maestra	12,683
Berlino	31,988
amici	190,818
vino	96,649
rosso	74,511
progetto	595,325
marito	67,617
cerca	128,81
pasticceria	4,026
dottore	21,062
camicia	10,772
blu	45,159
mazzo	5,043
fiori	48,099
conferenza	85,517

problemi	411,898
sorella	36,408
mobili	46,953
stadio	44,533
concerto	103,349
presidente	525,938
cameriere	5,232
richiesta	381,475
lampadina	3,132
fidanzato	9,580
spettacolo	123,266
divano	9,074
piscina	20,689
cellulare	44,14
Francesco	164,318
concerto	103,349
giudice	170,934
scarpe	26,408
supermercato	10,994
Germania	114,753
biscotti	6,228
spaghetti	4,952
ufficio	217,727
quaderno	4,648
dirigente	108,564
ristorante	38,902
vestiti	24,298
mercato	433,345
negozio	36,005
macelleria	1,746
bianco	92,936
telefona	16,423
abitare	9,129
anni	1,995,093
venduto	40,645
regala	11,383
fiore	22,896
parli	23,224
dice	386,993
verità	189,21
passo	153,269
salgo	1,725
Marta	13,847

regalo	23,385
fatto	1,416,572
bugia	4,715
chiameremo	2,28
dorme	8,606
assegno	37,468
mentito	2,613
tornare	98,098
libro	293,071
acquistato	26,408
aggiusto	159
stasera	24,171
parlerò	3,277
lunedì	86,333
incontrato	35,794
bacio	25,937
bevo	2,591
odiano	2,76
mancia	2,045
cambiare	104,828
fare	1,164,126
regalo	23,385
vedere	345,209
nuotare	5,142
rompere	16,331
spiegare	56,821
venire	93,579
vendere	40,645
abitare	9,129
mesi	456,224
mangiare	56,214
tre	760,316
notizie	125,423
sistemare	8,116
entrare	117,413

Table III Frequencies of words included in Group 2

WORD	**FREQUENCY**
zia	11,365
Matteo	35,373
adora	2,089
nonna	18,601

gioca	38,392
Giulia	35,827
cercare	127,938
barca	45,057
figlio	177,856
bar	56,167
racconto	72,443
bevo	34,089
caffè	35,805
Marta	13,847
parla	265,25
Giuseppe	144,239
prete	19,475
telefonare	11,052
Giorgia	4,928
vendere	40,645
capelli	55,301
Laura	35,365
sorpresa	49,568
mangiare	56,214
trascorrere	17,046
Milano	422,358
scrivere	121,492
professore	62,635
spiegare	56,821
criminali	23,408
polizia	166,793
mangiare	56,214
passeggeri	25,3
comprare	35,225
postino	2,32
negozio	36,005
fotografie	30,122
problemi	411,898
ricordare	104,379
autista	10,932
dire	670,654
studenti	231,048
amiche	16,179
libri	293,071
Paolo	229,907
cucciolo	5,535
Francesca	32,781

leggere	143,518
rivista	86,544
amici	190,818
carte	62,371
cane	53,811
preso	164,316
studiare	48,658
medicina	65,192
arrivato	68,266
lavora	63,347
giorno	710,825
Giacomo	40,103
soldi	122,47
pipa	2,351
genitori	154,416
libri	293,071
bellissimi	9,263
tempo	1,288,414
libreria	22,611
andare	273,104
saggio	44,07
teoria	87,552
passare	128,902
pentiti	3,86
cerca	128,81
ascoltando	9,757
ristorante	38,902
cinema	137,789
atterrati	722
zaino	6,024
nuovo	740,211
campanello	4,895
sette	99,602
comprate	2,809
spariti	3,26
guida	195,458
macchina	127,141
entrati	20,106
visto	458,623
caduti	19,287
adottato	64,691
riviste	52,871
arrivate	14,133

Table IV Number of words and graphemes of sentences included in Group 1

Sentence number	Number of words	Number of graphemes
3	**5**	**25**
4	**7**	**30**
6	**7**	**29**
7	**5**	**24**
8	**5**	**23**
9	**4**	**22**
10	**6**	**21**
11	**5**	**23**
14	**4**	**22**
15	**6**	**20**
18	**4**	**19**
20	**6**	**21**
21	**4**	**19**
23	**4**	**15**
24	**6**	**22**
26	**4**	**23**
28	**5**	**22**
30	**5**	**23**
31	**6**	**23**
32	**5**	**24**
33	**4**	**21**
36	**5**	**21**
38	**4**	**23**
41	**6**	**25**
43	**6**	**22**
46	**4**	**19**
47	**4**	**19**
51	**4**	**22**
53	**4**	**19**
55	**4**	**23**
57	**6**	**23**
58	**6**	**21**
65	**4**	**23**
66	**4**	**20**
67	**5**	**23**
68	**6**	**31**
70	**6**	**27**
75	**5**	**20**

76	**4**	**20**
77	**7**	**33**
78	**4**	**20**
82	**4**	**22**
83	**4**	**22**
84	**7**	**27**
88	**5**	**22**
90	**5**	**23**
93	**7**	**31**
94	**4**	**21**
95	**5**	**23**
96	**6**	**23**
103	**5**	**25**
104	**5**	**20**
105	**3**	**19**
106	**4**	**20**
108	**4**	**20**
112	**5**	**21**
113	**4**	**26**
118	**5**	**26**
119	**5**	**21**
121	**5**	**21**
124	**4**	**22**
127	**4**	**21**
128	**4**	**20**
129	**4**	**24**
132	**4**	**24**
134	**5**	**29**
137	**4**	**20**
142	**4**	**22**
149	**5**	**24**
152	**5**	**22**

Table V Number of words and graphemes of sentences included in Group 2

Sentence number	Number of words	Number of graphemes
2	**6**	**25**
12	**5**	**21**
13	**7**	**25**
16	**5**	**22**
25	**4**	**23**
34	**4**	**18**
37	**4**	**21**
39	**6**	**29**
48	**5**	**26**
49	**5**	**23**
52	**5**	**17**
56	**5**	**30**
62	**5**	**22**
64	**6**	**25**
73	**6**	**29**
85	**5**	**29**
92	**6**	**29**
100	**5**	**23**
109	**4**	**26**
111	**5**	**20**
114	**4**	**24**
117	**5**	**23**
122	**5**	**26**
125	**5**	**24**
131	**5**	**29**
136	**5**	**25**
139	**6**	**29**
145	**4**	**22**
148	**5**	**23**
150	**6**	**23**
155	**4**	**26**

List of all the errors reported.

N.	SENTENCE	MG	BP	CG	OL	GG
1	AL MAESTRO GLI PARLERÒ	**E**	**E**			
2	LA NOSTRA ZIA LEGGE LA RIVISTA		**E**			**E**
3	AL SUO MEDICO TELEFONA DOMANI					
4	IN QUESTA STRADA ABITO DA MOLTI ANNI		**E**	**E**		

5	IL CAMINETTO HA ACCESO					
6	IL LIBRO DI STORIA GLIEL'HO VENDUTO		E			
7	ALLA RAGAZZA REGALA UN FIORE		E			
8	AL VETERINARIO GLI PARLI TU	E	E			
9	NEL QUARTIERE CI ABITIAMO					
10	DOVE SEI STATO FINO AD ORA ?		E			E
11	ALL'AVVOCATO DICE LA VERITÀ	E			E	
12	MATTEO ADORA I SUOI AMICI			E		
13	LA NONNA GIOCA CON LE SUE CARTE	E	E			
14	LA BICICLETTA LA COMPRERÀ					
15	DA CASA TUA CI PASSO DOPO			E		
16	GIULIA CERCAVA IL SUO CANE					
17	IL GIORNALE LO LEGGERÒ					E
18	SUL TRENO SALGO SUBITO	E	E			
19	AL MERCATO CI VA MARTA					
20	AI MIEI NONNI DO UN REGALO					
21	UN ESEMPIO HANNO FATTO	E	E			
22	È UNA BARCA CHE HA PRESO	E	E	E	E	E
23	CHE COSA HAI VISTO?					E
24	A SUO CUGINO DICE UNA BUGIA		E	E	E	
25	MIO FIGLIO STUDIA MEDICINA		E			E
26	IL MECCANICO LO CHIAMEREMO			E		
27	IL QUADRO LO VEDETE	E	E			
28	NELLA CAMERA CI DORME POCO	E				
29	LA POLITICA CAPISCO POCO		E			
30	ALL'IDRAULICO DO UN ASSEGNO		E	E	E	
31	AL TUO AMICO GLI HAI MENTITO			E		E
32	VORREI SAPERE CHI È ARRIVATO			E		
33	IN SPAGNA VORREI TORNARE			E		
34	QUEL BAR LAVORA MOLTO					
35	LA PROPOSTA HO SPEDITO	E				
36	AI BAMBINI LEGGO UN LIBRO					E
37	TI RACCONTO TUTTO DOMANI	E	E			
38	UNA MACCHINA HO ACQUISTATO	E		E		
39	BEVO TANTO CAFFÈ DURANTE IL GIORNO	E				E
40	NON SO CHE COSA DICI			E	E	E
41	IL SUO CANCELLO LO AGGIUSTO IO					
42	AL DIRETTORE LASCIO UN PACCO		E			
43	DI TEMPO LIBERO NE HO MOLTO					
44	LE SCARPE LE ADORA					
45	IL FUOCO HA ACCESO					

46	AL CINEMA VADO STASERA					
47	ALLA CENA ARRIVO TARDI					
48	MARTA PARLA CON GIACOMO SPESSO		**E**		**E**	
49	GIUSEPPE CONTA I SUOI SOLDI				**E**	
50	LA LAMPADA LA SPENGO					
51	ALLA MAESTRA PARLERÒ DOPO		**E**			
52	IL PRETE FUMA LA PIPA			**E**		
53	A BERLINO TORNO LUNEDÌ					
54	DI MONETE NE HO POCHE	**E**				
55	ALCUNI AMICI HO INCONTRATO		**E**			
56	DEVONO TELEFONARE AI LORO GENITORI	**E**				
57	AL MIO BAMBINO GLI DO UN BACIO					
58	IL VINO ROSSO LO BEVO POCO		**E**			
59	IN QUESTA CASA VIVIAMO INSIEME	**E**				
60	DEI REGALI COMPRERANNO					
61	IL PROGETTO LO FAREMO					
62	GIORGIA VENDE I SUOI LIBRI					
63	LA TUA STORIA SAPPIAMO BENE					
64	MIO MARITO CERCA LE SUE SCARPE					
65	IN PASTICCERIA VADO SPESSO	**E**				
66	AL DOTTORE GLI TELEFONO		**E**			
67	LA CAMICIA BLU INDOSSA OGGI					
68	IL MAZZO DI FIORI GLIELO RESTITUISCO		**E**			
69	COSA PENSI DI FARE?					
70	ALLA CONFERENZA CI VENGO SOLO IO		**E**		**E**	
71	LA MATITA GLIELA PASSO				**E**	
72	UNA TORTA HO CUCINATO			**E**		
73	I CAPELLI DI LAURA SONO BELLISSIMI		**E**	**E**		**E**
74	IL TERRITORIO LO CONOSCE	**E**				
75	DI PROBLEMI NE AVETE DUE			**E**		
76	TUA SORELLA HO SALUTATO	**E**		**E**		
77	I MOBILI DELLA CASA LI VOGLIO CAMBIARE		**E**			
78	ALLO STADIO VADO SABATO					
79	è UNA SORPRESA CHE MI HAI FATTO	**E**	**E**	**E**		**E**
80	COSA MANGI DOMANI?					
81	LA CASA LA LAVO	**E**				**E**
82	AL CONCERTO ANDREMO TUTTI				**E**	
83	IL PRESIDENTE LO ODIAVANO					
84	AL MIO CAMERIERE GLI DO LA MANCIA		**E**		**E**	
85	TRASCORRO MOLTO TEMPO IN LIBRERIA	**E**	**E**	**E**		
86	LA RICHIESTA MANDEREI ORA					

87	A MIA SORELLA LE SPIEGO			**E**		**E**
88	LA LAMPADINA LA CAMBI DOPO					
89	è A MILANO CHE DEVI ANDARE			**E**		
90	CHI DEVE SCRIVERE IL SAGGIO?	**E**	**E**			**E**
91	L'OROLOGIO COMPRERAI					
92	IL PROFESSORE SPIEGA LA SUA TEORIA		**E**	**E**		
93	AL MIO FIDANZATO GLI FACCIO UN REGALO		**E**			
94	LO SPETTACOLO LO VEDREMO					
95	CHE COSA HAI VISTO PASSARE?	**E**	**E**			**E**
96	SU QUEL DIVANO CI STA SPESSO	**E**		**E**	**E**	**E**
97	IL TITOLO SCRIVO IO					
98	IL DOLCE LO VUOLE					
99	AL MINISTRO GLI SCRIVO					
100	I CRIMINALI SI SONO PENTITI				**E**	
101	LA CITTÀ CONOSCE BENE					
102	è LA POLIZIA CHE LO CERCA	**E**	**E**	**E**		**E**
103	NELLA PISCINA CI NUOTA SEMPRE			**E**		
104	IL CELLULARE LO HA ROTTO					
105	COSA STAI ASCOLTANDO?					
106	A FRANCESCO SPIEGO DOPO					**E**
107	IL DISEGNO HO PORTATO					
108	AL CONCERTO CI VERRANNO					
109	MANGIAMO SPESSO AL RISTORANTE					
110	DI VINO BIANCO NE BEVE TROPPO			**E**		
111	IO VADO SPESSO AL CINEMA	**E**	**E**	**E**		
112	AL GIUDICE GLI DICO TUTTO					
113	QUESTE SCARPE GLIELE VENDEREI					**E**
114	I PASSEGGERI SONO ATTERRATI		**E**			
115	GLI ATTORI LI AMMIRIAMO					
116	IL CANCELLO GLIELO APRO					
117	HA COMPRATO UNO ZAINO NUOVO		**E**			
118	AL SUPERMERCATO CI VADO DOMANI	**E**				
119	IN GERMANIA ABITO DA MESI		**E**			**E**
120	LA FINESTRA LA LAVA SARA					
121	DI BISCOTTI NE MANGIO TRE			**E**		
122	IL POSTINO SUONA IL CAMPANELLO					
123	ELEONORA NON LA VEDO DA MOLTO			**E**		
124	GLI SPAGHETTI LI MANGIAMO					
125	IL NEGOZIO CHIUDE ALLE SETTE					
126	A MILANO CI TORNO					
127	ALL'UFFICIO DEVO TORNARE					

128	IL QUADERNO AVEVO PERSO			**E**		
129	AL DIRIGENTE CHIEDO NOTIZIE					
130	AL CINEMA CI ANDRò					
131	LE FOTOGRAFIE SONO STATE COMPRATE					
132	AL RISTORANTE MANGIO DOMANI					
133	IN ITALIA CI ABITO					
134	TUTTI I VESTITI ABBIAMO SISTEMATO				**E**	
135	AL POSTINO APRI LA PORTA					**E**
136	TUTTI I PROBLEMI SONO SPARITI	**E**			**E**	
137	AL MERCATO ANDIAMO DOPO					
138	NON TI RICORDI COSA TI AVEVO DETTO?					**E**
139	IL NUOVO AUTISTA GUIDA LA MACCHINA					
140	GLI APPUNTI GLIELI PRESTO					
141	IN FRANCIA CI VIVREI					
142	NEL NEGOZIO ENTRIAMO DOPO					
143	TE LO DICEVO CHE NON SAREBBE ARRIVATO	**E**		**E**		**E**
144	IL PAVIMENTO HO LAVATO					
145	GLI STUDENTI SONO ENTRATI			**E**	**E**	
146	IL TUO GATTO LASCIO FUORI					
147	VORREI TANTO SAPERE CHI HAI VISTO IERI		**E**			
148	LE MIE AMICHE SONO ARRIVATE					
149	IN MACELLERIA CI VADO SPESSO			**E**		
150	I LIBRI DI PAOLO SONO CADUTI					
151	IL CUSCINO HA SPORCATO			**E**		
152	IL VINO BIANCO BEVO SPESSO					
153	A SCUOLA CI ENTRIAMO					
154	è UN CUCCIOLO CHE HO ADOTTATO		**E**		**E**	
155	FRANCESCA LEGGE MOLTE RIVISTE					

Bibliography

Arcara, G., Lacaita, G., Mattaloni, E., Passarini, L., Mondini, S., Benincà, P., Semenza, C. (2012), Is "hit and run" a single word? The processing of irreversible binomials in neglect dyslexia. *Frontiers in Psychology, 3, DOI: 10.3389/fpsyg.2012.00011*

Arcara, G., Semenza, C., Bambini, V. (2014), Word structure and decomposition effects in reading. *Cognitive Neuropsychology, 31,* 184-218.

Arduino, L. S., Burani, C., Vallar, G. (2003), Reading aloud and lexical decision in neglect dyslexia patients: a dissociation. *Neuropsychologia, 41,* 877-885.

Arduino, L. S., Previtali, P., Girelli, L. (2010), The centre is not the middle: Evidence from line and word bisection. *Neuropsychologia 48,* 2140-2146.

Badan, L., Del Gobbo, F. (2010), On the Syntax of Topic and Focus in Chinese, in: Benincà, P., Munaro, N. (eds.), *Mapping the left periphery. The cartography of syntactic structures*, vol. 5, New York: Oxford University Press, 63-90.

Belletti, A. (2008), The CP of Clefts. *Rivista di Grammatica Generativa, 33*, 191-204.

Belletti, A. (2012), *Focusing on clefts*, in: Paper presented at the Workshop Cleft Sentences in Romance and Germanic, Going Romance, Leuven.

Belletti, A. (2015), The Focus Map of Clefts: Extraposition and Predication, in: U. Shlonsky, (eds.), *Beyond Functional Sequence: The Cartography of Syntactic Structures*, vol. 10, New York: Oxford University Press, 42-57.

Benincà, P. (2001), The position of Topic and Focus in the left periphery, in Cinque, G., Salvi, G. (eds.), *Current Studies in Italian Syntax*, Amsterdam: Elsevier-North Holland, 39-64.

Benincà, P., Poletto, C. (2004), Topic, Focus and V2: defining the CP sublayers, in: Rizzi, L. (eds.), *The structure of CP and IP*, vol. 2, New York: Oxford University Press, 52-75.

Behrmann, M., Moschovitch, M., Black, S.E., Mozer, M. (1990), Perceptual and conceptual mechanisms in neglect dyslexia: Two contrasting case studies, *Brain, 113,* 1163–1183

Bianchi, V., Frascarelli, M. (2010), Is Topic a root phenomenon?. *Iberia: IJTL 2*, 43-86.

Bisiach, E., Luzzatti, C. (1978), Unilateral neglect of representational space. *Cortex, 14*, 129-133.

Burchert, F., Swoboda-Moll, M., De Bleser, R. (2005), The left periphery in agrammatic clausal representations: evidence from German. *Journal of Neurolinguistics, 18,* 67-88.

Caplan, D., Michaud, J., Makris, N. (2016), Deficit-lesion correlations in syntactic comprehension in aphasia. *Brain & Language, 152,* 14-27.

Caramazza, A., Hillis A. E. (1990), Levels of representation, coordinate frames, and unilateral neglect. *Cognitive Neuropsychology, 7,* 391-445.

Cecchetto, C. (2000), Doubling Structures and Reconstruction. *Probus, 12:1*, 1-34

Cecchetto, C., Chierchia, G. (1999), Reconstruction in Dislocation Constructions and the Syntax/Semantics Interface, in: Blake, S., Kim, E., Shahin, K. (eds.) *Proceedings of the 17th West Coast Conference on Formal Linguistics,* Stanford: CSLI publications, Stanford University, 132-146.

Chokron, S., Imbert, M. (1993), Influence of reading habits on line bisection, *Cognitive Brain Research, 1,* 219-222.

Cinque, G. (1977), The Movement Nature of Left Dislocation. *Linguistic Inquiry, vol. 8, 2,* 397–412.

Daini, R., Angelelli, P., Antonucci, G., Cappa, S., Vallar, G. (2002), Exploring the syndrome of spatial unilateral neglect through an illusion of length, *Experimental Brain research, 144 (2),* 224-237.

Danckert, J., Ferber, S. (2006), Revising unilateral neglect. *Neuropsychologia, 44*, 987-1006.

Delais-Roussarie E., Doetjes, J., Sleeman, P. (2004), Dislocations, in: Corblin. F., de Swart, H. (eds.) *Handbook of French semantics,* Stanford, CA: CSLI Publications, 501–528

Deutsch, A.J. (1963), Attention: Some theoretical considerations. *Psychological Review, 70 (1),* 80-90.

Ellis, A. W., Flude, B. M., Young, A. W. (1987), "Neglect dyslexia" and the early visual processing of letters in words and nonwords, *Cognitive Neuropsychology, 4,* 439-464.

Fischer, M.H. (1996), Bisection performance indicates spatial word representation, *Cognitive Brain Research, 4,* 163-170.

Friedmann, N. (2002), The fragile nature of the left periphery: CP deficits in agrammatic aphasia, in: Falk, Y. (eds.) *Proceedings of the 18th IATL Conference*.

Friedmann, N., Tzailer-Gross, L., Gvion, A. (2011), The effect of syntax on reading in neglect dyslexia. *Neuropsychologia, 49,* 2803-2816.

Garzonio, J. (2008), Dislocazioni a sinistra e clitici di ripresa obbligatori. *Annali Online di Ferrara, 2,* 1-19.

Guariglia. C., Padovani, A., Pantano, P., Pizzamiglio, L. (1993), Unilateral neglect restricted to visual imagery, *Nature, 364,* 235-237.

Gundel, J., Fretheim, T. (2004), Topic and Focus, in: Horn, I., Ward, G. (eds.) *The Handbook of Pragmatics,* Oxford: Blackwell, 175-196.

Gussenhoven, C. (2007), The Phonology of Intonation, in: de Lacy, P. (eds.) *The Cambridge Handobook of Phonology,* Cambridge: Cambridge University Press, 253-280.

Haegeman, L. (2012), *Adverbial Clauses, Main Clause, Phenomena, and the Composition of the Left Periphery*. New York: Oxford University Press, 3-52.

Haywood, M., Coltheart, M. (2000), Neglect dyslexia and the early stages of visual word recognition. *Neurocase, 6,* 33-44.

Heilman, K. M., Bowers, D., Valenstein, E., Watson, R.T. (1985), Hemispace and Hemispatial Neglect, *Advances in Psychology, 45,* 115-150.

Jewell, G., McCourt, M. E. (2000), Pseudoneglect: a review and meta-analysis of performance factors in line bisection tasks, *Neuropsychologia, 38,* 93-110.

Karnath, H. O., Huber, W. (1992), Abnormal eye movement behaviour during text reading in neglect syndrome: A case study, *Neuropsychologia, 30,* 593-598.

Kinsbourne, M., Warrington, E.K., A variety of reading disability associated with right hemisphere lesions, J*ournal of Neurology, Neurosurgery, and Psychiatry, 25(4),* 339-344.

Kinsbourne, M. (1987), Mechanisms of Unilateral Neglect, *Advances in Psychology, 45,* 69-86.

Krifka, M. (2007), Basic notions of Information Structure. *Acta Linguistica Hungarica, 55,* 243-276.

Kwon, S.E., Heilman, K.M. (1991), Ipsilateral neglect in a patient following a unilateral frontal lesion, *Neurology, 41 (12),* DOI: 10.1212/WNL.41.12.2001

LaBerge, D., Brown, D. (1989), Theory of attentional operations in shape identification, *Psychological Review, 96,* 101-124.

Làdavas, E., Umiltà, C., Mapelli, D. (1997), Lexical and semantic processing in the absence of words reading: Evidence from neglect dyslexia, *Neuropsychologia, 35,* 1075-1085.

Leikin, M., Bouskila, O. A. (2004), Expression of syntactic complexity in sentence comprehension: a comparison between dyslexic and regular readers. *Reading and Writing, 17,* 801-822.

Marelli, M., Luzzatti, C. (2012), Frequency effects in the processing of Italian nominal compounds: Modulation of headedness and semantic transparency, *Journal of Memory and Language, 66,* 644-664.

Martelli, M., Arduino, L. S., Daini, R. (2011), Two different mechanisms for omission and substitution errors in neglect dyslexia. *Neurocase, 17 (2),* 122-132.

Ortigue, S., Mégevand, P., Perren, F., Landis, Blanke, O. (2006), Double dissociation between representational personal and extrapersonal neglect, *Neurology, 66,* 1414-1417.

Poletto, C., Bocci. G. (2016), Syntactic and prosodic effects on Information Structure in Romance, in: Féri, C., Shinichiro, I. 8eds.) *The Oxford Handbook of Information Structure,* New York: Oxford University Press.

Pollock, J. Y. (1989), Verb movement, universal grammar, and the structure of IP, *Linguistic Inquiry, 20,* 364-424.

Posner, M.I., Presti, D. (1987), Selective Attention and Cognitive Control, *Trends in Neuroscience, 10,* 12-17.

Primativo, S., Arduino, L., De Luca, M., Daini, R., Martelli, M. (2013), Neglect dyslexia: A matter of "good looking", *Neuropsychologia, 51,* 2109-2119.

Rayner, K. (1979), Eye guidance in reading: fixation locations in words. *Perception, 8*, 21–30.

Reinhart, S., Wagner, P., Schiltz, A., Keller, I., Kerkhoff, G. (2013), Line bisection error predicts the presence and severity of neglect dyslexia in paragraph reading, *Neuropsychologia, 51*, 1-7.

Reznick, J., Friedmann, N., Evidence from neglect dyslexia for morphological decomposition at the early stages of orthographic-visual analysis, *Frontiers in Human neuroscience*, DOI: 10.3389/fnhum.2015.00497.

Rizzi, L. (1997), The Fine Structure of the Left Periphery, in: Haegeman, L. (eds.) *Elements of Grammar: Handbook of Generative Syntax*, Dordrecht: Kluwer, 281-337.

Rizzi, L. (2004), Locality and Left Periphery, in: Belletti, A. (eds.) *Structures and Beyond, The Cartography of Syntactic Structures*, vol. 3, New York: Oxford University Press, 223-251.

Roggia, C. E. (2009), *Le frasi scisse in Italiano: struttura informativa e funzioni discorsive*. Genève: Skatline.

Ronchi, R., Algeri, L., Chiapella, L., Gallucci, M., Spada, M. S., Vallar, G. (2016), Left neglect dyslexia: Perseveration and reading error types. *Neuropsychologia, 89*, 453-464.

Semenza, C., Arcara, G., Facchini, S., Meneghello, F., Ferraro, M., Passarini, L., Pilosio, C., Vigato, G., Mondini, S. (2011), Reading compounds in neglect dyslexia: The headedness effect, *Neuropsychologia, 49,* 3116-3120.

Stein, J., Walsh, V. (1997), To see but not to read; the magnocellular theory of dyslexia. *Trends in neurosciences, 20,* 147-152.

Subbiah, I., Caramazza, A. (2000), Stimulus-centered Neglect in Reading and Object Recognition. *Neurocase, 6*, 13-31

Tajsner, P. (2008), *Aspects of the Grammar of Focus: A minimalist view*. Frankfurt; Peter Lang AG.

Treisman, A.M. (1969), Strategies and models of selective attention. *Psychological Review, 76* (3), 282-299.

Vallar, G. (1998), Spatial hemineglect in humans, *Trends in Cognitive Sciences, 2*, 87-97.

Vallar, G., Daini, R., Antonucci, G. (2000), Processing of illusion of length in spatial hemineglect: a study of line bisection, *Neuropsychologia, 38,* 1087-1097.

Vallar, G. (2001), Extrapersonal Visual Unilateral Spatial Neglect and Its Neuroanatomy, *NeuroImage, 14,* 52-58.

Vallar, G., Burani, C., Arduino, L. S. (2010), Neglect dyslexia: a review of the neuropsychological literature. *Experimental Brain Research, 206*, 219-235.

Veronelli, L., Vallar, G., Marinelli, C. V., Primativo, S., Arduino, L. S. (2014a). Line and word bisection in right-brain damaged patients with left spatial neglect. *Experimental Brain Research, 232,* 133-146

Veronelli, L., Guasti, M. T., Arduino, L. S., Vallar, G (2014b) Combining language and space: sentence bisection in Unilateral Spatial Neglect. *Brain & Language, 137*, 1-13.

Zanuttini, R., Portner, P. (2003), Exclamative Clauses: At the Syntax-Semantics Interface. *Language, 79,* 39-81

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