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***Italian Prepositions in Aphasic Production:
evidence from three experimental studies.***

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To Luca, Cristina, Fabio and Marco

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INTRODUCTION

In their linguistic interactions, people make large use of prepositions, using them in several contexts in order to, for instance, add informational material, establish a correlation between two other components of the sentence, express spatial or temporal relations holding between objects. Hence, prepositions are a peculiar grammatical class, in that they can be used to fulfil many different syntactic functions. For this reason, the classification and definition of prepositions in fine grained terms remains a challenge for theoretical linguists, who are still looking for a unitary description of these elements.

The greatest difficulty in studying prepositions is the fact that they often share properties of both lexical and functional categories. On the one hand, in fact, they act as functional heads, in the sense that they are case-less, and they do not usually merge with TAM (tense–aspect–mood) morphology. Moreover, some prepositions (usually, simple ones) are mainly monosyllabic items without stress and their limited number seems to indicate that, like pronouns or determiners, they pertain to a closed grammatical class.

However, on the other hand, another group of prepositions includes polysyllabic elements with heavy semantic content. They also assign clearly defined theta-roles to their complements (e.g. spatial and temporal prepositions) being, thus, classified as lexical items.

What is more, in some cases, a single preposition can show different properties depending on how it is used in the sentence. Just to mention one example, the Italian preposition *a* can be: (i) a dative case marker (e.g. *Dare qualcosa a qualcuno*, to give something **to** someone); (ii) a spatial directional preposition (e.g. *Vengo a Roma*, I come **to** Rome) (notice that in this case it also participates in the semantic interpretation of the sentence, specifying the direction of the movement); (iii) a subcategorized preposition, selected by the verb (e.g. *Penso a Maria*, I think of Mary).

Prepositions have also been often shown to be problematic for patients affected by aphasic deficits. This fact is not surprising, considering that they are involved in many different syntactic structures, being, thus, very frequently used by normal speakers. Despite this, the syntax of prepositions has been a somewhat neglected topic within the neuro-linguistic literature. This is possibly due to the fact that these items have not been completely understood in theoretical terms, and that, as a consequence, linguistic anomalies are hardly interpretable. Indeed, the existence of many different hypothesis on the syntactic structure

underlying prepositional phrases, could also lead to different (sometimes opposite) explanations of the origin of the deficit.

On the other hand, however, the assessment of aphasic patients' linguistic skills could become a very useful tool to identify which linguistic model is more likely to reflect how really the language faculty works. Moreover, linguistic research may suggest a different point of view both to identify patients' disorders and to project a targeted rehabilitation program.

In particular, according to us, generative linguistics has the advantage of considering the language faculty as an innate component of all human beings. Studies based on generative assumptions, basically aim to identify how the universal grammar postulated by Noam Chomsky (1981) is organized, at the same time describing, in detail, the parametric variations existing among languages. The most important method used by generative linguists is the cross-linguistic analysis of specific phenomena, through which they try to determine the unitary structure underlying them.

In particular, as far as the syntax of prepositions is concerned, our work is based on the cartographic approach, whose principal ideas are exposed in Cinque and Rizzi (2010). The main goal of this approach is to map natural language syntactic structures in as much detail as possible. Every single feature of a clause is represented in the cartographic architecture, including its semantic nuances and the lexical item content specifications. Thus, abstract components, which are essential in the construction of the sentence, such as for instance mood, aspect, tense etc., are considered and, from our viewpoint, are crucial in order to detect possible subtle linguistic deficits. Furthermore, the cartographic approach tries to explain the interactions between syntax and semantics. This is particularly important in a work assessing prepositions given that, as stated above, these elements often carry semantic content, at the same time fulfilling syntactic functions.

Under these considerations, investigations on language disorders can be a helpful issue for generative linguists, especially if addressing controversial fields such as the morpho-syntax of prepositions. Brain injuries, in fact, as any illness, are transversal in affecting people of every age, gender, social class, and, above all, of every language. That is why, it is reasonable to assume that similar brain damages cause similar language deficits, affecting the same underlying mechanism in all languages.

Hence, linguistic studies also taking into account anomalies occurring in aphasic speech, probably have some more chance to successfully build up a plausible language model,

becoming, at the same time, very helpful means for the identification of the causes of the deficit.

We have also to stress the fact that prepositions often encode locative meaning, being used to describe the spatial relations holding among objects. In these cases, therefore, there is a strict correlation between the linguistic expression of space and its mental representation. For this reason, in our opinion, a linguistic analysis of prepositions cannot ignore evidence coming from the study of aphasic patients, which can shed light on how prepositions are processed in the brain. A neuro-linguistic point of view, in fact, could allow us to observe the interaction of processes underlying both the linguistic expression and the non-linguistic mental design of events (fixed or in motion).

At first sight, neuro-anatomical observations are consistent with the claim that language and space are mutually segregated (Chatterjee, 2001; 2008), given that impairments in language, are usually associated with left hemisphere damages, while impairments of spatial representations are associated with right hemisphere damages. Under these assumptions it could be argued that language and space are neurologically independent. Nevertheless, despite these broad differences in their neuroanatomy, language and space can hardly be considered completely split (Mesulam, 1998). In language psychology, for example, it has been frequently proposed that human spatial language is a direct reflection of our anthropomorphic and relativistic concept of space (See Levinson 2003 for a detailed review), and even some language acquisition studies have shown that the first linguistic expressions of spatial relations are probably acquired later than non-linguistic spatial knowledge (Leikin 1998).

In conclusion, the goal of this work is to analyze Italian PPs, from both a theoretical and an experimental perspective. We will develop three main topics: the morphology of Italian simple prepositions contracting with definite articles; the syntax of Italian complex prepositions and the linguistic representation of spatial relations; the nature of prepositional compounds (including both complex and simple prepositions) and the processes leading to their formation.

From a theoretical point of view, our study will be mainly ground on the most recent cartographic studies on the syntax of prepositions and will be developed in a cross-linguistic perspective. Moreover, morphological operations underlying the formation of prepositional contracted forms will be addressed.

Three neuro-linguistic experiments will also be described, every one assessing one of the fields I have just mentioned. In particular, we will present a study assessing the production of articulated prepositions in a group of aphasic patients and two case-studies, both involving an agrammatic patient, aimed at collecting data on the linguistic production of complex prepositions and prepositional compounds.

Our work will be organized as follows:

In the **first chapter** I will present a detailed review of the major existing studies concerning the contraction of prepositions with other functional elements. This section has been developed following a cross-linguistic approach, in order to observe how the same phenomenon can occur in different languages. As we will see, prepositions can contract and fuse with an adjacent functional element in many languages. In some cases, like for instance in French, Portuguese and German, the definite article can be incorporated to the preceding simple preposition, on condition that the two elements appear in adjacent positions. In Celtic languages, instead, the preposition contract with the following personal pronoun. Exploring the distribution of this phenomenon among languages, I will also present the theoretical explanations which have been advanced to describe the underlying process leading to the formation of these complex elements. Two main hypotheses will be taken into consideration: (i) an inflectional theory (Nevis and Napoli, 1987; Zwicky, 1987; Cabredo, in press), claiming that contracted forms actually are inflected prepositions and, consequently, that it is not necessary to postulate a syntactic/morphological operation for their formation; (ii) a compositional theory, arguing for a syntactic or morphological origin of contracted prepositions, which should be considered as items composed by two elements, both keeping their primitive grammatical and semantic properties.

In the **second chapter** I will take into consideration Italian simple and complex prepositions. As far as simple prepositions are concerned, we will especially address the formation of contracted forms. We will start from Nevis and Napoli's (1987) work in which they argue for the existence of inflected prepositions, taking agreement endings as those appearing on demonstratives and definite articles. Mainly following Embick and Noyer's (2001) insights,

based on the Distributive Morphology framework, I will argue against Nevis and Napoli (1987), that articulated prepositions are the result of a morphological post-syntactic operation. Complex prepositions will be assessed from a syntactic point of view. The most recent theories provided by the cartographic literature and mainly collected in Cinque and Rizzi (2010) will be presented and applied to the analysis of Italian complex prepositions too. Folli (2008) and Tortora (2005, 2006)'s considerations on this field will also be taken into account. A further section will then, be, dedicated to Italian prepositional compounds including both simple and complex prepositions. Here again, the most important studies dealing with the processing which give rise to these elements will be presented. As we will see, the retrieval of prepositional compounds has not been completely understood, and many different hypotheses have been advanced. The two principal positions are that (i) prepositional compounds, as all complex words, are unitary lexical items directly selected from the lexicon; (ii) a syntactic compositional process has to be postulated in order to explain the origin of prepositional compounds. We will especially look at Delfitto and Melloni's (2009) proposal, in which a syntactic derivation for all types of complex words is hypothesized.

The **third chapter** will be dedicated to a detailed survey of the neurolinguistic investigations dealing with prepositions and aphasic speech. We will observe as the interpretation of the linguistic deficit can be different depending either on the theoretical background authors refer to or on the type of tasks patients are asked to perform. In general, we will show that, even if the origin of the deficit involving prepositions is difficult to identify, these items are often impaired in aphasic speech. Further investigations, thus, are needed, in order to better understand where the language system is broken.

The **three last sections** of this dissertation will be dedicated to three experiments involving patients with language deficits. Every section will be devoted to explore one of the fields we addressed in the previous sections.

Our goal is, in the one hand, to describe as Italian patients with aphasic diseases use prepositions and, on the other hand, to identify the theoretical hypotheses closer to the real parsing of prepositions in healthy language.

The **first experiment** has been created to explore how aphasic patients behave when they are forced to produce articulated prepositions. Two tasks (a sentence completion and a sentence repetition task) have been performed by several patients diagnosed with different types of aphasia. On the basis of the results, we will show that a constructionist hypothesis is to be preferred respect to an inflectional one.

The **second experiment** is a case study involving an agrammatic patient. The goal of this investigation is to assess how a subject with heavy morpho-syntactic deficits processes complex prepositions. Very interestingly, the results will confirm those theories arguing for a functional nature of complex prepositions. In particular, as we will show, Svenonius' (2006) insights on the existence of both Axial Parts and relational nouns, seem to be on the right track.

The **third experiment** is a case study too, and deals with prepositional compounds. Again, a patient with a severe agrammatic aphasia has been involved. He performed reading, repetition and completion tasks including all types of Italian compound words and prepositional unlexicalized phrases. Results seem to indicate that while NpNs (noun-simple preposition-noun) are compositionally retrieved, PN compounds (complex preposition-noun) are selected as unique lexical entries.

1. ARTICULATED PREPOSITIONS: A CROSS-LINGUISTIC PERSPECTIVE

The majority of Italian simple prepositions can fuse with the definite article which introduce their complement, generating a new unique word. When the contraction is allowed, the derived paradigm is complete, including all gender and number combinations. The Italian case, therefore, is useful to develop a detailed analysis of contraction phenomena concerning prepositional elements.

Italian, however, is not the only language in which a contraction operation involving prepositions takes place. The fusion of a preposition with an article or with another functional element such as, for instance, a personal pronoun, can be found in many other languages. Nevertheless, whereas the morpho-syntactic behaviour of Italian “articulated” prepositions have not received great attention in previous research (to our knowledge only one study exists by Napoli & Nevis (1987) specifically devoted to this topic), a lot more has been done in other languages. Many studies have been developed with the purpose of explaining the syntactic mechanism leading to contraction, and the morphological status of the new lexical element.

The scientific debate about the nature of contracted prepositions has been developed around two opposite issues concerning the cognitive processing of their retrieval. Following an inflectional point of view, contracted forms should be considered as inflected words displaying agreement endings. Thus, following this approach, the presence of two fused elements should be rejected because the final part of the preposition should be considered as an inflectional morpheme rather than a true article or a true pronoun. As a consequence, “inflected prepositions” (as for instance Napoli and Nevis 1987 call them) are directly selected from the lexicon, where they are stored as specific lexical entries. Then, once they have been selected and their features checked, no further operations are necessary to their formation.

On the contrary, from a strictly syntactic perspective, contracted forms are the result of syntactic and morphological operations taking place after the selection of lexical entries. The contracted preposition, thus, despite being a morphologically unique word, is formed by two different elements which play their specific role in the syntactic derivation of the sentence.

In addition to these two opposite approaches, other hypotheses have been developed, based on both inflectional and syntactic assumptions and providing mixed theories to explain the phenomena of contracted forms.

In this section we present the most important works concerning prepositional contractions in languages other than Italian. We think that, some of the theoretical observations developed here could also be applied to the Italian case, which until now has not received enough attention.

First of all, we will take into consideration French, German, and Portuguese, in which, as in Italian, prepositions combine with definite articles. Then, we will focus our attention on Irish and other Celtic languages, where prepositions can fuse with personal pronouns.

1.1 Languages with contraction between prepositions and articles

1.1.1 French inflected prepositions

French has a little inventory of fused forms composed by a preposition and an article. In particular the contraction occurs when the prepositions *à* (at) and *de* (of) take as a complement a noun introduced by the singular or plural masculine form of the definite article (*le/les*).

Zwicky (1987) analyzed French fused forms through a comparison between contexts in which their presence is allowed and contexts where an elision strategy is preferred.

In French, the contraction of prepositions and articles into a unique word is limited to masculine singular and plural nouns beginning with a consonant, like for example in (1).

(1) a. du garçon
of-the boy

b. *du homme.
of-the man

lb becomes grammatical only substituting *du* with *de l'* and using, therefore, a non-contracted solution with the application of the elision rule on the article. *Du* and *de l'* are thus allomorphs

of the same form, given that, while the meaning they convey and the syntactic role they play in the sentence are the same, their form changes depending on the phonological characteristics of the following noun.

According to Zwicky (1987), the linguistic system resorts to contraction only when any other possibility is ruled out. In French, for instance, only when elision is impossible, namely with masculine nouns beginning with a consonant, a fused form is required. In this way a new form is created only when any other solution is impossible, thus following a sort of economy rule. To explain this phenomenon Zwicky (1987) formulates the *Rules of Referral* (reported in (2)) which operate on the phonological domain.

(2)“Art[+DEF, MASC, SG] in morphosyntactic structure is referred to the corresponding [FEM] when a V-initial word follows.” (Zwicky,1987)

Briefly, the *Rules of Referral* describes a kind of compensation strategy applied by the language system when a special phonological context occurs. Specifically, when two adjacent words are not phonologically compatible, the linguistic system automatically resorts, if possible, to the corresponding feminine/masculine form. In this way the phonological barrier is circumvented, without the formation of a new word.

For instance, in French, the possessive feminine adjectives *ma, ta, sa*, are substituted with the masculine forms *mon, ton, son* before a feminine noun beginning with a vowel (e.g. *mon amie* – my friend_{FEM}). At the same time, the masculine demonstrative *ce* becomes *cet* before a vowel initial noun, its pronunciation exactly matching with the feminine form *cette*. In this way the linguistic system economizes, using an already existent element instead of creating a new one.

According to Zwicky, a similar process occurs when a combination of a preposition and a determiner is required. In fact, if the masculine form *du* cannot be used because of phonological reasons (see e.g. (1b)), the solution *de l'* has to be selected. This last form, Zwicky argues, comes from the application of elision rules on the feminine form *de la*, as normally happens also with all vowels initial feminine words, leading to an “already known” phonological result (*de l'*). With such a solution Zwicky explains the existence of the masculine allomorph avoiding the postulation of a further form *de le* on which elision should be always applied, given that it doesn't exist in French.

As far as the formation of fused prepositions is concerned, Zwicky (1987) proposes a theory that could be considered as a midpoint between a syntactic and an inflectional one.

On the one hand, in fact, he refuses a complete inflectional explanation, arguing that this approach doesn't take into account the definiteness feature that seems to characterize fused forms. In fact, he claims, if we consider contraction as a morphological inflection, we also have simultaneously to explain why articles cannot appear after an inflected preposition and why inflected prepositions can only appear with definite NPs.

Zwicky (1987) suggests, as a possible solution, the existence of two kinds of prepositions, one of which is marked with a definiteness feature. Only this one should be selected if inflection is needed.

Anyway he limits this hypothesis to French, arguing that other languages, like Italian and German, match with a totally inflectional theory, as argued by Hinrichs (1984) and Napoli & Nevis (1987), for instance.

On the other hand, he also rejects a solely functional hypothesis which assimilates the fusion process to a cliticization mechanism considering contracted forms as complex portmanteau. According to Zwicky (1987), in fact, while clitic elements maintain their syntactic identity when they are involved in an enclitic or proclitic construction, fusion of a preposition and an article lead to the formation of a unique complex word which substitute a piece of phonological material.

In the light of these preliminary remarks, Zwicky (1987) claims that contracted French PPs are simple portmanteau (SP), namely complex PPs paired with an unanalysed word carrying P features. In other words SP theory, consider fused form as two syntactically distinct elements expressed by a unique morpho-syntactic form. Notice that this hypothesis agrees with Zwicky's (1987) *Referral Rules*, given that the preposition *du* and his allomorph *de l'* are exactly the same from a syntactic point of view, but obviously, only in the non contracted solution both the preposition and the article are identifiable.

A second, more recent analysis of French "inflected" prepositions has been offered by Patricia Cabredo (in press). She presents the case of French prepositions comparing them with German ones. In both languages, contracted forms involving prepositions and articles exist. Focusing her attention especially on coordination phenomena, she claims that French prepositions should be considered inflected items, selected from the lexicon with specified features of number, gender and case, before the syntactic derivation take place. On the

contrary, as we will see, she argues that German contracted forms arise from a syntactic process.

With regard to the French case, Cabredo (in press), as Zwicky (1987), refuses to consider contracted forms a simple result of phonological rules, and she reports the following examples in which the same phonological context doesn't cause a contraction.

(2) a. Jean a peur de le mettre

Jean is afraid to it put.

b. *Jean a peur du metre

Jean is afraid of-it put

c. Jean a peur du maître

Jean is afraid of-the master

d. *Jean a peur de le maître

Jean is afraid of the master

It is clear that from the phonological side, (2a) and (2c) are exactly the same. In (2b) however, the contraction with a clitic pronoun introducing an infinitival sentence is not admitted. At the same time, as exemplified by (2d), the fused preposition *du* cannot be split.

On the other hand, syntactic reasons are nowhere to be found to show the formation of contraction, given that no differences in distribution, functional status and semantic content between fused forms and separated ones are detected. In addition, Cabredo (in press) observes, a fused form cannot be replaced by a non-fused one, as shown in examples (3) and (4).

(3) a. Le père du garçon

The father of-the boy

b. *Le père de le garçon

The father of the boy

(4) a. Il parle au garçon

He talks to-the boy

b. *Il parle a le garçon

He talk to the boy

Following Kiparsky (1982) she explains this impossibility through the *Elsewhere Condition*, according to which a specific rule is always preferred instead of a less specific one. So, if a single word exists expressing all required information, a two words combination is *blocked*.

This observation leads to the same conclusion we have found in Zwicky (1987), namely that contracted forms are the real allomorphs of non contracted ones.

According to Cabredo (in press), however, the process leading to the emergence of contracted forms is quite different. She claims that, considering that prepositions obligatorily fuse only with singular and plural masculine definite articles (*le/les*), contraction depends on the morphological characteristics of the DP they introduce. Feminine article *la* and the elided form *l'* (both masculine and feminine) are not involved in this process.

Following Anderson's *Split Morphology* hypothesis (1986, 1992) she admits the possibility of morphological operations both before and after the syntactic derivation. Since she has already excluded a syntactic operation causing the contraction, she claims that French fused prepositions must be derived by a pre-syntactic morphological mechanism.

Hence, fusion of a preposition and an article gives rise to a unique inflected word, belonging to the prepositional category. This operation is triggered by morphological characteristics of the NP complement which, in turn, influences the selection of the definite article involved in the contraction.

Thus, when the syntactic derivation takes place, the contraction process has already been concluded and a single inflected preposition occupying a unique syntactic node, can be inserted.

Cabredo (in press) takes coordination as a further demonstration of her assumptions. In fact, if two NP complements of the same preposition, one of which needs the contracted form, have

to appear in coordinated sentences, the preposition has to be repeated twice, in order to obtain a grammatical result, as shown in examples in (5)¹.

- (5) a. J'ai parlé à la mère et la fille
I have talked to the mother and the daughter
- b. *J' ai parlé au père et la mère.
I have talked to-the father and the mother
- c. *J'ai parlé à le père et la mère.
I have talked to the father and the mother
- d. *J'ai parlé à la fille et le garçon.
I have talked to the daughter and the boy

According to Cabredo (in press), (5a) is possible because the both the NPs *la mère* and *la fille* disallow the contracted form. In sentences (5b), (5c) and (5d), instead, a masculine complement is present and the derivation crashes, because of the impossibility of coordinate a contracted form and a non-contracted one.

To explain this phenomenon, Cabredo (in press) argues that the coordination does not simply involve two NPs, but that it takes scope on two complete PPs, the second losing its preposition when the coordination occurs. Thus, given that (i) the deletion of a contracted form would also lead to the lack of the determiner and that (ii) the blocking effect excludes the possibility of a non contracted solution, this operation is impossible when a contracted form is required.

Zwicky (1987) too deals with coordination phenomena, reporting some examples drawn from the normative grammar of Grevisse (1964), in which the coordination that Cabredo excludes seems to be acceptable. However, as also Zwicky underlines, all of these examples concern citations of book titles which have to be considered special, in view of their mention use.

Just to take an example, consider the sentences in (6) (drawn from Zwicky 1987)

¹ Examples drawn from Cabredo (in press)

(6) a. Les héros du “Diable et le Bon Dieu”

The heroes of-the “Evil and the Good Lord”

b. La dédicace du “Coq et l’ Arlequin”

The dedication of-the “Cock and the Harlequin”

In both sentences a coordination involving a contracted form appears, without the repetition of the preposition in the second conjunct. Zwicky (1987) explains this apparent anomaly by invoking the principles of:

Integrity: material quoted in a sentence must appear exactly as in the original. (Zwicky, 1987)

and

Grammaticality: when a constituent appears within a sentence, both the constituent and the material surrounding it must satisfy all relevant grammatical conditions of the language. (Zwicky, 1987).

Furthermore, he said that, when necessary, one of the two principles have to be “sacrificed” in order to obtain an acceptable result.

So, in (6a) and (6b) the first determiner of the mentioned title is considered as external, and fused with the preposition.

In addition, it seems to us that this is not a real case of coordination of two NPs, because the preposition takes scope on the entire title and not on its single components. The sentence in (7), in fact, shows that the use of a non-fused form is also accepted despite the presence of a masculine singular noun after the preposition. This fact confirms that the entire title should be considered as a unique lexical item, comparable to a proper noun without article.

(7) La fin de “ Le Rouge et le noir” (Zwicky, 1987)

1.1.2 German inflected prepositions

The distribution and usage of German prepositional contracted forms are quite complex, mainly because of the existence of both the contracted and the non-contracted forms. Anyway, the two possibilities seem to be in complementary distribution if we take into consideration the semantic and pragmatic interpretations linked to the syntactic environment. First of all, in standard German, not all prepositions can fuse with the determiner and give rise to a contracted form. Prepositions which can do it are; *an* (at/on), *bei* (at/near), *in* (in), *von* (of), *um* (at/around), *zu* (to). Contracted forms also express case specification and never occur when a plural determiner is required.

Interestingly, unlike French prepositions, German inflected ones are not completely interchangeable with non-contracted forms, which also exist. Thus, the *blocking* effect apparently does not hold in German. To summarize in which contexts German contracted forms can be used, we will refer to Waldmüller (2008), in which a thorough description is provided.

As far as contracted prepositions are concerned, they are obligatorily inserted when their NP complement forms part of (i) an idiomatic expression; (ii) nominalised infinitives, (iii) proper names requiring a definite article, (iv) date expressions, and (v) preposition *am* + adverbial superlatives.

First of all it seems clear that, like Zwicky has already observed for the French case, also German fused prepositions add some definite value to their complement, contrarily to the non contracted form.

Secondly, the fusion of the preposition with the article is used to introduce entities that are considered unique for general knowledge of the world (such as the moon, the Pope etc.), for social context (the father, the mother etc.) or for conversational reasons (talking about a house: the kitchen, the garden etc.). At the same time, contracted forms are allowed neither in anaphoric nor in deictic contexts nor with restricted relative clauses because, when more than one referent is possible in the sentence, the presence of a contracted form is not sufficient to solve the ambiguity; for this reason only unique referents are admitted.

Non-contracted forms can be used only with elements which have already been introduced in the discourse, so that the hearer knows them. Thus, they are obligatory when an anaphoric

link with an NP previously mentioned has to be established. That is why, non-contracted forms appear with restricted relative clauses and with all restrictive modifiers in general.

In contrast to the Italian case, German contracted forms have been studied by several linguists. Many theories have been proposed to explain how these elements are computed. Essentially three main ideas have been followed; a phonological one, an inflectional one, and a syntactic one.

Phonological mechanisms have been taken into consideration, but homophonous contexts in which the contraction takes place are easily detectable, so they have been immediately excluded. For instance, Shaub (1979) proposes a phonetic process responsible of the contraction phenomenon.

According to her a two-step operation is necessary. First of all the article is simplified through elision of its first consonant: *d*. Then, the remaining material is attached to the adjacent final phoneme of the preposition.

Shaub (1979) explains the existence of both contracted and non contracted forms adducing social and psychological reasons governing the choice of the speaker. Nevertheless, she seems not to consider that phonologically identical contexts exist, which display a different behaviour as far as contraction is concerned. Nevertheless, her analysis has the merit of anticipating the local relation between prepositions and articles, that seems to be necessary for the contracted forms to appear.

Mixed analyses that combine phonological mechanisms and grammatical constraints have been formulated by Nübling (1992) and Shiering (2006). The first one considers determiners involved in contracted forms as enclitic articles, linked to a prepositional phrase. Following Nübling's theory, articles syntactically depend on the NP complement of the PP, even if they are phonetically fused with the preposition. In order to explain the possibility of having contracted and non-contracted forms raising from the same combination, he postulated the existence of three degrees of cliticization; simple clitic; special clitic and inflection.

When both the contracted form and the non contracted one are allowed, a cliticization phenomenon has to be assumed; if the two solutions have the same meaning, the article is a simple clitic, and fusion depends of an economy choice of the speaker. On the contrary, if they differ in semantic interpretation, the article should be considered a special clitic.

Finally, in some cases a non contracted form does not exist and usage of a fused element is the unique option. In this case, Nübling (1992) consider the contracted form as an inflected element, directly derived from the lexicon.

Shiering (2006) proceeds in the same direction. He postulates the same clitic nature of contracted forms and the existence of the three steps already mentioned in Nübling's theory (1992). In addition, she considers contraction as the preferred option, assuming that non-contracted forms are used ad hoc, to contrast or emphasize an idea.

We present now two theories which follow a lexical approach, in order to explain formation of contracted prepositions.

Hinrich (1986) rejects a cliticization theory to explain contracted forms. If a clitic article really existed, he claims, it should be also available in some other contexts, and not only in contracted prepositions. Moreover, a cliticization process should involve the entire paradigm of the articles, while feminine and plurals forms are most often absent. Finally, he thinks that this hypothesis is not sufficient to explain interpretational differences between contracted and non contracted forms. In contrast, he proposes that, while a cliticization process have to be excluded, contracted forms should be considered the product of an affixation mechanism.

According to him, fused prepositions have to be considered inflected items, represented by a unique lexical entity. He calls them *case-marked prepositions* and postulates that they carry definiteness features. Semantic and pragmatic rules govern their usage, establishing when a contracted form is required and when, instead, a non-contracted one has to be used. Contracted forms introduce specific entities, but also generic ones, providing that they constitute a unique unit. In contrast, non-contracted forms reflect article distribution, and they are chosen when a deictic or anaphoric relation has to be established with an element already mentioned in the discourse.

A second proposal concerning an inflectional hypothesis is the one advanced by Stolz (1990). He considers contracted forms as *adpositional inflections* or *inflected adpositions* rejecting the distinction between the lexical and the functional domain. According to his idea, contracted forms are produced by the language evolution process which involves prepositions. He motivates this assumption by observing that in many languages, prepositions frequently give rise to contracted form.

Thus, fused forms exist in the lexicon, already marked for gender, number, case and localisation. When necessary, they are selected and used following lexical rules which can allow or not their presence in the sentence. In particular Stolz (1990) observes that contracted forms are normally used with concrete nouns that can be easily localized in time and space, such as body parts.

These two inflectional theories agree with Napoli & Nevis' work (1987) concerning Italian prepositions. We will provide a deeper review of their proposals in the next chapter, but we briefly mention here their work because they also take into account the German case. In particular they assimilate German contracted forms to the Italian ones, arguing that their inflectional hypothesis can explain the phenomenon in both languages. However, also Waldmüller (2008) notes, Napoli & Nevis (1987) don't take into consideration differences in meaning between contracted and non-contracted prepositions, which emerge in German coordinated clauses.

In any case, Waldmüller (2008) agrees with an inflectional point of view. She observes that inflectional ending shown by contracted forms are detectable in other functional elements such as adjectives. In German, in fact, a strong and a weak inflections exist, carrying respectively nominative/accusative and genitive/dative case. Waldmüller (2008) notes that adjectives take a weak inflectional ending when a definite article precedes them, while they have a strong ending if they follow an indefinite article. After a contracted form, only weak ending adjectives are admitted, showing that, not only contracted forms express definiteness, but also they assign case (dative or genitive) to the NP complement.

Therefore, Waldmüller (2008) assuming that "*what you see is what you get*", considers contracted forms as inflected prepositions taking as complement a bare noun phrase and carrying ϕ -features.

To explain interpretational differences between inflected and non-inflected prepositions, Waldmüller (2008), following Schaub (1979), claims that inflected prepositions are impossible in anaphoric contexts because they lack the deictic consonant *d-*, with which articles begin.

Non-inflected prepositions, instead, are regular combinations of prepositions and articles, which, having the deictic *d-*, can be used to introduce elements previously mentioned in the sentence.

A syntactic explanation concerning contracted prepositions has also been proposed. Van Riemsdijk (1998) notes that contraction takes place only if the preposition and the determiner are in a local relation. He claims, thus, that contraction should be caused by a movement operation involving the article. However a head to head movement cannot be taken as a valid explanation, given that when a head moves to another head, a new word pertaining to a unique syntactic category should be generated. Contracted forms, instead, are composed of a preposition and an article which keep existing also after contraction. For this reason he proposes the existence of two different types of head movement by formulating the:

“Head Adjacency Principle (HAP):

A transformational process that affects two head positions must be either Head Adjunction or Head Substitution.

a. Head Adjunction (HA): two phonetically identified heads are joined, yielding an adjunction structure, in which case the two heads must be strictly linearly adjacent at the moment of application of the rule;

b. Head Substitution: a head is moved into head position which is phonetically empty but which may contain ϕ -features, thereby unifying the two morphosyntactic feature matrices.”
(van Riemsdijk (1998, p.644))

With respect to contraction between prepositions and articles van Riemsdijk (1998) postulates a morpho-phonological reduction of the article before the head adjunction takes place. In this way he explains how a phonologically accepted result could emerge from head adjunction operations.

According to van Riemsdijk (1998), if adjacency were the only necessary condition required to reach contraction, this last could be considered a strictly morphophonological phenomenon. However it is not the case; adjacency is necessary but not sufficient for the contraction to occur. Indeed, when a relative clause acts as a prepositional complement, the contracted form is not allowed. Moreover, as shown in example (8), in German, homophonous verbal particles and prepositions exist, but particles don't fuse with the adjacent determiner.

(8) Er fängt [an dem,*am] Hans einen Brief zu schreiben.

He starts to_{PRT} the to_{DAT} Hans a letter to write

He starts to write a letter to Hans

In other words, he claims that contraction takes place only under specific structural conditions, combined with the adjacent position of prepositions and articles. Hence, morpho-phonological explanations are not sufficient, and a syntactic process has to be postulated. As far as semantic and pragmatic restrictions are concerned, van Riemsdijk (1998) does not take them into consideration.

Cabredo (in press) also thinks that syntactic reasons have to be searched to explain the German case. First of all, as we have already seen, phonological processes must be excluded for the presence of homophonous cases, such as for instance the relative pronoun, which is identical to the definite article but doesn't fuse with prepositions.

In addition, she observes that when coordination between two complements of the same contracted preposition occurs, either repetition or elision of the second preposition is allowed. Nevertheless, the semantic interpretation is different; repetition of the preposition gives a distributive value to coordinated elements while the coordination under a unique preposition leads to a collective interpretation of the two complements.

Just to give an example (drawn from Cabredo, in press),

(9) a. In zwölf Komitees wurden Themen diskutiert und Resolutionen

In twelve committees were topics discussed and resolutions

verabschiedet, die **ans** Europarlament und **an** die entsprechenden

passed that to-the European parliament and to the corresponding

europäischen Institutionen weitergeleitet werden

European institutions transmitted are.

b. In zwölf Komitees wurden Themen diskutiert und Resolutionen

In twelve committees were topics discussed and resolutions

Verabschiedet, die **ans** Europarlament und die entsprechenden

passed that to-the European parliament and the corresponding

europäischen Institutionen weitergeleitet werden.
European institutions transmitted are.

Following Cabredo's (in press) idea, (9a) is interpreted in a distributive way, because the preposition has been repeated. So, in this case, the European institutions and the European parliament are two separate entities. On the contrary, in (9b) the first preposition take scope on both NP complements, so that the European institutions are interpreted as internal components of the parliament. Interestingly, contrary to French, German syntax allows either the presence of the second preposition or its absence, even if a contracted form is required.

Moreover, as Cabredo (in press) underlines, syntactic derivation plays an important role in interpreting the sentence. According to her, these considerations make it clear that, contrary to the French case, a simple inflectional hypothesis is not sufficient to explain German contraction phenomena. Then, following Wescoat (2002) and taking into account van Riemsdijk's considerations on adjacency (1998), she proposes that German contraction is a post-syntactic operation, similar to cliticization, which obligatory involves two adjacent elements. The result is a unique morpho-phonological form which represents two terminal nodes of the syntactic tree.

1.1.3 Portuguese inflected prepositions

Like Italian and other Romance languages, Portuguese too displays an inventory of inflected prepositions, combining articles and simple prepositions.

Benucci (1992) takes into consideration prepositional contractions focusing attention on those sentences in which the preverbal subject of an infinitival inflected verb is introduced by a preposition. He distinguishes, in particular, subcategorized prepositions selected by the main verb, from those which follow a noun or an adjective. In modern Portuguese, prepositions governed by nouns occupy a separate and independent projection in the syntactic derivation and cannot incorporate with their governing functional node. On the contrary, a strict relation is still present between a verb and the preposition it selects. In this case, according to Benucci (1992), incorporation can take place between the preposition and the verb leading to a unique complex head.

Given this assumption, he manages to syntactically explain occurrences of contracted forms in inflected infinitival subordinates.

Following his hypothesis, subcategorized prepositions are hosted in the SpecCP of completive and adverbial infinitive sentences. After the incorporation to the main verb has occurred, they become CP external. In this way, CP, intervening between the preposition and the article, blocks their contraction, for which adjacency is obligatory. In (10) we report Benucci's (1992) example with a tentative syntactic representation of the sentence.

- (10) a. O meu amigo concorda em o Manel vir à feira
The my friend agrees in the Manel (to)come_{INFL} to the fair
- b. O meu amigo concorda em [CP ~~em~~ [DPo Manel]...]]

However, if an adverb intervenes between the verb and the preposition, incorporation process becomes optional. The same adverb could, in fact, incorporate to the verb. Since a governor can only receive one element through incorporation, when adverb incorporates, the preposition does not. In this case, it remains CP internal in an adjacent position respect to DP, so that a contracted form is accepted, as shown in (11).

- (11) a. Penso sempre em o Manel ter casado com a Maria...
I think always in the Manel to have married with the Maria...
- b. Penso sempre [CPem[DPo Manel]...]]

As we said, prepositional incorporation into its governing head doesn't take place when a PP functions as NP complement. In this case, thus, the preposition is not base generated in CP, but behaves as a true preposition, occupying the head of an independent PP projection, whose complement is the entire subordinate clause. Consequently, remaining external to CP, the preposition is too far from the article for the contraction to occur. See, for instance, examples (12) and (13) (drawn from Benucci (1992)):

- (12) A estrutura è muito mais complexa em virtude de a mesma seir mais
The structure is much more complex in virtue of the same to be more

longa
long

(13) Estou contente por o Joao estar melhor

As (12) and (13) show, also nouns and adjectives block the formation of a contracted preposition, even if the syntactic structure is not the same that we saw with verbal subcategorized prepositions.

Incorporation of the preposition into its functional governing head is also excluded in the case of complex prepositions. This syntactic operation, in fact, cannot take place between two elements pertaining to the same category. In other words simple prepositions cannot incorporate into the complex ones. This is due, Benucci (1992) argues, to the property of assigning case which characterize both complex and simple prepositions. However, according to him, complex prepositions behave like verbs, in directly selecting the simple ones. Those are, thus, hosted in the specCP of the infinitival clause, exactly matching with subcategorized verbal particles.

Following Benucci's idea, then, in this case contraction between preposition and article should be required, because, lacking incorporation, the particle remains CP internal accomplishing adjacency.

Crucially, it is exactly what happens, as example (14) shows.

- (14) a. Antes da/*de la chuvada estalar no pavimento, entrou pela
Before of-the downpour to rattle_{INFL} in-the soil entered by-the
vila uma charrete
village a barrow
- b. Antes [CPde[DPa chuvada]...]

Following Benucci's (1992) analysis of Portuguese contracted forms, it seems to us that the adjacency condition postulated by van Riemsdijk (1998) is confirmed. At the same time, however, Benucci's examples show that adjacency strictly depends on syntactic conditions,

given that even nodes not morphologically realized can block it. In this sense we think that Portuguese can be taken as evidence of the post-syntactic nature of contraction, which appears to be a morphological operation regulated by specific syntactic conditions.

A more recent work on Portuguese contracted prepositions is that of Nunes and Ximenes (2009) who compare Brazilian Portuguese (BP) with European Portuguese (EU).

First of all they explain the existence of fused forms recalling Distributed Morphology of Halle & Marantz (1993). In particular they assume that:

“Given the spelled-out structure in (15a), P and D undergo morphological merger in (15b), followed by fusion in (15c), and Vocabulary Insertion then plugs in a single vocabulary item, namely, no, as shown in (15d).

- (15) a. *Spelled-out structure:* $[_{PP} \mathbf{P} [_{DP} \mathbf{D} N]]$
 b. *Morphological merger:* $[_{PP} [_{DP} \mathbf{P+D} N]]$
 c. *Fusion:* $[_{PP} [_{DP} \mathbf{P/D} N]]$
 d. *Vocabulary insertion:* $[_{PP} [_{DP} \mathbf{no} N]]$ ” (Nunes & Ximenes, 2009)

On the basis of this previous assumption, they analyse contracted prepositions in BP inflected infinitival clauses, focusing their attention on coordination.

With regard to inflected infinitival clauses with non coordinate subjects, Nunes & Ximenes (2009) agree with Benucci’s (1992) analysis we have just mentioned. Given that Brazilian Portuguese optionally allows contraction in personal infinitival clauses, they argue that prepositions can be CP-external as well as CP-internal, as example (16) shows:

- (16) a. Apesar **de o** meu pé estar quebrado, eu fui à festa.
*despite **of the** my foot be-INF broken, I went to-the party*
- b. Apesar **do** meu pé estar quebrado, eu fui à festa.
*despite **of-the** my foot be-INF broken, I went to-the party*

In (16a), the preposition being external to CP, adjacency is missed and consequently contracted forms cannot appear. On the contrary, in (16b) the preposition is hosted in CP in an adjacent position with respect to the article, so that the fusion can occur.

Further evidence of CP blocking contraction is given by small clauses which, lacking CP, only accept the contracted form. See for instance example (17).

- (17) a. *Apesar **de o** meu pé quebrado, eu fui à festa.
*despite **of-the** my foot broken, I went to-the party*
- b. Apesar **do** meu pé quebrado, eu fui à festa.
*despite **of-the** my foot broken, I went to-the party*

Absence of CP makes the preposition and the article always adjacent, thus the contracted form is obligatory in small clauses sentences preceded by a preposition.

Coming back to coordination, Nunes & Ximenes (2009) remark that, when an inflected infinitive has two coordinate subjects introduced by a preposition, this one has to be repeated before every component of the coordination. See for example the sentence in (18) (drawn from Nunes & Ximenes, 2009)

- (18) Ela não pensou **no** João e **na** Maria viajarem (junto com eles).
*She not thought **in-the** João and **in-the** Maria travel-INF.3PL together with them*

Nunes & Ximenes (2009) observe that coordination seems to involve two separate PPs, given that the preposition is present in both the conjuncts. Nevertheless, the verb, displaying plural agreement, needs a plural subject which is undetectable if we consider coordination taking scope on two separate PPs. In addition, PPs are not able to carry the ϕ -role assigned by verb. The unique solution, according to Nunes & Ximenes (2009), is to consider (17) as a case of coordination of two DPs, despite the appearance.

In order to explain this phenomenon, Nunes & Ximenes (2009) extend Parallelism Requirement (Hornstein & Nunes, 2002), which originally operates on syntactic and lexical domains, also to the morphologic one. Following their reasoning, since the first DP contracts

with the preceding preposition, the morphological fusion has to take place in the second conjunct too.

For this reason they propose that when contraction appears on the first element of a coordinated construction, after the syntactic computation the preposition is copied and merged with the second conjunct. Then, fusion with the adjacent determiner occurs, leading to a contracted form.

Evidence of a Parallelism Requirement as a morphological operation, also comes from those cases where fused forms only appear on the second coordinate element, the first being an NP without article.

(19) a. *Eu confio **em** Deus e **o** João
*I trust **in** God and **the** João*

b. Eu confio **em** Deus e **no** João
*I trust **in** God and **in-the** João*

As example (19) shows, The first preposition, that intrinsically could contract, appear in its simple form simply because an NP without article is used. So, the preposition copied in the second conjunct, which has exactly the same intrinsic morphological characteristic than the first one, fuses with the adjacent determiner.

Nunes & Ximenes (2009) also try to explain those cases in which contraction doesn't appear in both elements of a coordinated construction, even if both NP need article, such as in 19.

(20) a. Ele não aprovou a ideia **do** João e **a** Maria viajarem.
*He not approved the idea **of-the** João and **the** Maria travel-INF-3PL*

b. Ela não pensou **no** João e **a** Maria viajarem.
*She not thought **in-the** João and **the** Maria travel-INF-3PL*

According to them, the first coordinate element of (20) is introduced by a non contracted form, which is an allomorph of the contracted one. In other words, since The Parallelism Requirement concerns the morphological characteristics of prepositions, a non-contracting

preposition is correctly copied on the second coordinate element. Subsequently, however, phonetic rules lead to a form that is identical to the fused one. In this sense Nunes & Ximenes (2009) consider *do* and *no* ambiguous as far as their origin is concerned. In fact they can derive either from morphological contraction, for which adjacency is necessary, or from late phonetic readjustment, that is exactly the case of (19). Furthermore, where phonetic readjustment is not necessary, fusion in the first conjunct is ungrammatical. At the same time, in some cases, phonetic rules generate a different result with respect to fusion, avoiding ambiguity. To prove their idea, Nunes & Ximenes (2009) give examples like those in (21).

- (21) a. Eu fiquei contente **por a** Maria e o João ganharem o prêmio.
*I was happy **by the** Maria and the João win-INF-3PL the prize.*
- b. *Eu fiquei contente **pela** Maria e o João ganharem o prêmio.
*I was happy **by-the** Maria and the João win-INF-3PL the prize.*
- c. Ela pensou **n'eu** e **a** Maria fazermos isso.
*She thought **in-I** and **the** Maria do-INF-1PL this*
- d. *Ela pensou **n'eu** e **na** Maria fazermos isso.
*She thought **in-I** and **in-the** Maria do-INF-1PL this*

(21b) is ungrammatical because no phonetic readjustment is required and contraction is blocked as the preposition is CP-external. On the other hand, (21d) is unacceptable because *n'eu* is not a contracted form, but only a product of phonetic rules operating in a particular context. Here too, the preposition appears to be CP-external, blocking fusion in both the coordinate elements.

1.2 Languages with contraction between prepositions and other functional elements.

Stalmaszczyk (2007) analyzes possessives expression in Celtic languages. All these languages, in fact, lack the verbal form “*to have*”. Possession meaning is conveyed combining verb with a contracted form composed by a prepositions and a pronoun. We report

an example drawn from Stalmaszczyk (2007), which can be useful to make clear how Celtic languages are organized:

- (22) Tá airgead agam
is money at-me

The Irish sentence in (22) means “I have money”. The possession value is expressed by the contracted form *agam* rather than by the verb, which, in this case, plays a solely functional role.

Stalmaszczyk (2007) describes Irish, Scottish, Gaelic, Welsh and Breton prepositional system, focusing his attention on possessive constructions in which prepositions are combined with pronouns. As already noted by Doyle and Gussmann (1997), fusion of these two elements can also be found in other languages such Polish and Spanish. Nevertheless their use is limited to few cases like for example Spanish expressions *conmigo* (with-me) and *contigo* (with-you), and the Polish *patrzyła nań* (she was looking at-him) and *pisala doń* (she was writing to-him). Celtic languages, on the contrary, show a complete paradigm of prepositional contracted forms containing pronominal elements. Constructions involving these fused forms are, thus, very frequently used. Moreover, it is often difficult to obtain a faithful translation of these expressions, because of the wide range of meaning they can convey. In fact, contracted forms are also used in metaphorical sentences, idiomatic phrases and to express figurative possession sense. In some way, the Celtic so called “prepositional pronouns” (Stalmaszczyk, 2007), have the same function shown by other functional elements (adverbs, verbs) in other languages.

What is also relevant, is that normative grammars (especially the more recent ones) seem not to consider these forms as simple inflected prepositions, but, naming them “pronominal prepositions”, they underline their compositional nature. The suffix attached to the preposition is thus treated as a true pronoun, despite its similarity with verbal agreement endings.

1.2.1 Irish contracted forms

Like other Celtic languages, Irish prepositions can be used in their bare form or with inflectional morphemes. A complete paradigm is detectable including all number, person and gender forms.

Inflected prepositions are in complementary distribution with pronouns expressing the same features and with verbs carrying the same inflection. Moreover, they cannot appear with an overt complement.

According to Acquaviva (2001), endings of Irish contracted prepositions show a syntactic pronominal nature, even if they are morphologically expressed throughout a suffix. The difference between an inflectional morpheme and the pronominal ending of prepositions leads in the fact that the former is necessary to check agreement features, while the second is not. Prepositions have pronominal ending encoding person, number and gender, while verbal agreement only express number and person. Moreover, prepositions without an inflection paradigm also exist, whereas all verbs obligatory have a finite form. Acquaviva (2001) also adds that;

“ [while] for example, each form of a German finite verb corresponds to a combination of features, or sometimes to several combinations, in cases of syncretism, [...] the Irish base form is not syncretic; rather, it does not fall in any slot of person/number/gender combination. Apparently, this means that the base form is simply uninflected, in contrast with the inflected, suffixed ones.”

In fact, pronominal suffixes of prepositions are recognizable; for example, 2nd masculine plural endings are always the same, independently of the preposition they are attached to. Some phonological variations are possible, but they only concern the prepositional stem, which is modified following syllable structure rules. In this way, pronouns maintain their own status, without completely fusing with the preposition.

Among all contracted prepositions, those combining with 3rd singular masculine endings represent an exception. Acquaviva (2001) considers them more similar to an inflectional operation, showing that every preposition selects a specific form including it. Endings, losing their regularity, are less visible, thus fusion with prepositions leads to a more lexicalized result.

Moreover, 3rd singular masculine form is used not only to express ϕ -features which are associated with the complement, but also to substitute bare forms. It can also appear with a full definite DP complement, which can also be feminine or plural. From a morphological point of view, he claims, 3rd singular masculine endings simply are a different representation of bare forms, which are used in some particular morpho-phonological contexts. In fact,

appearing with full DPs it becomes the sole contracted form which actually allows inflectional reduplication.

Acquaviva (2001) analyzes contracted prepositions, and proposes that they are morphologically marked. In particular he postulates that they encode an abstract morphological feature which he calls [AGR] and which is an inherent property of the prepositional stem. [AGR] has only post syntactical consequences and does not interfere with the syntactic context. In other words, it does not have functional properties nor activates grammatical operations such as movement or feature checking. According to Acquaviva (2001), all pronominal prepositions hold [AGR]. He has, thus, to account for differences that are detectable among base forms, prepositional suffix and 3rd singular masculine endings.

At first sight, in fact, his assumption perfectly explains 3rd singular masculine endings, justifying their use as bare forms and their indivisible nature. Following his hypothesis, these exceptions should be considered the *default inflected form* of prepositions and they can be represented as follow:

(23) WITH, AGR <---> leis (with-him)

Afterward, in order to account for existence of a true bare form and of pronominal prepositions, maintaining his idea that all prepositional forms are marked by [AGR], he resort to the *discharging* concept of Distributed Morphology (Halle & Marantz, 1993). In this way, he provides a description of every different prepositional realisation, concluding that the base form should be represented like this;

(24) WITH (AGR) <---> le (with)

In contrast to prepositions with 3rd singular masculine endings, in this case [AGR] is present and visible for lexical rules, but it is not discharged from a morpho-syntactic point of view. So the preposition doesn't take any suffix.

Pronominal prepositions, finally, discharge [AGR] like the default form, but cannot have the same representation. Acquaviva (2001) proposes that contracted forms combining with suffixes other than 3rd singular masculine should be illustrated with two separate formulas, namely:

- (25) a. *WITH* <---> /l'-/ / _____ *AGR*
- b. [AGR: 2 sg.] <---> /t/ / P _____

(25a) shows the morphology of a preposition stem which can receive pronominal affixation. In (25b), instead, Acquaviva (2001) gives an example of the structure of a pronominal ending (in this case 2nd singular masculine) following a preposition. In this way the preposition and the pronoun respectively have their own representation and every combination of prepositions and pronouns become possible (under phonological readjustment when necessary).

One of the most detailed (and very useful for our purpose) works concerning the prepositional system of a Celtic language, is Brennan's study (2008, 2009) on Irish inflected prepositions. He particularly focused his attention on preposition + pronoun constructions providing a convincing theoretical explanation of their syntactic derivation.

First of all he notes that fused prepositional forms have many characteristics in common with inflected verbs. In fact both can be followed by reflexive pronominal suffixes; they can occupy the head of a relative clause; when an emphatic or relative particle follows them, they can coordinate with a full DP. Despite this, he thinks that Irish contracted forms have to be considered a combination of a preposition and a pronoun, refuting inflectional approaches. Indeed, he claims that Irish inflection, the verbal too, is always to be considered pronominal rather than a simply inflectional ending.

Brennan (2009), in fact, notes that it is possible to apply Cardinaletti and Stark's (1994) syntactic tests for the classification of pronouns to Irish inflection. Results confirm the pronominal nature of inflection, and indicate that it has many characteristics of weak pronouns such as:

- It has reduced morphology;
- It shows prosodic reconstruction;
- It is preferred to the strong form;
- It is hosted in a derived position higher than its surface one;
- It cannot be coordinated.

Inflection also matches with semantic characteristics of weak pronouns given that it has non referential restrictions and can be used with both animate and inanimate entities.

Finally Brennan (2009) notes that Irish inflections and pronouns are phonologically very similar.

All these considerations, lead Brennan (2009) to the conclusion that Irish inflection is a true pronoun and not a simple agreement morpheme. From a syntactic point of view, according to Brennan (2009), pronouns represent nominal ϕ -feature when a full DP is absent and they are hosted in D° . When a preposition or a verb precedes them, their reduced form attaches to it.

Thus, following Brennan's assumption, Irish inflected prepositions are the result of a preposition + a pronominal deficient element, instead of a simple preposition carrying agreement morphemes.

On the basis of these assumptions, Brennan (2009) proposes that inflected preposition are formed through a post-syntactic operation called M-Merger (Matushansky, 2006), which allows two adjacent nodes to be unified in a single word. Before M-merger takes place, pronominal features have to be moved from the DP head to a higher Spec position forming a chain. Brennan (2009) assumes that since only the higher node of a chain is spelled-out (Nunes 2001), so the weaker pronominal element is phonologically realized, after his unification with the preposition.

2. ITALIAN PREPOSITIONS

2.1 Introduction

Like other Romance languages, such as Spanish and French, Italian is a language in which morphological Case has disappeared. Some pronominal Case marked expressions still exist, like for example the dative clitic forms: *mi* (to me), *ti* (to you_{sing}), *gli* (to him) *le* (to her) *ci* (to us), *vi* (to you_{plur}).

Apart from these and few other exceptions, Case in Italian is normally expressed through a preposition introducing the NP complement. That is why, only verbal subjects and objects, together with some nominal predicates and few adverbials can directly follow the verb. As a consequence, all other arguments and phrasal adjuncts have to be preceded by a prepositional element. Even subjects and objects of nominal expressions have to be governed by a PP (e.g. *la telefonata di Gianni*/The call of Gianni; Gianni's call). Unlike verbs and nouns, however, Italian prepositions cannot select several arguments, but can take a unique complement (Rizzi, 2001).

In the linguistic literature, prepositions are traditionally divided in two main groups; functional prepositions and lexical prepositions. Functional prepositions are usually described as being simple/basic elements, while lexical ones, which have been observed to be different in both their semantic specification and their syntactic behavior, are traditionally considered complex prepositions. Rizzi (2001) observes that also in Italian, this distinction is detectable, and two well defined groups of prepositions can be described. Moreover, Italian simple and complex prepositions are easily identifiable, because they are phonologically different. In fact it is possible to distinguish between monosyllabic/functional/simple and polysyllabic/lexical/complex prepositions.

As we will see, the classification of prepositions based on the sharp distinction between functional and lexical items could be too simplistic. Anyway, for the moment it is easier for us to follow the traditional distinction. Further considerations will arise from both theoretical and experimental analysis, so that our conclusions would probably be quite different.

Except for those complex prepositions which need a simple one following them, all the Italian prepositions (both complex and simple) can directly take an NP as their complement. The NP can be considered a non-marked complement, but Italian prepositions also accept other type

of complements such as finite (1a) and infinitival (1b) clauses, adjectives (1c) and other constituents.

- (1) a. Tengo a che tu possa vincere
 (*pro*) *like*_{1stSing} to that you could win_{Inf}
 I'd like you to win.
- b. Tengo molto a vincere
 (*pro*) *like*_{1stSing} very much to win_{Inf}
 I'd like to win very much
- c. Non succede niente di interessante
 NEG (*pro*)*happens nothing of interesting.*
 Nothing interesting happens

Some preposition, moreover, can be used intransitively. In general this last property concern polysyllabic prepositions, but in colloquial Italian the simple preposition *su* (on/up) can also be used without a complement, as in (2).

- (2) Vado su.
 *pro go*_{1stSing} up
 I go upstairs.

Finally, Italian prepositional phrases generally don't accept modifiers, apart from some few adverbs as *proprio* (just), *solo* (only), *anche* (also) which convey, most often, a focalized interpretation (Rizzi, 2001).

2.2 Monosyllabic Prepositions

Italian monosyllabic prepositions are *a* (at/to), *di* (of), *da* (from), *in* (in), *con* (with), *su* (on/up), *per* (for), *tra/fra* (between). Simple prepositions are usually considered to be functional elements without a specific semantic content. In effect it is difficult, if not

impossible, to assign a specific/unique meaning to every monosyllabic preposition (especially to *a* and *da*), without referring either to the verb which select it or at least to the syntactic context in which it is inserted (Rizzi, 2001).

Anyway, when they express spatial relations, monosyllabic prepositions can contribute to the semantic interpretation of the sentence. For example, sentences (3a) and (3b) clearly have different meanings, depending on the preposition the verb selects.

(3) a. Arrivo **a casa**

Procome at home

I get home.

b. Arrivo **da casa**

Procome from home

I come from home.

As observed by Folli (2008), however, this property is limited to a little set of constructions involving a particular class of verbs, which inherently encode directionality. These verbs (which Folli describes as having a Resultative feature), are the ones allowing the expression of goal of motion simply selecting a simple spatial preposition. In other words, given that the direction/path meaning is already conveyed by the verbal stem, the simple preposition is sufficient to identify the result of motion (“at home” or “from home”).

According to Folli (2008), this is in line with the fact that Italian is a *verb framed* language, in which the aspect of the verb is always crucial to express the goal of motion (we will come back to Folli’s (2008) theories in the section dealing with complex prepositions).

These two examples show how simple prepositions can play a role in the semantic specification of the sentence. We have to notice, however, that, in any case, this possibility is subordinated to the presence of an inherently directional verb.

When simple prepositions are used in other (non locative) syntactic contexts, their semantic contribution strictly depends either on the verb which select them or on the grammatical construction they are inserted in.

As in other languages, therefore, simple prepositions can appear in different syntactic structures, playing different grammatical roles and giving different semantic contributions to the interpretation of the sentence.

In this sense, Rizzi (2001) makes an interesting distinction between cases in which the same preposition is involved in two (or more) different semantic contexts and cases in which two prepositions are simply homophonous, being, actually, distinct syntactic units.

For example, the simple preposition *a* (to/at) can both introduce the recipient of an event and describe the origin of a process, depending on the verb that select it. See sentences in (4) (drawn from Rizzi, 2001).

(4) a. Ho dato il libro **a Mario**
pro have given the book to Mario
I gave the book to Mario

b. Ho sottratto il libro **a Mario**
pro have stolen the book to Mario
I stole the book from Mario

Despite the semantic differences, examples in (4) both include a dative preposition. According to Rizzi (2001), therefore, in this case we are dealing with the same preposition from a syntactic point of view, whose semantic value is different depending on the aspectual class the selecting verb belongs to.

On the other hand, the preposition *a* can also appear in non-dative constructions, when it is selected by verbs such as *pensare* (to think), *tenere* (to care for), *rinunciare* (to renounce), as exemplified by (5) (drawn from Rizzi, 2001).

(5) a. Ho dato il libro **a Mario**
pro have given the book to_{DAT} Mario
I gave the book to Mario

b. Ho pensato **a Mario**
pro have thought to Mario

I thought of Mario

According to Rizzi (2001), prepositions of the same type, such as those in (4) can appear as single complements of two coordinated phrases. Moreover, they can be substituted using the same pronoun. Homophonous prepositions like those in (5), instead, do not have these properties.

See, for instance, sentences in (6);

(6) a. **Gli** ho dato il libro
him_{DAT} pro have given the book
I gave him the book

b. Ho dato il libro e sottratto il disco **a Marco**.
pro have_{1stSING} given the book and stolen the disc to Marco
I have given the book to Mark and I have stolen his disc.

c. ***Gli** ho pensato.
him_{DAT} pro have thought

d. *Ho dato il libro e pensato **a Marco**
pro have_{1stSing} given the book and thought to Marc

When two predicates requiring the same preposition are coordinated, as in (6b), the prepositional phrase can appear once, taking scope on both the events. In line with this observation, the ungrammaticality of (6d), proves that the dative *a* and the non-dative one are homophonous, but syntactically different. At the same time (6a) and (6c) show that only PPs introduced by the dative *a* can be replaced by a dative clitic pronoun.

The alternation with the dative clitic also suggests, according to Rizzi (2001), that the preposition *a* can be considered the morphological realization of the dative case when this last is not expressed by a clitic element.

We have to point out, as Rizzi (2001) does, that the syntactic difference holding between two homophonous prepositions is not a morpho-phonological difference. In fact, the preposition *a*, is always subject to the same rules concerning the formation of the contracted form and the adjunction of a *-d* (leading to *ad*) before a word beginning with a vowel .

Finally, Italian simple prepositions do not allow the stranding phenomenon, which, instead, is possible with complex ones, as we will see.

Italian simple prepositions are involved in the formation of a contracted form when they appear in a contiguous position with respect to the definite article. The first experiment we will present in the experimental section of this work, will concern the capacity of producing and comprehending contracted prepositions of aphasic patients. That is why, we will dedicate the next section to a detailed description of contracted prepositions.

2.2.1 Articulated Prepositions

Some Italian simple prepositions, namely *a* (at/to), *di* (of), *da* (from/by), *in* (in) and *su* (on), are obligatorily involved in a contraction process when their NP complement is introduced by a definite article. Also *con* (with) allows this phenomenon, but the contraction is optional. Contraction is impossible, instead, with prepositions *per* (for) and *tra/fra* (between). Italian speakers and all traditional grammars call contracted forms *preposizioni articolate*, (articulated prepositions), showing that these elements are commonly perceived as single items containing both a preposition and an article. This name also suggests that we are dealing with a preposition receiving an article, so that the resulting element, should be considered as forming part of the grammatical category of prepositions. Rizzi (2001) describes them as synthetic forms, which are used when the simple preposition is contiguous to the definite article. For Rizzi, therefore, the fact that contracted forms really include a preposition and an article of the following NP is not under discussion. However, he doesn't explain through which mechanism the two elements are merged together.

Italian also displays of a set of partitive articles, whose behaviour exactly matches that of the contracted preposition *di* (of) combined with the definite article.

Rizzi (2001) includes partitives in the set of contracted prepositions, underlying their special nature. The most relevant difference he finds, between the partitive article and the articulated preposition is that the former can be used in combination with another simple preposition,

while two simple P are generally not accepted to appear contiguously. See, for example, sentences in (7):

(7) a. Gianni lavora per delle persone che non mi piacciono.

Gianni works for of-the_{PlurFem} people that NEG I_{GEN} like

Gianni works for some people who I don't like.

b. *Per con quante persone tu possa parlare, non capirai.

For with how many people you could talk (pro) NEG understand_{2ndSing}

Nevertheless, Rizzi also observes that partitive article cannot be used in combination with the preposition *di*, as exemplified in (8).

(8) *Le auto di delle persone sono parcheggiate male.

The cars of of-the_{PlurFem} people are parked badly

Some people's cars are badly parked.

For this reason, he claims that the partitive article is a special usage of the contracted form of the preposition *di*.

According to us, however, despite this last example, the partitive article and the contracted prepositions are homophonous, not being, however, the same element.

Partitive articles, in fact, appear to have the same distribution of some indefinite adjectives such as *alcuni* (some) and of expressions such as *un po'* (a bit). Partitive, therefore, is marked for indefiniteness, while contracted prepositions only occur with definite NPs.

See examples in (9)

(9) a. Mangio dei biscotti.

pro eat_{1stSing} some biscuits.

I eat some biscuits.

b. Mi piace il sapore dei biscotti.

I like the taste of-the_{PlurMasc} biscuits.

I like the biscuits taste.

In (9a) we don't know neither how many biscuits the subject eats, nor if he eat many or few biscuits. The partitive behaves, therefore, as a modifier of the NP he introduces. If we try to replace the partitive with another element obtaining a grammatical result, in fact, we can chose an indefinite quantifier, such as *alcuni* (some), *molti* (many), *pochi* (few), but we don't need a PPs (see examples in (10)).

(10) a. Mangio alcuni/molti/pochi biscotti
*pro eat*_{1stSing.} *Some/many/few biscuits*

b. *Mangio di alcuni/molti/pochi biscotti
*pro eat*_{1stSing.} *of some/many/few biscuits*
I eat some/many/few biscuits.

In (9b), instead, we have to interpret the sentence as referring to the biscuit as general unique entity having a certain number of characteristics, one of which (the taste) is taken into consideration.

The formation of Italian contracted prepositions have been less investigated with respect to other phenomena related to prepositional phrases. The unique detailed work dealing with the morphology of Italian contracted prepositions is the one performed by Napoli and Nevis (1987), in which the authors try to demonstrate the inflectional nature of these elements. According to them, in fact, contracted forms are unitary lexical items, matching for gender and number with the noun they take as complement. Following this assumption, the final part of the contracted preposition cannot be considered an "attached/cliticized" definite article. Instead, it is a simple inflectional ending similar to the one appearing on indefinite adjectives and pronouns (*quello/quella*; *that*_{SingMasc/Fem}).

First of all, Napoli and Nevis (1987) observe that inflected prepositions (as they called them), are in complementary distribution with their non inflected form, as exemplified in (11).

(11) a. La borsa della mamma
*The bag of-the*_{SingFem} *mum.*

- b. *La borsa di la mamma
the bag of the_{SingFem} mum.
 Mum's bag.

The only exception is represented by the preposition *con* (with), for which inflection is optional.

- (12) a. Parlo col papà
pro talk_{1stSing} with-the_{SingMasc} dad.
- b. Parlo con il papà
pro talk_{1stSing} with the_{SingMasc} dad
 I talk to dad.

Napoli and Nevis (1987) explore different solutions to explain the nature of Italian articulated prepositions, taking into consideration phonology, morphology, and syntax.

First of all they notice that an exclusively phonological process cannot originate inflected prepositions. In fact, some phonological contexts exist, identical to those in which the contraction takes place, but where the presence of an inflected preposition is ungrammatical, as in (13).

- (13) a. Marco mi tira su il morale
Marco me_{GEN} lifts up the spirits
- b. *Marco mi tira sul morale.
Marco me_{GEN} lifts up-the spirits
 Marco lifts my spirits.

Examples in (13) makes clear that the phonologic context, namely the presence of a definite article after a simple preposition, is not sufficient to trigger the contraction. Moreover, Napoli and Nevis (1987) notice that the phonological process which should lead to the formation of

the contracted preposition is anomalous. Specific phonological rules should be postulated to explain how, for instance, *in* (in) combined with *il* (the) becomes *nel*. This change, in fact doesn't exist in any other phonologic Italian context.

Allomorphy rules are excluded for similar reasons. They would predict that, for example, *in* alternates with *ne* in some special contexts. But this constraint should only be limited to prepositions, given that the same process doesn't occur, with words finishing in *-in* preceding words starting with *-l*.

From a syntactic point of view, Napoli and Nevis observe that inflected prepositions cannot be the product of a cliticization process involving the preposition and the definite article. In fact, according to them, this solution doesn't account for sentences including coordinated phrases, like those in (14c), in many respects; first of all both the prepositions appear here with an attached article. However, the Right Node Raising principle, should prevent the raising of the article on the first coordinated preposition, given that this operation can only involve maximal projections. In this case, instead, the determiner is separated from its NP. Moreover, according to them, any syntactic cliticisations rules cannot be applied to the case of articulated prepositions.

- (14) a. Sotto e sopra la tavola
Under and on the table
- b. *Sotto la e sopra la tavola
Under the and on the table
- c. Alla e della ragazza
to-the and of-the girl
- d. *a e della ragazza
to and of-the girl

According to Napoli and Nevis (1987), this is evidence of the unitary nature of inflected prepositions. Their hypothesis they claim, has the merit of explaining the existence of inflected prepositions without assuming an ad hoc morpho-syntactic operation.

On the basis of these observations, Napoli and Nevis (1987) are led to the conclusion that inflected prepositions cannot be considered complex words composed of two distinct elements. Instead, they believe that contracted forms can only be considered as unitary inflected items.

With this idea, they also consider the possibility of having an inflected article rather than an inflected preposition. If that were the case, inflected prepositions should be described as Case-marked articles. Nevertheless they easily find many pieces of evidence against this possibility, especially concerning the fact that contracted forms behave as members of the grammatical category of prepositions. Case-marked articles should, in fact, have the same distribution of simple prepositions. What is more, prepositional phrases headed by inflected prepositions can only be coordinated with other PPs, even when they are introduced by different prepositions. In Italian, however, two elements carrying different cases can never be conjoined (e.g. **tu e me*; **you_{NOM} and me_{ACC}*).

In addition, if inflected prepositions were articles morphologically expressing Case, every different prepositional stem should be paired with a different Case. As a consequence, many new Cases should be assumed to exist, given that the number of inflecting prepositions is higher than that of Cases used in Italian.

Finally, an ad hoc explanation should be found to account for the fact that the NP marked with case is licensed not to agree with the verb;

- (15) Nelle grotte è dove voglio vivere.
In-the_{PlurFem} caves is where pro want_{1stSing} live_{INF}.
 I want to live in the caves

In (15), if we assume that *nelle* is a case-marked article, we also have to consider *nelle grotte* an NP. But, if it were true, the NP should agree with the verb, being the subject of the sentence. However, as we can see in (15) the sentence is perfect even if the subject and the verb don't agree.

Moreover, we should also accept that an NP could receive two Cases, namely nominative assigned by AGR, and one assigned by the Case-marked article.

Once they have excluded all the possibilities we have just mentioned, Napoli & Nevis (1987) conclude that contracted forms involving prepositions and articles, are, actually, simple prepositions with an inflectional morpheme. Such a theory, enable us to avoid the postulation of either phonological or morpho-syntactic processes, to explain how the article moves to the preposition and forms a single complex word.

To demonstrate their hypothesis, Napoli and Nevis (1987) provide a series of argumentations which, according to them, show the inflectional nature of contracted prepositions.

First of all, they observe that endings of inflected prepositions are the same appearing on both articles (e.g *il*, the_{SingMasc}; *lo*, the_{SingMasc}; *la*, the_{SingFemm}; *gli*; the_{PlurMasc}) and demonstratives (e.g *quel/quello*, that_{SingMasc}; *quella*, that_{SingFemm}; *quei/quegli*, that_{PlurMasc}; *quelle*, that_{PlurFem}). Since these elements are, as prepositions, non predicative, the phonological similarity they show in the inflectional paradigm, represents evidence for Napoli and Nevis' (1987) hypothesis.

In addition, Napoli and Nevis (1987) argue for a special status of inflected prepositions which make them different from bare ones. They admit that inflected prepositions, clearly belong to the prepositional grammatical category, as proved by the fact that they show the same distribution of simple Ps. In effect they can appear in all the contexts in which a preposition is required, while they are rejected when a PP is not accepted. Moreover, a coordination of two prepositional phrases is accepted, even if one of the two is introduced by a simple preposition and the other by an inflected one, as in (16).

- (16) Marco va a Roma e alla partita.
Marc goes to Rome and to-the_{SingFem} match
 Marc goes both to Rome and to the match

On the contrary, the coordination of a simple and an inflected preposition both taking scope over the same complement, is not possible. This fact, according to Napoli and Nevis (1987) proves that the two elements are different with respect to the type of complement they can take. They claim that while simple prepositions introduce a N'', inflected ones take as complement an N'. That is why, according to them, it is impossible to conjoin inflected P and a simple P, as in (17)

- (17) a. Parlava alla e della ragazza

*pro talked*_{3rdSing} *to-the*_{SingFem} *and of- the*_{SingFem} *girl*

b. *Parlava a e della ragazza

*pro talked*_{3rdSing} *to and of- the*_{SingFem} *girl*

He/She talked of the girl and to the girl.

This assumption is also confirmed by the fact that inflected prepositions cannot introduce both proper nouns and pronouns, which have to be considered N'.

(18) *Vado alla Roma

*Pro go*_{1stSing} *to-the*_{SingFem} *Rome*

This explanation also enables Napoli and Nevis to account for the systematic absence of the definite article after an inflected preposition.

Finally, they explain the existence of both inflecting and non-inflecting prepositions by postulating a blocking effect which impedes the selection of a non inflected preposition if an inflected one is possible in a given context.

2.2.2. Argumentations against the inflectional hypothesis

Napoli and Nevis's analysis of Italian contracted forms is very interesting and detailed. Certainly, if contracted forms really were inflected prepositions, the postulation of a morpho-syntactic process explaining how the article merges to the preposition would be no longer necessary.

However, according to us, this theory is not totally convincing.

We agree on the fact that an explanation exclusively based of phonological readjustment rules is not sufficient to explain the existence of contracted prepositions. As Napoli and Nevis show, the existence of identical phonological contexts in which the contraction doesn't occur, is the evidence that the simple adjacency of prepositions and articles is not enough to trigger the contraction. We also agree with Napoli and Nevis (1987) in considering contracted forms as members of the prepositional category and heads of prepositional phrases. In fact, as they

have demonstrated, articulated prepositions have the same distribution of non-articulated prepositions, and they introduce oblique complements and adjuncts.

Despite this, in contrast to Napoli and Nevis (1987), we think that contracted prepositions cannot be simply considered inflected items, but that they should be described as single words including two separate grammatical elements, namely an article and an inflected preposition.

First of all, if an agreement relation were necessary between the preposition and its NP complement, we wonder why this relation should hold only in a limited set of occurrences. In other words, why sentences in (19) should differ in terms of inflection?

(19) a. Vado a casa
 *pro go*_{1stSing} *to home*

b. Vado alla partita
 *pro go*_{1stSing} *to-the*_{SingFem} *match*

The nouns *casa* (home) and *partita* (match) don't differ for number and gender; both are singular, feminine, common nouns. If an agreement relation were necessary, the solution *vado alla casa* should be accepted, and even obligatory. Nevertheless this eventuality is not allowed in Italian.

The only difference holding between (19a) and (19b) is the fact that only in the second sentence the noun has to be introduced by a definite article, while in the first one the article is not required. Further evidence for this assumption, comes from prepositional phrases with a head not allowing the contraction, such as *per* (for).

(20) a. I compiti per casa
 the homework for home
 The homework.

b. I compiti per le vacanze
 The homeworks for the holiday
 The holiday homework.

Here again, the only difference between (20a) and (20b) is that in the first sentence, the noun (*casa*) doesn't need the article. This situation is, in our view, identical to the one exemplified in (19), in which, however, the preposition and the article appeared fused in a contracted form.

Examples (19) and (20), moreover, make clear that contracted forms have to be used in contexts in which the definite article is obligatory. In addition, when a contracted preposition is present the definite article cannot be used. Such an explanation enables us to account for the absence of the determiner after a contracted preposition (actually, it is not absent, but it appears attached to the preposition), without the necessity of postulating the existence of prepositions heading different NPs.

Italian preposition *con* (with) which allows both contracted and non contracted forms, provides a good example of this last observation. See examples in (21) and (22).

- (21) a. La ragazza parla con il ragazzo
The girl talks with the_{SingMasc} boy
- b. La ragazza parla col ragazzo
The girl talks with-the_{SingMasc} boy
 The girl talks to the boy.
- (22) a. La ragazza parla con (??la) Maria
*The girl talks with (*the_{SingFemm}) Mary*
- b. ??La ragazza parla colla Maria
**The girl talks with-the_{SingFemm} Mary*
 The girl talks to Mary

In (21) the common noun *ragazzo* (boy), needs the definite article. The contracted preposition in (21b) clearly replaces the set preposition + article of (21a), without causing changes in the semantic interpretation or in the syntactic structure of the sentence. At the same time, if a proper noun acts as complement of a PP as in (22), a contracted form is not allowed, exactly as the definite article in (22a). Notice that some Italian varieties admit the definite article

before proper nouns. Italian speakers of these varieties would, thus, accept the presence of the definite article in (22a). As a consequence, also (22b) would be considered grammatical.

Moreover, in some exceptional cases, the articulated preposition has obligatory to precede a proper noun. See example in (23).

(23) a. Il Cairo è la capitale dell' Egitto
The Cairo is the capital of Egypt

b. Vado al Cairo
I go to-the Cairo

(23b) shows that articulated prepositions are allowed before proper names, even if they are N', when they are introduced by a definite article.

The distribution of Napoli and Nevis's inflected prepositions, therefore, seems to exactly reflects also the one of definite articles.

According to us, thus, contracted forms are prepositional elements, heading prepositional phrases, but having, in addition, a limited distribution which depends on whether the NP complement is introduced by a definite article or not.

(19) is a good example confirming this last assumption, given that the preposition *a*, which obligatory contracts where necessary, appears in its simple form before a noun not requiring a determiner. Further evidence comes from those contexts in which the definite article is not allowed, such as some occurrences of the possessive adjective.

Italian possessives are normally preceded by the definite article (*la mia borsa* / the-my bag; my bag). In some cases, however, the article is not allowed as in (24b).

(24) a. mia madre
my mother

b. *la mia madre
the my mother

In contexts like the one in (24) the contracted form cannot be used, as exemplified in (25).

- (25) a. La borsa di mia madre.
The bag of my mother
- b. *La borsa della mia madre.
The bag of-the my mother

The reasons why the article is not accepted in these particular constructions are not relevant for our purpose. What is interesting for us is that a structure blocking the definite article, also blocks the contracted preposition, allowing, at the same time, the presence of the simple preposition.

As we have already noticed, Napoli and Nevis (1987), are forced to find an explanation for the complementary distribution existing between articles and inflected prepositions, since they consider the attached article an agreement ending. As we have seen, they assume that the difference between inflected prepositions and simple ones consists in the fact that the former introduce N' while the second take N'' as their complements.

Their hypothesis clearly doesn't take into consideration the debate on the structure of NP, which Abney (1986; 1987) and other linguists developed about in the same period when their paper was published. Following these theories, the noun phrase cannot be headed by a noun, but has to be governed by a functional element, namely a determiner. The functional head of an NP, thus, is D° which gives the categorical specification to the entire phrase. The noun, instead, being a lexical element, acts as a semantic head for the projection.

The debate on the syntactic structure of the DP has been developed further, and many studies have explored the similarities which hold between the internal structure of the noun phrase (DP) and that of IP/CP (see for instance Abney, 1987; Shlonsky 1991; Cardinaletti and Giusti 1989; Giusti 1991). The question is, obviously, still open, but the idea that the noun phrase has to be governed by a DP is, nowadays, largely assumed.

On the basis of these assumptions, the possibility of having either N' or N'' as PP complements is ruled out, given that the noun phrase is headed by a DP. Trying to adapt Napoli and Nevis' (1987) theory along these lines, we could compare their N' to a noun phrases with an empty determiner, while N'' could be described as "complete" DP phrase.

Italian, however, as shown by Longobardi (2003) doesn't allow NPs to occur without a phonetically filled D. In particular, he observed that common nouns can be used without an article, only if they are interpreted generically or existentially. In those cases, they behave as proper nouns, moving to D°, which, therefore, is phonetically realized.

Common nouns with referential interpretation, on the contrary, obligatorily take the definite article in D°.

If we observe the distribution of inflected prepositions, it seems clear that they obligatorily introduce referential nouns, while simple prepositions introduce generic NPs or proper nouns. See the minimal pair in (26)

- (26) a. Maria entra nella casa rossa
Mary gets into-the_{SingFem} house red
Mary gets into the red house.
- b. Maria entra in casa.
Mary gets into house
Mary gets into the house.

In (25b) the simple preposition is allowed because, lacking any specification, the house is generically considered as pertaining to the subject. No other interpretations are possible, and the sentence is not ambiguous. Thus, in (26b), being a common noun with a generic interpretation, *casa* doesn't require a definite article. In (26a), instead, the speaker refers to a specific house, namely the red one. In this case, therefore, the definite article has to be used. Notice that in sentences like (26a) the contracted preposition is obligatory.

The sentences in (26) thus, confirm that the contracted forms are used when a definite article is required, while a simple preposition appears with nouns not requiring a determiner.

On the basis of these assumptions, it seems to us that Napoli and Nevis' inflected prepositions are more likely to be simple prepositions fused with a definite article, than elements with an inflectional ending.

As already noticed by Napoli and Nevis (1987), the possibility of coordinating two prepositional phrases, one of which headed by a contracted form, proves that articulated

prepositions form part of the same grammatical class of simple ones. This fact, is not under discussion, and, moreover, it is also compatible with a compositional theory.

What is more, a hypothesis which considers contracted forms as the union of two separate elements, clearly predicts the possibility of coordinating two prepositional phrases, even when one of these is headed by a contracted preposition. The difference between the two conjoined elements, in fact, holds in their NP complement, since it can appear either with or without the definite article. We repeat in (27) example (16), to clarify this last observation.

- (27) Marco va a Roma e alla partita.
Marc goes to Rome and to-the_{SingFem} match
Marc goes both to Rome and to the match

In (27), two PPs are conjoined, the only difference between them being that the former introduces a proper noun, which doesn't need an article, while the second takes as its complement a referential common noun, which requires a determiner. The latter, is fused with the preceding preposition, and a contracted form is inserted.

This explanation, according to us, is much simpler than Napoli and Nevis', who don't explain why inflectional rules should be only applied in some cases.

At the same time, Napoli and Nevis (1987) noticed that, while the constituent is of the prepositional type, so that a coordination is possible, simple and inflected prepositions are different from each other, in that they cannot be conjoined. We have already mentioned this observation, which is exemplified in (17). Following Napoli and Nevis' (1987) idea, if a phonological or morphological rule really produces the fusion of the preposition with the adjacent article, (17b) should be acceptable, given that only the second preposition directly precedes the determiner. On the contrary, we propose that the ungrammaticality of (17b) is not due to the usage of two different prepositions, but is the result of the fact that *a* (to/at) is a preposition which obligatory contracts when its complement is headed by a definite article. We will propose a morphological analysis of sentences like those in (17) in the next section.

The last question which, in our opinion, excludes an inflectional analysis of the contraction phenomenon, is the necessity of postulating a special proviso, in order to account for the impossibility of inserting a definite article between the preposition and the noun.

Napoli and Nevis' solved this problem by assuming that the inflected preposition semantically acts in the same way the definite article. This observation is in line with studies of other linguists who analyzed the contraction-phenomenon in other languages (e.g Zwicky (1987) for French and Hinrich (1986) for German)). In particular they attributed to inflected prepositions a definiteness feature, which constrains prepositions with inflection to introduce only nouns with specific/referential interpretations.

A compositional hypothesis, instead, would have the advantage of not needing such a specification. Contracted forms, in fact, can only introduce referential nouns simply because they include a determiner which is inherently definite. Following this hypothesis, thus, the postulation of a new, complex word is not necessary.

2.2.3. How does contraction happen?

In the previous paragraph we have seen that the inflectional analysis proposed by Napoli and Nevis (1987) is not convincing in many respects, above all concerning the distribution of contracted prepositions which clearly recalls that of definite articles.

Many pieces of evidence seem to confirm that contracted prepositions should be considered complex words, in some way resulting from the fusion of a simple/monosyllabic preposition and a definite article. In the next section, therefore, we will try to explain how the contraction takes place, especially taking into account some theoretical observations which have been developed within the framework of Distributive Morphology (henceforth DM).

First of all, we have seen that the contraction cannot be triggered by a phonological readjustment occurring in specific environments. This impossibility can easily be proved empirically, since there are cases in which, given an identical phonological context, the contraction is not allowed (see example in (13)). Anyway, the necessity of found evidence to confute a phonological hypothesis, comes from the simple observation that the preposition and the article have to be contiguous for the contraction to take place.

Van Riemsdijk (1998) formalized this fact by analyzing German contracted prepositions; he assumed that the fusion between the two element is possible only if an adjacency relation holds between the two. As far as Italian prepositions are concerned, Wescoat (2007) noticed that this relation holds too, since the contraction cannot take place if any element intervenes between the simple P and the determiner, as in (28).

- (28) a. Le stanze della casa
The rooms of-the_{SingFemm} house
 The rooms of the house
- b. Le stanze di tutta la casa.
The rooms of all_{SingFemm} the_{SingFemm} house
 The rooms of the entire house.

Van Riemsdijk's (1998) adjacency, moreover, is strictly related to the syntactic structure, as Benucci (1992) has shown in his analysis of Portuguese contracted forms. Here, in fact, an empty CP intervening between the preposition and the article can block the contraction (for a detailed survey of Benucci's (1992) theories see section 1.1.3), showing that adjacency is not simply a phonological nearness but that it is influenced by the syntactic structure.

Despite being necessary for the contraction to occur, however, adjacency is not sufficient, as already mentioned by Van Riemsdijk (1998) and many others and as proved, for the Italian case, by the sentence in (13).

Since we have argued against an inflectional hypothesis, according to which contracted prepositions are unique lexical entries directly selected from the lexicon, we also have to assume the existence of a movement operation accounting for the raising of the article (or the lowering of the preposition).

From a syntactic point of view, the first option which should be taken into account is that of considering contracted forms as prepositions receiving a clitic article. Napoli and Nevis (1987) already tried to argue against such a hypothesis. Let us however consider some further evidence. In Italian, clitic elements are personal pronouns and, what is more, they are the only elements carrying morphological case. Definite articles clearly are not pronouns, but a parallelism could be established between accusative clitic pronouns and definite articles. In fact, some accusative clitics are homophonous with definite articles and, moreover, they are commonly assumed to be base generated in D° (Matushansky 2006, Belletti 2009). However, while clitics are forced to move to a higher position in order to check their case features (following the framework suggested by Chomsky (1995) within the minimalist program), definite articles, which don't contain case, do not have any necessity to move out of the DP

projection. The contraction process, in addition, doesn't add functional or semantic features to the attached article, so that its movement cannot be assumed to be syntactically necessary. As a matter of fact, some prepositions don't allow the contraction to occur, and in such cases the article normally appears in its canonical position without the syntactic derivation crashing. It seems, therefore, that the possibility of having a contracted form depends on the preposition itself, rather than on a checking operation of the syntactic system.

If articles were clitics, in addition, a further explanation should be provided to account for their final position, namely to the left of the preposition. In other words, the same preposition should be assumed to be generated in some other lower position, from which it would raise to the one already reached by the "clitic article" (exactly as verbs and clitic pronouns merge in AGR). Such a possibility clearly cannot be considered because PPs, receiving the theta role by the selecting verb, can only be base generated.

All these considerations make us conclude that a syntactic movement cannot originate the contracted forms which, on the other hand, can neither be considered a product of simple phonological rules. How, can we explain, then, the existence of contracted forms?

In line with some recent works based on the Distributive Morphology framework, we suggest that a post-syntactic morphological operation should be postulated to account for the formation of contracted prepositions.

First of all, we have to notice that before the contraction takes place the article has already received the gender and number features which make it agree with the noun. It means that, syntactically speaking, the definite article, even when it is involved in a contracted form, maintains its position of higher projection in the DP phrase, establishing with the noun the sisterhood relation which obligatorily holds in Italian DPs (as observed by Giusti 1999). In fact, no elements can be inserted between the articulated preposition and the noun, as happens when the preposition doesn't contract. See examples in (29)

- (29) a. *Della tutta gente
 Of-the_{SingFemm} all people
- b. Di tutta la gente
 Of all the_{SingFemm} people

c. *Per la tutta gente
 for the_{SingFemm} all people

d. Per tutta la gente
 for all the_{SingFemm} people

It also means that, whatever syntactic movement should occur inside the DP² to check/realize all the agreement relation holding between the determiner and its complement, those operations have already taken place when the contraction occurs.

If we are right in assuming that contraction is a post-syntactic process, we can also add something to the adjacency constraint that we have previously mentioned. The contraction, in fact, seems to be possible if the preposition and the article are adjacent after the syntactic derivation.

Embick and Noyer (2001), following Marantz and Halle's framework of Distributive Morphology, postulate the existence of two types of morphological movement which can occur after the syntactic derivation. Lowering and Local Dislocation.

The Lowering movement, despite operating after syntax, depends on syntactic information contained in some nodes. The moving element, therefore, is attracted by some features of its host, independently of its lexical aspect or semantic content. An example of Lowering is, according to Embick and Noyer (2001) the past morpheme *-ed* appearing on English regular verbal forms. In fact, even if in English V doesn't move on T in overt syntax, T morphologically reaches V. Being triggered by abstract features, this type of movement takes place before vocabulary insertion. Moreover, it clearly depends on hierarchical relations between the two involved elements and, thus, it doesn't need adjacency.

The Local Dislocation, instead, strictly depends on some special characteristics of the attracting element (inflectional class, morphological category, or phonological weight) being, therefore, vocabulary sensitive. Embick and Noyer (2001) exemplify the Local Dislocation by mentioning the English rule for the formation of superlatives and comparatives. As is well known, the superlative and comparative forms of English monosyllabic adjectives have to be

² Parallels between the DP phrase and CP (Szabolcsi 1983) make think that, as CP, also DP has an extended projection including further functional heads between D and N such as K (or F) (Giusti 1993), Q (Shlonsky 1991; Cardinaletti and Giusti 1989; Giusti 1991). As a consequence, the postulation of syntactic movements involving the noun or the determiner itself is unavoidable. For a detailed survey of the proposed DP internal structures see Coene and D'hulst (2003).

formed by adding specific morphemes to the same adjective (they follow Abney's (1987) hypothesis assuming a projection hosting superlative or comparative features and dominating the adjective). The usage of such morphemes, therefore, strictly depends on the phonologic shape of the specific adjective which has been inserted and is, in this sense, vocabulary sensitive. Moreover, the comparative/superlative morphemes can be morphologically merged to their hosting adjective, only if the condition of linear adjacency is satisfied. In fact, if an adverb is inserted before the adjective, the comparative/superlative form cannot be realized with an "enclitic" morpheme, as shown in (30).

- (30) a. Mary is the mo-st amazingly smart person ...
 b. *Mary is the *t* amazingly smart-est person ...

Local dislocation, thus, can take place under two necessary conditions: (i) the linear adjacency of the two merging elements; (ii) the occurrence of the movement after the vocabulary insertion. Embick and Noyer (2001) synthesize these conditions by the formula in (31).

(31) *The Local Dislocation Hypothesis*

If a movement operation is Vocabulary sensitive, it involves only string-adjacent items.

Coming back to Italian contracted forms involving prepositions and definite articles, it seems to us that Embick and Noyer's (2001) Local Dislocation Hypothesis could represent a good model to account for this process.

First of all, as the Italian prepositional system shows, not all the prepositions are involved in the contraction phenomenon. Prepositions *per* (for) and *tra/fra* (between) for some reason block the contraction. With *con* (with), instead, the process takes place optionally.

- (32) a. Il ragazzo scrive una lettera alla (*a la) ragazza
*the boy writes a letter to-the_{SingFem} (*to the) girl*
 b. Il ragazzo scrive una lettera per la (*pella) ragazza

the boy writes a letter for the_{SingFem} (for-the) girl

Sentences in (32) show that the possibility of having the morphological movement (if we follow Embick and Noyer 2001) of the article on to the preposition, depends on whether the selecting preposition is of the type allowing the contraction. This means that the movement is sensitive to Vocabulary insertion, and that it should be assumed to occur only after this.

As a consequence, following (31), we also expect the contraction to be possible only if the two elements involved are adjacent. In effect, this is exactly what happens. As already shown in (28), in fact, the article and the preposition have to be linearly adjacent for the contraction to take place, and when another element is inserted before the DP, the contraction is ruled out. What is more, as also Embick and Noyer (2001) point out, linear adjacency is necessary for the Local Dislocation movement to take place, but it is not sufficient. Besides depending on the lexical properties of the hosting element, the movement can also be blocked by other reasons, even structural ones. In (33) (in which we report example (13)), for example, even if the prepositions and the article appear in a linear adjacent position, the contraction leads to an ungrammatical result.

- (33) a. Marco mi tira su il morale
Marco me_{GEN} lifts up the spirits
- b. *Marco mi tira sul morale.
Marco me_{GEN} lifts up-the spirits

How can we explain this apparent anomaly? According to us, in (33) *su* (up) is not a true preposition. As already observed by Littlefield (2006) a distinction should be made between particles and prepositions, which can, of course, be homophonous elements. In fact, in English, while particles can appear both after and before their NP complement, prepositions cannot, being forced to precede the complement they introduce. In Italian the preposition is normally only accepted if it precedes the complement, but (34a) in which *su* is a particle, is much more acceptable than (34b) in which *su* is a preposition.

- (34) a. ??Marco mi tira il morale su.

Marco me_{GEN} lifts the spirits up

b. *Marco mette il telefono il tavolo su.

Marco puts the telephone the table on

In other words it is clear that prepositions form part of the same constituent of the complement, while particles don't. Notice also that a direct object in Italian is always directly selected by the transitive verb, and does not need to be introduced by a preposition. In (34a) *il morale* (the spirit) is the direct object selected by the predicate, which, as a consequence, includes both the verbal form *tirare* (to lift) and the particle *su* (up). As a matter of the fact, the entire string *tira su* (lifts up) could be replaced without any problem, by a single verb such as *sollevare* (to raise), as in (35).

(35) Marco mi solleva il morale
Marco me_{GEN} raise the spirit

From these last observations we can infer that the contraction only involves true prepositions, heads of prepositional phrases. These PPs, moreover, have to directly govern the DP complement whose article is involved in the contraction.

This assumption fits perfectly with Embick and Noyer's (2001) Local Dislocation, given that it predicts the movement to be influenced by the categorial status of the host. In our case, we can say that the preposition has to show "prepositional" features and has to be able to head a prepositional phrase.

Moreover, as predicted, the local adjacency is not sufficient. We have just seen, in fact, that it is possible to postulate the existence of a government relation between the contracting preposition and the article.

In conclusion we can say that the articulated preposition is originated by a post-syntactic morphological movement, which occurs at PF after Vocabulary insertion. This operation is realized only if:

- (i) After the syntactic derivation the preposition and the article are adjacent in the linear order of the sentence.

- (ii) After the syntactic derivation a head-complement relation holds between the preposition (head of the PP) and the article (head of the DP complement).
- (iii) After Vocabulary insertion the selected preposition is one of those allowing the contraction (a simple/monosyllabic P other than *per* and *tra/fra*).

We also have to point out that this solution perfectly explains why the contracted preposition shows the same distribution of both simple/monosyllabic prepositions and definite articles. At the time of contracting, in fact, the structure of the sentence is already formed, and the vocabulary inserted, so that only contexts admitting simple prepositions followed by definite articles are included in the process. This assumption also has the advantage of avoiding ad hoc explanations accounting for both the definite nature of “inflected” prepositions and the related unexplainable lack of the article.

A morphological operation causing the contraction also enables us to account for cases such as the one exemplified in (17), here repeated as (36).

- (36) a. Parlava alla e della ragazza
 *pro talked*_{3rdSing} *to-the*_{SingFem} *and of- the*_{SingFem} *girl*
- b. *Parlava a e della ragazza
 *pro talked*_{3rdSing} *to and of- the*_{SingFem} *girl*
 He/She talked of the girl and to the girl.

Napoli and Nevis (1987) compare (36) with the sentences in (37)

- (37) Sotto e sopra la tavola.
 *Under and on the*_{SingFem} *table.*

Here, the article can appear once, despite the ungrammaticality of a construction like **sotto tavola* (*under table). Complex prepositions like *sopra* (on/above) and *sotto* (under), have been shown to be very different both syntactically and semantically from the simple ones (we will come back to this point presenting Italian complex P). A comparison between complex and simple prepositions is, thus, not so felicitous. It would be better to compare (36) with a

similar construction in which simple non-contracting preposition are used, such as the one in (38).

- (38) a. Compro un regalo per e con la ragazza.
(pro) buy_{1stSing} a gift for and with the girl
- b. ??Compro un regalo per la e con la ragazza.
(pro) buy_{1stSing} a gift for the and with the girl

Confirming Napoli and Nevis' (1987) observations (38a) is largely accepted by Italian speakers, while (38b) is hardly ever considered a grammatical sentence. Those speakers who would accept (38b) judge, in any case, the first sentence as the best result, considering (38b) acceptable in colloquial contexts, but not perfect.

Anyway, if we consider the contraction to be caused by a morphological post-syntactic operation, we can also account for (36) resorting to the Nunes and Ximenes' (2009) Parallelism Requirement. According to them, in fact

"...if morphological merger affects a preposition and an adjacent determiner that is part of a coordinated structure, all conjuncts must undergo similar morphological merger."

If they are right, we can argue that since the lower conjunct is in a position realizing all the required conditions for the contraction to occur, the article is merged both on the adjacent preposition and on the coordinated one.

2.3 Complex prepositions

Complex prepositions are different with respect to simple ones because of some characteristics which make them recognizable quite systematically in human languages. First of all, in opposition to simple prepositions, complex ones have often been considered lexical items. This assumption is mainly based on the fact that they seem to have more semantic content than simple prepositions. In effect they generally convey spatial meanings, and are

used to express spatial (sometimes temporal) relations between objects. However, as observed by Terzi (2010), even if complex Ps are easily associable with the lexical domain (above all for their heavy semantic content), it is impossible to ignore their syntactic function in the sentence. Moreover, as noticed by Svenonius (2006), complex prepositions often derive from relational nouns which are reanalyzed as locative elements. Indeed, sometimes the corresponding noun still exists in the language. That is why, complex prepositions can be mistaken for nouns. See, for instance, Svenonius' (2006: 49) examples that we report in (1).

- (1) a. There was a kangaroo in the front of the car.
b. There was a kangaroo in front of the car.

According to Svenonius (2006) complex prepositions differ from their lexical counterpart because they do not refer to a concrete part of an object, as relational nouns do, but they indicate a space. For instance, while in (1a) the noun *front* specifically refers to a punctual portion of the car, in (1b) it indicates a definite space which is related to the car, but does not physically pertain to it. According to Svenonius (2006) *front* in (1a) acts as a relational noun, while in (1b) it is a functional element with special syntactical characteristics. The functional (not lexical) nature of this element is proved by the fact that, for example, it cannot be pluralized, being not sensitive to agreement changes inside the sentence. See examples in (2)³.

- (2) a. There were kangaroos in the fronts of the cars.
b. *There were kangaroos in fronts of the cars.

For the same reasons, the word *front* can be modified by an adjective only when it is employed as a relational noun. When it is a complex preposition, instead, it cannot take modifiers such as adjectives. Again, we report Svenonius' (2006: 50) examples;

- (3) a. There was a kangaroo in the smashed-up front of the car.
b. *There was a kangaroo in smashed-up front of the car.

³ Examples drawn from Svenonius (2006: 49-52).

All these considerations show that complex prepositions are considered lexical items mainly because of their similarities with the relational nouns from which they originate. Given these observations, Svenonius (2006) argues that complex prepositions form part of a separate functional syntactic category, which is distinct from both nouns and simple prepositions. As Jackendoff (1997), he calls them Axial Part, considering the fact that, as we have just shown, they are usually morphologically related to nouns (lexical items) that denote axial parts (e.g. back, top, front, bottom, etc.).

Moreover, examples in (1), (2) and (3) prove that elements carrying semantic content are not necessarily lexical. Also Cinque (2010) notices that many elements universally considered functional, such as demonstratives, quantifiers or tense and aspect morphemes, also convey specific meanings.

More reliable evidence of functionality, instead, would be pertaining to a closed class. Simple prepositions, for instance, clearly represent a very small set of elements cross-linguistically, and also complex prepositions, despite including a higher number of elements, seem to constitute a closed class in many languages (Cinque, 2010). Moreover, functional elements are selectively impaired in agrammatic patients' linguistic production. Simple prepositions are commonly mentioned in the amount of functional elements frequently omitted by Broca's aphasics. However, complex prepositions too have been shown to be problematic for patients with morpho-syntactic deficits. In Froud (2001)⁴, for example, the performance of a subject with a selective deficit in reading function words is presented. Interestingly he failed to read complex prepositions, but has any problems when the same words were used as relational nouns. In other words, he managed to read sentences like (1a), while he showed great difficulties with sentences like (1b). These results confirm Svenonius' (2006) claim of a syntactic difference existing between relational nouns and Axial Part, and prove that spatial complex prepositions have a functional nature.

In one of the experimental chapters of this thesis (see chapter 6), we will give a further evidence of the functional nature of these elements, describing the linguistic skills of an agrammatic patient, who has been tested on complex prepositions through a repetition task.

Even if simple and complex prepositions have both been proved to be functional elements, they clearly differ in their syntactic behavior.

⁴ For a detailed survey of Froud's work, see chapter 4

As Cinque (2010) notices, complex prepositions generally cannot directly introduce their complement. Most often, in fact, they need a further simple preposition assigning Case to the following NP, as exemplified in (4).

- (4) La casa è davanti all' albero
The house is in front of-the tree

This same structure can be found in several languages, such as for instance in Kîtharaka (a Bantu variety spoken in Niger-Congo, analyzed by Muriungi, 2006), where complex prepositions cannot directly assign Case, needing a simple functional P between them and their complement and in Persian, where the ezafe has to necessary link the complex P and its complement, while simple prepositions don't need it (Cinque 2010). Given these regularities, Cinque (2010) claims that a projection (KP⁵ for Svenonius 2006, Terzi, 2010 and some others) below the complex preposition has to be postulated, whose head, sometimes, can remain unpronounced.

In effect, in Italian some complex prepositions can appear directly before their complement. Nevertheless, even if the simple one is unnecessary, its presence is not ungrammatical, as in (5).

- (5) a. La casa dietro l' albero.
The house behind the tree
- b. La casa dietro all' albero
The house behind to-the tree

Another characteristic of complex prepositions is that they can be stranded, while simple prepositions lack this possibility, as shown by (6)⁶.

- (6) a. *Quale paese viene da?
Which country is (he/she) from

⁵ See Bittner & Hale (1996) who firstly highlighted the necessity of a functional projection hosting Case (KP)

⁶ Examples drawn from Cinque (2010).

- b. A chi eri seduto sopra?
To who were (you) sitting on

These considerations on the functional nature of complex prepositions and on the differences holding between them and simple ones, lead to conclude that complex prepositions should occupy a different syntactic position in the syntactic tree with respect to simple ones.

Taking as starting point Koopman's (2000) work on Dutch prepositional system, generative linguists seem to agree with a model considering simple prepositions as heads of PPs normally taking a complement (usually an NP). Complex prepositions, instead, are mainly considered as modifiers of an empty nominal projection (PLACE) (e.g. Kayne 2004, 2007; Terzi, 2010). PLACE is the abstract representation of a portion of the ground, which is defined by the complex preposition. Thus, when the complex preposition is present, PLACE denotes a narrower space, while if it is not used the space is less punctually defined. According to Terzi (2010), this hypothesis is confirmed by the fact that the distribution of Greek attributive adjectives matches, both diachronically and synchronically, with that of complex prepositions. What is more, it has the advantage of accounting for the "nominal flavor" (Terzi, 2010: 197) of complex prepositions without, at the same time, consider them as nouns.

Cross-linguistic evidence also shows that the Axial Part (following Svenonius 2006) is the complement of a simple stative preposition. This last, in turn, is introduced by a directional simple preposition, which seems to be hierarchically higher than the stative one. Excluding parametric differences among languages, Cinque (2010) concludes that the final universal structure of prepositional phrases could be the one in (7)

- (7) [P Dir [P Stat [P AxPart [P [DP]]]]] (Cinque 2010: 8).

This complex structure accounts for the many differences holding between simple and complex prepositions. Of course, as Cinque (2010) points out, this underlying structure is derived through leftwards movements or unpronounced elements, depending on the surfacing word order of every language. In Italian, for example, as exemplified in (5), the simple preposition following the Axial Part can be optionally omitted. Moreover, both the directional

As we will see in chapter 4, spatial (most often complex) prepositions have been more investigated than non-locative ones, as far as language diseases are concerned. The linguistic expression of location, in effect, is strictly related to the cognitive perception of spatial relations among objects. In a seminar work, Talmy (1975; see also Talmy, 1985; 2000a; 2000b) shows that the linguistic expression of events (fixed or in motion) is cross-linguistically encoded by a small array of key linking items. According to him, each event requires a moving (or possibly movable) item (i.e. the Figure) to do the action on a relatively stationary setting (i.e. the Ground). To express an event, therefore, natural languages select a portion of a scene, the figure, as the focal point and describe it in relation to another portion, the ground. In other words, human languages seem to universally express events using figures and grounds, so that Talmy's crucial insight is that both Figure and Ground are two core components of the encoding of events in language. See the sentence in (10).

(10) The dog is running across the road.

In (10) the dog acts as the figure and the road acts as the ground. Talmy also argues that, the Figure is projected as geometrically simpler than the Ground, often only as a point. It is also usually smaller, more salient, more movable, than the Ground, which, instead, is more stable. Moreover, Talmy also points out that, the objects participating in the event, the types (manners) of motions that they undergo, and the paths along which the objects travel, are represented in the linguistic component. Parametric factors determine in which elements (verbs, particles or prepositions) the spatial information (e.g. path, manner, result) can be morpho-syntactically encoded.

Following such an idea, Axial Part cannot be merely considered a semantic link between the Figure and the Ground; in fact, as Talmy (2000a, 333-335) noted, languages represent the relation between Figure and Ground through specific syntactic structures in which the spatial meaning is conveyed and, at the same time, a functional hierarchy is established. Svenonius' (2006, 2010) Axial Parts, in our opinion, enhance Talmy's ideas, motivating a layered functional bottom-up derivation, able to catch, in fine-grained terms, the relation holding between Figure and Ground. Moreover, his analysis based on vector space (Svenonius, 2010), provides a syntactic configuration accounting for both the linguistic structure and the visual perception of space.

2.3.1 Italian Complex prepositions

In Italian, complex prepositions, which correspond to Rizzi's (2001, 1988) polysyllabic prepositions, seem to perfectly match with the syntactic configuration we have presented above. First of all, as observed by Tortora (2005, 2006), they have rich semantic content, given that they convey locative and temporal meanings. Moreover, many of them can be associated with a relational noun in the sense of Svenonius (2006).

Secondly, Italian complex P can also be stranded, as noticed by Rizzi (2001, 1988). This property is in line with the traditional description of these elements, and it is not shared by monosyllabic prepositions. We report in (11) example (6), in which this contrast has already been exemplified.

- (11) a. *Quale paese viene da?
Which country is (he/she) from
- b. A chi eri seduto sopra?
To who were (you) sitting on

Also in Italian, in addition, the majority of complex prepositions (e.g. *davanti a*, in front of; *lontano da*, far from; *fuori da*, out of) generally need a simple functional preposition to introduce their NP complement. See examples in (12).

- (12) a. La casa davanti all'albero
The house in front of-the tree
- b. La casa lontano dall'albero
The house far from-the tree

However, as Rizzi (2001, 1988) underlines, the monosyllabic preposition is not always obligatory. Some complex prepositions, like *dietro* (behind), *sopra* (on/above), *sotto* (under)

can optionally take the following simple preposition, as proved by the fact that both (13a) and (13b) are grammatical.

(13) a. La casa dietro all' albero
The house behind of-the tree

b. La casa dietro l' albero
The house behind the tree

In addition, there also are some complex prepositions which do not allow the presence of the monosyllabic one, such as *dopo* (after), or *senza* (without). See sentences in (14).

(14) La casa senza finestre
The house without windows

*La casa senza di/delle finestre
The house without of(the) windows

(for a detailed list of prepositions pertaining to every group see Rizzi, 2001-1988).

Examples above confirm the postulation of a further projection below PLACE hosting a Case assigning simple preposition. As Cinque (2010) claims, the functional preposition can either be phonetically realized or remain unpronounced.

In Italian, as we have seen above, both the possibilities exist. In addition, as Rizzi (2001, 1988) notices, the existence of this silent functional head becomes clear when the complement to be introduced is a personal or a reflexive pronoun. In such a case, in fact, even those complex prepositions which normally don't allow (or optionally allow) the presence of the monosyllabic one, have obligatory to be followed by *di* (of). See examples in (15).

(15) a. È partito senza Gianni
He left without Gianni

b. È partito senza di me

He left without of me

The presence of the functional preposition has also been observed to contribute to the semantic interpretation of a sentence. Tortora (2005, 2006), in fact, observes that, when the functional preposition is optional, its presence or absence changes the perception of the space in which the described event takes place. See examples in (16), drawn from her works.

- (16) a. Gianni era nascosto dietro all' albero.
Gianni was hidden behind at-the tree
- b. Gianni era nascosto dietro l' albero.
Gianni was hidden behind the tree

According to Tortora (2005, 2006) in (16b) the event can only be interpreted as occurring in a punctual space, namely exactly behind the tree. (16a), on the contrary, suggests that the event takes place in a wider space. This contrast is clearer when verbs are used denoting activities which require an open space. In these cases, in fact the presence of the preposition is crucial to convey the correct message. See sentences in (17).

- (17) a. Gianni corre dietro all' albero
Gianni runs behind to-the tree
- b. Gianni corre dietro l' albero
Gianni runs behind the tree

In Tortora's view, (17b) can only mean that Gianni starts to run and that his movement finishes exactly behind the tree. On the contrary (17a) not only can be interpreted as (17b), but can also indicate that Gianni is running in a wider undefined space starting from the tree and developing behind it. In this sense, we can say that (17a) is ambiguous. According to Tortora (2005, 2006), the functional preposition has an aspectual value, given that it specifies the kind of space the sentence refers to. Therefore, she proposes the existence of an AspP in the extended projection of PP (which she postulates to be parallel to that of DP and CP, in line with den Dikken, 2003 and Koopman, 1997). The prepositional aspectual head should appear

above the complex preposition, which, in its turn, should move to the SpecAspP in order to derive the surfacing word order.

In a subsequent work, also Folli (2008) takes into consideration contrasts like those in (17). In addition to Tortora's observations, she also notices that the ambiguity of (17a) depends on the type of verb which is used and that, as a consequence, the simple preposition has different functions depending on the motion verb which describes the event.

According to her, in fact, Italian, unlike English, is a verb-framed language; this means that the aspect of the verb is crucial to form the goal of motion of the event as locative or directional. However, when necessary, Italian speakers can resort to satellite-framed strategies to express the goal of motion, using complex prepositions.

With respect to sentences like those in (17), for example, she observes that the simple preposition participates in specifying the kind of space (as bound/unbound) only with verbs of motion which are inherently directional. These verbs, which, she claims, have a Resultative aspectual feature, don't necessary need a complex P to form the goal of motion, because they allow the interpretation of the path. In fact, they can also appear only with a simple preposition expressing the result of the movement (e.g. *Sono corso al parco*/I ran to-the park). Verbs of motion lacking the Resultative feature, instead, cannot produce a goal of motion on their own, and they need a further Resultative element expressing path. In these cases, therefore, a complex preposition is needed, and a simple one is not sufficient to form the goal of motion. For instance the verb *galleggiare* (to float) does not allow a directional interpretation. See examples in (18).

- (18) a. *La barca galleggia al ponte.
The boat floats to-the bridge
- b. La barca galleggia sotto il ponte.
The boat floats under the bridge
- c. La barca galleggia sotto al ponte
The boat floats under to-the bridge.

As expected (18a) is ungrammatical. *Galleggiare* (to float), in fact, is a non-Resultative verb which can only accept a stative interpretation. In (18a) the simple preposition introduces the result of a motion whose direction is not specified, lacking an element able to encode path. (18b) can only have a stative interpretation. The boat is floating under the bridge in a specific point.

According to Folli (2008), only (18c), in which both the prepositions are present, can be interpreted as expressing a goal of motion. In this case, in fact, the complex preposition encodes path, denoting the direction of the movement, while the simple one encodes place, namely the result of motion. Reading (18c), thus, one can imagine the boat going under the bridge by floating. In such an interpretation, the event is not punctual, but it has a beginning and a finish.

According to Folli (2008), therefore, with non-Resultative motion verbs, the simple preposition is necessary to express a directional interpretation. In these cases, thus, it doesn't specify the kind of space (bounded/unbounded) in which the event takes place (as with Resultative verbs), but the kind of movement (locative/directional) the subject does.

Finally, with locative verbs (non-motion) the presence or absence of the simple preposition does not change the grammatical result of the sentence, but simply further specifies PLACE (as bounded or unbounded, like in Tortora, 2005, 2006), as exemplified in (19).

- (19) a. Rimango dietro l' albero.
 (pro)Remain_{1stSing} behind the tree
- b. Rimango dietro all' albero.
 (pro)Remain_{1stSing} behind to-the tree

On the bases of these observations, Folli (2008) proposes a syntactic structure which explains all these differences, at the same time taking into consideration the semantic value of verbs. Following Koopman (2000), Svenonius (2006) and many others, she postulates the necessity of having two different aspectual heads, namely a PathP encoding direction and a PlaceP encoding location. To express goal of motion, both the positions have to be filled, in order to have a direction of motion and a result of motion. In her configuration, in addition, only elements with a Resultative feature can be hosted in PATH. Verbs inherently directional, such

as *correre* (to run) are allowed to appear in PathP, so that the simple preposition, hosted in PlaceP, is sufficient to complete the goal of motion, by expressing the result. Non-directional motion verbs, instead, such as *galleggiare* (to float), lacking the resultative feature, cannot appear in PathP. That is why a complex preposition is necessary; this one, in fact, expressing the direction, can fill the empty aspectual head PATH and combine with the locative simple preposition, thus completing the goal of motion.

According to us, however, Folli's (2008) and Tortora's (2006) analyses don't consider that the two classes of motion verbs they take into consideration (allowing or not goal of motion readings), not only differ in their semantic, but also in their syntax.

In fact, Folli's (2008) Resultative verbs can all be represented with an unaccusative configuration. Some of them, like *scivolare* (to glide) are purely unaccusative, while some others, such as *correre* (to run) are unergative and can be used in both transitive and unaccusative constructions.

It seems to us that the contrast in (17) disappears if an unaccusative interpretation is forced. See sentences in (20).

- (20) a. Gianni è corso dietro all' albero
Gianni is run behind to-the tree
- b. Gianni è corso dietro l' albero.
Gianni is run behind the tree
- c. Gianni ha corso dietro l'albero
Gianni have run behind the tree
- d. Gianni ha corso dietro all' albero
Gianni have run behind to-the tree

Both (20a) and (20b) mean that Gianni began to run far from the tree and that his movement finished just behind the tree. (20c) and (20d), instead, both describe a situation in which Gianni ran for some time behind the tree. This last interpretation clearly suggests that the space in which the event occurs is wider than in the former.

The specification of the space as bounded or unbounded, thus, seems to be triggered by the syntactic nature of the verb, rather than by the presence or absence of the simple preposition. In fact, if we consider a purely unaccusative verb, such as *scivolare* (to glide), the double reading is not possible.

- (21) a. Marco scivola dentro il buco
 Marco glides in the hole
- b. Marco scivola dentro al buco
 Marco glides in to-the hole

In (21) the only possible interpretation (in both sentences) is the directional one. In other words we can only imagine Marco gliding into the hole, starting from the outside. Moreover, neither Tortota (2005, 2006) nor Folli (2008) account for the cases in which the complex preposition has obligatory to be followed by the simple one. *Davanti* (in front of), for instance, requires the simple preposition, as shown in (22).

- (22) a. Gianni corre davanti all' albero
 Gianni runs in front of-the tree.
- b. *Gianni corre davanti l' albero.
 Gianni runs in front the tree

If the simple preposition really participates in specifying the space as unbounded, sentences like (22a) in which the preposition *a* (at/to) is obligatory, should only refer to a wide space. Nevertheless, this is not the case, given that (22a) can have both the interpretations, depending, according to us, on whether the verb is analyzed as unaccusative or as transitive. The different interpretations of sentences in (17) should, therefore, depend on the lexical aspect (following Cinque, 1999) of the verb which, as Cinque (1999) postulates, lacking a specific aspectual morpheme (usually an adverb), can move from inside the VP and reach a specific aspectual head encoding the required meaning. Among Cinque's (1999) set of aspectual heads, constructions like those in (21a) and (21b) can maybe be classified as

terminative, while sentences in (21c) and (21d) can be considered ambiguous, given that both the terminative and the continuative readings are possible.

If we are right, further aspectual projections for prepositions are no longer necessary, and Italian complex prepositions can be assimilated to Svenonius' (2006) Axial parts, showing the structure described in the section 2.3, with a (possibly unpronounced) KP hosting the simple preposition below Axial Part.

As Rizzi (2001, 1988) points out, moreover, in Italian it is also possible to extract the simple preposition and the NP complement, moving them in a higher position and leaving the Axial Part in situ. In addition, the extracted material can be replaced by a clitic pronoun. See examples in (23).

- (23) a. Mario siede davanti a Maria.
Mario sits in front of Maria
- b. Gianni le siede davanti.
Gianni her_{DAT} sits in front

This process is more common when the simple preposition following the complex one is *a* (at/to), but also occurrences with *da* (from) are attested, as in (24).

- (24) a. Gianni è fuori dal gruppo.
Gianni is out of-the group
- b. Gianni ne è fuori.
Gianni DAT is out.

Given that Italian clitic pronouns typically convey morphological Case, it seems to us that this alternation could be taken as further evidence that the simple preposition is a case assigner.

3. PREPOSITIONAL COMPOUND WORDS

3.1 Introduction

In many languages, prepositions (both simple and complex) can also participate in the formation of compound words. The linguistic debate on this type of elements especially concerns the process through which they are formed; are they completely lexicalized items? Does syntax participate in their formation just at the moment of their computation?

These questions clearly concern a controversial matter, namely the interaction between syntax and morphology. Previous works (e.g. Scalise 1994) considered morphology a language component completely independent. Any relation with the syntactic system wasn't accepted, so that a morphologic product could not originate from a syntactic operation.

Subsequent studies have shown that this assumption is too drastic and simplistic. In Bisetto and Scalise (1999) this model is reviewed, and the interaction between the syntactical and the morphological interfaces is assumed to be possible, if not necessary in some cases. English and Afrikaans constructions like those in (1), for instance, are called "phrasal compounds" (Lieber 1992) but, according to Bisetto and Scalise (1999) cannot be considered true morphological products, because they don't obey to the Lexical Integrity Principle (see Bisetto and Scalise 1999).

(1) a. A pipe and slipper husband

b. God is dood theologie

God is dead theology (Bisetto and Scalise, 1999: 33)

In Italian, the same expressions, in fact, can be modified by adding a further element to the coordination or by inserting adjectives referring to one of its components such as in (2). Similar operations are not allowed by true compounds.

(2) a. Un marito casa pipa e pantofole

An husband house pipe and slippers

b. Un marito casa pipa Peterson e pantofole De F.

An husband house, Peterson pipe and De F. slippers

Bisetto and Scalise (1999) take cases like those in (1) and (2) to prove that even if not all the morphological constructions can be explained using syntactic models, a theory aiming to account for the morphological processes underlying the formation of words, should admit “*morphological rules of compounding to take a syntactic construction as its base*” (Bisetto and Scalise, 1999: 32) because it can occur that phrases become “*input constituents to words formation*” (Bisetto and Scalise, 1999: 33).

In Italian, two type of prepositional compounds are detectable; (i) compounds formed by two nouns linked by a simple preposition (henceforth NpN) as *ferro da stiro* (electric iron); (ii) compounds formed by a complex preposition and a noun (henceforth PN) as *lungomare* (seafront).

3.2 NpN compounds

3.2.1 Theoretical background

NpN compounds are fully productive in Romance languages and have been more studied than PNs. Their linguistic nature is controversial, because, on the one hand they show many of the typical characteristics of complex words, but, on the other hand, their structure suggests a compositional process under their formation.

This duality also emerges when assessing aphasic patients’ linguistic skills. On the basis of neuro-linguistic observations, for instance, Semenza and Mondini (2006), claim that NpNs are more likely to be originated from a lexicalization of syntactic structures (Following Di Sciullo and Williams, 1987), rather than be a morphological product, as compound words generally are considered. In aphasic speech, in fact, difficulties in correctly produce the linking preposition appearing inside NpNs have often been detected (see Mondini et al. 1997, and also chapter 7 of this dissertation). On the other hand, conceptually, NpNs should be considered single lexical entries stored in the lexicon. Given this duality, Semenza and Mondini (2006) propose that NpNs are selected as unitary items, which are decomposed

before the phonological representation. In this way, syntactical and semantic properties of every component are activated, causing aphasic patients' deficits.

From a linguistic point of view, many scholars have highlighted that NpNs can be assimilated to other compounds. Ralli (2008), in a cross-linguistic work dealing with compound words, postulates the existence of compound markers. These elements are semantically empty segments (often a single phoneme), appearing between the first and the second component of the compound, whose function is that of indicating the compositional process. Moreover, according to Ralli (2008), they are selectively present in languages with a rich morphology. English, for instance, does not have compound markers.

Speaking about prepositional compounds, she argues that the simple preposition appearing in NpNs should be considered a kind of compound marker, or at least, a step at the beginning of a compound-marking process.

Similar hypotheses have been made by many other linguists, also referring to other romance languages. Kampers-Manhe (2001), for instance, has made the interesting observation that, as far as concerns these linguistic units in French, prepositions such as *de* and *à* do not seem to have any *referential* value, are semantically empty and their role is merely to set forth the complement of the head-noun. A confirmation of these assumptions is that, in some cases, they may be even omitted (as, for instance, *robe à fleurs/robe-fleurs*, both, flower dress). In line with this observation, the simple preposition of French NpNs, which are very productive and, thus, very often investigated, is sometimes labelled *préposition incoloree* (colourless preposition) (e.g. Cadiot, 1991).

The syntactic opaqueness of NpNs has also been postulated by Rio-Torto and Ribeiro (2009), who assess Portuguese NpNs (e.g. *olhos de lince*, eagle eyes; *bilhete de identidade*, identity card). In line with Di Sciullo and Williams's (1987), they consider them "*univerbation of phrases*", namely elements with an internal syntactic structure which, however, are reanalysed as syntactic atoms, occupying an X° and being treated as single lexical items in the mental lexicon.

The same conclusion is reached by Bernal (2012) who analyses Catalan compounds. Following Cabré (1994) and again in line with Di Sciullo and Williams (1987), she claims that NpNs (such as e.g. *màquina de cosir*, sewing machine, *ulld'escale*, out-of-scale) are the "*result of the lexicalisation of a syntactic sequence*" (Bernal, 2012: 9).

Compounds of the NpN type can also be found in Spanish (e.g. *agente de seguridad*, security officer; *barco de vapor*; steamboat) where they are commonly labeled *compuestos improprios* (improper compounds), and in Romanian (e.g. *vagon de dormit*, sleeping car; *floare de număuita*, forget-me-not).

Also in Italian, the simple preposition forming part of NpNs seems to have a mere linking role, lacking of both referential value and syntactic function. Mondini et al. (2005), for instance, notice that NpNs seem to be opaque with respect to the choice of the preposition and that the presence (or absence) of the article is not motivated by specific rules, as exemplified in (3).

(3) a. Film in bianco e nero.

Movie in black and white (black and white movie)

b. Film a colori

Movie at colors (color film)

c. Tiro a segno

Shooting at target (target shooting)

d. Tiro al piattello

Shooting at-the clay-pigeon (clay-pigeon shooting)

In (3a) and (3b) different prepositions are used in two compounds expressing the same relation between their components. In similar way, in (3d) an articulated preposition is inserted while in (3c), which have almost the same meaning, the article is not present.

Examples in (3) show that also Italian NpNs, despite having the shape of a prepositional phrase syntactically derived, seem to form a unit with respect to the lexical domain. This fact is also underlined by Bisetto and Scalise (1999), who show as Italian NpNs respond positively to their compound-hood tests. The tests they apply, are especially related to the impossibility of executing syntactic operations which lead to the separation of the compound components.

For example, Italian NpN *alleged* compounds do not allow the insertion of an adjective between the head noun and the modifying prepositional phrase. Hence, as stated in Semenza

& Mondini (2006), if we want to modify the compound noun “sedia a rotelle” (*wheelchair*), with an adjective, this one cannot be located inside the compound, after the head, but it has to appear after or before the entire compound. See examples in (4).

(4) a. *Una sedia nuova a rotelle

A chair new at wheels

b. Una nuova sedia a rotelle.

A new wheelchair.

c. Una sedia a rotelle nuova.

A wheelchair new.

Bisetto and Scalise (1999) also individuate four syntactic operations that cannot be applied on compound words, being, instead, allowed with non-lexicalized phrases. See them in (5)

(5) a. head deletion under coordination

b. wh- movement of the head and the non-head constituent

c. non-head topicalisation

d. pronominal reference (of the non-head) (Bisetto and Scalise, 1999: 37)

According to authors, the application of these tests to NpNs shows that they are somewhat opaque to syntax. (5a) suggests that, while prepositional phrases can be coordinated without repeating their first element, this operation is impossible with two NpNs, as in (6).

(6) a. *Gianni compra un ferro da stiro e uno da calza

Gianni buys a iron of flat and of knitting

Gianni buys an electric iron and a knitting needle

b. Gianni invita un amico da Roma e uno da Milano

Gianni invites a friend from Rome and one from Milan

(5b) indicates that a compound word does not admit the wh-movement of one of the two elements of the complex noun, such as in (7).

(7) a. *Che cosa hai comprato da stiro? - un'asse
What do you bought from ironing - a board.

b. Che cosa hai comprato da Pagliaccio? - Il costume/la parrucca/il naso
What do you bought from clown? - the costume/the wig /the nose

(5c) shows that a non-head of a compound word cannot be topicalised without moving the head too, as in (8).

(8) a. *Da stiro, ho comprato il ferro.
Of press, I bought the iron

b. Da pagliaccio, ho comprato il costume.
Of clown I bought the costume.

Finally, (5d) explains how it is not possible to assign a pronominal reference to one of the elements of the compound. In particular, this rule has to be referred to the non-head, given that the pronominalisation of the head is not distinguishable from that of the entire compound. See examples in (9).

(9) a. *Compro gli occhiali da sole_t, che_t forse uscirà domani.
I buy the glasses of sun_t, which maybe will come out tomorrow.

b. Ho un'amico da Roma_t, che_t è una bellissima città.
I have a friend from Rome_t, which_t is a wonderful city.

As we have seen, the nature of prepositional compounds is difficult to describe. On the one hand they behave as unitary elements, both because they appear to be resistant to syntactic

operations and because they unequivocally match with a unique conceptual entry, suggesting that they are stored in the mental lexicon as single units.

On the other hand, however, NpNs clearly have the same structure of prepositional phrases and, in addition, they seem to be less resistant than other compounds in agrammatic speech.

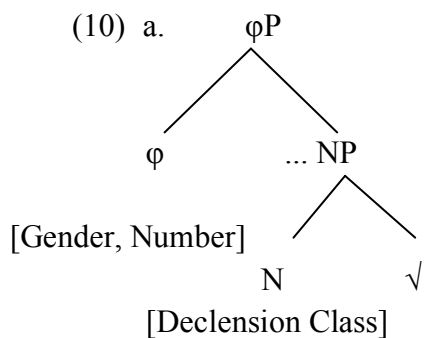
Delfitto and Melloni (2009) try to solve this question by assuming that the formation process of NpNs is similar to that of compounds words formed by two nouns (henceforth NN), whose status of complex words is not under discussion. Interestingly, moreover, they argue for a syntactic operation underlying the structures of both these elements. Mainly basing their analysis on Kayne's (1994) LCA and on the subsequent Moro's (2000) reinterpretation, Delfitto and Melloni (2009) claim that NN compounds originate from the Parallel Merge of two elements occupying symmetric positions in the syntactic derivation. Given that no hierarchic relations hold between the two nouns, none of them "*can project its label to the dominating node*" (Delfitto and Melloni, 2009: 81), and Kayne's LCA is violated. In other words, when two identical nominal structures are merged, given that they are not hierarchically organized, a Point of Symmetry is created and the syntactic derivation is broken.

Hence, the repair strategy to solve the symmetry, according to Delfitto and Melloni (2009), consists in an Internal Merging operation, namely the insertion of a head (e.g. a φ -head in Romance languages or a NP in Germanic⁷ ones, see Delfitto and Melloni 2009: 85-92), able to attract one of the two elements of the compound. Authors refer to this syntactic model as a Compound Phase, claiming that it is a repair strategy, to be applied as soon as possible only to minimal lexical units.

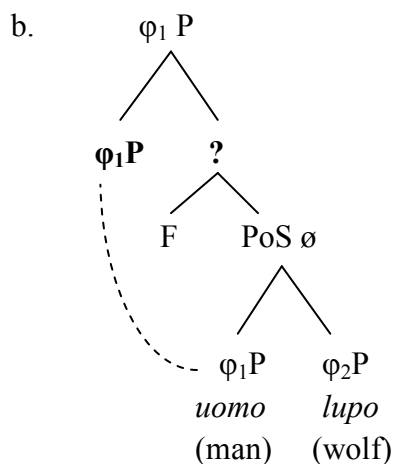
The φ -head insertion occurring in Romance languages to solve the Point of Symmetry combines a syntactic movement with the semantic properties of compounds leading to a *Semantically Driven Compounding* (Delfitto and Melloni, 2009) process. This theory takes inspiration from the Qualia Structure⁸ of Pustejovsky's (1995) Generative lexicon. The resulting underlying structure of NNs should be the one in (10).

⁷ Germanic and Romance languages are different because, in the former gender and declension class are strictly connected. In fact, nouns forming part of a certain declension class also have a specific gender. In Romance languages, instead, gender and declension class are independent. For this reason neither the declension class nor the gender can be taken as triggers of the Internal Merger.

⁸ In brief, the *qualia structure* of a word specifies four aspects of its meaning: a) the relation between it and its constituent parts (the constitutive role); b) that which distinguishes it within a larger domain (the formal role); c) its purpose and function (the telic role); d) whatever brings it about (the agentive role).



(Delfitto and Melloni, 2009: 91)



(Delfitto and Melloni, 2009: 93)

To use Delfitto and Melloni (2009) words, Compound Phase consists in merging

“a functional category F with a valued Qualia-oriented feature (FQ) that targets an unvalued Qualia-oriented feature on one of the two compound members (φPs), driving adjunction of the selected compound member to the structure obtained by applying External Merge of F.”

(Delfitto and Melloni, 2009: 92)

As far as NpNs are concerned, Delfitto and Melloni (2009) simply argue that when the two nouns forming a compound word are mediated by a preposition, no Point of Symmetry is present and, therefore, parallel merge is not necessary at all. However, a syntactic processing has to be postulated anyway in the formation of these compounds. The empty F postulated in 10b, in fact, seems to play the same role as a phonetically realized *light* preposition, being, actually, the morphological realization of specific Qualia of a word.

3.2.2 NpN Compounds in aphasia

While compound words have been a lot investigated in neuro-linguistic literature, works specifically dealing with the linguistic abilities of aphasic patients in producing or comprehending prepositional compounds are not so many.

In general, it has been observed that the morphological status of a complex word is recognized by patients. Substitution errors, in fact, very often concern the replacement of a compound word with a similar item (e.g. an NN compound is more likely to be substituted with another NN compound) (see Semenza et al. 1997; Hittmair-Delazer et al., 1994).

Subsequent works show that not only patients are aware of compounds structure, but also that they seem to resort to compositional strategies in order to retrieve them. For instance, when asked to produce verb-noun compounds (such as *portalettere* lit. carries-letters), patients with impairments affecting verbs often omit the first element of the compound, namely a verb (Semenza et al. 1997; Mondini et al. 2004, Luzzatti et al. 2002). This fact suggests that, even if the compound is syntactically treated as a noun, the elements forming part of it, in some way conserve their original properties. Moreover, it also suggests that some compositional processes are involved when a compound word has to be retrieved; otherwise, omissions should not be present in the amount of errors subjects do. This hypothesis has recently been confirmed by a study performed by El Yagoubi et al. (2008), whose results, collected using a lexical decision task, support the idea of an independent retrieval of compound units.

Nevertheless, other studies (a previous one by Dressler and Denes, 1989 and two more recent ones by Marelli et al. 2009 and Marelli and Crepaldi 2012) show that when retrieving compounds the compositional strategy could be selectively applied, depending on specific properties of the compound.

Dressler and Denes (1989), for example, investigated the comprehension and identification of transparent (e.g. *portalettere*, postman) vs. opaque compounds (e.g. *mangiapreti*, anticlerical, lit. ‘priest-eater’) in Italian Broca's and Wernicke's aphasic patients. On the basis of their results they claimed that two different strategies were mainly used by subjects to identify/retrieve compounds; a morphological or a semantic strategy. More specifically, when compounds are morphologically analysed, substitutions based on only one of the two elements can be detected, because the two components are separately processed (e.g. *portalettere*, lit. carries-letters could be substituted with “someone who carries letters” or “the man who brings the letters”). The morphological strategy can be applied only to transparent compounds.

The semantic strategy, instead, leads to the production of synonymous of the whole compound or to descriptions not directly connected to any unit of the compound. (e.g.

portlettere, lit. carries-letters could be replaced with “employee of the post office”) (for a more general picture see Semenza and Mondini, 2006).

Dressler and Denes’ (1989) patients performed better with transparent compounds and Broca’s patients were always superior to Wernicke’s ones. Moreover, as expected considering the main characteristics of these two syndromes, Broca’s aphasics applied the appropriate (semantic) strategy more often, while Wernicke’s aphasics were able to rely almost exclusively on a morphological strategy.

More recently, Marelli et al. (2009) performed an experiment using priming and eye-tracking techniques. Their results seem to suggest that the head position inside the compound is crucial in determining how this last is retrieved. In particular, while head-final compounds (e.g. *terremoto*; earthquake) are represented with a head-modifier internal hierarchy, both head-initial (e.g. *capobanda*; chief) and exocentric compounds (mainly VN) are lexicalized (disconfirming Semenza et al., 1997).

As far as prepositional compounds are concerned, the few existing neuro-linguistic studies support the idea of a compositional operation underlying the formation of NpNs. Luzzatti and De Blaser (1996) described the performance of two patients with great difficulties in the choice of the simple preposition linking the two nouns of NpNs. The same patients had no problems with the inflectional morphology appearing on the two nominal elements and were only mildly disturbed in suffixation.

In a further investigation, Mondini et al. (2005) (see also Mondini et al. 1997) assessed the performance of seven agrammatic patients in a set of different tasks (naming, repetition, completion, reading and writing) involving NpN compounds. Omissions were the most frequent error in naming, while in the other tasks a higher number of substitutions was detected. These results, according to Mondini et al. (2005), can only be explained by assuming that, at some point of the retrieval process, NpNs, which had been selected from the lexicon as unique entities, are decomposed. When it happens, the internal syntactical structure of the compound resurfaces, resulting problematic for agrammatic patients.

As we will see, one of the experiments we will present in this thesis leads to similar conclusions.

3.3 PN compounds

PN compounds have been less studied than NpN ones. One of the most articulated and interesting works dealing with these elements is the one of Kampers-Manhe (2001), who proposes a syntactic explanation for their formation, relying on Kayne (1994). Starting from some previous observations of Zwanenburg (1990), she claims that compounds involving complex prepositions can be divided in two groups.

(i) PNs of the *sans-papiers* (without documents) type imply, according to Kampers-Manhe (2001), a structure involving an unpronounced lexical head being modified by the compound. In effect a *sans-papiers* is a person without documents. In a certain sense, therefore, we can say that an abstract external argument is needed for the syntactic representation to be completed. Such an observation leads to the postulation of a syntactic structure in which the preposition, which has referential value, acts as the head of a PP projection. With some differences, it seem to us that in these compounds the complex preposition could be assimilated to Svenonius' (2006) Axial Part, exactly behaving as a true preposition.

(ii) PNs of the *contre-culture* (against-culture) type, on the contrary, don't need the postulation of a further abstract lexical element. The modification, in fact, directly takes place inside the compound. Crucially, a *contre-culture* is a type of culture. In this case, thus, the preposition also acts as modifier. The structural representation of these PNs, thus, is different. Kamper-Manhe (2001) proposes a structure in which the preposition occupies a Spec position of an Inflection projection. The noun raises to Infl^o to take the inflectional affix and, in a second step, the preposition is adjoined in to SpecInfl.

In any case, in both PNs described by Kampers-Manhe (2001), the complex preposition has referential value exactly as normal prepositional phrases, thus, suggesting that a syntactic process is involved in the formation of complex words with complex prepositions.

Italian compounds of this type have not been studied in detail. Bisetto and Melloni (2008) only touch on them arguing that they probably are para-synthetic structures, namely compound formations characterized by a ternary structure. In particular they postulate the

existence of a third empty element after the noun of the PN, with a resulting structure like this: [[P N]Ø]. Crucially, such a structure is hardly to be assumed in a generative point of view, given that the “binary branching” constraint is by now widely accepted (since Kayne 1984).

Bisetto’s (2008) insight, however, goes in the same direction of Kampers-Manhe’s (2001) one in assuming the necessity of a further element to be present after the compound. Indeed, if we analyse her observation in syntactic terms, we could explain Bisetto’s (2008) structure with a Figure/Ground configuration, in which the Ø would be the “external argument” of the preposition, namely the Figure (see Svenonius, 2006; Talmy, 2000 and chapter/section 2.3).

As we have seen, the few existent works on PNs seem to suggest a syntactic process under their formation.

Nevertheless, another possibility could also be explored. According to Svenonius (2006), in fact, complex prepositions can be used, in certain contexts, as relational nouns (e.g. the behind of the elephant *vs* behind the elephant. See section 2.3 for more details). If he is right, PNs compounds could either originate from the same syntactic structure representing Axial Parts or arise from the same process leading to, for example, NN compounds. As we have seen above with Delfitto and Melloni (2009) hypothesis, this last option can be explained in syntactical terms too, even if the debate is still open. Unfortunately, we don’t find neuro-linguistic studies concerning PNs. In fact, the linguistic behaviour of aphasic patients, especially if agrammatic, toward elements of this type could be crucial in the definition of the path along which they are processed. In one of the experimental chapters of this thesis (see chapter 7), we will assess the capacity of producing PNs of an agrammatic patient. Conclusions will be very interesting and, sometimes surprising.

4. PREPOSITIONS AND APHASIA

4.1 A review of the neuropsychological literature on prepositions

Prepositions did not receive a great amount of attention in neurolinguistic research. As already pointed out in Mätzig et al. (2010), this fact is quite strange, given that problems related to production and comprehension of prepositions by aphasic patients are quite common. This apparent lack of interest towards prepositions in the field of linguistic disorders, probably depends on their controversial nature, as they constitute an hybrid category, showing both lexical and functional properties.

The existence of many different linguistic hypothesis describing semantic, syntactic and lexical features of prepositions, makes more difficult to interpret deficits involving them. The same pattern of errors, in fact, could be ascribed to different causes depending on the theoretical model followed by the experimenters.

Moreover, the few existing works (a detailed survey is given in Mätzig, 2009 and Mätzig et al., 2010) dealing with the production or comprehension of prepositions in aphasic populations, show that results can be different depending on several variables such as, for example, the types of prepositions which are investigated, the tasks the patients are asked to perform, the neuro-linguistic diagnosis participants have received and so on.

Anyway, comparing findings of the most important studies, some regularities are detectable which can help in identifying some features of prepositions, also cross-linguistically.

We present here some of the few major studies assessing the processing of prepositions by aphasic subjects.

The majority of neuro-linguistic works on prepositions concern the assessment of Broca's aphasics' linguistic skills, which are often compared with those of Wernicke's aphasic patients. In line with traditional descriptions of the syndromes, moreover, Wernicke's aphasics have been proved to be more impaired than Broca's aphasic patients in the comprehension of prepositional items (Goodgalss et al. 1970).

With respect to production, instead, it is usual to hold/predict that prepositions tend to be omitted in Broca's aphasia, while in Wernicke's aphasia they are mostly substituted (Caplan 1985; Grodzinsky 1990).

In this direction we find, for example the studies of Friederici (1981) and Friederici et al.

(1982). They assessed English spatial prepositions in patients with both Broca and Wernicke's aphasia. In line with traditional descriptions of these syndromes, they found that both populations had problems in producing prepositions, but errors patterns were different. While patients with Broca's aphasia produced a high number of omissions, Wernicke's aphasics mostly substituted the target preposition with another one.

Authors argued that impairment had different causes, with respect to the type of syndrome patients were affected; agrammatic patients omitted prepositions because of the difficulties in the syntactic and phonological parsing of the entire sentence. As expected, in fact, they did not show any problem with the single words naming task. Wernicke's patients, instead, suffered of a lexical selection disorder causing the choice of a wrong preposition.

In other subsequent works, however, unexpected patterns of errors emerged. For instance, prepositional substitutions have also been shown to appear quite frequently in agrammatic Broca's aphasia (see e.g. Friederici 1985; Miceli et al. 1989). Moreover, further researches have highlighted that the prepositional deficit should be assessed taking into account that many types of prepositions exist⁹.

The neurolinguistic debate on production/comprehension of prepositions in aphasia is most often related to the difference between prepositions considered "lexical" and those defined as "syntactic/functional". Theoretically, it is largely assumed that the same preposition can act as merely functional item, thus lacking of semantic content, or as a lexical entry being necessary for the semantic interpretation of the sentence. However, the distinction between these two big classes doesn't depend only on the presence/absence of semantic content. The question is more complex and the identification of lexical vs. functional features of prepositions is still under discussion.

Friederici (1982), for example, in a study assessing linguistic skills of German aphasic patients, compared spatial prepositions with subcategorized ones. She classified the former as lexical items because of their heavy semantic value, while she assumed the second to be syntactic as they are selected by the preceding verb, and they don't convey semantic content. She assessed linguistic skills of Wernicke's and Broca's aphasics using both a completion and a grammatically judgment task. She found that while Wernicke's aphasics made a lot of errors

⁹ As we see in next chapters, prepositions are traditionally classified respect to whether they are functional or lexical element. Further studies as revealed that this sharp distinction is not sufficient to describe the entire class of prepositions well (see for instance Littlefield, 2006). Elements such as particles and adverbial prepositions have to be considered, as well as the different usage (more or less functional) of one and the same preposition.

in items requiring locative prepositions (making within category substitutions), agrammatic patients had more problems with subcategorized prepositions, especially omitting them and making across category substitution errors.

An opposite pattern of errors, instead, were detected in the experiment conducted by Bennis et al. (1983), in which Dutch prepositions were assessed using a completion task. In opposition to Friederici (1982) they considered subcategorized prepositions as lexical, as well as spatial ones. They based this classification on the capacity of being theta role assigners, comparing them with the two purely syntactic prepositions, namely *of* and the dative *to*.

They found that lexical prepositions were better retrieved by Broca's aphasics, while patients diagnosed with Wernicke's aphasia showed the opposite pattern. Authors consider these results as evidence that the lexical domain is spared in case of agrammatism and impaired in fluent aphasias.

As shown by these two works, the theoretical status of subcategorized prepositions, is controversial. Crucially, authors came to the same conclusions, namely that syntax is impaired in agrammatism, although subcategorized prepositions resulted spared in Friederici's experiment and impaired in the Bennis' et al. one. And what is more, both predictions were confirmed by results, establishing that subcategorized prepositions are, at the same time, lexical and functional.

This fact clearly highlights that theoretical assumptions are essential in the interpretation of the data.

For instance, following the theories claiming that lexical items are recognisable by their capacity of assigning theta role (Jackendoff 1973; Rizzi 1985), and supposing that subcategorized prepositions convey to their complement the ϕ -role they have just received by the selecting verb, these elements should be classified as lexical. Following these assumptions, therefore, the comparison between locative and subcategorized prepositions should not reveal differences in terms of functionality (both should be correctly processed by agrammatics). In particular, agrammatic patients, who have impaired syntax, but spared lexical system, should not have problems with those prepositions assigning theta roles, such as subcategorized ones (as also Rizzi 1985 hypothesises). According to this hypothesis, thus, Friederici's findings should be considered as unexpected.

According to us, the analysis proposed by Grodzinsky (1988) represent a step forward in the field of prepositions and aphasic speech, going over the simple comparison between lexical

and functional prepositions. As we have seen, in fact, this approach is quite problematic, above all because of the difficulty in establishing which prepositions are lexical and which functional. An example of this contrast has been given comparing Friederici's study and Bennis et al's one.

The real question, at this point, is whether a classification defining prepositions as strictly lexical or functional is to be followed in the assessment of linguistic disorders.

Grodzinsky (1988), stated that data collected in previous works don't confirm the prediction that the agrammatic deficit exclusively depends on the lexical/functional nature of the preposition. If it were true, in fact, English agrammatic patients should omit or substitute only purely syntactic prepositions, namely infinitival *to* and *of*. However, a so limited deficit has never been attested.

At the same time, the assumption that the so called "lexical" prepositions are always preserved in case of agrammatism (as claimed by Friederici (1982)), seems too generic, and doesn't account for the impairments affecting several types of prepositions forming part of this big category.

Grodzinsky (1988) agreed with the hypothesis that prepositions can play a role in the semantic interpretation of the sentence or, on the contrary have a purely syntactic function, depending on whether they can or cannot assign a thematic role. However, he also underlined that, besides being thematic role assigners or purely functional items, sometimes prepositions can also be subcategorized by the verb without losing their semantic content. It is the case of locative prepositions in obligatory complements, whose selection also depends on the spatial relation holding in the sentence. For instance, in the sentence *John puts the book on/under the table*, the preposition is required by the verb to introduce the complement. At the same time, however, the meaning of the sentence changes with respect to which preposition is selected.

In addition, prepositions can appear in optional phrases, which are constituents conveying locative or temporal information or adjuncts introduced by the passive *by*.

On the basis of these observations, Grodzinsky (1988) proposed a configurational explanation for aphasics' difficulties with prepositions. His hypothesis, is mainly based on the syntactic relation between the prepositional phrase and the other elements in the sentence, rather than looking at the lexical/functional features of every single preposition.

In particular, he claimed that impaired prepositions are governed by another syntactic projection (most often the verb), while ungoverned prepositional phrases, are most often

preserved.

For this reason, he predicts that prepositions heading sentential adjuncts as well as verbal particles should not be impaired, while prepositions in all other contexts should lead to a low performance in case of Broca's aphasia.

According to Grodzinsky (1988) this explanation correctly matches with Rizzi's (1985) and Frederici's (1982) findings, besides be confirmed by his experiment.

In his study, he used a grammatical judgment task to test a list of minimal pair of sentences in which prepositions were used in both governed and ungoverned structures. Errors in ungrammatical sentences were within category substitutions or omissions of the preposition. Three types of sentences were used: (1) sentences with subcategorized prepositions obligatorily selected by the verb; (2) sentences with lexical passive constructions (in which Grodzinsky assumes the preposition to be governed); (3) passive sentences (in which the prepositional *by*-phrase is not governed). Confirming his predictions, agrammatic patients he tested had less difficulties in perceiving errors included in ungoverned prepositional phrases, differently from fluent patients. Governed phrases, instead, were more difficult for Broca's aphasics to be judged, so that most often patients didn't manage to distinguish grammatical from ungrammatical sentences. In a subsequent study, Tesak and Hummer (1994) provided further data, coming from spontaneous speech, concerning the contrast between governed and ungoverned prepositions. They discovered that patients with Broca's aphasia produced less ungoverned prepositions than governed ones. In spontaneous speech, thus, the deficit affecting governed prepositions didn't emerge. Nevertheless, we have to notice that ungoverned prepositions usually introduce adjuncts, and given that agrammatics' speech is characterized by short and telegraphic sentences, optional (and often superfluous) constituents are more easily absent.

Anyway, Grodzinsky (1988) stated that his theory can only be applied to prepositions, both because they have a unique ambiguous status in the linguistic system and because no other closed class category show the same selective deficit in agrammatism. His results, he claimed, also showed that a configurational approach is needed to identify the origin of the grammatical deficit in Broca's aphasia.

Nevertheless, even admitting that prepositions play a special role in the grammatical computation, a structural impairment specifically triggered by their presence is not totally convincing. The government relation, in fact, commonly takes place in the syntactic

configuration, even when prepositions are absent. As also Froud (2001) observed, if we assume that this configuration is problematic for Broca's aphasia, all the governed constituents should result impaired.

In any case, Grodzinsky's findings are an interesting starting point for an analysis taking into consideration the wide range of constructions involving prepositions.

The importance of the relation between the verb and the preposition also arises in other works. For instance Canzanella (1990) in her doctoral dissertation, reported a dissociation between adjunct PP (spared) and argumental PP (impaired) in a patient showing Broca's aphasia. She combines results of a multitasking test, assessing both production and comprehension of prepositional elements, and she noticed that the production of prepositions was very limited when verbs were highly omitted. In addition she never found omission of the verb but production of the related prepositional argument. On the contrary, prepositions which did not need a verb, namely those heading adjuncts, were correctly produced. Canzanella (1990), thus, suggested that the deficit affecting prepositional constituents reflects, actually, the difficulties showed by the patient with verbs.

Lonzi & Luzzatti (1995; 2006) obtained a pattern similar to that described by Grodzinsky (1988) and Canzanella (1990), assessing linguistic skills of four Italian agrammatic patients. They found that prepositions in obligatory contexts were more impaired than those introducing optional constituents. This dissociation clearly recalls the contrast between governed and ungoverned prepositions of Grodzinsky (1988), given that ungoverned prepositions head adjuncts, namely optional constituents.

In addition to Grodzinsky (1988), however, Lonzi & Luzzatti (1995; 2006) separately analysed locative prepositions which appeared in the same contexts of non locative ones, providing further evidence that the functional/lexical nature of prepositions cannot abstract from the syntactic context.

In particular, they based their analysis on the Recoverability condition (Pesetsky 1994, 1998), which regulates the omission of function words in normal adult telegraphic language (e.g. omission of complementizer). According to Lonzi & Luzzatti the "telegraphic grammar" of agrammatic patients respects the Recoverability condition which, generally, states that function words can be omitted if their semantic specification is provided by a local antecedent. As far as prepositions are concerned they propose that:

“in telegraphic “grammar”, the lexical matrix of a verb provides the required local antecedent for an unpronounced P, if P is selected by the verb” (Lonzi et al., 2006:268)

Following this assumption they predict that recoverable prepositions, which are those strictly subcategorized by the verb (+SS), should be omitted (or substituted) by agrammatic patients, while prepositions lacking an antecedent selecting them (-SS), namely a verb, should be preserved.

Again, there is no great difference with respect to Grodzinsky’s hypothesis, considering that unrecoverable prepositions appear in non obligatory constituents, namely adjuncts, while recoverable ones are selected by verbs, and they introduce obligatory complements.

In addition, Lonzi & Luzzatti (1995; 2006) separately assessed locative prepositions, which are generally assumed to be lexical items because of their rich semantic content. For this class of prepositions authors expected a quite different pattern. According to them, in fact, –SS items should result spared exactly as in case of non locative adjuncts. Retrieval of +SS locative prepositions, instead, is not predictable. Their computation in fact could depend on whether they are pragmatically selected as meaningful lexical items (in this case they should be preserved) or whether they are treated as functional heads of an obligatory complement (in such a case an impaired pattern is expected).

The experiment Lonzi & Luzzatti (1995; 2006) performed included two tasks; a completion task and a grammatical judgement task. The most interesting results are those coming from the completion task. As expected, in fact, the production of non locative subcategorized prepositions (+SS) was significantly worse than that of non locative “free” prepositions (-SS). Further evidence of this contrast is given by the preposition “*da*” (*from*) which was assessed as selected by psychological verbs (+SS) or as head of an optional agent complement (-SS). In the first case the preposition was more often omitted or substituted confirming that the syntactic deficit of Broca’s aphasia doesn’t concern the preposition as such, but depends on the structural domain in which the preposition is inserted.

With respect to (+SS) locative prepositions, as expected, it was not possible to find a regular behaviour among the four patients who were tested. When locatives introduced an optional constituents (-SS), instead, all the patients produced them correctly.

Lonzi & Luzzatti’s (1995; 2006) analysis of agrammatics’ difficulties, have the merit of

considering both the functional role played by prepositions and their semantic content. According to them, in fact, Grodzinsky's (1988) hypothesis is weak because, besides being not applicable to other elements, it doesn't consider the importance of the semantic value of prepositions in the derivation of the sentence.

A further confirmation of the ambiguous nature of locative prepositions comes from Terzi et al.'s (2009) work on Greek. As Lonzi & Luzzatti (1995; 2006), she found that these elements play an important functional role in the sentence. Their agrammatic patients, in fact had difficulties in producing them, despite their supposed "lexical" nature.

As in Italian, Greek spatial relations are most often expressed using a complex preposition followed by a simple one. It is generally assumed that the first part of the construction shows lexical properties, while the "small" P (as Terzi call it) plays a functional role.

At the same time, complex prepositions not introducing a DP complement (thus, without the following "small" P) can be used as adverbial elements, while simple prepositions not following a complex P can convey, sometimes, a semantic content.

The three agrammatic patients they tested performed four different tasks, two assessing comprehension and two aiming at collecting production data. As expected in an agrammatic frame, comprehension tests gave not so many problems to patients. Surprisingly, the few errors that were detected concerned adverbial locative, while most complex prepositions were correctly interpreted by patients. Nevertheless, as Terzi et al. (2009) noted, the test they used to analyse adverbs was more difficult for patients to perform than that which contained complex Ps.

As far as data collected through the production tasks are concerned, instead, results are more interesting. In the first experiment participants were asked to describe a spatial relation between two elements in a picture. If an answer was not obtained, two further cues were given to the subject in order to trigger the desired item. Results of this task showed a high number of omissions of the simple P following the complex one. Also complex Ps were sometimes omitted, even if in a minor proportion than the "small" ones. We have to underline that patients were tested on only 12 pictures. Moreover, they were sometimes helped in reaching the correct answer through questions more and more punctual, so that, the final answer was often reduced to a single word. In this case, we think, it is not possible to know which mechanism have triggered the retrieval of the correct answer, even when the word pronounced by the subject corresponded to the target.

This weakness is confirmed, in our opinion, by the results of the last test administered to the patients, namely a spontaneous speech production. Production of complex prepositions was observed in a description task using the cookie theft picture. We have to notice that, again, through specific questions, patients were driven to the elicitation of spatial relations holding among the elements appearing in the picture. Despite this, complex prepositions never appeared in patients' descriptions. Subjects didn't produce them spontaneously and, when helped by examiners, they only managed to use complex prepositions in adverbial contexts, namely in isolation, as single word answers.

Again, therefore, the assessment of agrammatic deficits shows the complexity of the prepositional system, showing that the categorisation lexical vs functional is probably too simplistic.

As we have seen, in fact, prepositions which are currently classified as lexical elements can be problematic for aphasic patients, who, on the other hand, are sometimes able to produce and comprehend functional prepositions appearing in some particular structures (see Lonzi et al., 2006).

In the same direction we find the work of Froud (2001) in which the performance of a patient with a selective deficit in reading functional words was assessed.

The grammatical deficit was present in the spontaneous speech too, but it only affected very complex structures such as passive sentences or wh- questions. The subject, thus, generally managed to produce functional words when inserted in a sentence.

Froud (2001) thought that this case was perfect to verify if prepositions have to be considered as functional words or not. Her experiment especially concerned locative prepositions. Every item was presented to the patient in three different conditions; (1) inserted in a sentence as a prepositional element; (2) inserted in a sentence as a nominal element; (3) not inserted in a sentence. The task was reading aloud the words or the sentences printed on cards.

Froud (2001), analysed items which can be used both as locative prepositions and as nouns. For example the word *behind* is a (complex) preposition in the sentence *Behind the elephant*, but it is a noun in the sentence *The behind of the elephant*.

If her patient's deficit really concerns only functional words, only locative prepositions should be impaired, while "locative" nouns should be spared. Moreover, data coming from the single word reading task, would reveal if locatives should universally be considered functional or lexical.

As expected, Froud's patient produced a high number of substitutions errors in sentences in which the locative preposition acted as a functional head. Locatives were mainly substituted with other spatial or temporal prepositions, apparently showing a pattern of within category substitutions. However, Froud (2001) reported that in previous tests the subject preferred some functional elements, which he often used as substitutes of the target word. Many of these "preferred" items were prepositions, so that his substitution pattern has to be analysed taking this fact into account. Additionally, in previous occasions locatives were also substituted with other functional elements.

In other words Froud's patient tended to replace functional heads with other functional heads, independently of the grammatical category they pertained. Substitutions with another element of the same grammatical category (e.g a preposition with another preposition and so on) were also detected, but their number was not significant.

What is interesting is that such a distribution of errors didn't affected locative elements when used as nominal items.

Analysing results of the single words reading task, Froud (2001) considered locatives as prepositional items (thus, not nominal), given that they are more frequently used as prepositions. This intuition was confirmed by her findings, which showed a substitution pattern similar to that obtained from the repetition of sentences containing locative prepositions.

These data represent further evidence that the identification of prepositions, especially if locative, as totally functional or totally lexical is not possible. Moreover, Froud's work also proves that words carrying a semantic content, can also play a functional role in the sentence without necessarily being nominal elements. Similar findings had already been found by Morton & Patterson (1987). They described the performance of an English patient with a deep dyslexia. He had a selective deficit affecting prepositions and conjunctions which caused to the patient a high number of within category substitutions in a reading task. This impairment especially affected items semantically weaker; in particular authors found a dissociation between spatial (spared) and temporal (impaired) prepositions. They argued that items with a more concrete meaning were better recognised by the patient.

Froud (2001), instead, argued for an account related to the fact that the deficit affecting functional elements, arose when the patient was asked to read single words. She hypothesised that a dedicated lexicon might exist, forming part of the UG and including all

“universal (procedural) items, complete with their associated syntactic structure and s-selectional features”.

According to Froud (2001), the more evident proof of the existence of this lexicon is that functional items cannot be acquired after the end of the critical period, thus leading to the formation of closed classes. On the contrary, the conceptual lexicon can be increasingly expanded during the entire life of an individual.

Following this hypothesis, the deficit affecting agrammatic patients is not really syntactic. In fact it could be caused by a wrong selection of those items pertaining to the UG-lexicon. According to Froud (2001), this explanation also accounts for the very delimited brain lesion agrammatic patients often have. In fact, exactly as other innate cognitive faculties (sight, audition, and so on), also the UG-lexicon should depend on a very limited and specific brain region.

The question of whether the UG-lexicon exists or not, is clearly still open, and we do not intend to solve it in the present work. Nevertheless, it seems to us that a similar assumption should predict the existence of two different homophonous words; (i) the preposition included in the UG-lexicon and (ii) the noun forming part of the conceptual lexicon. Following this reasoning, the same phonological word should be stored twice in the brain, which is clearly not impossible, but at least unlikely.

Finally, we have to observe that Froud’s data are based on the performance of a single patient with a very selective deficit. Anyway, the high number of substitutions she detected, seems to confirm an impairment in the selection of the lexical entry, rather than a structural deficit.

One of the most recent works concerning prepositions and aphasic speech is

Mätzig (2009, see also Mätzig et al. 2010). Curiously, she was led to a conclusion similar to that already reached by Froud (2001), namely that the deficit shown by patients with respect to prepositions, is more likely to be lexical rather than caused by a structural syntactic deficiency. Mätzig compared the performance of both agrammatic and anomic English patients on 4 different tasks. In particular, subjects were given one completion task and three grammatical judgment tasks.

Results were analysed taking into account many different parameters, in order to ascertain which is the origin of the deficit. First of all both Broca’s patients and the anomic one

produced more substitution than omission errors.

Errors were not influenced by the length of the preposition, given that their distribution didn't change with respect to whether prepositions were composed of one or two syllables. A phonological deficit, therefore, could be excluded. The same conclusion was reached when looking at frequency. Only one patient was subjected to a frequency effect, and even in this case the result wasn't expected, because less frequent prepositions proved spared. Given that this patient was affected by a severe agrammatism this result is more probably due to a deficit concerning functional items, which are also more frequent.

Lack of semantic content resulted not being the cause of the impairment, given that meaningful prepositions were not better retrieved than the meaningless ones. The same was true for syntax. While the anomic patient, as expected, was better with functional prepositions respect to lexical ones, the opposite pattern wasn't found for Broca's aphasics. One agrammatic patient performed even better on syntactic prepositions, making a higher number of errors with lexical items.

The hypothesis of Grodzinsky (1988) was verified too, but any difference between governed and ungoverned prepositions was detected among the subjects' errors.

Considering these results, Mätzig claimed that neither semantics nor syntax were involved in the choice of the correct preposition. At the same time, both phonology and frequency could be excluded from being possible causes of the aphasic deficit.

On the contrary, since both anomic and agrammatic patients made predominantly within-category substitution errors, she proposed that a deficit at the post-syntactic level of (late) spell-out was the underlying reason for the prepositional deficit. In other words, she suggested that the disease intervenes after the syntactic parsing of the sentence had already finished. Patients, in fact, not only knew where the preposition should appear, but were also able to individuate which was the required element, as demonstrated by the high number of within category substitutions.

The problem, therefore, concerned the choice of the correct preposition. Following the *Late vocabulary insertion* of Halle & Marrantz (1993), Mätzig (2010) proposed that difficulties with prepositions of her aphasic patients were caused by a spell-out deficit.

According to her, every preposition is composed by a certain number of features, defining it both syntactically and semantically. Since some of these features can be selected by more than

one preposition, spell-out errors could depend on a wrong selection of one or more features forming part of the needed preposition.

In Trofimova's (2009) doctoral dissertation, results were quite different, and seemed to confirm previous works assuming the prepositional deficit being structural. Trofimova's study was especially dedicated to observe Case assignment on NP complements of Russian prepositions. Russian is a SVO language in which nouns are inflected for gender, number and case. Prepositions, together with verbs, are the principal Case assigners (Trofimova, 2009). The goal of her study was to discover if difficulties affecting prepositions in aphasic production and comprehension also have some consequences on the correct assignment of Case.

She started collecting samples of spontaneous speech, in which prepositional phrases were counted and analysed. She found that non-fluent aphasic patients produced fewer prepositions with respect to both controls and fluent aphasic subjects. The retrieved prepositions were often substituted, but Case didn't result affected by the deficit. The NP complement, in fact, was most often correctly inflected, matching for case with the produced preposition, even when this one didn't correspond to the target.

She then performed three further experiments using completion tasks, with the aim of assessing differences both between verbs and prepositions as case assigners and between lexical and subcategorized prepositions.

Surprisingly fluent and non-fluent patients showed the same behaviour performing these tasks. In the first one, the Case assigner had to be inserted. Missing items were both prepositions and verbs, and the NP complement was provided in its bare form, namely without Case morphology. Errors were most often substitutions, and prepositions resulted more impaired than verbs. For the second test patients were asked to complete sentences adding the NP complement after the Case assigner. Again both verbs and prepositions were assessed. Results showed very few errors concerning Case selection. When patients didn't fail in reading verbs or prepositions, the correct case was always selected.

A little difference between the two groups of patients was only detected in the third completion task, in which non-fluent patients showed more difficulties with subcategorized prepositions than with lexical ones. This result, however, was not statistically significant.

In general, errors mostly concern the selection of the correct preposition, while very few mistakes concerning Case selection were found.

Trofimova's goal was to check if Case assignment of NP complement of prepositional phrases was preserved in aphasic speech. As she predicted on the basis of previous work on Case selection and aphasia, her results confirmed that when the retrieval of the Case assigner wasn't impaired, case was correctly selected too. This means that the selection of the correct Case strictly depends on the element which assigns Case.

What is interesting for our purpose, is that a high number of substitution errors were detected, even with non-fluent aphasic patients. This fact would seem to confirm Mätzig results on English prepositions, representing further evidence for a lexicalist account.

Nevertheless, some observations should be considered with respect to Trofimova's findings. First of all during the narrative task, non-fluent patients produced a number of prepositions significantly smaller than controls and fluent subjects. This fact supports that omissions were present in their spontaneous speech. Moreover, it should be considered that structured tests, like completion tasks, despite giving the opportunity of observe a specific phenomenon, facilitate the production of substitutions errors, given that patients, who know that something has to be inserted in the gap, are forced to produce an answer. These same considerations should be taken into account for the interpretation of Mätzig's findings, and will also be followed for the assessment of some of the data we will present in the experimental section of this thesis.

Also semantic qualities of prepositions have received some attention in the neurolinguistic and psycholinguistic literature. Particularly relevant are works by Leikin (1996, 1998), who also analysed their production in the acquisition process. Leikin (1996,1998) observed that, if compared with content words, prepositions are acquired later. This means that children start to use prepositions when they are able to treat them as functional elements.

At first, spatial relation are expressed through deictic constructions or adverbs with locative meaning. Then locative prepositions are acquired and, only after that, functional meaningless prepositions appear in the speech of children.

Considering this process of acquisition, Leikin (1996;1998) claimed that first spatial relations have to be cognitively assimilated by children. Then, these relations can be verbalized using prepositions or other elements expressing location.

In subsequent work (Leikin, 2002) he compared the children's acquisition process of prepositions with aphasic patient's linguistic difficulties in producing or comprehend these elements.

Interestingly, substitutions was the major error type in both children and aphasics in Leikin's (2002) study. Nevertheless, patterns of substitution were quite different in aphasic patients vs. children. During the naming test, in fact, while children tended to replace prepositions with locative adverbs or deictic words, aphasic patients rarely changed category in their substitutions.

Moreover, children showed a preference for certain prepositions, reflecting a hierarchy of acquisition. In other words, children's set of preposition resulted incomplete, above all in the group of younger subjects, who used words they had already acquired. Children's performance, in fact, improved with age.

With respect to aphasic patients, Leikin (1996) assessed linguistic abilities of subjects diagnosed with Broca's aphasia, Wernike's aphasia and Transcortical sensorial aphasia. Every group of aphasics failed in a task. Broca's aphasics obtained low scoring in the naming task (in which participants were asked to produce a complete sentence, not a single word); Wernike's aphasics weren't able to correctly repeat sentences with prepositions; patients with transcortical sensorial aphasia produced a higher number of errors in the comprehension task. Despite these differences, the substitution pattern has been observed not to be influenced by the aphasic syndrome. In all patients, in fact, substitutions proved to be the most frequent error, and the type of substitutions was similar in all subjects.

Unfortunately, we didn't find, in Leikin's study, a detailed description of errors patterns of every subgroup of patients. A higher number of omissions was found in Broca's productions, but the amount of substitutions was bigger. Any other information was not present.

Anyway, as in Mätzig's findings, neither syntax nor phonology seemed to be the cause of difficulties in selecting the correct preposition. In opposition to Mätzig, however, Leikin hypothesised a semantic deficit.

Another interesting study, that specifically addresses the behaviour of complex prepositions, is Kemmerer and Tranel (2000), which provide some evidence that the representations of language and space are relatively independent. Kemmerer and Tranel (2000) tested the linguistic and perceptual/cognitive representations of spatial relationships in two brain-damaged subjects, revealing a double dissociation between linguistic and perceptual representations of spatial relations. One subject had a right hemisphere lesion affecting many cortical and subcortical areas and behave unsuccessfully on tests of non-linguistic visuo-spatial abilities, but rather well on tests on the comprehension and production of spatial

(complex) prepositions. The second subject had a left hemisphere lesion affecting some other cortical and subcortical regions and performed poorly on tests evaluating the linguistic abilities, but well on the visuo-spatial tasks.

A further study was conducted in 2004, when Tranel and Kemmerer assessed the capacity of expressing spatial relations in 78 patients with brain damage. Their goal was that of discovering which portion of the brain is mainly responsible for the processing of prepositions. Patients with lesions on both right and left hemispheres were considered, so that a large sample of cases could be taken into consideration.

In contrast to many other works, this wasn't specifically addressed to evaluating aphasic speech. Indeed, patients were not necessary aphasics. Those who had received a diagnosis of aphasia only showed residual signs of the syndrome, and therefore they could easily undergo all the proposed tasks.

Participants' skills were assessed through both production and comprehension tasks concerning spatial prepositions. Patients were grouped with respect to the score they had obtained from the linguistic assessment. In addition, they also underwent standard neuropsychological tests as well as Magnetic Resonance. Finally, patients who have failed all the proposed linguistic tasks, were further evaluated, in order to detect which brain region was more frequently damaged in case of impairment of prepositions.

Briefly, Tranel and Kemmerer (2004) concluded that the left inferior prefrontal and the left inferior parietal regions play an important role in the processing of locative prepositions. In particular, the left inferior prefrontal portion should trigger the phonological processing of these items. A confirmation of this assumption, according to Tranel and Kemmerer (2004), came from the selective deficit on naming test, showed by two of their subjects, who had a restricted lesion to left inferior prefrontal area. Previous studies showed that the same region is also probably involved both in the semantic and syntactic processing of prepositions. This last assumption is less clearly demonstrated by Tranel and Kemmerer (2004), given that syntax and semantic are quite difficultly separable in their tasks. Syntax, in fact, is not directly investigated, and even when patients produced a complete sentence during the naming task, the authors claim that the semantic information is more relevant for the retrieval of the preposition.

At the same time, the left parietal region was shown to be involved in the knowledge of spatial relations. Previous studies demonstrated that the corresponding right portion of the

brain involve the coordinate spatial processing. Results of Tranel and Kemmerer (2004) confirmed these assumptions, showing that patients severely impaired with prepositions (those who failed on all the tasks), had brain damage restricted to the left parietal and prefrontal regions. The same patients were well on conventional neuropsychological tests of visuospatial and visuoconstructional abilities.

In a subsequent work, conducted with four brain-damaged subjects with left perisylvian lesions, Kemmerer (2005) suggested that the spatial and temporal meanings of English prepositions can be independently impaired, so that they can be represented and processed independently of each other in the brain.

4.2 Conclusions

In this chapter we have given a brief excursus on the most important studies in which the relation between preposition and aphasia have been investigated.

As we have seen, the existing investigations on prepositions and aphasic speech mainly address linguistic skills of patients with Broca's aphasia, who are usually compared with patients with anomia or Wernicke's aphasia.

In earlier works the impairment on prepositions was most often described as the result of a syntactic disease which impedes the structural parsing of the sentence and which usually affects agrammatic subjects (see. Friederici 1982; Grodzinsky 1988; Lonzi & Luzzatti 1995). This explanation matches with the linguistic profile of agrammatism, which is traditionally associated with morpho-syntactic difficulties, especially causing omissions of function words and substitutions of bound/inflectional morphemes.

In subsequent studies, however, prepositions have been described to be more easily substituted rather than omitted, even by agrammatics (e.g Leikin 2002; Froud 2001; Mätzig 2010; Trofimova 2009), with a higher number of within category substitutions. A quite strange fact, which could lead to the negation of a syntactic impairment as cause of the prepositional deficit.

Nevertheless, data drawn from spontaneous speech analyses, clearly demonstrated that patients with grammatical impairments produced fewer prepositions than anomic or Wernicke's aphasics (Trofimova 2009; Terzi 2009).

It is, thus, clear that many variables have to be taken into account in assessing aphasic

patients' abilities in producing and comprehending prepositional phrases.

The type of tests which are administered to subjects, as we have already underlined, can have a big influence on the results. A completion task, for example, can trigger a higher number of substitution errors, because patients know that an answer is needed in a given context. Trofimova's (2009) experiment offers a good example of this observation; the same group of non-fluent patients omitted many prepositions in spontaneous speech and then produced a higher number of substitutions during the completion tasks.

As we have seen, in addition, also the theoretical background that authors chose to follow is very important in interpreting the data. Subcategorized prepositions, for instance, were classified as lexical or functional, depending on whether they were considered able to assign a theta role. As an example, we can observe the results of Friederici (1981) and Bennis et al. (1983). Errors detected on production of subcategorized prepositions by agrammatics, are oppositely interpreted by the respective authors, because of the different classification of prepositions they have followed.

The neuro-linguistic literature concerning prepositions and aphasic diseases is composed by few heterogeneous works. The different methods and tasks which have been administered, the several languages which have been assessed, the unavoidable differences among patients who have been tested and the different theoretical bases which have been followed, constitute a set of variables that makes generalizations difficult.

A unified conclusion is, thus, hard to be drawn even if some common findings could be considered as a good starting point for further investigations;

(i) In structured tasks prepositions are often substituted, even by Broca's aphasic patients (e.g. Mätzig et al. 2010; Trofimova 2009; Froud 2001).

(ii) In spontaneous speech of agrammatic patients an omission pattern have most often been observed (Trofimova 2009; Terzi 2009; Druks 1991).

(iii) Prepositions introducing optional constituents have been shown to be better retrieved than argumental PPs in structured tasks (Grodzinsky 1988; Lonzi & Luzzatti 1995; Canzanella 1990). Maybe this result could be considered as evidence of a more generalized difference between constituents forming part of the argumental structures and free adjuncts (an example of this difference in aphasia is given in Franco, Zampieri, et al., 2011).

(iv) Spatial prepositions are more investigated than non locative ones. In spite of the fact that they have traditionally been considered as lexical items, agrammatic patients have been found

with selective difficulties in producing spatial prepositions (Froud 2001; Terzi et al. 2009).

Finally, we have to notice that despite being elements which show a rich morphology in Italian and in many other languages (see chapter 1), we didn't find neuro-linguistic investigations dealing with morphological mechanisms involving prepositions. We are especially referring to the phenomenon of contraction, which causes the fusion of the preposition with the following element (e.g. an article or a pronoun), in a specific context.

The contraction leads to the formation of more complex forms, which could be more difficult to be used/retrieved by subjects with linguistic disorders.

For this reason we think that further investigations are needed concerning the field of morphological phenomena operating on prepositional elements.

5. EXPERIMENT 1 – PREPOSITIONAL CONTRACTED FORMS IN ITALIAN APHASIC PRODUCTION.

5.1 Introduction

The first experiment dealing with Italian prepositions and aphasic speech aims to explore how patients with language diseases behave when asked to produce articulated prepositions. As widely shown in chapters 1 and 2, in fact, there is no consensus in the linguistic literature about the syntactic nature of these elements.

Two main ideas have been proposed: (i) articulated prepositions (simple P + article) actually are inflected prepositions taking gender and number morphemes (e.g. Napoli and Nevis 1987; Zwicky, 1987; Hinrich, 1986); (ii) contracted forms originate from the fusion of a simple preposition with a definite article, which are merged together through some syntactic or morphological operation (Van Riemsdijk, 1998; Nunes and Ximenes, 2009) (for a detailed review of the most important theoretical works on contracted prepositions see chapter 1 and section 2.2).

In this study, we will explore the linguistic skills of a group of aphasic patients, who performed both a completion and a repetition task, in which simple and articulated prepositions, as well as definite articles were inserted.

5.2 Participants

The 8 patients who took part to our experiment were recruited at the Neuro-rehabilitation Unit of IRCCS Ospedale San Camillo, Venezia (Italy), where they were attending their rehabilitation program. Here they have been evaluated with standard Italian batteries for Aphasia (Batteria per l'Analisi dei Deficit Afasici - BADA, Miceli et al., 1996; Esame Neuropsicologico Per l'Afasia - ENPA, Capasso and Miceli, 2001).

Three patients have been diagnosed with Wernike's aphasia, two with mild Broca's aphasia and two other with transcortical motor aphasia. The last subject had been diagnosed as anomic, but she also had impaired morpho-syntax, especially showing a deficit concerning verbs and prepositions.

Patients were 3 men and 5 women, their average age was 57 years and they had, on average, 12 years of education.

General information on participants is summarized in Table 1.

Patients	Gender	Age	Education	Diagnosi logopedica
S1	M	47	13	Broca's aphasia
S2	M	48	13	Transcortical motor aphasia
S3	F	48	11	Anomic with morpho-syntactic deficits
S4	F	53	17	Broca's aphasia
S5	F	54	13	Wernike's aphasia
S6	M	66	13	Wernike's aphasia
S7	F	69	11	Wernike's aphasia
S8	F	72	5	Transcortical motor aphasia

Table 1 – Patients' information

5.3 Completion task

5.3.1 Materials and Methods

The completion task included 200 sentences missing simple or articulated prepositions, definite articles, nouns and verbs. Patients were asked to read every sentence and fill the gap. Stimuli have been presented to patients one by one with the aid of a power point presentation, in which every slide contained a sentence. Items were written in big size and appeared at the centre of the computer screen. In this way, we avoided both patients' sight and attention difficulties. Every patient performed the test in, at least, four sessions, in order to prevent automatic answers and the overproduction of errors caused by tiredness. Stimuli were randomly organized. Before starting the test, we presented to patients some training stimuli in order to make them familiarize with the task.

The list of sentences we administered was composed as follows:

63 sentences lacked an articulated preposition. All the Italian contracting prepositions (*a*, to/at; *di*, of; *da*, from; *in*, in; *su*, on) have been considered as well as every possible combination with all definite articles (*il*, the_{MascSing}; *lo*, the_{MascSing}; *la*, the_{FemSing}; *i*, the_{MascPlur};

gli, the_{MascPlur}; *le*, the_{FemPlur}; *l'*, the_{Fem/MascSing}). In 28 sentences of this group the missing preposition appeared to be selected by a complex preposition. Only complex prepositions obligatory followed by a simple one were used (*fuori*, outside; *lontano*, far; *vicino*, near; *davanti*, in front of).

21 sentences lacking both a simple preposition not allowing the contraction (*per*, for; *tra/fra*, between) and a definite article. At the beginning of the test, patients were informed that, in some cases, it should be necessary to insert two separated words. In 7 of these items the preposition *con* (with) was missing. This element is peculiar because it can optionally contract (both *col*, [with-the] and *con il*, [with the], are possible).

28 sentences lacking a simple preposition (without definite articles). All simple prepositions have been taken into consideration (*a*, *di*, *da*, *in*, *con*, *su*, *per*, *tra/fra*). 4 of these sentences also contained a complex preposition (the same we have mentioned above) selecting the missing one.

65 sentences lacking a definite article (without prepositions). All Italian definite articles were used in the test (*il*, the_{MascSing}; *lo*, the_{MascSing}; *la*, the_{FemSing}; *i*, the_{MascPlur}; *gli*, the_{MascPlur}; *le*, the_{FemPlur}; *l'*, the_{Fem/MascSing}).

23 sentences lacking a noun or a lexical verb. These sentences were inserted as distracters and, therefore, they won't be considered in the presentation of results.

The composition of our battery is summarized in Table 2.

MISSING ELEMENTS	N. ITEMS	MISSING ELEMENTS	N. ITEMS
Articulated P.	63	Articulated P.	35
		Articulated P. selected by complex P	28
Simple P.+Article	21	PER-TRA/FRA	14
		CON	7
Simple P.	28	Simple P.	24
		Simple P. selected by complex P.	4
Definite articles	65		
Distracters	23		
Total	200		

Table 2 – Stimuli description

5.3.2 Results

All patients' answers not matching with the target items were considered incorrect. Errors were classified respect to whether they were omissions or substitutions. In addition, they were further analysed taking into account which element were mostly omitted or substituted. In total we consider, for the assessment of our results, 177 sentences, given that distracters were not included.

Patients produced, on average, 43.25 errors (43.25/177 – 24.44%). Among these, substitutions accounted for 52.89 %, while omissions were, on average 15.38/43.25 (35.55%). The rest of errors (5.01/43.25 – 11.56%) were classified as adjunction of unnecessary material. These previous data are summarized in Table 3.

<i>General results</i>		
Errors	Errors (mean)	% on n. of errors
Substitutions	22.88	52.89
Omissions	15.38	35.55
Insertions	5.01	11.56

Table 3 – Completion tasks – distribution of errors

5.3.3 Articulated prepositions

In Table 4 we present results concerning the general performance of all patients with sentences missing an articulated preposition. Given that the presence of the complex preposition seems not to influence patients' performance, we will present, in what follows, all data concerning articulated prepositions (63 sentences).

We collected 118/504 errors (22.22%) which included both substitutions and omissions. Substitutions errors (85/118 – 72.03%) were much more frequent than omissions (33/118 – 27.97%). This fact is not surprising, given that, during a completion task, patients are more likely to produce substitutions rather than omissions.

Among substitution errors, whose distribution is described in table 4A, prepositions were the most affected element (71/85 – 83.53%), while articles were less substituted (14/85 – 16.47%).

As far as omissions errors are concerned, despite being less frequent, they were qualitatively very interesting. In fact, as shown in Table 4B, omissions affecting the entire item (11/33 – 33.33%), omissions of the simple contracting prepositions (12/33 – 36.36%), and omissions of the definite article (10/33 – 30.30), were equally produced. Therefore, the amount of errors concerning only one of the two elements forming part of the articulated preposition is almost twice (22/33 – 66.66%) the omission of the entire element (11/33 – 33.33%).

<i>Articulated prepositions</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	85	16,87	72,03
Omissions	33	6,55	27,97
Total	118	-	-

Table 4 – Completion task – Articulated prepositions

<i>Articulated prepositions</i> <i>Substitutions</i>	n.	% on total n. of errors (118)	% on total n. of substitutions
Substitutions of articles	14	8,47	16,47
Substitution of P.	71	10,17	83,53
Total	85	-	-

Table 4A – Completion task – Substitutions – articulated prepositions

<i>Articulated prepositions Omissions</i>	n.	% on total n. of errors (118)	% on total n. of omissions
Omissions of articles	10	8,47	30,30
Omissions of P.	12	10,17	36,36
Omissions of P. articulated	11	9,32	33,33
Total	33	-	-

Table 4B – Completion task – Omissions – articulated prepositions

5.3.4 Simple prepositions

Data concerning sentences missing simple prepositions are summarized in Table 4. Patients failed in filling the gap in the 32.14% of the times (72/224 – 32.14%). Again, substitutions (35/72 – 48.61%) were more than omissions (16/72 – 22.22%). In addition, unexpectedly, we found a substantial number of insertions of an articulated prepositions (21/72 – 29.17) in contexts which didn't allow it. We labelled this kind of anomalies “insertion of the article”, given that, in these cases, the correct preposition was always selected.

<i>Simple prepositions</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	35	15.6	48.61
Omissions	16	7.14	22.22
Insertions of articles	21	9.38	29.17
Total	72	-	-

Table 4 – completion task – Simple prepositions

5.3.5 Definite articles

The 12.50% (65/520 – 12.50%) of sentences lacking definite articles were not correctly completed by patients. We didn't detect a high difference between the number of omissions (24/65 – 36.92) and that of substitutions (22/65 – 33.85). Again, we found some instances in which subjects inserted a superfluous element, namely a simple preposition, thus forming an articulated preposition which was ungrammatical in those contexts.

<i>Definite article</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	22	15.6	33.85
Omissions	24	7.14	36.92
Insertions of prepositions	19	9.38	29.23
Total	65	-	-

Table 5 – Completion task – Definite articles

5.3.6 Non-articulated prepositions

Results concerning sentences which lacked both prepositions and articles are included in Table 6. Articulated prepositions cannot be inserted here, because prepositions *per* (for) and *tra/fra* (between) don't allow the contraction. Also preposition *con* (with), which optionally allowed the fusion with the article, has been considered in the amount of these items, because it has been most frequently used in its non-articulated form.

Interestingly, these items gave more problems to patients, with respect to the others. In fact they produced 91/168 errors (91/198 – 54.17%). Omissions (50/91 – 54.95) were more frequently produced than substitutions (41/91 – 45.05%) and, as shown in Table 6B, they mainly affected the definite article (33/50 – 66%). Substitutions, instead, concerned prepositions in the great majority of cases (39/41 – 95.12%, see Table 6A).

<i>Non-articulated prepositions</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	41	24.4	45.05
Omissions	50	29,76	54.95
Total	91	54.17	-

Table 6 – Completion task – Non-articulated prepositions

<i>Non-articulated prepositions</i> <i>Substitutions</i>	n.	% on total n. of errors (91)	% on total n. of substitutions
Substitutions of articles	2	1.19	4.88
Substitution of P.	39	23.21	95.12
Total	41	-	-

Table 6A – Completion task – Substitutions – Non-articulated prepositions

<i>Non-articulated prepositions</i> <i>Omissions</i>	n.	% on total n. of errors (91)	% on total n. of omissions
Omissions of articles	33	19.64	66
Omissions of P.	17	10.12	34
Total	50	-	-

Table 6B – Completion task – Omissions – Non-articulated prepositions

5.3.7 Further observations

Patients' performances have been also analysed taking into account their aphasic syndromes. We found that, in general, Wernike's aphasics performed better (on average 25/177 errors, 14.12%) with respect to all other patients, who showed similar percentage of wrong answers (on average 54.2/177 – 30.62%, see Table 7).

As far as the distribution of errors is concerned, Wernike’s aphasics produced the lowest number of substitutions (on average 12.67/43.25 – 29.29%) with respect to all other subjects, among who, instead, no significant differences were detected (on average 29/43.25 – 67.05). Notice that substitutions were highly present in the performance of Broca’s aphasics too (on average 28.50/43.25 – 65.9%).

With respect to omissions, instead, they were mostly produced by patients with transcortical aphasia (on average 32/43.25 – 73.99%), while, quite surprisingly, Broca’s subjects omitted the required item less frequently than all other participants (on average 8/43.25 – 18.50).

The separate assessment of sentences lacking different type of elements reflects the general trend we have described above, with Wernike’s aphasics less impaired and similar amount of errors in all other subjects’ performances.

The only relevant peculiarity emerged from the analysis of sentences lacking articulated prepositions. In fact, as we said above, we detected a higher number of omissions affecting only one of the two contracting elements (compared with the omission of the entire item). Additionally, we also observed that Broca’s aphasics and S3 (who had a morpho-syntactic deficit) never omitted the entire articulated preposition (0/14.75 – 0%). Their omissions, therefore, always led to the split of articulated prepositions, with the isolated production of either the preposition or the article (3.67/14.75 – 24.9%).

<i>Patients</i>	Errors (n. on average)	% on total n. of stimuli
Wernike	25	14.12
Broca	43	24.29
Transcortical	66	37.29
Anomic (with morpho-syntactic deficit)	53	29.94

Table 7 – Completion task – results for syndromes

5.4 Repetition task

5.4.1 Methods and Materials

Patients were asked to repeat 80 sentences including simple prepositions, definite articles, articulated prepositions and prepositions which don't allow the contraction (*per*, for; *tra/fra*, between). In addition some sentences also contained complex prepositions obligatory followed by a further simple (or articulated) preposition. Subjects had to repeat every item as soon as they had heard it by the examiner. Items were randomly organized and patients always performed a training session before doing the test.

The list of sentences we administered was composed as follows:

56 sentences contained an articulated preposition. As in the completion task, all prepositions allowing the contraction (*a*, at/to; *di*, of; *da*, from; *su*, on) were combined with all Italian definite articles (*il*, the_{MascSing}; *lo*, the_{MascSing}; *la*, the_{FemSing}; *i*, the_{MascPlur}; *gli*, the_{MascPlur}; *le*, the_{FemPlur}; *l'*, the_{Fem/MascSing}) and included in the test. In 28 sentences of this group the articulated preposition was selected by a complex one (we used *fuori*, outside; *lontano*, far; *vicino*, near; *davanti*, in front of).

15 sentences contained a preposition not allowing the formation of the articulated form (*per*, for; *tra/fra*, between). In these cases, thus, the definite article was separated from the preposition. The preposition *con* (with), which can optionally contract with the article, was always used in its non-articulated form.

10 sentences contained a simple preposition directly introducing a noun without article. All Italian simple prepositions were included in this group. 4 of these sentences also contained a complex preposition (of the type described above).

Furthermore, in order to assess the production of definite articles in contexts excluding prepositions, we also insert in our battery a balanced amount of definite articles, which

appeared in 72 of the 80 stimuli. Errors appearing on definite articles have been separately analysed.

5.4.2 Results

Patients' repetitions have been analysed for errors. Given that we mainly aimed to assess prepositions and articles, errors not concerning these elements were not considered. In other words, when prepositional phrases and articles were correctly repeated, mistakes such as semantic substitutions of nouns, omissions of nouns, verbal errors, omissions of non essential phrasal adjuncts and so on, were not considered.

Subjects' answers were classified as incorrect when prepositions (both complex and simple/articulated) and articles didn't match with those appearing in the given items. Errors were then classified with respect to whether they were omissions or substitutions. Moreover, we also observed which element was most often omitted or substituted.

As we have pointed out above, the assessment of definite articles (when they were not included in prepositional phrases) was separately performed.

As far as prepositions are concerned, patients produced, on average, 31 errors (31/80 – 38.75). The 5.07% (on average 1.57/31) of wrong answers were sentences which patients didn't manage to repeat. The remaining wrong repetitions mainly contained substitution errors (16.86/31 – 54.38), but we also detect a fair number of omissions (10.14/31 – 32.72%). Additionally, as in the completion task, we found the insertion of elements (on average 2.43/31 – 7.83) not included in the target sentences.

<i>General results</i>		
Errors	Errors (mean)	% on n. of errors
Substitutions	16.86	54.38
Omissions	10.14	32.72
Insertions	2.43	7.83
Non-productions	1.57	5.07

Table 8 – Repetition task, distribution of errors

5.4.3 Articulated prepositions

In table 9 we have summarized data concerning patients' performance with articulated prepositions. In this first analysis all the 55 sentences have been considered (included those with complex prepositions).

Patients failed in repeating articulated prepositions in the 38.52% of cases (on average 151/392).

Substitutions were the most frequent errors (87/151 – 57.62%) and they mainly affected the simple preposition (44/87 – 50.57). Articles were replaced in the 32.18% of cases (on average 28/87) and, finally, we also detect some paraphasias of the complex preposition (15/87 – 17.24%).

The difference between the amount of omissions and substitutions was lower than that detected in the completion task. Anyway, here again, omissions (51/151 – 33.77%) were less than substitutions. Unlike in the previous test, where omissions were almost equally distributed among the assessed elements, when repeating sentences patients omitted prepositions more often. In particular, the simple preposition was omitted in the 35.28% (18/51) of instances (in this case the article resulted spared), as well as complex prepositions. Definite articles forming part of articulated prepositions, instead, lacked from subjects' repetitions in the 17.65% (9/51) of cases. Very surprisingly, omissions of contracted form only accounted for the 11.76% (6/51). In this connection, we have to underline that omissions affecting only one of the elements of the articulated prepositions (on average 27/51 – 52.94%), were many more than those affecting the entire word. Notice that this same pattern has also been found in the assessment of completion task results. The qualitative analysis of omissions and substitutions concerning articulated prepositions is given in Tables 9A and 9B. In the 3.97 % of patient's wrong answers, we found the insertion of some element which didn't appear on target sentences. These errors always concerned items with complex prepositions in which patients inserted further simple prepositions before the complex one (e.g. they said *al di fuori*, lit. at-the of outside, instead of *fuori*).

<i>Articulated prepositions</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	87	22.19	57.62
Omissions	51	13.01	33.77
Insertions	6	1.53	3.97
Non-productions	7	1.79	4.64
Total	151	38.52	-

Table 9 – Repetition task – Articulated prepositions

<i>Articulated prepositions</i> <i>Substitutions</i>	n.	% on total n. of errors (151)	% on total n. of substitutions
Substitutions of articles	28	18.54	32.18
Substitutions of P.	44	29.14	50.57
Substitutions of complex P.	15	9.93	17.24
Total	87	57.52	-

Table 9A – Repetition task – Substitutions – Articulated prepositions

<i>Articulated prepositions</i> <i>Omissions</i>	n.	% on total n. of errors (151)	% on total n. of omissions
Omissions of articles	9	5.96	17.65
Omissions of P.	18	11.92	35.29
Omissions of complex P.	18	11.92	35.29
Omissions of P. articulated	6	3.97	11.76
Total	51	33.77	-

Table 9B – Repetition task – Omissions – Articulated prepositions

5.4.4 Simple prepositions

In Table 10 we present results concerning sentences with simple prepositions (without articles). These items were not correctly repeated in the 40% of cases (28/70). Prepositions were more often substituted (11/28 – 39.29%) than omitted (6/28 – 21.43%). Moreover, as in the completion task, we collected some repetitions in which an articulated preposition replaced the simple one (11/28 – 39.29%). These errors were classified as “insertions of the definite article”.

<i>Simple prepositions</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	35	15.6	48.61
Omissions	16	7.14	22.22
Insertions of articles	21	9.38	29.17
Total	72	-	-

Table 10 – Repetition task – Results – Simple prepositions

5.4.5 Non-articulated prepositions

Results concerning prepositions not allowing the contraction (with separated articles), are included in Table 11. The pattern of errors we found with respect to these items was similar to that we have described for articulated prepositions. Wrong repetitions were 38/98 (38.78%). Patients didn't give any answer in the 10.53% of cases (4/38). Again, we found a higher number of substitutions (20/38 – 52.63) as compared with omissions (14/38 – 36.84).

Prepositions were the most impaired element with a higher number of both substitutions (16/20 – 80%) and omissions (7/14 – 50%).

What is more, here again the amount of omissions concerning only one of the two elements (9/14 – 64.29%) was higher than that concerning both the preposition and the article (5/14 – 35.71).

<i>Non - articulated prepositions</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	20	20.41	52.63
Omissions	14	14.29	36.84
Non-productions	4	4.09	10.53
Total	38	38.78	-

Table 11 – Repetition task – Non-articulated prepositions

<i>Non - articulated prepositions</i> <i>Substitutions</i>	n.	% on total n. of errors (38)	% on total n. of substitutions
Substitutions of articles	4	18.54	20
Substitutions of P.	16	42.11	80
Total	20	52.63	-

Table 11A – Repetition task – Substitutions – Non-articulated prepositions

<i>Articulated prepositions</i> <i>Omissions</i>	n.	% on total n. of errors (38)	% on total n. of omissions
Omissions of articles	2	5.26	14.29
Omissions of P.	7	18.42	50
Omissions of Preposition and article	5	13.16	35.71
Total	14	36.84	-

Table 11B – Repetition task – Omissions – Non-articulated prepositions

5.4.6 Definite Articles

Articles not involved in prepositional phrases were, in general, the most spared elements. We found, in total, 44/576 (8.73%) errors (see Table 12). In 15/44 instances (34.09%) patients replaced the target article with another one. Omissions were, instead, 20/44 (45.45%). Other errors were almost equally distributed among insertions of unrelated elements (5/44 – 11.36) (simple prepositions, thus leading to the formation of an articulated preposition) and unpronounced repetitions (4/44 – 9.09%).

<i>Definite article</i>	n.	% on total n. of stimuli	% on total n. of errors
Substitutions	15	2.60	34.09
Omissions	20	3.47	45.45
Insertions of prepositions	5	0.87	11.36
Non-productions	4	0.69	9.09
Total	44	-	-

Table 13 – Repetition task – Definite articles

5.4.7 Further observations

As for the assessment of completion task results, patients with different aphasic deficits also showed different patterns of errors.

Here again, Wernike’s aphasics had less difficulties (their errors were, on average, 11/80 – 13.75%) in correctly repeating the proposed sentences. S3 (diagnosed with morpho-syntactic deficits), resulted highly impaired (61/80 – 76.25), as well as Broca’s aphasics (47/80 – 58.75).

A qualitative analysis didn’t reveal differences with respect to this first observation. Broca’s aphasics and S3, in fact, produced a higher number of both omissions (on average 21/31 – 67.74%) and substitutions (on average 26.33/31 – 84.95%) with respect to other participants, who produced on average 9.75/31 (31.45%) substitutions and 2/31 (6.45%) omissions.

This pattern of errors, with Wernike’s subjects less impaired and higher number of errors in both Broca’s patients and S3 was also found in the separated analysis of every element included in the battery.

As far as articulated prepositions are concerned, patients with morpho-syntactic impairments (namely Broca's subjects and S3) produced many omissions. In particular, in line with results obtained in the completion task, they mainly omitted one of the elements forming part of the articulated preposition (on average 8.77/51 – 16.99%), very rarely omitting the entire element (on average 1.67/51 – 3.27).

5.5 Discussion

Our results clearly show that articulated prepositions are not inflected elements, but items resulting from the contraction of a simple preposition and a definite article.

As we have shown, in fact, we found both substitutions and omissions affecting only one of the two elements involved in the contraction.

The most interesting pattern of errors emerged assessing the distribution of omissions in items with articulated prepositions. In both the completion and the repetition task, in fact, we detected a higher number of omissions of either the article or the preposition, as compared with the amount of the same errors affecting the entire articulated preposition. Furthermore, Wernicke's aphasics hardly ever produced omissions, while answers of patients with morpho-syntactic deficits (namely Broca's aphasics and S3), very often lacked either articles or prepositions.

This observation is crucial, considering that bound morphemes are, in general, hardly ever omitted in case of grammatical deficit and, what is more, they never appear in isolation. Thus, if we hypothesise, following Nevis and Napoli (1987, see section 2.2.1) that articulated prepositions are inflected elements with agreement endings, our findings are hardly explainable.

According to such a theory, in fact, we should postulate that patients with agrammatic symptoms could omit a stem (in this case the preposition), only producing an inflectional morpheme (namely the definite article) in isolation. This pattern, however, has never been found in aphasic production. At the same time, we should also claim that inflectional endings (in our case the definite article) could be omitted, despite being bound morphemes.

On the contrary, if we assume that articulated prepositions arise from the fusion of a definite article and a simple preposition, maintaining their categorical status as well as all their properties, we can easily explain why agrammatic patients separately omit both the

component. Indeed, both prepositions and articles are free functional words, which have been widely shown to be impaired in agrammatic production (see for instance Miceli et al. 1989). The same phenomenon emerging from patients' pattern of omission, was also found observing substitutions. This fact is very interesting, but it is not sufficient to confirm our claim. Substitutions, in fact, could be easily explained by both an inflectional and a constructionist hypothesis. While the substitution of the sole preposition could always be considered as a semantic paraphasia, the substitution of the article could be classified either as a paragrammatic error (namely an agreement mistake), or as the wrong selection of a function word.

In addition, patients behaved in similar way when asked to complete or repeat sentences with non-articulated prepositions being followed by a definite article. In these case impairments affecting only one of the two elements are expected, and, in fact, they have been found. What is surprising is that articulated prepositions seemed to be treated by patients exactly as non-articulated ones, as if they were perceived as the combination of two distinct elements.

All these considerations make think that articulated prepositions are the result of a compositional process, rather than being directly selected from the lexicon as reach morpho-syntactic elements.

Specifically, as we widely explained in section 2.2.3, we postulate (following Embik and Noyer, 2001) that the contraction originates from a morphological operation (Local Dislocation) occurring after both the syntactic parsing of the sentence and the vocabulary insertion.

Such a hypothesis has the advantage of explaining both the substitution and the omission patterns observed in our experiment. We propose that omissions, being caused by a syntactic deficit, occur during the syntactic processing of the sentence. Thus, lacking one of the element involved in the contraction, Local Dislocation does not take place and the remaining element is produced (notice that, when lacking the article, simple prepositions always appear in their normal shape, which, on the contrary, should have been phonologically readjusted in case of contraction).

Substitutions, instead, could be caused either by a syntactic deficit or by a wrong lexical selection. In particular, with respect to prepositions, given that we only found within category substitutions, we claim, partly confirming Mätzing (2009) results, that errors are produced during the vocabulary insertion (thus after the syntactic computation).

5.6 Conclusions

In conclusion, drawing data from the performance of a group of aphasic patients on both a completion and a repetition task, we confirmed the morphological origin of articulated prepositions, which appear to be the result of a post-syntactic movement.

This work is a preliminary investigation, and should be considered the starting point for further studies on the field of prepositional contractions in aphasic production.

In a wider perspective, moreover, the neuro-linguistic assessment of elements involved in independent morphological operation could become a suitable tool to detect selective deficits. Items like articulated prepositions, in fact, if assessed with targeted tests, could make emerge impairments specifically affecting the morphological component, which are often confused with syntactical difficulties.

6. EXPERIMENT 2 – COMPLEX PREPOSITIONS IN AGRAMMATIC APHASIA

6.1 Introduction

The goal of this second experiment is to assess the production of complex prepositions in a patient affected by severe Broca's aphasia. As we have seen in section 2.3, in fact, the nature of complex preposition is quite controversial. Traditionally, they are considered lexical elements because of their heavy semantic content. Nevertheless, recent studies, especially coming from the cartographic literature (see in particular works collected in Cinque and Rizzi 2010) have shown, on the basis of a comprehensive typological survey, that complex prepositions are more likely to form part of a separate *functional* syntactic category, which is distinct from both nouns and other types of prepositions.

If complex prepositions (or Axial Part following Svenonius, 2006) really are functional elements, they should be problematic to be retrieved by patients with morpho-syntactic deficits.

6.2 The patient

FM is an Italian 55-year-old man with 13 years of education formerly employed as a sales manager in a company that produces eye-glasses. In 2004, when he was 47, he sustained an ischemic stroke in the left middle cerebral artery territory, following an internal carotid artery dissection. Consequently, he began to show linguistic difficulties and was diagnosed as having a severe non fluent agrammatic aphasia and a right hemiparesis, with greater impairment to the upper limb. On July 2005 FM sustained a second ischemic subcortical stroke. At the time of the last assessment on June 2010, which was performed at the Neurorehabilitation Unit of IRCCS Ospedale San Camillo, Venezia (Italy), the neurological examination showed a right hemiparesis with mild spastic hypertonia, hyperreflexia and right facial nerve paresis. On the Italian NIHSS - National Institutes of Health Stroke Scale, FM scored 7/42, which corresponds to a mild neurological deficit.

FM non linguistic abilities were, in general, preserved. He didn't show spatial or attention deficits and on the Raven P.M. (1947) Test, which measures general non-verbal intelligence,

FM's performance was at ceiling (36/36).

At the time of the proposed experiment FM's linguistic abilities were still severely compromised. His formal linguistic examination was performed mainly using two Standard Italian Batteries for Aphasia: (i) *Batteria per l'Analisi dei Deficit Afasici* (BADA, Miceli et al., 1996) and (i) *Esame Neuropsicologico Per l'Afasia* (ENPA, Capasso and Miceli, 2001).

FM's spontaneous speech was agrammatic and non-fluent with many anomic and planning pauses. He sometimes resorted to *conduite d'approche* strategies and produced some semantic paraphasias. In spontaneous speech any phonetic or phonologic deficit weren't detected.

Function words were most often omitted and great morpho-syntactic difficulties were observed especially concerning verbal inflections. FM, in fact, when managed to retrieve verbs, mainly used simple present or infinitive forms. Moreover, he wasn't able to produce syntactically complex sentences/structures.

Naming tests and repetition tasks revealed some semantic paraphasias which, surprisingly, lead the patient to replace the target with less frequent words.

The Semantic Association Test (Italian version, Visch Brink and Denes, 1993), excluded semantic deficits.

Comprehension was good in conversational contexts, while in structured tests some difficulties emerged, especially in the interpretation of reversible sentences. Moreover, FM often failed to detect grammaticality in auditory judgments tasks.

FM's language deficit can be considered as chronic.

As far as repetition is concerned, FM's performance was better in word than non-word repetition. Sentences, instead, were almost impossible for him to be repeated.

Results of reading tasks highlighted phonology deficits but relatively preserved comprehension, especially for nouns.

6.3 Materials and Methods

Given FM's difficulties with verbs and complex sentences both in spontaneous production and in repetition, we decided to use short phrases showing the syntactic structure we aimed to investigate. Verbs and completed sentences were consciously avoided in order to not distress the subject.

The patient, thus, underwent a repetition task composed by 82 phrases of the type illustrated in (1). Every proposed item included two nominal elements (the Figure and the Ground)

connected by a complex preposition (Axial Part) followed, when necessary, by a simple functional preposition.

- (1) { L'albero_{Figure} [*accanto*_{Axial-Part} *alla*_{prep}] casa_{Ground} }_{phrase}.
the tree [*beside* *to-the*] *house*.
"The tree beside the house".

Hence we have a set of items, all basically structured as follows:

- (2) [FIGURE [AXIAL PART [(SIMPLE PREPOSITION) [GROUND]]]]

Notice, crucially, that not all Italian complex prepositions require a functional monosyllabic preposition to introduce their complement, as showed below in (3).

- (3) a. *Prima di mezzanotte*
before of midnight
- b. *Dopo mezzanotte*
After midnight

In (3a) the temporal preposition *prima* is obligatory followed by a monosyllabic preposition, while in (3b) the temporal preposition *dopo* directly selects its complement. Our battery consisted of 68 items containing complex prepositions obligatory followed by a simple functional one and 14 items in which the complex locative/temporal preposition directly introduced the NP complement.

FM had to repeat every phrase as soon as he had heard it from the examiner. When necessary, items were repeated by the examiner a second time.

Items were faithfully transcribed online during testing. The session was also audio-taped and transcribed. On and offline transcriptions were checked against each other. FM was tested in a quiet room in the rehabilitation centre he attended (*Centro Medico di Foniatria*, Padua, Italy).

6.3.1 Analysis

Scoring of repetitions was examined for errors. We considered errors those repetitions which did not correspond to the target clause pronounced by the examiner.

Errors have been classified with respect to whether they contained omissions or substitutions of one of the elements in the clause. Moreover, omissions and substitutions were classified with respect to the element they concern.

6.4 Results

FM's performance on the repetition task is shown in Table 1. FM correctly repeated fewer than 5% (78/82 – 4,87%) of the items presented, thus producing a substantive corpus of errors for analysis. The majority of errors we detected were omissions (69/78 - 88,46%), while substitutions accounted for a much smaller percentage of errors (6/78 - 7,69%). There were only one instance of an insertion and very few phonological paraphasias.

On the contrary, omissions showed a distinctive pattern revealing a very interesting dissociation between preserved and omitted elements. First of all, axial prepositions tended to be omitted, as well as Figure. Moreover, there was a clear trade-off between these two elements in that, they hardly ever co-occur.

On the other hand, Ground and, quite surprisingly, simple prepositions were most often preserved. All these previous observations are further examined below.

Errors	N.	%
Omissions	69/78	(88.46)
Substitutions	6/78	(7,69)
Insertion of the copula	1/78	(1,28)
Phonological paraphasias	7/78	(2,56)

Table. 1 FM's Overall Distribution of Repetition Errors

6.4.1. Omission of Axial Part

The most frequent error we found in FM's repetitions was the omission of the Axial Part (28/78 - 35,89%) with preservation of Figure and Ground. Interestingly, in such cases, we found only two instances in which simple prepositions were omitted (7,14%). When the axial preposition was omitted, Figure and Ground were always preserved. Thus, the structure of FM's repetition missing AxPart was as follows: {FIGURE + SIMPLE PREPOSITION + GROUND}. In (4b) we give an example of FM's answers.

- (4) a. *Target* – Gli studenti fuori dalle aule.
The students out of-the classrooms.
- b. *FM* – *Gli studenti dalle aule
The students of-the classrooms.

Moreover, interestingly, simple prepositions, although present, were often substituted with another element of the same category. These paraphasias accounted for 57,14% (16/28) of FM's answers missing Axial Part. We also noticed that in these cases simple prepositions appeared to be substituted with a more *salient* preposition, which made the phrase grammatical and meaningful. In this way the patient tried to avoid an ungrammatical result. See for example (5).

- (5) a. *Target* – Il bosco lontano dalla città
The wood far from-the city
- b. *FM* – Il bosco nella città.
the wood in-the city.

The target phrase without *lontano* (far), besides being syntactically ungrammatical cannot be semantically interpreted (**il bosco dalla città*/the wood from-the city). On the contrary the substituting preposition inserted by FM, lead to a grammatical and semantically interpretable expression, albeit with a different meaning from the proposed phrase.

6.4.2 Omission of Figure

When FM did not omit the Axial Part, most of the times he managed to repeat {AXIAL PART + SIMPLE PREPOSITION + GROUND}, thus omitting only the Figure, (23/78 - 29,5% of contexts). See for instance, the example in (6);

- (6) a. *Target* – La bambina *davanti* alla finestra
The girl in front of-the window
- b. *FM* – **Davanti* alla finestra.
In front of-the window

Again, simple prepositions were hardly ever omitted. There were only 2/23 (8,68%) omissions of simple prepositions following the AxPart *davanti* (in front). Notice that, in these cases, FM correctly maintained the definite article (which should be incorporated to the missing simple preposition) and that, even if the presence of the simple P is obligatory with *davanti*, its absence is accepted by many Italian speakers.

6.4.3 Omission of Axial Part and Figure

We also detected some repetitions of the Ground only, with omissions of both the Figure and the Axial Part (15,4%). In this cases, the simple preposition was most often (9/12; 75%) omitted within AxPart. Notice that given that a single element was retrieved, a prepositional linker would not be necessary.

6.4.4 Summary of results

Overall, the Ground resulted, the most likely element to be preserved; only four of FM's wrong repetitions lacked it (4/78; 5,12%), two of which also missed the Axial Part. Consequently, there were only 2/78 (2,56%) incorrect answers in which the Axial Part and the Figure were present at the same time. Counting the four correct answers the patient had been able to give and the 11 repetitions containing other errors, there were only 17/82 (20,73%)

repetitions in which *Figure* and *AxPart* coexist.

In conclusion, in FM production *Figure* and *AxPart* hardly ever co-occur.

The remaining 11/78 (14,10%) errors, which we have just mentioned above, concerned sporadic and not systematic anomalies such as phonological or semantic paraphasias or omissions of other morphemes (e.g. articles). In Table 2 we summarize the errors distribution in FM's repetitions.

Phrase repetition task	Number	% on total n. of errors
Total number of items	82	-
Correct repetitions	4	-
Omission of figure	23	29,5
Omission of AxPart and figure	12	15,4
Omission of AxPart	28	35,89
Omission of ground	2	2,6
Omission AxPart and Ground	2	2,6
Other errors¹⁰	11	14,10
Total n. of errors	78	-

Table. 2 Complete FM error's distribution in the experimental task

6.5 Discussion

FM's performance is striking in several respects. First of all, the classical distinction between functional and lexical prepositions seems to be disconfirmed by the results presented above. Our patient, in fact, who was affected by severe agrammatic aphasia, exhibited serious problems in the processing of the (locative/temporal) axial prepositions. Simple prepositions were almost unaffected which is unexpected under the classical view that simple prepositions are functional elements.

This first observation confirms the theoretical hypotheses we presented in section 2.3 arguing for a functional nature of axial prepositions and postulating a dedicated syntactic structure for these elements. Simple prepositions, instead, despite being functional too, have a different

¹⁰ We found: 2 omissions and 2 substitution of the article, 4 substitutions of AxPart, 1 insertion of the copula and 2 phonological paraphasias.

syntactic behaviour. In fact, they were mostly substituted (in a limited set of contexts) rather than omitted by FM.

From a neuro-linguistic point of view, evidence for a syntactic nature of complex prepositions had already been detected by Froud (2001), whose patient showed a selective deficit affecting functional words. In particular, Froud's subject was not able to read functional elements, even in isolation, including complex prepositions. Interestingly, moreover, he had no problems in reading axial prepositions when they were used, in complete sentences, as relational nouns (in the sense of Svenonius 2006).

In other words Froud (2001) found dissociation between Axial Part and relational nouns, as if they were homophonous but syntactically different elements.

Svenonius' (2006) insight on the derivation of complex prepositions from relational nouns goes in this direction (see section 2.3). He proposes, different syntactic derivations, in order to explain sentences like those in (7) (already mentioned in section 2.3 in (1), and reported here for readers' convenience).

- (7) a. There was a kangaroo in the front of the car.
b. There was a kangaroo in front of the car

Svenonius claims that (7a) and (7b) crucially differ in their syntactic derivation, in that in (7a) *front* acts as a nouns, thus occupying a nominal head of a DP embedded in a prepositional phrase, while in (7b) it acts as a functional element establishing a syntactic relation between the Figure and the Ground. According to Svenonius (2006: 51-52), a possible structure for (7a) and (7b) would be the ones in, respectively, (8a) and (8b).

- (8) a. [_{PLACE} in [_Dthe [_Nfront [_Kof [_{DP}the car]]]]]
b. [_{PLACE} in [_{AXPART}front [_Kof [_{DP}the car]]]]

As shown in (8b) above, Axial Part crucially lacks the functional structure associated with the relational noun (as illustrated in (8a)), for instance the Determiner, being itself a functional-relational item. Notice also that the DP Ground is embedded in both structures under a K (Case) projection.

In Italian, items which correspond to Axial Part can convey locative/temporal meanings and are sometimes followed by functional prepositions such as *a* ('at/to') and *di* ('of') (e.g. *dietro (al)l'albero* '(lit.) behind (to) the tree') (see section 2.3.1). Moreover they can also function as relational nouns as exemplified in (9).

- (9) a. Il davanti della casa
The front of-the house
- b. Davanti alla casa
In front of-the house

In Italian, moreover, this syntactic difference is even more evident, given that the simple preposition linking the spatial preposition/noun and its complement is different. In (9a) there is a functional preposition marked for genitive case, while in (9b) the simple preposition seems to be directly selected by the axial preposition. In this sense Italian seems to confirm Benucci's analysing of Portuguese prepositions, in which he assimilates simple prepositions that follow complex ones to subcategorized prepositions selected by verbs to convey Case (also confirming Svenonius' derivation with a K projection introducing the Ground). In effect, with the Axial Part *davanti* (front) only the simple preposition *a* (to/at) is allowed. Following this idea, the Axial Part can be considered as a syntactic liker between Figure and Ground.

In addition, if we consider Talmy's (2000) observations on axial prepositions, we found that, semantically, the Axial Part identifies the position of an object, the Figure, by selecting a region (*the front, back, bottom, etc.*) of a second object, the Ground. Thus, the axial preposition also represents a semantic connection between Figure and Ground.

Coming back to our patient's performance, the high number of omissions concerning Axial Parts confirms the functional nature of these elements, especially considering that our battery was composed by phrases only including Axial Parts and not relational nouns.

Moreover, in mostly of FM's repetitions Figure and AxPart appear to be in complementary distribution. In other words, when Figure was retrieved, the axial preposition was systematically omitted; on the contrary, when the complex preposition was present, Figure was missed.

According to us, when Figure is firstly retrieved, a derivation along the lines of (8b), is

activated, but, at this point, FM is unable to fill and retain *functional* Axial Parts. Hence, he links Figure and Ground through a reduced configuration, mediated by the monosyllabic preposition operating as a relational item (and not as a Case assigner, as expected). This idea is also confirmed by the high number of substitutions affecting the simple preposition. FM, in fact, semantically reanalysed the phrase, choosing a more meaningful (in the sense of Littlefield 2006) salient item to reach an acceptable result (notice that FM had any semantic deficit).

On the contrary, when the complex preposition was retrieved, it was considered by FM as a relational noun. In such a case he omitted the Figure for the impossibility of having two nouns competing for the same position, and managed to correctly repeat the rest of the given phrase. In these cases simple prepositions were not substituted, but were correctly repeated. Possibly, once FM had retrieved the spatial relational noun, it was easy for him to correctly complete the repetition he had just heard by the examiner, even more so that the final result was not ungrammatical.

What is interesting is that, in both instances, FM seemed to build up the same base structure, of the type in (10), namely two nouns linked by a simple, if possible meaningful, preposition.

(10) {NP (Figure/relational noun) + liker (Simple preposition) + NP (Ground)}

In other words, we are claiming that FM, unable to parse too complex syntactic derivations, resorts to a simplified construction mainly using nominal elements (notice that he has not lexical diseases) connected by linkers with poor syntactic value.

6.6 Conclusions

In conclusion, in this case study we have investigated the syntax of Italian locative complex prepositions, drawing data from an Italian Broca's aphasic patient. We especially found many omissions of the complex preposition, with preservation of the simple ones. Moreover, we detected a clear dissociation between Figure and Axial Part.

According to us results confirm that complex prepositions are functional (not lexical) items, which establish both a syntactical and a semantic relation between the Figure and the Ground.

Relational nouns, on the contrary, are homophonous of complex prepositions but form part of a different syntactic derivation.

We argue that FM, when able to retrieve complex prepositions, reanalysed them as relational nouns, thus not managing to correctly build up their syntactic derivation. This errors pattern seems to be caused by FM' incapacity of parsing a complex syntactic structure. This difficulty leads FM to simplify the phrase to be repeated, reducing it to a minimal crippled structure mainly composed by two nouns and a relational linker.

7. EXPERIMENT 3 – PREPOSITIONAL COMPOUNDS IN BROCA’S APHASIA

7.1 Introduction

This experiment is aimed at assessing the processing of Italian compound words in Broca’s aphasia. As we have noticed in chapter 3, the process underlying the formation of complex words is still under investigation.

Compounds, in fact, appear to be opaque to syntax, given that, in general, their components cannot be split through syntactic movements or operations. Moreover, they behave, conceptually, as unitary lexical entries. Despite this, previous neuro-linguistic evidence have shown that they should be considered as items compositionally formed and that elements forming part of the compound, in some way conserve their own properties (see Mondini et al. 2005, Semenza et al. 1997, Semenza and Mondini, 2006).

In addition, recently, some scholars have postulated a syntactic origin for all compounds, included prepositional ones.

To observe how prepositional compounds are normally processed, we will analyze the aphasic production of a patient with a severe agrammatic deficit. Since the subject was affected by a heavy morpho-syntactic impairment, compound words are expected to be spared only if no syntactic operations are necessary to retrieve them correctly.

During the experiment all types of compound words have been tested, but we have especially evaluated the performance with; (i) NpN compounds of the *ferro da stiro* (electric iron) type also including some instances in which an articulated preposition was needed (e.g. *bocca dello stomaco*, pit of-the stomach); (ii) PN compounds of the *lungomare*, (seafront) type. (See chapter 3, for a survey of the most important theoretical works on compounds).

7.2 Participant

SM is a 56 years old right handed man, with 10 years of education. He suffered of a hemorrhagic stroke in February 2011, and was diagnosed with Broca’s Aphasia on the basis of Italian standard tests (BADA - *Batteria per l’Analisi dei Deficit Afasici*, Miceli et al. 1996; AAT - *Aachener Aphasie Test (the Italian Version)*, Luzzatti et al. 1991). We also recruited a

control group of five subjects matching with SM for age and age of instruction. They were three women and two men without any physical, psychological or neurological problem.

The patient and the control subjects were administered with 4 different tasks:

- reading aloud of compound words
- repetition of compound words
- completion of compounds lacking the preposition (two different completion tasks have been administered, as we will see below).
- repetition of phrases (with the same surfacing structure of prepositional compounds)

7.3 Repetition and reading tasks

7.3.1 Materials

The same material was used in the repetition and in the reading tasks. Stimuli consisted in a list of compound words which included: (i) NpN compounds (with both simple and articulated prepositions); (ii) PN compounds; (iii) compounds composed by two separated nouns without a linking element; (iv) a balanced number of Italian compounds without prepositions (for a detailed description of the stimuli see below and Table 1). Moreover, also compound-like nouns were inserted, namely nouns having a word, not related in meaning to the whole word, embedded in the left or right edge. These items, whose shape makes them similar to compounds, have been used as distracters, following the work of El Yagoubi et al. (2008).

The stimuli were balanced for length, frequency and neighbourhood size. Length was calculated counting the number of letters of every item. Frequency was obtained from a digital corpus of written Italian (Bertinetto et al. 2005)¹¹. The neighbourhood size of a word was calculated as the total number of words that could be formed by replacing one letter of a target word.

¹¹ *Corpus e Lessico di Frequenza dell'Italiano Scritto* (CoLFIS), available on line at <http://www.ge.ilc.cnr.it/strumenti.php>

The 391 stimuli were divided as follow:

- 80 PN compounds composed by a complex preposition and a noun (e.g. *lungolago*, lakeside)
- 144 NpN compounds with two nouns linked by a simple preposition. 104 of them contained a non-articulated preposition such as *ferro da stiro* (electric iron) and 40 of them (NapN) contained an articulated preposition such as *occhio del ciclone* (storm centre).
- 23 NspaceN compounds with two separated nouns without a linking element (e.g. *cane poliziotto*, police dog).
- 88 balanced Italian compounds of the following types: 19 Verb-Noun^[exocentric] (VN) (e.g. *coprifuoco*, curfew), 10 Verb-Verb^[exocentric] (VV) (e.g. *bagnasciuga*, foreshore), 10 Noun-Adjective^[exocentric] (NA) (e.g. *pellerossa*, redskin), 11 Adjective-Noun^[exocentric] (AN) (e.g. *purosangue*, thoroughbred), 19 Noun-Noun^[left-headed] (Nn) (e.g. *capobanda*, gang leader), 18 Noun-Noun^[right-headed] (nN) (e.g. *fotoromanzo*, photostory).
- 57 distracters divided in two groups; (a) 29 nouns with a word embedded in the left *edge* (D1) (e.g. *cremagliera*, rack, where *crema* stands for cream); (b) 28 nouns with a word embedded in the right *edge* of the word (D2) (e.g. *scarafaggio*, beetle; where *faggio* means beech).

COMPOUNDS	N	%		N	%
PN	80	20,46			
NpN	144	36,83	NpN	104	26,60
			NapN	40	10,23
NspaceN	23	5,88			
Others	88	22,51	NA	10	2,56
			AN	11	2,81
			Nn	19	4,86
			nN	18	4,60
			VN	19	4,86
			VV	10	2,56
Distracters	57	14,58			
Total	391	-			

Table 1 – Stimuli description

7.3.2 Methods

The same material was assessed in a repetition task and in a reading task. During the repetition task the patient was asked to faithfully repeat a compound at a time as soon as the examiner had pronounced it. For the reading task, instead, we presented to SM the stimuli every one printed in big size on a paper, and we asked to him to read them aloud one by one. Items were randomly organized and administered in four sessions to avoid a learning effect. Moreover, to familiarize SM with the task, each experimental session started with a training block, whose items were then excluded from the results.

7.3.3 Results of the repetition task

SM's performance was analysed by classifying as errors all repetitions which didn't exactly match with the target. Wrong answers were, then, classified depending on whether they contained omissions or substitutions. Furthermore, we also observed if errors affected the whole word or only one of the elements forming part of the compound.

In the repetition task SM's wrong answers were 60/391 (15.35%). As shown in table 2, the majority of errors we detected 50/60 (83%) concerned prepositional compounds of the [NOUN - SIMPLE/ARTICULATED PREPOSITION – NOUN] type. All other errors were randomly distributed among distracters (4/60 - 6.67%), PN (1/60 - 1.67%) and other compounds (5/60 - 8.33%). All control subjects performed without errors in the repetition task.

<i>General results</i>			
Stimuli	Errors (n.)	% on n. of errors	% on n. <i>intra-class</i> items
PN	1	1.67	1.25
NpN	50	83.33	34.72
NspaceN	0	0.00	0.00
AN	0	0	0
NA	0	0	0
Nn	2	3.33	10.52
Nn	1	1.67	5.55
VV	2	3.33	20
VN	0	0	0
D1+D2	4	6.67	7.02
Total	60	-	-

Table 2 – Repetition of compound words

What emerged from this first general analysis is a deep difference between NpNs (impaired) and all other items (virtually spared). This fact suggests that NpNs computation is more difficult than that of other compounds for our agrammatic subject and that, consequently, a different mechanism for their derivation should be postulated.

In particular, it is very interesting to notice that NpN compounds are significantly more impaired than PNs with a different ratio of performance which is statistically very significant (1/80 vs. 50/144, [$\chi^2(1) = 22.8$; $p < .0001$]).

Among errors affecting NpN compounds (summarized in Table 3) we found a high number of omissions (40/50 - 80%) of the entire prepositional element, few omissions (3/50-6%) of the article when the preposition was articulated and some parafasias affecting the preposition (7/50-14%). When the preposition was substituted, SM generally used another element of the same category. Only in 2/50 (4%) errors, he used a conjunction (*e-and*).

<i>NpN</i>	n.	% on total n. of stimuli	% on total n. of errors
Correct items	94	65.28	-
errors	50	34.72	-
omission of P	40	27.78	80
Substitution of P	7	4.86	14
Omission of article in aP	3	2.08	6
Total	144	-	-

Table 3 – Repetition task, results on NpN items.

As far as complex prepositions are concerned, instead, SM performed very well, making only 1/80 (1.25%) errors, which was a substitution of the complex preposition with another element of the same grammatical class. PNs, therefore, are more likely to be similar to all other compounds rather than to NPNs. The few errors we detected in the rest of the items, in fact, revealed a high number of substitution errors and no omissions. In particular we found 2/19 (10.52%) paraphasias among repetitions of Nn compounds, one of which concerned the substitution of the first element of the compound with an element of another category (a complex P rather than a noun); 1/18 (5.55%) errors among nN compounds, namely the insertion of a simple preposition between the two nouns; 2/10 (20%) paraphasias among VV compounds both affecting the first element.

These data show that not only SM had not difficulties in repeating compounds other than NpNs, but also that the few errors he made with these items were similar both qualitatively and quantitatively to those affecting PN compounds.

7.3.4 Results of the reading task

Again, SM's performance was analysed by classifying all wrong read items with respect to the type of errors they contained (omissions or substitutions). Moreover, a qualitative analysis has been performed to detect whether errors affected the entire word or one of the elements forming part of the compound.

General results of the reading task are presented in Table 4. This test resulted, in general, more difficult for SM. The total amount of errors, in fact, was about twice the number of wrong repetitions (129/391-32.99%). Again, NpN compounds were the most impaired items with 68/129 errors (52.71%). Errors concerning PNs were 19/129 (14.73%) many more than in the repetition task. Despite this, NpN compounds were, again, significantly more impaired than PN (19/80 vs. 68/144, [$\chi^2(1) = 5.6$; $p = .0184$]).

As far as other compound words are concerned, SM performed slightly worse than in the repetition task. Again, the healthy subjects of the control group made no errors.

<i>General results</i>			
Stimuli	Errors (n.)	% on n. of errors	% on n. <i>intra-class</i> items
PN	19	14.73	23.75
NPN	68	52.71	47.22
NspaceN	6	4.65	26.09
AN	1	0.78	9.09
NA	1	0.78	10
Nn	4	3.10	21.05
nN	7	5.43	38.88
VV	4	3.10	40
VN	7	5.43	36.84
D1+D2	12	9.30	21.05
Total	129	-	-

Table 4 – Reading of compound words

As in the repetition task, the omission of the preposition was the more frequent error (40/68-58.62%) among those concerning NpN compounds (see Table 5). Again, some omissions (3/68-4.41%) of the article of articulated prepositions have been found. Moreover, 5/68 (7.35%) errors were classified as substitutions affecting the simple preposition.

In addition, we also detected some phonological (4/68-5.88%) and verbal paraphasias (5/68-7.35%) and some substitutions of one of the nouns forming the compound (5/68 – 7.35 for the first noun (N1) and 4/68 – 5.88 for the second noun (N2)). In only 1/68 (1.47) instance he omitted N1.

<i>NpN</i>	n.	% on total n. of stimuli	% on total n. of errors
Correct items	76	52.78	
Errors	68	47.22	
agreement	1	0.69	1.47
Phonologic error	4	2.78	5.88
Verbal paraphasia	5	3.47	7.35
Paraphasia of N2	5	3.47	7.35
Paraphasia of N1	4	2.78	5.88
Omission of P	40	27.78	58.82
Substitution of P	5	3.47	7.35
Omission of N1	1	0.69	1.47
Omission of article in case of ap	3	2.08	4.41
Total	144	-	-

Table 5 - Reading task, results on NpN items.

PN compounds resulted more difficult for SM to read than to repeat. In the reading task, in fact, he made a number of errors (19/129 – 14.73%) about 10 times higher than in the repetition task (1/60 – 1.67).

Distribution of errors didn't revealed significant differences neither between omissions and substitutions nor with respect to the element showing the deficit. Both prepositions (3/19 – 10.53%) and nouns (5/19 – 26.32%) were substituted. The noun was omitted only once (1/19 – 5.26%), while omissions of the complex P were 3/19 (15.79%). Results are summarized in Table 6.

<i>PN</i>	n.	% on total n. of stimuli	% on total n. of errors
Correct items	61	76.25	-
Errors	19	23.75	-
Phonologic paraphasias	1	1.25	5.26
Verbal paraphasias	3	3.75	15.79
Paraphasias of N.	5	6.25	26.32
Paraphasia of P.	3	2.50	10.53
non production	3	3.75	15.79
Omission of P	3	3.75	15.79
Omission N.	1	1.25	5.26
Total	80	-	-

Table 6 – Reading task, results on PN items

At first sight, errors on compounds not including prepositional elements (30/129; 23.25%) were above all substitutions of the entire compound with another word (9/30-30%). Nevertheless, a thorough observation of our data revealed that, adding omissions (4/30 – 13.33%) and substitutions (7/30 – 23.33%), a higher number of errors affected the first element (11/30 – 36.66%) of the compound. No regularities were detectable among items showing these anomalies, nor the position of the head, neither the category to which the substituted element belonged. Possibly, the prevalence of errors we found on the left side of compounds was caused by the serious left neglect affecting our subject. See Table 7 below for a comprehensive view of the performance of SM with the *residual* compounds.

<i>Other compounds</i>	% on total n. of errors		% on total n. of errors
Agreement errors	1/30 (3.33%)	-	-
Complete substitution	9/30 (30%)	-	-
Errors on the 1 st element	11/30 (36.66%)	Substitutions	7/30 (23.33%)
		Omissions	4/30 (13.33%)
Errors on the 2 nd element	4/30 (13.33%)	Substitutions	2/30 (6.66%)
		Omissions	2/30 (6.66%)
No answer	5/30 (16.66%)	-	-

Table 7 – Reading task, results on residual compounds

7.4 Completion tasks

To better investigate the computational process involved in the production of prepositional compounds, two Completion tasks (henceforth completion (a) and completion (b)) were also performed.

7.4.1 *Materials and Methods*

For Completion (a) we prepared a set of 49 NpN compounds (17 with articulated preposition and 32 with simple preposition) in which the linking preposition had been omitted. A speech therapist said aloud every item to SM, who was asked to say which preposition had to be inserted between the head and the modifying noun.

Items of Completion (b), instead, were a list of 30 NpN compounds (4 of which had an articulated preposition) intermixed with 20 NN compound fillers (50 items in total). The examiner said aloud every item to the patient, omitting all the prepositional linkers. Once he had heard the item, SM had first to say whether or not a prepositional link was required. For instance *calzamaglia*, tights (lit: stocking-knit) does not require a preposition, while *mulino a vento*, (windmill), requires it. Then, if he thought that a preposition was necessary, he had to say which preposition had to be inserted. The work of Mondini et al. (2005) suggested us these completion tasks.

Again, in both completion tasks, items were checked for length, frequency and neighbourhood size.

7.4.2 *Results of completion tasks*

As far as Completion (a) is concerned, all answers not corresponding to the target were counted as errors. We then classified them depending on whether they were omissions or substitutions.

In Completion (a) SM made 27/49 (55.10%) errors. This means that he failed in completing more than an half of the given items. As shown in Table 8, we have separately analysed data

concerning articulated prepositions. In fact, considering the percentage of errors in relation to the number of stimuli of every *intra-class*, compounds with articulated prepositions were more impaired than the remaining NpNs. Again, control subjects performed perfectly on this task.

<i>General results</i>			
Stimuli	Errors (n.)	% on n. of errors	% on n. <i>intra-class</i> items
NpN	15	(15/27) 55.55	(15/32) 46.87
NapN	12	(12/27) 44.44	(12/17) 70.58
Total	27	-	-

Table 8 – Completion task (a)

Observing in detail SM's errors, we can notice that simple prepositions were always substituted (14/15 – 93.33%) with another element of the same category, except for one (1/15 – 6.66%) case in which the patient inserted an article instead of a simple preposition. No omissions were detected.

As far as articulated prepositions are concerned, instead, we found some substitutions (6/12 – 50%), the majority of which (5/12 – 41.66%) also included the omission of the article. We also detected 5 items (5/12 – 41.66) with the correct preposition but lacking the article. The definite article, therefore, was highly omitted (10/12 – 83.33%) by SM when he was asked to insert an articulated preposition. Finally we found only one (1/12 – 8.33) instance in which the entire preposition was omitted. Results concerning simple and articulated prepositions are summarized, respectively, in Table 9A and 9B

<i>NpN</i>	Errors (n.)	% on n. items (32)	% on n. of errors
NsPN (32)	15	55.10	
Substitution with a preposition	14	43.75	93.33
Substitution with an article	1	3.12	6.66

Table 9A – Completion task (a), results on NpNs

<i>NapN</i>	Errors (n.)	% on n. items (17)	% on n. of errors
NapN (17)	12	70.58	
Substitution of the P	1	5.88	8.33
Substitution of P + omission of Art.	5	29.41	41.66
Omission of Art.	5	29.41	41.66
Non production	1	5.88	8.33

Table 9B – Completion task (a), results on NapNs

Results of completion (b) have been analysed in two steps. First of all, we analysed SM's answers counting how many times he was able to distinguish items requiring the preposition from those that did not need it.

Secondly, SM was asked to complete those items he had identified as prepositional compounds. On these answers we applied the same analysis we have performed on data of Completion (a).

We found that our patient had no problems in identifying NN compounds, given that no errors were detected in the group of 20 NNs we have used as distracters. In other words SM always correctly said that the compound did not need a preposition.

With regard to NpNs, instead, we detected 11/30 (36.66%) cases in which SM erroneously answered that a preposition was unnecessary for completing the compound (see *Step 1* in Table 10, for a synthesis of these results).

When SM recognized NpNs (19/30 – 63.33%), we asked him to complete them with the correct prepositional linker.

The type of errors concerning this second step was similar to that we had already described in Completion (a). We detected 3/19 errors (15.78%): 2/3 (66.66%) substitutions of the simple preposition and 1/3 (33.33%) omission of the article of the articulated preposition. Notice that there was only one articulated preposition in the group of 19 items which SM tried to complete. Results of this second test are summarized in Table 10 (*Step 2*). The subjects of the control group, again, did not commit any errors.

<i>General results</i>			
<i>Step 1</i>	Errors (n.)	% on n. of errors	% on n. <i>intra-class</i> items
NpN (30)	11	(11/11) 100	(11/30) 36.66
NN (20)	0	(0/11) 0	(0/20) 0
Total	11	-	-
<i>Step 2 (completion of 19 NpNs)</i>	Errors (n.)	% on n. of errors	% on n. <i>intra-class</i> items
Substitution of P	2	66.66	(2/19) 10.52
Omission of the article (NapN)	1	33.33	(1/1) 100
Total	3	-	-

Table 10 – Completion task (b)

7.5 Repetition task with phrases

A further repetition task was created, with the aim of comparing the structure of prepositional compounds with un-lexicalized phrases showing the same composition.

7.5.1 Materials and Methods

We used a set of 111 (un-lexicalized) phrases (e.g. *i biscotti alle noci*, nut-cookies, *lit.* the cookies at-the walnut) which included:

- 60 N+ap/p+N phrases in which two nouns were linked by either simple (25) or articulated (35) (ap) prepositions recalling the structure of NpN compounds.
- 21 N+p+A+N phrases in which two nouns were linked by a simple preposition not allowing the formation of the articulated form, thus being followed by a separate definite article.
- 30 N+P+ap/p+N phrases in which two nouns were linked by a complex preposition (P) requiring a simple (or articulated) preposition following it. We inserted this type of phrases because, even if they don't exactly replicate the structure of PN compounds, they could tell us something on the nature of complex prepositions, making available the assessment of these elements in both syntactic and lexical contexts.

SM was asked to repeat a phrase at a time as soon as a speech therapist had pronounced it. All of patient's answers were transcribed on line and also recorded, to be checked in a second time. Items were presented twice by the examiner only if the patient asked for a repetition.

7.5.2 Results of the repetition task with phrases

SM performance in phrase's repetition was quite poor, with 75/111 (67.56%) wrong answers. On the contrary the five subject of our control group performed without any errors or hesitation.

About a half (43/75 – 57.33%) of SM's errors affected simple or articulated prepositions of phrases recalling the structure of NpN compounds.

With respect to complex prepositions, instead, we found an outstanding number of errors (18/75 – 24%) when the patient was asked to repeat phrases, while, as we have shown above, compounds with complex P were almost spared.

Phrases including simple prepositions not allowing the contraction with the definite article, were incorrectly repeated in the 18.66% of cases (14/75 – 18.66%). These first data are summarized in Table 11.

<i>General results</i>			
Stimuli	Errors (n.)	% on n. of errors	% on n. <i>intra-class</i> items
N+ap/p+N	43	57.33	(43/60) 71.66
N +p+A+N	14	18.66	(14/21) 66.66
N+P+ap/p+N	18	24	(18/30) 60
Total	75	-	-

Table 11 – Repetition of phrases

Errors concerning phrases with simple or articulated prepositions are shown in detail in Table 12. Interestingly, we didn't found substitution errors in SM's repetitions concerning phrases with the same composition of NpN compounds. A part from some errors (16/43 – 37.21%) which we classified as "other" (errors not affecting the prepositions, above all omissions of other elements such as a noun or the initial article), only omissions were detected (27/43 – 62.79) affecting: (i) the simple preposition (6/43 – 13.95%); (ii) the entire articulated

preposition (15/43 – 34.88%); (iii) the simple preposition forming part of an articulated one (6/43 – 13.95%). Notice that the article of articulated prepositions resulted spared.

N+ap/p+N	N.	% on total n. of items	% on total n. of errors
Items	60		
Correct repetitions	17	28.33	
Errors	43	71.67	
Omission of aP	15	25	34.88
Omission sP	6	10	13.95
Omission P of aP	6	10	13.95
Other	16	26.67	37.21

Table 12 – Repetition of phrases, results on N+ap/p+N

With N+p+A+N phrases, SM failed to repeat 14/21 (66.67%) items. The majority of wrong repetitions included omissions of the simple preposition with the preservation of the definite article (3/14 – 21.43%) or omissions of both the elements (6/14 – 42.86%). We also counted the substitution of a preposition (1/14 – 7.14%) and some other errors (4/14 – 28.57), again concerning elements other than prepositions. Results are synthesised in Table 13.

N +sP+Art+N	N.	% on total n. of items	% on total n. of errors
Items	21		
Correct repetitions	7	33,33	
Errors	14	66,67	
Omission of sP	3	14,29	21,43
Omission of sP+A	6	28,57	42,86
Other	4	19,05	28,57
Substitutions of sP	1	4,76	7,14

Table 13 – Repetition of phrases, results on N+p+A+N

Finally, as far as phrases with complex prepositions are concerned, SM produced 18/30 (60%) errors (see Table 14). Omissions were, once again, the most frequent error. Crucially, a high

number of errors (9/18 – 50%) was found concerning the simple (or articulated) preposition linking the complex one to the noun.

6/18 (33.33%) errors affected the complex preposition, only one of which (5.55%) was a substitution. We also counted 4/18 phrases (22.22%) lacking both complex and simple prepositions. Again, 3/18 (16.66%) wrong answers were classified as “other” errors.

N+P+ap/p+N	N.	% on total n. of items	% on total n. of errors
Items	30		
Correct repetitions	12	40,00	
Errors	18	60,00	
Omission of aP/sP	8	26,67	44,44
Omission of P of aP	1	3,33	5,55
Other	3	10,00	16,66
Omission cP+aP/sP	4	13,33	22,22
Omission cP	1	3,33	5,55
Substitutions of cP	1	3,33	5,55

Table 14 – Repetition of phrases, results on N+P+ap/p+N

7.6 Discussion

Our results make emerge a clear deficit affecting the simple preposition linking the two nouns of Italian prepositional compounds and confirm previous investigations (e.g. Mondini et al. 2005). SM’s deficit is, thus, consistent with the difficulties concerning functional elements which normally affect Broca’s aphasics (e.g. Miceli et al. 1989; Grodzinsky, 1990; Friedmann and Grodzinsky 1997, among many others).

In all of the tasks we administered to SM, we found dissociation between errors concerning NpN compounds and those affecting all other types of complex words. This difference was both quantitative and qualitative.

In repetition and reading tasks, the great majority of errors affected NpN compounds and were most often omissions of the preposition. The few remaining wrong answers, only showed substitution errors and were equally distributed among other compounds.

In both completion tasks, instead, SM produced a high number of substitutions affecting the preposition, but no omissions. These results, in spite of appearances, are not in contradiction with those of other tasks. In fact, as we have pointed out in several occasions, completion tasks are likely to trigger substitution errors, given that the patient is driven to give an answer. The high number of substitutions, therefore, is a further evidence of SM's deficit. Moreover, in completion (b), SM hardly ever correctly identified NpNs.

Interestingly, repetition and reading of VN (verb-noun) and PN (complex P-noun) compounds were significantly easier for SM respect to repetition and reading of NpNs. This is a striking fact because both VNs and PNs could be considered as words including a functional element (complex preposition), or, at least a morphologically reach item (verbs). Also NNs resulted spared in the two first tasks and, moreover, results of Completion (b) showed that SM had less difficulties in recognize NN compounds with respect to NpN ones (11/30 errors with N-P-N vs. 0/20 errors with N-N; $\chi^2(1) = 4.857$, $p = 0.0275$). Several observations can then be made on the basis of these results.

First of all VN and PN appear to be lexicalised items, directly selected from the lexicon as unique lexical entries.

For what concerns VN, the significant dissociation we found between them and NpNs (in repetition, 50/144 vs. 0/19 errors, $\chi^2(1) = 6.4$; $p = .0114$) basically disconfirms Ralli's (2008) hypothesis, according to which the thematic vowel involved in the formation of Italian VN is a compound marker, just like simple prepositions of NpNs. Such an assumption, therefore, clearly states that the two forms under discussions have similar structures. Nevertheless, our data suggest a different interpretation, given that VNs appear to be spared in our patient's speech, in opposition to NpNs. Very surprisingly, moreover, our results are different from those collected by Semenza et al. (1997), who assessed the performance of six Italian Broca's aphasics, and found many omissions of the verbal component of VN compounds.

As far as PN are concerned, they were significantly better retrieved than NpNs in the repetition (1/80 vs. 50/144, [$\chi^2(1) = 22.8$; $p < .0001$]) and in the reading task (19/80 vs. 68/144, [$\chi^2(1) = 5.6$; $p = .0184$]) by our patient. Moreover, they also resulted easier for SM with respect to phrases containing complex prepositions. In other words, we can say that

complex prepositions (e.g. *fuori*, outside; *dietro*, behind) are differently processed depending on whether they form part of compound words or whether they are used in phrases.

Given these results, and following Svenonius (2006, but see also Cinque 2010), complex prepositions are more likely to be relational nouns when appearing in compound words, being, on the contrary, functional elements (Axial Parts) when used in prepositional phrases. This idea is confirmed by the poor performance (33.33% of errors) SM obtained on repetition of phrases, in which complex prepositions clearly fulfilled a functional role. The functional nature of Axial Part, moreover, has also been proved by Zampieri et al. (2011, see also chapter 6) who described an agrammatic patient with a selective deficit on complex prepositions.

With respect to NNs, our results seem to enhance those hypotheses claiming that these elements are directly selected from the lexicon, being unitary elements. Indeed the existence of an underlined syntactic mechanism forming these compound words seem not be plausible. Delfitto and Melloni (2009, see section 3.2) hypothesis, thus, do not to explain our data. According to them, in fact, NN and NpN compounds have the same syntactic derivation. SM's performance, however, not only proves that no syntactic mechanisms are involved in NNs retrieval, but also show that NNs and NpNs have different sources. Otherwise, dissociation between them should not have been present.

Give these previous considerations, NNs, PNs and VNs seem to be all retrieved as unique lexical entries, directly selected from the lexicon. As a consequence, it could be assumed that the process responsible for their formation is the same and that PNs and VNs, are actually similar to NNs.

First of all, as we said, the complex preposition appearing in PNs is more likely to be interpreted as a relational noun, rather than as a functional Axial Part. If this assumption is on the right track, PNs are, thus, composed by two nouns.

Secondly, as far as VNs are concerned, we want to highlight that their verbal component is always represented by a lexical verb (in the sense of Cardinaletti and Shlonsky, 2004). Following Hale and Keyser's (1993, 2002), moreover, most transitive and intransitive verbs (namely lexical ones) are actually nouns reanalysed as verbs through the incorporation of the noun into a limited class of light verbs. As a consequence, only nouns can be considered as

primitives (see also Kayne, 2008). Under these assumptions, one could consider verbs of VNs as true lexical elements, with the same properties of nouns. If we are right, the *thematic vowel* shouldn't be considered an inflectional morpheme, but only the marker of the bare form of the verb. Indeed, no errors were detected concerning the verbal endings, or the production of infinitival forms (typical signs of agrammatism).

Coming back to NpNs, they resulted the only element severely impaired in our patient's production. That is why, they are likely to be processed in a different way with respect to all other compounds. In addition, in contrast to complex prepositions, simple ones resulted highly impaired in the repetition of phrases too (57.33% of errors were omissions of simple/articulated prepositions). This fact is even more interesting if we consider that phrases including simple prepositions had exactly the same form than NpN compounds.

On the basis of these data, NpN compounds seem to be processed according to the same underlying computation of phrases. But, how does this computation occur?

A possible explanation accounting for our patient's pattern of errors could be that NpNs are a sort of lexicalized phrases. Semenza and Mondini's (2006), for instance, following Di Sciullo and Williams (1987), claimed that these elements are firstly selected as unitary lexical entries and then decomposed before being phonologically represented.

Another possibility, maybe more convincing, is that of postulating the lexicalisation of syntax occurring after the functional parsing of the structure. An analysis of this kind matches Starke's (2009) interpretation of idioms as multi-terminal expressions stored in the Lexicon. Starke (2009) starts from the assumption that, from a cartographic point of view, lexical items are most often the combination of several syntactic nodes (including abstract features, inflectional morphemes, and so on). The Spell-Out operation, therefore, is normally applied to sets of syntactic nodes. For this reason it is reasonable to assume that even larger portion of the syntactic tree could be spelled-out together (Phrasal Spell-Out), on condition that every component of these structures were, in its turn, stored in the lexicon. According to this hypothesis, therefore, NpN compounds could be considered as prepositional phrases on which Phrasal Spell-Out have been applied. In other words, the same syntactic structure, which in any case gives problem to agrammatic patients, is subjected to Phrasal Spell-Out when necessary, resulting in a compound word. Otherwise, it is normally interpreted as a prepositional phrase.

Under these assumptions, thus, it is not surprising to find residuals of the syntactic deficit on NpNs, affecting both simple and articulated prepositions, given that they have been previously syntactically parsed (see chapter 5 for a possible explanation of impairments on articulated prepositions). That is also why, NpNs have many of the typical features of compound words, refusing syntactic operation inside them and being conceptually unique.

CONCLUDING REMARKS

In this dissertation we have explored the syntax and the morphology of Italian prepositions, following the most recent theoretical studies and drawing data from the linguistic production of aphasics'.

Three specific topics concerning the Italian prepositional system have been addressed, every one being also further investigated through a neuro-linguistic experiment.

First of all we have analysed the phenomenon causing the contraction of the simple preposition with the definite article. In chapter 1 we have seen that the possibility of contracting it with another functional element is not limited to Italian prepositions. In many other languages, in fact, the same phenomenon is detectable, sometimes involving the definite article, as in Italian, and, in other instances, involving personal pronouns, as in Celtic languages (leading to the formation of the so called pronominal prepositions).

The Italian case, however, is particularly suited for such an investigation, because, when the contraction is allowed, the entire paradigm is created, including all genders, numbers and all the different forms of the masculine definite article (*il/lo/l'*, the_{MascSing}; *i/gli*, the_{MascPlur}, whose usage depends on the first letter of the following word).

Cross-linguistic evidence has highlighted that, even if every language has its specific rules governing the contraction, in all languages articulated prepositions can only express definiteness (thus, indefinite articles cannot contract). Moreover, in all languages, contracting elements have to be adjacent, in order for the fusion to be allowed.

As far as Italian prepositions are concerned, we have argued in favour of a morphological operation triggering the contraction, against Nevis and Napoli's (1987) inflectional hypothesis. According to us, in fact, articulated prepositions are composed by a simple preposition and an article, which are joined together through a morphological operation (Local Dislocation; Embik and Noyer, 2001. See section 2.2.3) which occurs at PF, after the syntactic derivation and Vocabulary insertion have already taken place. The first experiment we presented dealt with aphasic patients' capacity of using articulated prepositions.

We administered a repetition and a completion task to 8 aphasic patients affected by different types of aphasic syndromes. The results showed that substitutions were the most frequent errors in the patient's production. As we pointed out before, this fact is not surprising, given that recruited patients were only mildly impaired. Moreover, during the completion tasks,

substitutions errors are more likely to be produced, because patients are forced to fill the gap. Additionally, we also found a substantial number of omissions affecting articulated prepositions. In particular, we found about 20% of omissions of one of the two elements forming part of the contraction. These findings prove that articulated prepositions cannot be considered inflected items. If that were the case, omissions should have not been present at all, or, at least, not in a so high a percentage, given that, in general, inflectional morphemes are substituted but not omitted. Substitutions, instead, can affect both bound and free morphemes.

The morphological hypothesis we proposed in section 2.2.3, has the merit of explaining both substitutions and omissions. Both errors, in fact, can be produced either during the syntactic parsing of the sentence (omissions) or during Vocabulary insertion (substitutions). In any case, Local Dislocation operates when the system has already been broken, also explaining why we didn't detect the separation of the two elements without omissions or substitutions.

Complex prepositions were assessed from a syntactic point of view, especially referring to the most recent cartographic studies (see section 2.3). Following Cinque (2010), Terzi (2010), Svenonius (2006, 2010) and many others, we argued for the functional nature of complex prepositions, especially claiming that complex prepositions have a peculiar syntactic structure, different from both nouns and simple prepositions. They are represented as modifiers of a silent noun (PLACE), selected by a locative functional preposition and followed by a case marking simple P. Specifically, they occupy the Spec position of a projection called Axial Part (in the sense of Svenonius, 2006).

Our second experiment involved a chronic agrammatic patient (FM) with a severe Broca's aphasia. He performed a repetition task of phrases in which two nouns were linked by a complex preposition (actually an Axial Part and a simple preposition following it). Results were very interesting for two main reasons: (i) we detected a high number of omission of the complex preposition. The following simple prepositions were mainly spared, but we found many substitutions errors when the complex P was missing; (ii) analysing our results in a Figure/Ground perspective, we observed that a clear dissociation emerged between Figure and AxPart.

Our findings, thus, confirmed the functional nature of complex prepositions. Moreover, they also indicate that, as Svenonius' (2006, 2010) proposes, these spatial "words" can be analysed as either complex prepositions (thus having a functional behaviour) or relational nouns. Our

subject, in fact, when managed to retrieve Axial Part, seemed to treat it as a relational noun, thus omitting the Figure which, being a noun too, competed for the same position. This fact not only confirmed that FM had lost the capacity of parsing complex syntactic structures, but also revealed a strategy he applied in order to accomplish the given task. The final structure of the majority of its repetitions in fact reflected the simplified structure [NOUN (Figure/Relational noun)- LINKER (simple P, possibly meaningful) – NOUN (Ground)].

Also prepositions inside words were taken into consideration (see chapter 3). As we said, in the linguistic literature there is no consensus on the nature of compounds including simple prepositions (e.g. *ferro da stiro*, electric iron). In fact, even if they respond positively to Bisetto and Scalise's (1999) compound-hood tests, appearing, thus, similar to all other compound words, evidence coming from neuro-linguistic studies (see, for instance Mondini et al. 2005; Semenza and Mondini 2006) reveal a possible compositional process in their retrieval. In this section, we have also presented Delfitto and Meloni's (2009) theory, according to which all compounds (included NNs) have a syntactic origin.

Unfortunately, compounds including complex prepositions (e.g. *lungomare*, seafront), have been less studied, both theoretically and experimentally. The few existing works seem to suggest a more complex process originating PN compounds, mainly based on the observation that a group of these compounds behaves as modifier of a following silent noun (Kampers-Manhe, 2001). As we have pointed out in section xxx and following Svenonius's (2006) insights, two hypotheses could be made; (i) PN compounds are formed by a complex preposition and a noun. In this case a compositional process could be postulated, leading to a structure similar to that stated for Axial Parts; (ii) PN compounds include a relational noun and a noun, namely two nominal elements. In this case they should be assimilated to NN compounds, being governed by the same rules as far as their formation is concerned.

The experimental section concerning compounds words, have shown as NpNs seem to have a syntactic origin, while PNs are more likely to be similar to NN compounds. Our agrammatic patient, in fact, often failed in correctly repeat compounds of the *ferro da stiro* (electric iron) type, his errors especially affecting the simple preposition (which was omitted or substituted depending on the task the patient had to perform). PNs compounds, instead, resulted less affected, and errors were almost equally distributed between the two elements of the compound not revealing significant differences between nouns and complex prepositions.

On the basis of these results, we claimed that in PNs the complex preposition is analysed as a relational noun, thus making these elements more similar to NN compounds. We also argued against a syntactic origin of NN compounds (thus, against Delfitto and Melloni, 2009), given that our patient seem not to have problems in retrieving them, making very few unsystematic errors.

In conclusion, in this dissertation we have analysed three specific topics dealing with Italian prepositions. In doing this, we have taken into account both theoretical and neuro-linguistic hypotheses, thus addressing this complex matter combining two different point of views. This method has been a successful tool, because, on the one hand, it has allowed us to single out, among the various proposals, the linguistic model which better characterizes how Italian prepositions are processed, and, on the other hand, experimental results have been assessed through the most recent and innovative linguistic theories, which have been useful in suggesting the correct explanation of certain unexpected deficits.

We have shown, thus, how linguistic theoretical assumptions can successfully be applied to neuro-linguistic investigations, leading to an improvement in both research fields.

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APPENDIX A – EXPERIMENT 1

Completion Task – Italian Stimuli

1. Stasera vado _____ cinema con gli amici.
2. _____ orto del nonno è molto ben curato.
3. La protesta si svolge fuori _____ cancelli.
4. L'amico _____ Giovanni e Maria è simpatico.
5. La sarta _____ il vestito per la modella.
6. Vedo le Dolomiti _____ mia finestra.
7. _____ mamma di Gianni è molto giovane.
8. Maria esce _____ casa alle 8.
9. La minigonna è nata _____ anni sessanta.
10. La giacca è dentro _____ armadio marrone.
11. A Marta piace uscire _____ sue amiche.
12. Ho stampato la tesi _____ carta lucida.
13. _____ borse di plastica sono vietate.
14. Ho conosciuto _____ fratello di Marco.
15. E' importante rispettare _____ ambiente.
16. Tengo i medicinali lontano _____ bambini.
17. Martina _____ nel coro della parrocchia.
18. Ho appuntamento _____ studio del medico.
19. Ogni mattina tengo _____ posto a Marco.
20. Il cuoco _____ il pranzo con impegno.
21. Gianni ha una forte passione _____ sport.
22. Marco ha finito _____ studi l'anno scorso.
23. Maria si veste davanti _____ specchio.
24. Il foglio è caduto _____ sedia e il muro.
25. Mi hanno rubato _____ bicicletta nuova.

26. Dopo pranzo la mamma lava _____ piatti.
27. La cameriera si prende cura _____ ospiti.
28. La donna piega i vestiti _____ cura .
29. Maria sistema la pianta vicino _____ panca.
30. Prima di mangiare bisogna lavarsi _____ mani.
31. Per prendere l'autobus ci vuole il _____.
32. Gli alunni mettono i quaderni _____ banchi.
33. Hanno intervistato _____ sindaco di Roma.
34. L'uomo si riposa _____ salotto.
35. I bambini giocano vicino _____ genitori.
36. Sono nervosa _____ esame di fisica.
37. E' tornata di moda _____ minigonna.
38. Ieri ho incontrato _____ papà di Marco.
39. Tengo l'agenda nuova _____ borsa verde.
40. La mamma innaffia sempre _____ suoi fiori.
41. Gianni si _____ tutte le mattine alle 6.
42. La tenda si pianta lontano _____ alberi.
43. La maestra dà le caramelle _____ bambini.
44. Maria parte oggi da Roma _____ Germania.
45. Maria fa un favore _____ Marco.
46. Maria ha perso _____ chiavi di casa sua.
47. A carnevale Gianni si veste _____ gatto.
48. L'ultimo della fila chiuda _____ porta.
49. Marco _____ una poesia d'amore per Maria.
50. _____ calciatori guadagnano molti soldi.
51. Marco lascia i vestiti fuori _____ armadio.
52. Ho detto _____ Marco di non telefonare più.
53. _____ fotografie di Marco sono belle.
54. _____ rose e i tulipani, preferisco le rose.
55. Gli animali sono maltrattati _____ uomini.
56. La nave è ferma davanti _____ isola.
57. Ho incontrato Giovanni _____ caso.

58. _____ prossimo compito di latino è venerdì.
59. Andiamo al mare _____ auto rossa di Gianni.
60. Marco è bravo a suonare _____ fisarmonica.
61. Il _____ spiega la lezione alla lavagna.
62. Domani mattina ci sarà _____ sole.
63. Il contadino _____ il campo di patate.
64. I turisti aspettano davanti _____ alberghi.
65. Bisogna lavarsi _____ denti molto spesso.
66. Appendo il quadro _____ specchio e la finestra.
67. La lezione di inglese inizia _____ nove.
68. _____ scarpe rosse ti stanno davvero bene.
69. Giovanni è biondo e ha _____ occhi azzurri.
70. Vado _____ piscina ogni settimana.
71. L'astronave atterra _____ Marte.
72. D'estate Marco soffre molto _____ caldo.
73. Le persone sono in fila fuori _____ teatro.
74. La macchina è aggiustata _____ Mario.
75. Ho aspettato due ore sotto _____ pioggia.
76. Gli uccelli migratori _____ verso sud.
77. Ho parcheggiato vicino _____ autobus giallo.
78. Il gatto _____ mia vicina è scappato.
79. _____ cani sono degli animali fedeli.
80. Ho appoggiato il libro _____ comodino.
81. Ho incontrato Giulia fuori _____ casa sua.
82. _____ moglie e marito non mettere il dito.
83. Maria ha litigato _____ mamma di Gianni.
84. A San Martino si mangiano _____ castagne.
85. Il parroco raccoglie offerte _____ poveri.
86. A colazione mangio dei _____ al cioccolato.
87. D'estate mi piace il colore _____ erba.
88. La polizia arresta _____ ladri del quadro.
89. Facciamo il castello lontano _____ acqua.

90. Gianni viene salutato _____ suoi compagni.
91. Mi piace molto _____ voce acuta di Giorgia.
92. Per festeggiare faccio la torta _____ mele.
93. Mi piace abitare lontano _____ strada.
94. Nelle zone buie si vedono bene _____ stelle.
95. Se sali _____ sgabello rischi di cadere.
96. Domani sera vado _____ teatro.
97. I clienti escono _____ porte del negozio.
98. E' vietato sostare fuori _____ spazi blu.
99. Marta ha molta paura _____ serpenti.
100. Per proteggere le mani, uso i _____ di lana.
101. I primi uomini vivevano _____ caverne.
102. L'astronave passa lontano _____ sole.
103. Hanno estratto _____ numeri del Lotto
104. Mario si è preparato _____ calma per la cena.
105. Uso spesso _____ macchina per fare il pane.
106. _____ giornate invernali sono molto corte.
107. Non litigare davanti _____ bambini.
108. Gli studenti _____ insieme per gli esami.
109. A Gianni piacciono _____ canzoni tristi.
110. Il nostro treno parte _____ 10 minuti.
111. Maria solleva il secchio _____ manico.
112. Pianto l'albero vicino _____ steccato.
113. _____ gnomi sono dei personaggi magici.
114. Sei stato gentile _____ confronti di Maria.
115. I _____ hanno detto che guarirà presto.
116. Stamattina ho messo _____ calzini rossi.
117. Mi sono seduta vicino _____ ospiti.
118. Il mio amico guida le auto _____ corsa.
119. Dopo il liceo mi iscrivo _____ università.
120. I signori Rossi abitano vicino _____ noi.
121. Il mio _____ ha abbaiato tutta la notte.

122. Mi è entrato un moscerino _____ occhio.
123. L'ufficio _____ capo è al secondo piano.
124. Maria raccoglie _____ mele dagli alberi.
125. La nonna accompagna i bambini _____ zoo.
126. _____ astronauti sono in perfetta forma.
127. La nonna abita _____ periferia.
128. Marco tiene suo figlio lontano _____ stadio.
129. Pulisco il tavolo _____ straccio giallo.
130. _____ dire e il fare c'è di mezzo il mare.
131. _____ aglio è un alimento molto saporito.
132. Ho dimenticato il telefono _____ tavolo.
133. Le _____ sono parcheggiate in doppia fila.
134. I fedeli si incontrano fuori _____ chiese.
135. _____ spazzino pulisce bene la strada.
136. Mi lavo le mani _____ acqua e sapone.
137. Aspetto Marco davanti _____ stazione.
138. Ho comprato _____ stesso CD di Maria.
139. A Natale le persone _____ il panettone.
140. _____ scorpioni sono molto velenosi.
141. Mario si ferma davanti _____ strisce pedonali.
142. _____ stagno del castello è molto profondo.
143. La maestra detta i compiti _____ casa.
144. Quando fa freddo metto _____ cappotto blu.
145. Il nonno legge il libro _____ occhiali.
146. I miei figli _____ sui letti a castello.
147. _____ origine del mondo è sconosciuta.
148. La maestra manda Gianni fuori _____ porta.
149. Domani vado _____ medico per una visita.
150. Maria si rifà _____ letto tutti i giorni.
151. Ho preso la multa _____ divieto di sosta.
152. Marco gioca a calcio vicino _____ rose.
153. Ho incontrato _____ sorella di Gianni.

154. Regalo a Maria una crema _____ mani.
155. Oggi si è rotto _____ specchio del bagno.
156. Vado molto d'accordo _____ miei colleghi.
157. Maria vuole stare lontano _____ Marco.
158. Anna ha perso _____ orecchini d'argento.
159. C'è ancora molta neve _____ alberi.
160. Il bambino è caduto _____ albero di mele.
161. Marco e Giovanni _____ a calcio insieme.
162. Hanno preso _____ orso che ho visto ieri.
163. Maria ama leggere i _____ d'avventura.
164. Il nuovo bar è vicino _____ panificio.
165. C'è differenza _____ poveri e i ricchi.
166. Il calcio è _____ sport più diffuso in Italia.
167. Mi piacerebbe molto andare _____ luna.
168. Marta ha imparato a suonare _____ arpa.
169. I bambini _____ a scrivere a sei anni.
170. Mando un biglietto _____ mia amica Maria.
171. Il pilota vola lontano _____ montagne.
172. E' triste vedere _____ animali in gabbia.
173. Mi piace il sapore _____ more selvatiche.
174. _____ studio della medicina è importante.
175. Le forbici sono _____ cassetto più alto.
176. Il film comincia _____ un'ora.
177. La macchina è davanti _____ palazzo.
178. Ho spiegato _____ allievi la verità.
179. _____ figli di Anna sono molto educati.
180. Il bandito è arrestato _____ sceriffo.
181. Apri la _____ e fai entrare dell'aria.
182. _____ nuovo stadio è grande e moderno.
183. Il padre _____ sposo era emozionato.
184. _____ sposi tagliano insieme la torta.
185. La carne si taglia sempre _____ coltello.

186. Il sarto mi cuce un vestito _____ misura.
187. Mi sono caduti i soldi fuori _____ zaino.
188. Marco è _____ incudine e il martello.
189. Il pesce più feroce è _____ squalo bianco.
190. Le persone si sono spaventate _____ spari.
191. Marco mi aspettava seduto _____ scale.
192. Totti è _____ sportivo più pagato d'Italia.
193. D'autunno le foglie _____ dagli alberi.
194. Oggi è _____ anniversario dei miei amici.
195. Il musicista legge _____ spartito.
196. Marco si emoziona davanti _____ Maria.
197. La notizia si è già diffusa _____ ospiti.
198. _____ scienziati hanno scoperto una cura.
199. Ho un grande quadro di un _____ famoso.
200. Gianna ha macchiato _____ abito di Maria.

Repetition Task – Italian Stimuli

1. Il nonno gioca a carte tutte le sere.
2. L'altro ieri avevo un gran mal di testa.
3. Durante le prove ballerò con Maria.
4. Gli sposi stampano gli inviti su carta bianca.
5. Ho passato il capodanno da Marco.
6. La maestra ha dato molti compiti per casa.
7. Gli alunni hanno paura del maestro.
8. I ragazzi giocano sulla spiaggia tutta l'estate.
9. Il nonno compra una pianta nuova per il giardino.
10. Lo spettacolo inizia alle 20.
11. I bambini attaccano i disegni con la colla.
12. Il bambino è salito sullo sgabello.
13. Lo studente prepara la musica per la festa.
14. Ho perso la collana bianca della mamma.

15. Gli ospiti vengono serviti dai camerieri.
16. Compro lo zaino nuovo alla bambina.
17. Le modelle litigano con il fotografo.
18. I negozi vietano l'ingresso agli animali.
19. Maria ha visto la pinna dello squalo.
20. L'atleta si mantiene in forma con lo sport.
21. Mi piace lo zucchero sulle fette biscottate.
22. Dopo lo sbarco dall'aereo sono tranquilla.
23. Il satellite sta vagando per lo spazio.
24. Gli storici sanno la storia dei Maya.
25. Mario cammina sugli scogli e guarda l'alba.
26. Marco fa le visite guidate per i turisti.
27. Tutti i giorni raggiungo l'ufficio con l'autobus.
28. Il cane è scappato dal cancello principale.
29. Ho letto l'opera sui cavalieri medievali.
30. Gianni ha una grande passione per gli animali.
31. Lo zio si prende cura delle sue nipoti.
32. Gianni porta sempre suo figlio allo stadio.
33. Lo straniero compra la casa con le tende rosse.
34. Le strade sono ripulite dallo spazzino.
35. Vedo gli amici milanesi due volte all'anno.
36. Mario esce tutti i sabati con gli amici.
37. Il signore mette lo scatolone sull'armadio.
38. La protesta è organizzata dagli studenti.
39. Gli operai protestano per le tasse alte.
40. I film violenti sono vietati ai minori.
41. Marta è innamorata dell'amico di Luigi.
42. Le alunne ricevono un premio per l'impegno.
43. I bambini ci salutano dalle finestre.
44. Maria dimentica il telefono sul tavolo.
45. Gli uomini mettono la giacca con i bottoni blu.
46. L'artista usa le foglie degli alberi.

47. La nonna porta i bambini al parco.
48. Le mie amiche sono tornate dalla spiaggia
49. L'attore si esibisce davanti al pubblico
50. Il treno passa lontano dalla città.
51. I bambini giocano vicino al fiume.
52. La mamma aspetta Maria fuori dalla scuola.
53. Accendo il fuoco lontano dalle piante.
54. Lo zio dorme davanti alla televisione.
55. I cani mangiano vicino alla cuccia.
56. La penna cade fuori dall'astuccio.
57. Marco deve stare lontano dai guai.
58. La palla è finita vicino allo scivolo.
59. Le tue scarpe sono vicino agli stivali.
60. Il bandito è scappato fuori dallo stato.
61. Le rane saltano davanti allo stagno.
62. Gli studenti parlano fuori dalle aule.
63. Marco è caduto davanti ai miei occhi.
64. I miei amici lavorano lontano da Roma.
65. Maria si arrende davanti alle difficoltà.
66. L'atleta corre lontano dallo smog.
67. Marco ha una voce fuori dal comune.
68. Gli operai lavorano vicino alle macchine.
69. I turisti aspettano fuori dai musei.
70. L'alpinista cammina lontano dal burrone.
71. Gli impiegati lavorano davanti agli schermi.
72. I ragazzi si baciano davanti a Marco.
73. Il bagno pubblico è vicino all'uscita.
74. Le bambine si trovano davanti all'entrata.
75. Ho messo lo straccio vicino ai detersivi
76. Marco mi aspetta fuori da casa mia.
77. Lo strano signore si siede vicino a Maria.
78. Lo studente abita lontano dall'università.

79. Gli attori provano lontano dagli sguardi.
80. Lascio la biancheria fuori dagli armadi.

APPENDIX B - EXPERIMENT 2

Repetition task – Italian stimuli

1. La macchina fuori strada
2. Il paese fuori dalla crisi
3. Una zanzara vicino al mio orecchio
4. Il posto lontano da qui
5. Il vento fuori da qui
6. La quiete dopo la tempesta
7. Il sole prima del tramonto
8. il lavoro dopo la laurea
9. La rissa fuori da un ristorante
10. Le mura di cinta davanti al castello
11. L'elio dentro l'atmosfera
12. le caramelle dentro la scatola blu
13. il giorno dopo il disastro
14. Le maestre vicino a una cattedra
15. L'istinto dentro di me
16. La donna dentro una buca
17. Il formaggio dentro il paniere
18. La salute prima di tutto
19. La voce fuori dal coro
20. La squadra fuori dalla coppa
21. Il treno fuori dalle rotaie
22. Il pianeta lontano dal sole
23. Il gessetto vicino alla lavagna
24. Un posto fuori dal tempo
25. La protesta davanti a delle ambasciate
26. La luce davanti agli occhi
27. Le galline fuori dai cortili
28. Il cielo prima della pioggia

29. La carne fuori da una cella frigorifera
30. Gli elettroni lontano dal nucleo
31. Il presidio davanti a una scuola
32. Le case lontano da una scuola
33. Il martello vicino all'incudine
34. Il Cile davanti alle Elezioni
35. L'atleta lontano dal podio
36. La preghiera prima dei pasti
37. Il corridore davanti a tutti
38. L'alimentazione durante la gravidanza
39. La società italiana durante il fascismo
40. L'Egitto prima delle sabbie
41. Le informazioni lungo il viaggio
42. Il percorso lungo la via della seta
43. Gli alberi lungo la ferrovia
44. La stazione vicino a un paese
45. Il fulmine prima del tuono
46. La preparazione prima di una gara
47. La paura prima di un esame
48. Quella radura davanti a un bosco
49. Il riposo durante le giornate
50. La bambina davanti alla finestra
51. Gli studenti fuori dalle aule
52. Le scarpe vicino agli stivali.
53. L'atleta davanti alle tribune.
54. L'attore davanti al pubblico
55. L'albero fuori da casa mia.
56. Il bagno vicino all'uscita.
57. Le rane davanti allo stagno.
58. Gli impiegati davanti agli schermi.
59. L'altalena vicino allo scivolo.
60. Lo straccio vicino ai detersivi

61. I turisti fuori dai musei.
62. La casa lontano dall'università
63. Il viaggio lontano da Roma
64. Le penne fuori dall'astuccio.
65. I ragazzi davanti a Marco
66. I cani vicino alla cuccia.
67. Gli operai vicino alle macchine.
68. Il fumo lontano dagli occhi
69. La biancheria fuori dagli armadi
70. Il bambino davanti alla televisione
71. Lo studente vicino a Maria.
72. Il picnic lontano dallo smog
73. La medicina lontano dai pasti
74. L'alpinista lontano dal burrone.
75. I tifosi fuori dallo stadio
76. I genitori fuori dalla scuola
77. Il fuoco lontano dalle piante.
78. La voce fuori dal coro
79. Gli alberi vicino al fiume.
80. Le guardie davanti all'entrata.
81. I vasi davanti ai mobili.
82. Il bosco lontano dalla città.

APPENDIX C – EXPERIMENT 3

Repetition and Reading task

1. Lungolago
2. Sottovoce
3. Cremagliera
4. visopallido
5. Pianoterra
6. Megalite
7. Controsenso
8. Sottogamba
9. Fuoribordo
10. Controvoglia
11. Temperatura
12. Prezzemolo
13. Dirigente
14. Sottopassaggio
15. Oratore
16. Contromisura
17. Retrosцена
18. Grattacielo
19. Pavimento
20. moscacieca
21. Tergicristallo
22. Retrobottega
23. Coccodrillo
24. Montepremio
25. Dopolavoro
26. Sottobraccio
27. Fuoricorso
28. Sottocuoco

29. fuggifuggi
30. Ferrolega
31. Focamonaca
32. Docciaschiuma
33. Portachiavi
34. Calciomercato
35. Sottofondo
36. Gelosia
37. Retroguardia
38. Lungofiume
39. Avantielenco
40. lavasciuga
41. Tartaruga
42. Gommapiuma
43. mezzaluna
44. Sottovuoto
45. Sottobicchiere
46. Oltremare
47. Contraltare
48. Ceralacca
49. Servosterzo
50. Sottocoda
51. millefoglie
52. Pappagorgia
53. Peperone
54. Melograno
55. Bordovasca
56. Catastrofe
57. Cavaliere
58. millepiedi
59. Roccaforte
60. Arcobaleno

61. Virulenza
62. Sottobosco
63. Varicella
64. Melodia
65. Mandragola
66. Sottoscala
67. Sottoveste
68. Fuorionda
69. gattamorta
70. Semaforo
71. Oltreconfine
72. Toporagno
73. pellerossa
74. Barracuda
75. Contromano
76. Rotocalco
77. Filastrocca
78. Entrotterra
79. tiremmolla
80. Controvento
81. Oltrecortina
82. Fuoriprogramma
83. purosangue
84. Soprattassa
85. Madrepatria
86. Maresciallo
87. Fuorigioco
88. Mercenario
89. Sopracciglio
90. Controluce
91. Meteorite
92. Crocevia

93. Voltafaccia
94. Fuorisede
95. terzogrado
96. Controcorrente
97. Senzatetto
98. Fuoricampo
99. Asciugacapelli
100. pezzogrosso
101. Contropiede
102. Poggiatesta
103. malavita
104. Doposcuola
105. Fuoristrada
106. Controfigura
107. Lavastoviglie
108. Pugilato
109. Catafalco
110. Sottolio
111. Sottosuolo
112. Controfirma
113. Corrimano
114. Recidiva
115. Camposcuola
116. Soprabito
117. Pirofila
118. Battipanni
119. Imbarazzo
120. Fazzoletto
121. Controcultura
122. testacalda
123. Discepolo
124. parapiglia

125. Fuorimoda
126. Pellegrino
127. Fondovalle
128. falsariga
129. mezzacartuccia
130. Retroterra
131. Dopobarba
132. Fuorilegge
133. Aspirapolvere
134. Cavalcavia
135. Senzadio
136. Controverso
137. Sottopancia
138. giravolta
139. Collaudo
140. Contronatura
141. Sopraelevata
142. Dopoguerra
143. Scarafaggio
144. Sottosterzo
145. Pontefice
146. Lungolinea
147. Soprannome
148. Patriarca
149. dormiveglia
150. Girocollo
151. Reggiseno
152. Retromarcia
153. oronero
154. Salamandra
155. belladonna
156. Sottobanco

157. Requisito
158. Motosega
159. pigiapigia
160. Mondovisione
161. Boccaporto
162. Accredito
163. Fuoriclasse
164. bagnasciuga
165. Controsole
166. Barbabietola
167. pecoranera
168. Schiamazzo
169. Luogotenente
170. Lungomare
171. Vegetale
172. Oltreoceano
173. Acquavite
174. Cartamoneta
175. Funerale
176. Cavatappi
177. verderame
178. Sottopeso
179. Sottochiave
180. Pescespada
181. Pastorizia
182. musogiallo
183. Fuoripista
184. saliscendi
185. Melanoma
186. Serratura
187. Logaritmo
188. Clorofilla

189. Fotoromanzo
190. Sottaceto
191. Rompighiaccio
192. Lustrascarpe
193. Sopralluogo
194. Filosofo
195. Entrobordo
196. Contagocce
197. gattabuia
198. Marzapane
199. Soprammobile
200. Fuoriserie
201. Oltretomba
202. Coprifuoco
203. Calzamaglia
204. Polpastrello
205. Senzapatria
206. toccasana
207. Formalina
208. Maleficio
209. Soprapensiero
210. Portalettere
211. Pentecoste
212. Paladino
213. Portavoce
214. generale
215. compleanno
216. rasoterra
217. Terremoto
218. tela di ragno
219. fuga dei cervelli
220. Fangoterapia

- 221. banco dei pegni
- 222. codice a barre
- 223. Sacco a pelo
- 224. Finecorsa
- 225. auto civetta
- 226. dente di cane
- 227. chiodo di garofano
- 228. carta da parati
- 229. bocca dello stomaco
- 230. zampe di gallina
- 231. biglietto da visita
- 232. palla da tennis
- 233. mandato di cattura
- 234. colpo di grazia
- 235. luna di miele
- 236. vita da cani
- 237. Cappello a cilindro
- 238. braccio della morte
- 239. cavallo a dondolo
- 240. fucile a pompa
- 241. testa di rapa
- 242. borsa del ghiaccio
- 243. uva spina
- 244. arma da fuoco
- 245. guanto di velluto
- 246. dito d'apostolo
- 247. bötte da orbi
- 248. corpo del reato
- 249. Pepe in grani
- 250. tiro alla fune
- 251. braccio di ferro
- 252. bocca di dama

253. Ferro da stiro
254. messa da requiem
255. testa di legno
256. banca del seme
257. bocca di leone
258. occhio del ciclone
259. torso di cavolo
260. analisi del sangue
261. Giacca a vento
262. economie di scala
263. auto pirata
264. governo ombra
265. Barca a vela
266. indice dei prezzi
267. culto della personalità
268. occhio di tigre
269. quartiere dormitorio
270. cane poliziotto
271. addio al celibato
272. Castelli in aria
273. canto del cigno
274. testa d'uovo
275. Lenti a contatto
276. nave pirata
277. colpo d'occhio
278. decreto fantasma
279. mezzo da sbarco
280. lingua di terra
281. Latte in polvere
282. colpo di fulmine
283. peso gallo
284. ordine del giorno

285. stanza dei bottoni
286. Coltello a serramanico
287. pompa di benzina
288. donna cannone
289. marca da bollo
290. Freno a mano
291. Tiro a segno
292. cresta dell'onda
293. beneficio del dubbio
294. erba della regina
295. letto di morte
296. concorso di colpa
297. pelle d'oca
298. scherzo della natura
299. Messa in scena
300. assegno a vuoto
301. occhio di gatto
302. Partenza in salita
303. uccello del malaugurio
304. cura del sonno
305. colpo in canna
306. gesto da villano
307. pollo allo spiedo
308. Sale in zucca
309. corsa a ostacoli
310. birra alla spina
311. bastone da passeggio
312. fuochi d'artificio
313. dente del giudizio
314. festa da ballo
315. scherzo da prete
316. orologio al quarzo

- 317. Festa in costume
- 318. coda di cavallo
- 319. colpo di testa
- 320. cavallo da corsa
- 321. buco della serratura
- 322. servo della gleba
- 323. amico del cuore
- 324. freddo cane
- 325. foglio di via
- 326. pugno di ferro
- 327. idea chiave
- 328. Pentola a pressione
- 329. gatto delle nevi
- 330. bistecca ai ferri
- 331. convoglio tartaruga
- 332. medaglia al valore
- 333. ferri da calza
- 334. barba di capra
- 335. uomo di paglia
- 336. cane da caccia
- 337. concorso a premi
- 338. Ballo in maschera
- 339. Acquavite
- 340. bava alla bocca
- 341. Mulino a vento
- 342. rosa dei venti
- 343. testa coda
- 344. cono d'ombra
- 345. Videogioco
- 346. pezzo di ricambio
- 347. Tenuta in curva
- 348. battello mosca

- 349. piaga da decubito
- 350. tacco a spillo
- 351. cassetta delle lettere
- 352. intervista-bomba
- 353. Radiocronaca
- 354. Pantaloni alla cavallerizza
- 355. progetto pilota
- 356. curva a gomito
- 357. camicia da notte
- 358. rete da pesca
- 359. stato cuscinetto
- 360. Penna a sfera
- 361. faccia a faccia
- 362. polvere da sparo
- 363. piede di porco
- 364. Treno a vapore
- 365. cerniera lampo
- 366. Aereo a propulsione
- 367. colpo di scena
- 368. Vetroresina
- 369. schiuma da barba
- 370. Capobanda
- 371. Pesca a strascico
- 372. mulo da soma
- 373. occhio di lince
- 374. sfera di cristallo
- 375. collo di bottiglia
- 376. concetto chiave
- 377. corsa agli armamenti
- 378. asse delle ascisse
- 379. pozzo di scienza
- 380. Zucchero a velo

381. collo dell'utero
382. Bomba a mano
383. salto nel buio
384. abito da sposa
385. topo di biblioteca
386. viola mammola
387. occhio di bue
388. occhiali da sole
389. picco di ascolto
390. caso limite
391. caduta massi

Completion task (a)

1. sale_zucca
2. Codice_barre
3. sacco_pelo
4. fuga_cervelli
5. chiodo_garofano
6. dente_cane
7. palla_tennis
8. mandato_cattura
9. occhiali_sole
10. pozzo_scienza
11. topo_biblioteca
12. corsa_armamenti
13. zucchero_velo
14. bomba_mano
15. collo_bottiglia
16. mulino a vento
17. luna di miele
18. braccio della morte

19. arma da fuoco
20. guanto velluto
21. botte_orbi
22. giacca_vento
23. castelli_aria
24. Lenti_contatto
25. tiro_fune
26. bocca_stomaco
27. indice_prezzi
28. culto_personalità
29. colpo_fulmine
30. coltello_serramanico
31. pompa_benzina
32. latte_polvere
33. scherzo_natura
34. colpo_canna
35. pollo_spiedo
36. cura_sonno
37. pelle_oca
38. marca_bollo
39. stanza_bottoni
40. dente_giudizio
41. festa_costume
42. orologio_quarzo
43. uccello_malaugurio
44. medaglia_valore
45. cane_guardia
46. salto_buio
47. cavallo_dondolo
48. corpo_reato
49. ferro_stiro

Completion task (b)

1. croce_via
2. bordo_vasca
3. palla_tennis
4. campo_scuola
5. collo_utero
6. pugno_ferro
7. occhiali_sole
8. abito_sposa
9. madre_patria
10. sfera_cristallo
11. topo_ragno
12. colpo_scena
13. mulino_vento
14. piede_porco
15. capo_banda
16. foto_romanzo
17. treno_vapore
18. asse_ascisse
19. bomba_mano
20. monte_premio
21. schiuma_barba
22. cerniera_lampo
23. polvere_sparo
24. progetto_pilota
25. piaga_decubito
26. pezzo_ricambio
27. pesce_spada
28. stato_cuscinetto
29. uomini_rana
30. penna_sfera

31. tacchi_spillo
32. faccia_faccia
33. cassetta_lettere
34. occhio_lince
35. intervista_bomba
36. torso_cavolo
37. testa_uovo
38. quartiere_dormitorio
39. freno_mano
40. cocorso_colpa
41. peso_gallo
42. canto_cigno
43. letto_morte
44. nave_pirata
45. colpo_occhio
46. cane_poliziotto
47. decreto_fantasma
48. calza_maglia
49. tiro_segno
50. colpo_canna

Repetition of phrases

1. I cavalli nel campo
2. La sorpresa per Maria
3. Le pagine del libro
4. L'ora di matematica
5. Le penne nell'astuccio
6. Gli uomini con i capelli rossi
7. L'invito a cena
8. Le scale dello scivolo
9. L'attesa con pazienza
10. Gli studenti fuori dalle aule
11. Il libro con la copertina gialla
12. I petali dei fiori
13. L'edificio con l'antenna sul tetto
14. La partenza tra 10 minuti
15. Le radure tra gli alberi
16. Gli alberghi nei dintorni
17. La polvere sui mobili
18. Lo zaino sulle spalle
19. Lo sport di squadra
20. Le scarpe vicino agli stivali.
21. L'ombrello dell'uomo
22. L'atleta davanti alle tribune.
23. Gli aiuti ai poveri
24. L'attore davanti al pubblico
25. Il bambino sulla sedia
26. Il campo da calcio
27. L'uomo con il cappello
28. Le unghie con lo smalto
29. Gli attori in posa
30. La lavatrice a gettoni

31. Lo spazio per la firma
32. Il lavoro con cura
33. La passeggiata tra i monti
34. I vestiti su misura
35. Il negozio all'angolo
36. Il riso allo zafferano
37. Gli animali in gabbia
38. Le torte con le candeline
39. Il documentario su Gandhi
40. Gli abiti per il matrimonio
41. I lacci per le scarpe
42. Lo spavento per gli spari
43. Lo specchietto della macchina
44. La cena con gli amici
45. Le foto tra le pagine del libro
46. L'arrivo alla stazione
47. Il giardino delle case
48. Gli scaffali nello studio
49. I ragazzi sugli scogli
50. Le scarpe da calcio
51. L'albero fuori da casa mia.
52. La caduta dagli scalini
53. Lo stupore tra la folla
54. Il bagno vicino all'uscita.
55. Le rane davanti allo stagno.
56. L'appuntamento dal medico
57. Gli impiegati davanti agli schermi.
58. L'articolo sull'economia italiana
59. La partenza dall'aeroporto
60. L'altalena vicino allo scivolo.
61. Gli spartiti per l'orchestra
62. Lo straccio vicino ai detersivi

63. I turisti fuori dai musei.
64. I saluti con affetto
65. La casa lontano dall'università
66. Il viaggio lontano da Roma
67. I passeggeri nella macchina
68. Le penne fuori dall'astuccio.
69. I ragazzi davanti a Marco
70. Lo shampoo per i capelli
71. La partita a carte
72. La visita dallo specialista
73. Lo spazio tra l'albero e la casa
74. I cani vicino alla cuccia.
75. L'acqua nelle bottiglie
76. Gli operai vicino alle macchine.
77. Il fumo lontano dagli occhi
78. Lo straccio sullo stenditoio
79. La biancheria fuori dagli armadi
80. Il libro su Napoleone
81. Il bambino davanti alla televisione
82. Lo studente vicino a Maria.
83. I compiti per casa
84. Il picnic lontano dallo smog
85. Il film in inglese
86. La medicina lontano dai pasti
87. L'alpinista lontano dal burrone.
88. I dolci al cioccolato
89. I tifosi fuori dallo stadio
90. I vestiti negli armadi
91. I genitori fuori dalla scuola
92. Le cene da Gianni
93. Il fuoco lontano dalle piante.
94. I biscotti alle noci

95. La voce fuori dal coro
96. Lo scontro tra padre e figlio
97. Le citazioni dai libri di scuola
98. Il quadro tra lo specchio e la finestra
99. Gli alberi vicino al fiume.
100. Gli amici di Gianni
101. Il bruciore agli occhi
102. Le guardie davanti all'entrata.
103. I vasi davanti ai mobili.
104. Il bosco lontano dalla città.
105. La foto tra il vaso e la pianta
106. Il libro sul comodino
107. I voti degli studenti
108. Il saluto dalla finestra
109. La passione per lo sport
110. Il programma per domani
111. L'amicizia tra Marco e Maria

Estratto per riassunto della tesi di dottorato

L'estratto (max. 1000 battute) deve essere redatto sia in lingua italiana che in lingua inglese e nella lingua straniera eventualmente indicata dal Collegio dei docenti.

L'estratto va firmato e rilegato come ultimo foglio della tesi.

Studente: Elisa Zampieri matricola: 955588

Dottorato: Scienze del linguaggio

Ciclo: 24

Titolo della tesi : Italian Prepositions in Aphasic Production: evidence from three experimental studies

Estratto:

In questo lavoro offriamo un'analisi linguistica delle preposizioni italiane attraverso tre esperimenti neuro-linguistici. In una prima parte teorica vengono presentate le più importanti teorie linguistiche che si sono occupate di studiare: la formazione delle preposizioni articolate; la struttura sintattica delle preposizioni complesse; la natura dei composti preposizionali. La seconda parte, invece, è dedicata a tre esperimenti nei quali sono stati coinvolti alcuni pazienti afasici. Ogni esperimento riguarda uno degli argomenti teorici sopra menzionati. Le preposizioni articolate sono state analizzate attraverso due compiti di produzione somministrati ad un gruppo di 8 pazienti. Le preposizioni complesse ed i composti preposizionali, invece, sono stati oggetto di due casi di studio che hanno coinvolto due pazienti colpiti da agrammatismo. Dai risultati di questi tre studi sono state ricavate delle conclusioni teoriche che confermano alcune delle ipotesi presentate in precedenza.

Abstract:

In this work, we provide a linguistic analysis of Italian prepositions with the aid of three neuro-linguistic experiments. The first part of the dissertation is devoted to the most important linguistic theories dealing with the following topics: (i) the formation of articulated prepositions; (ii) the syntax of complex prepositions; (iii) the linguistic nature of prepositional compounds. In the second part, instead, three experiments are presented every one assessing one of the fields we have mentioned above. Articulated prepositions have been analyzed through two production tasks performed by 8 aphasic patients. Complex prepositions and prepositional compounds, instead, have been the subjects of two case studies involving two agrammatic patients. The results have allowed us to single out, among the various proposals presented in the theoretical chapters, the linguistic model which better characterizes how Italian prepositions are processed.