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***The lexical/functional divide in Aphasic Production.  
Five Italian case studies***

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*Per Salomè e per Carlo,*

*in memoria di nonno Vico.*

*Ben venga il caos, perché l'ordine non ha funzionato.*

Karl Kraus

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## **Chapter 1**

## **Preface**

Much recent literature on interface between syntax and the Lexicon (see e.g. Hale and Keyser 1993, 2002; Halle and Marantz, 1993; Marantz, 1997; 2001; Mateu, 2002; Harley, 2005; Ramchand, 2008, Manzini and Savoia, 2011 among many others) has prompted us with a novel interpretation of traditional categories (and their *categorial* labels). Getting away from the long-established conceptualization of the categorial value of lexical items as an inherent / immanent feature, many contemporary paradigms of research share the idea that lexical categories are the result of the MERGE operation of an *acategorial* root element with a light functional category, whose lexico-semantic outlook (and the associated attributes) is determined on a configurational (constructionist) basis (see the classic work of Hale and Keyser, 1993; 2002; Folli and Ramchand, 2005, among others).

This shift of perspective has lead not only to reconsider the innermost traits/textures of syntactic primitives and the essence of the Lexicon (see e.g. the very important work of Borer 2004), but also to make available -even as a a tool-kit for experimental investigations- a very dynamic approach to what a lexical category can be: just to give an example, verbs may *embed* a nominal, adjectival or prepositional element (in e.g. *inergative*, *resultative* or *locatum* verbs, respectively, following the path traced by the researches of Hale and Keyser), or have a *hybrid* nature, actually displaying a dual or *graded* nature (cf. the works collected in Corver and van Riemsdijk, 2001 for a wide range of issues concerning 'categorial gradience').

As we will see in this thesis, with rare exceptions, current neuro-linguistic literature does not take into consideration these theoretical advances. The rationale of the work done for the present dissertation is precisely to try to build a *bridge* between experimental evidence from clinical linguistics and theoretical arguments from morpho-syntactic analysis.

The thesis is structured as a collection of case studies all addressing the relationship between Lexicon and syntax. We will try to show that various less-studied aphasic syndromes (e.g. Logopenic Primary Progressive Aphasia, Mixed Trascortical

Aphasia, Crossed aphasia), and not only 'classic' Broca's Aphasia can enhance findings worth to be considered in contemporary theoretical debates on the status of *traditional* categories and particularly on the lexical/functional divide in grammar.

Notice that in recent years (at least since Caramazza and McCloskey, 1988) there has been a great resurgence of interest within neuropsychology in single case studies: they can be also crucial to corroborate (or falsify) theoretical advancements in linguistics.

## Chapter 2

### *Case study A*

*Not all verbs are created equal, but all verbs are light:  
evidence from a case of Logopenic Primary Progressive Aphasia.*

## 1. Introduction

In this chapter we present a case of Primary Progressive Aphasia (PPA), which is a degenerative syndrome marked by a progressive deterioration of language functions and relative preservation of other cognitive domains (other than praxis) for at least two years after the onset, firstly investigated by Mesulam (1982).<sup>1</sup> The spontaneous speech of our patient seems to support the idea of verbs as a closed class of *light* grammatical elements, as recently proposed by Kayne (2009) – drawing inspiration from the works of Hale and Keyser (1993; 2002). Since Jespersen (1965) the term “light verb” is a label used to refer to a class of verbs which is supposed to be semantically empty, thus lacking enough thematic strength to independently act as predicates (for a detailed introduction of grammatical (light) verbs in a cross-linguistic and theoretical perspective we suggest to refer to Mohanan, 2007).

Functional neuro-imaging studies on PPA have shown abnormalities mostly in the left anterior and posterior temporal lobe, with reduced language-related activations in Broca’s and Wernicke’s areas, and increased activations of the left posterior frontal cortex and right hemispheric regions (cf. Sonty et. al. 2003). However, in another on-line study of language processing, no significant differences emerge between patients with PPA and age-matched controls regarding the components of language networks, which were activated during on-line tasks. The sole relevant abnormality in PPA patients was greater neuronal activation outside the areas (e.g. Broca and Wernicke’s areas), commonly considered part of the language network (Sonty et al. 2007). Clinico-pathological correlations in PPA emphasize the contributory role of dementia with Pick bodies and other tauopathies, TDP-43 proteinopathies, and Alzheimer disease

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<sup>1</sup> According to Mesulam (2007: S8-9) the first clinical description of Primary Progressive Aphasia was done by Paul Sérieux in 1893 in a paper in which he presented the case of a woman brought to the hospital on March 11, 1891, who showed a progressive erosion of word comprehension and production and in whom “*la mémoire et l’intelligence de la malade étaient suffisamment conservées*”. The patient died in 1897 and her brain showed a bitemporal cortical atrophy and neuronal loss.

(Grossman, 2010).

On the basis of the nature of language impairment, patients with PPA have been recently subdivided into semantic, agrammatic/dysfluent and logopenic subtypes (Gorno Tempini et al. 2004; Rogalski and Mesulam, 2007; Mesulam et al. 2009; Bonner, Ash and Grossman, 2010). The semantic variant is characterized by poor single word comprehension but relatively well-preserved fluency and syntax; the agrammatic / non fluent variant is characterized by poor syntax and fluency but relatively preserved word comprehension; and the logopenic subtype (firstly pointed out by Gorno-Tempini *et al.*, 2004) shows preserved syntax and comprehension but variable fluency and impaired single word retrieval (see also Grossman, 2010). Mixed variants have also been described in the literature (e.g. Grossman and Ash, 2004; Knels and Danek, 2010). The connected speech of PPA patients, however, has often been dichotomized simply as fluent or non-fluent. A recent work by Wilson *et al.* (2010: 2069), however, points out that fluency is a “multidimensional construct” that encompasses features such as speech rate, phrase length, articulatory agility and syntactic structure, which are not always impaired in parallel.

At any rate, the single most common feature of PPA is a word-finding deficit, commonly known as Anomia (Goodglass and Wingfield, 1997; Mesulam, 2003). Patients *tagged* as non-fluent PPA have been reported to have greater difficulty naming verbs, whereas those with fluent PPA seem to have greater difficulty with nouns (Hillis et al. 2006). About the categorical gradience of the anomic deficit in PPA - namely verbs *vs.* nouns production and comprehension – however, there is no unambiguous consensus in the literature. For instance, Graham, Patterson and Hodges (2004) found no evidence of reduced verb production in PPA patients.

An interesting fact - relevant for the present work - is that PPA patients often use a verbal vocabulary that is somewhat less specific than normal speakers, with a larger use of so called “light verbs” (Graham and Rochon, 2007). Many PPA patients remain in an “anomic phase” (Mesulam, 2003) through most of the illness and experience a progressive intensification of word-finding deficits.

Other patients, however, develop distinct patterns of agrammatism and/or word

comprehension deficits (Kertesz et al. 2005). Nevertheless, non-fluent PPA differs from descriptions of classic Broca's aphasia: Clark et al. (2005) have found only little agrammatism and no severe comprehension deficits among non-fluent PPA subjects. At final stages of PPA, vocalization is reduced to the point where only "incoherent grunts" (Mesulam, 2001) or laughter-like automatic vocal outputs (Rohrer et al. 2010) are performed.

## **2. Outlining the research or why we need a "mirror image" of an agrammatic speaker**

In order to empirically investigate Kayne's (2009) claim about a Lexicon in which only nouns can be considered as primitives and to test the proposal of an argumental structure without thematic roles as primitives, which derives thematic interpretation from syntactic position (akin to Hale and Keyser 1993; 2002), we ideally need the "mirror image" of an agrammatic speaker, namely someone who has the functional morphology well-preserved and, on the other hand, a deep anomia, affecting her Lexicon. In other words, we need a subject that could trigger a sort of "transparency effect" for morpho-syntactic derivations, in order to demonstrate if it is possible to address the noun *vs.* verb processing dissociation in aphasia (an inflated topic in the literature), starting from the consideration that nouns/lexical *roots* are primitives, while verbs are a "syntactic by-product".

An approximation of this ideal subject has been found in BB, a patient affected by logopenic PPA<sup>2</sup>. Her grammatical features (e.g. tense and agreement markers) are well

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<sup>2</sup> Subjects with logopenic PPA have been reported to be variably fluent depending on the type of conversational frame or test being undertaken (Gorno-Tempini *et al.* 2008: 1228). Partly because of this variability, research groups have differed in their approach to classifying this variant of PPA. In addition to the peculiar speech and language characteristics, several associated cognitive and behavioral characteristics have been identified in the logopenic variant of PPA. With regard to neuropsychological profile, individuals with the logopenic variant have been observed to perform worse on tests of calculation than other PPA variants [Gorno-Tempini et al. 2004] and some cases, particularly those with Alzheimer's disease (AD) pathology, have demonstrated impaired performance on memory tasks (Mesulam et al. 2008). Impairment of limb praxis has

preserved, so that her language production appears to be almost exclusively damaged by severe anomia.<sup>3</sup>

It is a widespread knowledge that one of the hallmarks of agrammatic-type Broca's aphasia is a deficit in the production of functional morphology. Both free-standing function words and bound morphemes normally available to mark grammatical functions are impaired in that population, cross-linguistically (see Avrutin, 2000, 2001; Menn and Obler, 1990; Hagiwara, 1995; Benedect, Christiansen, and Goodglass, 1998; Friedmann, 2001; Wenzlaff and Clahsen, 2004, 2005; Luzzatti and Chierchia, 2002), while anomia is considered the hallmark symptom of PPA (Thompson et al. 1997; Rohrer et al. 2010).

Trying to schematically introduce our proposal, we argue for a split-hypothesis concerning impaired verbal production/comprehension. For us, the relevant dichotomy is "grammatical verbs" vs. "lexical verbs", and this breakdown has to be considered, prior to address the question and implications of nouns vs. verbs dissociation. As we have sketched above, in our view, lexical verbs are a product of syntax, specifically of a morpho-syntactic operation of incorporation (*conflation*, following Hale and Keyser terminology; see also Baker, 1988; 2001; 2003a), while "core" (light) verbs are grammatical/functional heads. We think that this simple shift can change the perspective on the "categorical debate" within the neuropsychological literature, where arguing for an intra-categorical dichotomy is actually the first step to naturalize what we consider to be the only relevant (binary) paradigm affecting the Lexicon: lexical (open class) vs. functional (grammatical, closed class) items (cf. Franco, 2008; Kayne, 2009). To resume in a few words our view, we may say that not all verbs are created equal, and

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also been noted (Rohrer et al. 2010). Studies examining abnormal behavioral characteristics associated with each variant of PPA have identified apathy as a consistent feature in logopenic patients (Rosen et al. 2010). Additional behavioral features include irritability, anxiety, and agitation (Rohrer and Warren, 2010).

<sup>3</sup> Her frequent use of the verb *fare* + *noun* resembles at a first glance the behaviour of those languages which make extensive (exclusive) use of complex-predicate constructions (the less exotic examples are possibly Persian and Urdu, for which see, respectively, Folli, Harley and Karimi, 2005 and Butt, 1995).

many previous experimental researches on the field could be misleading due to wrong starting assumptions. To check if we are on the right track a preliminary probe should come from raw hints along previous researches within the neuro-linguistic literature. Our idea, in fact, leads to the following approximate consequence: agrammatic Broca's aphasics should be impaired on semantically light (functional) verbs, while pathologies which have anomia as one of the most salient feature (say, for instance, Alzheimer disease) should lead to transparency effects in the Lexicon, relying on an increased rate of complex predicate/light verb constructions.

For Broca's agrammatism, for instance, a recent study by Barde *et al.* (2006) has detected greater difficulty producing verbs that have fewer semantic components (namely, light verbs) compared to verbs that have greater semantic weight; conversely, the "semantic complexity" of verbs seems to affect Alzheimer disease, but not agrammatic, patients' performance (Kim and Thompson, 2004). Hence, these data seem to support our hypothesis of selective differential impairments within the verbal category.

Shifting on a "bioprogrammatic perspective", which basically follows Bickerton (1984, and subsequent related works), our data should find endorsements in the field of language acquisition and language creation, labelling under the language creation process, the formation of pidgins and creoles (see DeGraff, 1999). Leaving aside the debate on Creole genesis (cf. Lefevbre, 1998), the interesting fact here is that creoles heavily rely on light verb constructions. A paradigmatic example is Sranan, a creole language spoken as a lingua franca by approximately 300,000 people in Suriname (Essegbey, 2004), which makes extensive usage of serial light verb constructions (cf. on serial verbs Baker, 1989; Cardinaletti and Giusti, 2001; Carsten, 2002; Collins, 2002a; Aboh, 2009). Other examples, just to name a few, include Saramaccan, a creole spoken by about 24000 people near the Saramacca and upper Suriname Rivers in Suriname (Veenstra, 1996; cf. also Aboh, 2005), Chinese Pidgin English (Sebba, 1997) and many other Caribbean creoles (e.g Leeward creole of Antigua and Barbuda, Jamaican creole, etc. see Durrleman-Tame, 2008).

Other hints come from language acquisition. During the past few years, language

acquisition researches have reported learners' use of semantically empty, "dummy" verbs (e.g. for English, Dutch, German, etc.), such as the verb form 'is' in the Dutch (ungrammatical) example "Hij is doorrijden" (He is drive) or the ungrammatical sentence "ik doe ook praten" (I do also talk). These constructions resemble English do-support constructions where 'do' lacks a specific meaning (Radford, 1990; Roeper, 1992; Van Kampen, 1997; Zuckerman, 2001; see also Bottari, Cipriani and Chilosi, 1993; Lightfoot, 1999). Furthermore, it has been reported an early flexible usage of light verbs due to their initial categorial (under)specification (at early stages of language development they seem to be used either as verbs or nouns, Barner and Bale, 2002).

Further possible suggestions can come from language contact. For instance, interesting evidence comes from loan words in a typological perspective. Recent investigations have found out that cross-linguistically a (wide-spread) strategy to absorb loan words in a "native" Lexicon is a special derivation process involving a light verb in order to accommodate the item that has been borrowed (Wichmann and Wohlgemuth, 2008). Independently from the perspective that can be adopted to explain the light verb spreading in the context of language acquisition, language creation and language contact (parameter setting, underspecification, pragmatically based accounts, etc.), the facts outlined above make us think that the "light verb" issue is a matter worth to be investigated within neurolinguistics, with special regard to language disorders.

### **3. The debate *over* categories**

The existence in the brain of traditional universal categories such as noun, verb, adverb or adjective has started to be questioned among psycholinguists and neurolinguists (Vigliocco *et al.* 2011; Kemmerer and Eggleston, 2010). As Vigliocco *et al.* (2011:408) correctly observe: "*Grammatical class is highly correlated with meaning: objects in the world are generally referred to using nouns, and actions are referred to using verbs. It is the case, however, that across languages the correlation between semantics and grammatical class is not perfect. Nouns can refer to events (the walk) and both nouns and verbs can refer to abstract concepts (e.g. the love/to love). The powerful correlation between*

*semantics and grammatical class has both theoretical and methodological consequences. The former will be addressed in the general discussion, the latter, because any study in which grammatical class and semantic distinctions are confounded cannot be interpreted univocally”.*

From an historical viewpoint, since the mid-eighties of the last century, among neuropsychological studies of language (e.g. Miceli *et al.*, 1984, 1988; McCarthy and Warrington, 1985; Damasio and Tranel, 1993; Hillis and Caramazza, 1995; Bastiaanse and Jonkers, 1998; Cappa *et al.*, 1998; Kim and Thompson, 2000; Luzzatti *et al.*, 2002; Shapiro and Caramazza, 2003; Aggujaro *et al.*, 2006; see also Mätzig, *et al.* 2009 for a comprehensive review), an assumed double dissociation between nouns and verbs emerged. We argue here for a radical change of perspective. The only relevant distinction is between lexical (open class) items and functional (closed class) items. For our point of view, for example, no meaningful distinction can be assumed for nouns and verbs both expressing the same “semantic target” (e.g. the run; to run), except for possible morphosyntactic activation, when derivational/inflectional morphology is involved. Neuro-imaging studies seem to strongly support an approach of this kind. In fact, once semantic matching is checked, only limited differences between processing nouns and verbs come out (Vigliocco *et al.* 2006, 2011; Siri *et al.* 2008). Greater activations for verbs than nouns in the left inferior frontal gyrus were reported in works that used tasks requiring, for instance, overt lexical decision (Perani *et al.*, 1999) or semantic decision (Tyler *et al.*, 2004), probably reflecting, as we have claimed, those morphosyntactic processes that may be more demanding for verbs than nouns. In fact, Siri *et al.* 2008, seem to convincingly show that the left inferior frontal gyrus activation is not selectively linked to verb processing, but to the processing of inflected items in general. Notice also that there are recent findings which seems to show that also the left posterior middle gyrus, together with the left inferior frontal gyrus has a crucial role in computing inflectional/derivational morphology (see Bornkessel and Schlesewsky, 2009).

The debate over category within theoretical linguistics is challenging and articulated. A recent influential hypothesis, advanced in Marantz (1997, 2001) within the Distributed Morphology (DM) paradigm and supported, from a psycholinguistic (and

neurolinguistic) viewpoint, in Barner and Bale (2002) is that lexical categories are syntactically determined and bare “roots” are stored in the lexicon without any categorical specification. Thus, only after insertion in syntax (for the DM principle of *Late Vocabulary Insertion*, see Embick and Marantz, 2008) the category of a given root is determined (contra this proposal, which assumes an underspecified Lexicon, see Don, 2004; Panagiotidis, 2005).

For the purpose of the present work we can take an agnostic position towards underspecification. To assume with Kayne (2009) and Hale and Keyser (1993; 2002) that all “verbs are light verbs” implies, however, an underlying underspecification of lexical verbs which are derived by conflating/incorporating an open class (lexical) complement in an abstract (closed class) functional head.

The relevant issue here is at any rate the distinction between closed-class/function words (which play a grammatical role) and open-class encyclopaedic items (which can be infinitely augmented by new coinages/borrowing). This (binary) opposition is possibly the only relevant prime available to our syntactic module. As Von Stechow (1995: 176) has argued, it seems that “*functional categories are what grammar is all about*”, while lexical items are somewhat “inert” in syntax. Furthermore, Talmy (1985), within the domain of cognitive linguistics, claims that function words cross-linguistically show a recurrent set of semantic distinctions, while the lexical words are more culture-specific.

The crucial property of open class items according to Kayne (2009) is *denotation*, which irrespectively involves nouns (see also Baker, 2003a) either if they are orientated towards an object or a state or an event (states and events can be functionally encoded, see Ramchand, 2008; Borer, 2004).

Given the open vs. closed class dichotomy, it is clear that comparing nouns vs. verbs processing is senseless, while a fine-grained analysis inside what is known as the verbal category can lead us to a better understanding of the way in which a syntactic derivation take place. Finally notice that linguistic typologists have autonomously undermined the classical notion of syntactic categories, which turn out to be vacuous tags (see e.g. Gil, 1994, 2000; Haspelmath, 2007; Evans and Levinson, 2009). In the words of Evans and Levinson (2009: 435): “*There are [...] languages without adverbs, languages*

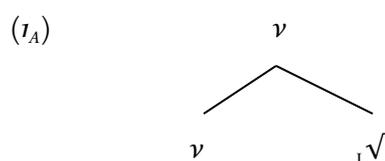
*without adjectives, and perhaps even languages without a basic noun-verb distinction. In the other direction, we now know that there are other types of major word-class – e.g., ideophones, positionals, and coverbs – that are unfamiliar to Indo-European languages”.*

We will introduce below the theoretical framework(s), which are the axes of the present experimental research (and basically of the whole experimental work of the thesis).

#### 4. Theoretical background

##### 4.1. *The L-syntax of Hale and Keyser (1993; 2002)*

In this section we explain the reason why we agree with the proposal of an argumental structure without thematic roles as primitives, instead deriving thematic interpretation from syntactic position (akin to Hale and Keyser 1993). Hale and Keyser (1993, 2002, henceforth: H&K) approach to grammar is a principled manner to thrash out theta theory (cf. also Harley, 1995). H&K (2002: 68) say that there essentially are no theta-roles, arguing that “*While we might assign a particular thematic label – say, “agent” – to the Noun Phrase [...], its grammatical status is determined entirely by the relation(s) it bears in the relational structure projected by the head V*”. Nevertheless, from our viewpoint, the most relevant feature of their work is that they offer original evidence for a dynamic role of a light verb [ $\nu$ ] projection, which has become a pivotal element within the Minimalist Program (Chomsky 1995, 2000), arguing, possibly, that these [ $\nu$ ] projections are not above the verb, but inherently a (series of) verb(s). Their key idea is that a lexical root “conflates” - through (a set of) head movements (see also Matushansky, 2006) which obey to the Head Movement Constraint (an  $X^0$  may only move into the  $Y^0$  that properly governs it) - with an empty (or nearly empty) verbal head to form a verb, as shown below:



In (1<sub>A</sub>), for instance, the adjectival root *red* fuses with verbal functional head *-en* to form the (deadjectival) verb *redde*n. H&K do not explicitly address the question concerning the functional status of the verbal head, but given this idea of verb formation as a syntactic (dynamic) process, it follows that verbs are not stored in the lexicon, which is the place for lexical roots. Moreover H&K (1993, 2002) do not explicitly claim for a lexical underspecification, in fact H&K (2002) argue for a predictable syntactic configuration of classical categories such as adjectives, nouns and prepositions. Nevertheless, their main idea of a constructionalist way to account for verbal formation in syntax, matches our claim that anomia, blocking the conflation process (due to the unavailability of the lexical root, impossible to be accessed/retrieved), resurface the functional verbal head (at least in those cases where syntactic computation is not heavily affected). This may be especially evident for unergative (intransitive) verbs. Coming back to H&K (2002) view, which involves canonical categories, they argue for the existence of two fundamental relations in argument structure: the head-complement relation and the spec-head relation. These two relations give rise to four structural types of lexical argument structure: a head which needs a complement (such as a verb), a head which needs a specifier (such as an adjective), a head which needs both (such as a preposition), and a head which needs neither (such as a noun). We do not enter into further details, concerning the analyses H&K give, which are not strictly relevant here.

However, it is important to clarify the notion of conflation, which the authors describe as a “concomitant of Merge” or the “fusion of syntactic nuclei”. Hence, for H&K, the lexical root moves into the categorial head at the same time as Merge, and they take this approach for practically all (lexical) denominal and deadjectival verbs, showing interesting data for languages such as Navajo (Athapaskan), Ulwa (Misumalpan), Tohono O’odham (Uto Aztecan), and Hopi (Uto Aztecan). Up to now, we have used conflation and incorporation as synonyms, but even if similar to incorporation, conflation, in fine grained syntactic terms, differs in at least one crucial side: “a verb cannot “conflate” with the specifier of its complement” (H&K 2002: 103), because

conflation, due to its selectional nature, is a strictly local relationship between a verb and the head of its complement, while incorporation (Baker, 1988) admit a configuration of a specifier that “jump up” into the higher head, preceding it. Given this clarification, we think that here we may continue to interchangeably use the two terms, assuming the basic fact that they both involve a syntactic derivation that gives rise to morphologically complex elements.

An interesting consequence of H&K proposal is that, taking conflation as a (morpho)syntactic operation, we may argue for its parametric application [+/-conflation] among natural languages (notice that in the same language, conflation can also be somewhat “parametrically” applied; take the case of kinship terms in Italian: fare un/a figlio/a – figliare (both: to have a child), both grammatical vs. fare il (da) padre [√]; \*padrare [ungrammatical] (possible translation, do the father’s work). This fact, in turn, leads to the (high) probability that a set of languages can show a closed class of functional items, which do not incorporate, hosted in verbal heads. From a typological perspective, while in many languages it has been observed that for instance adjectives or adverbs can constitute a closed, often quite small class of elements (Dixon, 2004, Baker, 2003a), the claim that verbs can be a closed class may appear controversial. But, as observed in Cinque and Rizzi (2010a: 58): *“If Hale and Keyser’s (1993) idea that most transitive and intransitive verbs are not primitive but result from the incorporation of a noun into a limited class of light / general purpose verbs (‘do’, ‘give’, ‘take’, ‘put’, ‘hit’, etc.), then even the class of primitive verbs may turn out to be closed and relatively small. This seems confirmed by the fact that some languages typically fail to incorporate the noun into the light verb so that most ‘verbal meanings’ are expressed as V+N periphrases”*.

Examples of languages in which verbs seem to be a closed (functional) class include Iranian languages, such as Persian and Kurdish, which rely almost exclusively on functional verb constructions. It has been argued that (simple) verbs in these languages form a closed class and most light verb/complex predicate constructions do not have simple verb counterparts (Megerdooian, 2002) and the already mentioned Folli *et al.* (2005) have showed that Persian can be considered as a transparent instance of Hale and Keyser’s “constructionalist” model. In addition, Schultze-Berndt (2006) reported that

Karimi (1997: 276) states that the complexive number of verbs in contemporary Persian does not exceed 115, while Haig (2000) states that verbs in Kurdish are a closed class, according to the results of a text count where only 60 verbs account for over 96% of all verb tokens. A somewhat different instance of light verb construction is found in a number of Northern Australian and Papuan languages, where the host element paired with a verb is not a (canonical) nominal, but comes from an open class of underived (underspecified) predicative elements, termed *coverbs* (see Pawley, 2006). Other examples of languages that adopt a strictly functional verbs' strategy are Urdu (Butt, 1995), Hindi (Mohanani, 2007), Amharic (Amberber, 2010) and some South-American languages (e.g. Mosetén, see Sakel, 2007).

#### 4.2. *A Lexicon without verbs* (Kayne, 2009)

Turning to recent applications of H&K work, without entering into technical details, we need to introduce Kayne's (2009) work, which germinates from Kayne's (1994) groundbreaking Linear Correspondence Axiom (LCA). Roughly, some of the most interesting syntactic consequences of the LCA, which argues for a strict relationship between hierarchical structure and linear order in language, are the following: (i) syntax obeys a rigid X-bar schema where any projection of a given head may host only a complement and a Specifier (or adjunct), hence not allowing multiple Specifiers/adjuncts projected by a head; (ii) there are no distinctions between specifiers and adjuncts; (iii) precedence-relations in Phonological Form-strings must be in a rigid one-to-one correspondence to c-command relations, constrained in a universal Specifier-Head-Complement order (namely, *Antisymmetry*). If the latter principle holds, then a logical consequence is that every exception from the Specifier-Head-Complement schema (e.g. the widely attested head-final word order such as in Japanese or Kannada), must to be restated in antisymmetric terms, involving a set of functional heads, triggering syntactic operations. Hence, Antisymmetry enhances the role of grammatic elements; for instance Kayne (1994:29) argues that: "*functional heads make landing sites available*". It is possible to argue against this "inflation" of arbitrary functional heads (see

for example Fukui, 2006), but recent developments in the antisymmetric framework (see Kayne, 2009) seems to rule out any possible issue, implicitly arguing for a constraint *ex ante* on Merge (the base operation of grammar in the Minimalist Program) which is possible only through grammatical classes/devices (see also Franco (2011a), that explicitly addresses this issue), which hold unvalued features and are the *loci* (cf. also Collins, 2002b) of parametric variation. Leaving aside the technical details of Kayne's (2009) proposal, it follows from this dichotomy on Merge that only *denoting* elements, which enter the derivation with no unvalued features, can be considered to be representative of an open class of lexical items. For Kayne no class other than nouns can meet this criterion. Hence, explicitly aiding our claim that verbs as inherently functional items, Kayne basically states that "all verbs are light verbs". Specifically Kayne (2009:8) says that: "*Falling under 'non-noun' are at least verbs (and aspectual heads), with the apparent paradox that verbs are normally thought to belong to an open class. That paradox needs to be rethought, however, in light of Hale and Keyser's (1993: 55) proposal concerning laugh and similar items. For Hale and Keyser there, English laugh is a noun that in some sentences co-occurs with a light verb that is unpronounced, giving the (misleading) impression that laugh in English can also be a verb. Strictly speaking, though, laugh is invariably a noun, even when it incorporates (in some sense of the term) into a (silent) light verb*".

The most important consequence of Kayne's proposal, for the issues raised in our work, is that the only significant and productive distinction in grammar is between functional and lexical elements. This fact can be easily inferred from the set of possible linguistic impairments: for instance, a deficit that selectively involve, let say nouns together with tense morphology on verbs, has never been detected (something that is not impossible a priori, but very unlikely to happen, given the lexical/functional *rift*).

The noun vs. verb dissociation (as said above, a *core* issue in the neurolinguistic literature), in our view, must be restated and we have possibly only two options: (i) nouns are the only loci for denotation (they are the only real open class) and all (heavy) verbs are, in a sense, "denominal" items; (ii) we need to assume a pattern of lexical underspecification, and every lexical process is mediated by the involvement of

functional devices (Halle and Marantz, 1993; Marantz, 1997; Barner and Bale, 2002; Pensalfini, 2004; Borer, 2004; Arad, 2005, among many others).

#### 4.3. *The cartographic legacy*

We have presented so far the two main theoretical axes that guide our investigation but, there is a third, underlying framework we are applying here: the cartography of syntactic structure, developed, as a shunt from the government and Binding research paradigm, since the mid-nineties. As effectively resumed by Endo (2007: 4) “*Cartographic approaches to syntactic structures aim at drawing a map, as detailed as possible, of the functional (or grammatical) structure of the clause and of its major phrases*”. Notably, the underlying assumption of cartography (explicitly emphasized in the work of Cinque (1999; 2006a; see also Cinque and Rizzi (2010a)) is that all languages share the same grammatical categories and the same principles of phrase and clause composition (Kayne, 1994), although they differ in the syntactic operation (e.g. movement) that they allow and in the projections that are overtly realized (Cinque 2006a: 4-5). Probably, the main trigger of the cartographic paradigm was, according to Cinque and Rizzi (2010a) the “explosion” of functional heads identified and implied in syntactic analyses, since the mid-eighties of the previous century, within the Government and Binding framework (Abney, 1987; Larson, 1988; Pollock, 1988). One further crucial point was the extension of X-bar theory to the functional elements of the clause (Chomsky, 1986) as a CP > IP > VP structure. These theoretical bases set the stage for cartography: the study of the structure of both phrases and clauses as hierarchical sequences of the same chunk, the fundamental X-bar schema (or, in a minimalist shape, the simple, recursive application of Merge).

Within the cartographic paradigm the most *embedded* occurrence of these building chunks is the projection of a lexical item, and this lexical item is subsequently merged with a series of chunks headed by functional items, providing more abstract semantic-pragmatic specifications to the intrinsic reference of the lexical head. Some possible instances are tense, mood, aspect, voice above the verb, or definiteness,

number, specificity, for the noun. Notice, that the somewhat latent opposition between functional and lexical categories presupposed by this paradigm of research has been an important trigger for the development of our reductionist hypothesis. Possibly, the most important research in the cartographic paradigm is the work of Cinque (1999), that represent a systematic cross-linguistical analysis of adverbial positions, leading to a strict unambiguous universal hierarchy, which reflects the universal hierarchy of functional heads expressing properties of tense, mood, aspect, voice, etc. Tense, aspect, mood, voice etc. can be expressed in natural languages either by morpheme (bounded or unbounded) or by functional verbs, hosted in the heads' position of the functional projections above V.

It stands to reason that the richness of postulated positions could be a critical difference with respect to the Minimalist Program (Chomsky, 1995; 2000; 2001; 2005; 2008) but as Cinque and Rizzi (2010a: 59-60) states, cartographers "*believe that there is no contradiction between these two directions of research, and the tension, where real, is the sign of a fruitful division of labor [...]. Minimalism focuses on the generating devices, and cartography focuses on the fine details of the generated structures, two research topics which can be pursued in parallel in a fully consistent manner, and along lines which can fruitfully interact [...]*".

#### 4.4. *Unaccusative verbs and the lexical/functional divide*

For the sake of the present discussion we have to say that, following the *Unaccusative Hypothesis*, natural languages distinguish between two classes of intransitive verbs: unaccusatives and unergatives (see Perlmutter 1978, for the original proposal and Burzio, 1986, for the first generative account). In semantic terms, the assumed difference is based on this fact: the subject of an unaccusative verb, unlike the subject of an unergative, which instead is really the Agent of the verb, bears the semantic role of the Patient, that in less *marked* conditions, is related to the object. Hence, according to the Unaccusative Hypothesis, the single argument of unaccusative verbs is, syntactically, a direct object, while the only argument of unergatives is, syntactically, a

subject.

Given this background, before introducing our Case Study, a relevant question needs to be addressed: where can we insert unaccusative verbs along our lexical/functional (polarized) axis?

As introduced above, an unaccusative verb is an intransitive verb whose (syntactic) subject is not a (semantic) agent and an unaccusative verb's subject is semantically similar to the direct object of a transitive verb, or to the subject of a verb in the passive voice. Our proposal is that at least core uncontroversial) unaccusatives are functional elements and they are base generated in a functional  $X^{\circ}$ , which is analogous to the one hypothesized for light verbs. We will see below that our hypothesis will be confirmed by experimental evidence. Notice that, as sketched above, we consider only *core* unaccusative (e.g. come, go, that are notably used as auxiliaries in non interrelated languages; consider the Italian example: *questo libro viene letto*, this book is read, lit. this book comes read) because it has been suggested that the representation of (some) unaccusative verbs requires some kind of lexical derivation, due to the fact that frequently these verbs with a surface unaccusative (ergative) realization are admittedly correlated to transitive predicates (e.g. break, roll).

This derivational view of unaccusativity, which *prima facie* contrasts with our hypothesis, has been developed, for instances, in works by Reinhart (1997; 2000) and Pesetsky (1995), but as we have said above we can by-pass the issue, arguing for a split-unaccusativity: *core* unaccusatives vs. *ergative* unaccusative. In Reinhart's and Pesetsky's accounts, unaccusative verbs are the results of lexical operations which suppress (or adopting an old Relational Grammar view and terminology, *demote* (see Perlmutter and Postal, 1984) the agent of the corresponding transitive instance of the verb. We ask the reader to refer to Levin and Rappaport Hovav (1995) for a detailed introduction to the matter.

What follows is a brief review of the neurolinguistic literature devoted to explore the unaccusative puzzle, which also aims at demonstrating that previous findings cope with our claim that the unergative/(core)unaccusative is first of all a matter of [+/-] morpho-syntactic derivation: in our view unaccusatives are base grammatical verbs,

while unergatives are a by-product of a light verb incorporating with a lexical root.

We want to open our review with an exciting fact discovered by Froud (2006). She reported many data from an aphasic subject who was unable to read any function words, with a characteristic pattern of “within-category” substitutions; his errors deeply extended to the class of unaccusative verbs. Thus, this deficit seems to provide evidence (a welcome result for us) in support of a functional determination of unaccusativity. As expected, it emerges from Froud (2006) that auxiliaries and modal and aspectual verbs behave like unaccusatives. An influential hypothesis concerning the performance (in production and comprehension) of aphasics with unaccusative predicates is the one developed in Thompson (2003) and Lee and Thompson (2004), where they find that in contrast to relatively spared comprehension of both unaccusative and unergative intransitives, the agrammatic subjects showed significantly greater difficulty producing unaccusatives as compared to unergatives.

This is an interesting result, because it is coherent with the findings in Barde et al. (2006) where a greater difficulty producing light(er) verbs has been detected. Notice that among the light verbs included in Barde et al. (2006) corpus there were, as expected, what we have labelled as [core] unaccusatives. Another relevant fact that Thompson (2003) puts in evidence is that agrammatic patients showed fewer productions of unaccusative verbs in their narrative samples as compared to other verb types (supporting what was reported in Kegl (1995)). Thompson (2003) argues from these findings that deficits in accessing verbs for production are influenced by argument structure template of the verbs involved, optimising her “argument structure complexity hypothesis”, which basically claims that when verbs become more complex in terms of the number of associated arguments or when the argument structure entry of the verb does not directly map to its S-structure representation (building on a version of Government & Binding framework), production difficulty increases. Her hypothesis even if intuitively plausible (generating a model that explain a pattern of this kind: more complexity, more difficulty) can be weakened by the simple consideration that there are languages in which the sole unaccusative argument is able to (productively) retain its base position.

## 5. Materials and methods

### 5.1. Subjects

As we have specified above, we needed an anomic patient with no syntactic difficulties in order to perform the research. BB is a 59 year-old right-handed woman, living in Murano (a little island in the Venetian lagoon). She attended a *liceo*, specializing in classic studies and then studied foreign languages for some years at Ca' Foscari University of Venice, without completing her studies. She lived in London for about one year and in Egypt for six months. For many years she has been working as a tourist guide in Venice, and then as an employee in an office.

She arrived at San Camillo Hospital, Venice in January 2009, because of serious linguistic problems, especially in word finding, which particularly affected her ability in common names naming.

The patient's language screening was carried out in winter/spring 2009 with standard batteries for Italian speakers. The standard batteries we used were the Italian version of A.A.T (*Aachener Aphasie Test*; Huber *et al.* 1983), B.A.D.A (*Batteria Analisi Deficit Afasico*; Miceli *et al.* 1994), Pyramids and Palm Trees Test (Howard and Patterson, 1992), Boston Naming Test (Kaplan, Goodglass, and Weintraub, 1983) and Mini-Mental State Examination (Folstein, Folstein and McHugh, 1975).

Four control subjects, two men and two women, were involved in the present study. They matched with the subject for age and age of instruction and didn't have any physical, neurological or psychological problem.

### 5.2. Stimuli

At the stage of the illness that we have considered for our analysis BB was still able to carry on a conversation and to produce sentences composed by many words, we have chosen a *spontaneous speech modality* experiment, as an ecological tool to collect our data. Naming tests were problematic because of the great difficulties we found in drawing some verbs (above all the functional ones). Also, completion tasks could have been problematic, because it would have been impossible to create an obligatory and unambiguous context for each type of verb.

Moreover, we had already preliminarily observed that in BB's spontaneous speech there were many sentences containing functional verbs with a noun or with an infinitival verb. For example, she used many modal verbs and very few lexical verbs, and she often omitted the lexical part of a construction. We need to experimentally confirm this simple descriptive observation in order to be able to claim that the word finding deficit affects verbs too, but crucially not all of them; namely, to try to demonstrate that lexical verbs are affected and verbs with grammatical features are preserved.

We collected five samples of spontaneous speech from March to July 2009 (approximately > 4.000 utterances). The samples were recorded in a quiet room at San Camillo, at the presence of two examiners that BB knew very well: the first time we asked BB to tell us how her work like tourist guide was; the second one she told us something about the year she lived in London; during the third session, we asked the patient to tell a story (she chose "*Cinderella*"); the fourth time she talked about the period she lived in Egypt; finally we asked to the patient to tell us what she had done the previous week-end.

During BB speech production, the examiners never interrupted her, excepting for some few words to encourage her when she seemed to be tired or frustrated.

Every control subject provided five sample of spontaneous speech telling some episodes of their life that could be similar to the ones told by/collected with BB (a travel they did in the past; how they had spent the last week-end; a particular period of their youth; the *Cinderella* story).

In a second time, two researchers separately transcribed the recordings as faithfully as they can. Then the two transcriptions were compared, and the few

controversial passages were listened by a third person who didn't know the previous results. Only if the third transcription tied in one of the two previous ones, the passage was included in the transcription. Finally we cut control texts in order to compare samples of same length with our patient's ones.

### 5.3. *Analysis*

All verb occurrences were counted. With the word “occurrence” we mean every time a verb was necessary to avoid an ungrammatical phrase. In this way, also omissions were included in the total number of occurrences. In (2<sub>A</sub>) we give an example of omissions.

(2<sub>A</sub>) allora e poi [omission] al / anche al bazaar  
 so and then [omission] at-the / also at-the bazaar

The repetition of a word was considered a single occurrence if it were used to express a single concept, like, for instance, in (3<sub>A</sub>):

(3<sub>A</sub>) perché avevo avevo... avevo avevo... avevo  
 because (I) had had... had had... had

Finally, the produced verbs were subdivided into three classes: lexical verbs, functional verbs and *quasi* functional verbs, namely causative, motion, and perception verbs (following the *taxonomy* of Cardinaletti and Shlonsky, 2004); in addition to auxiliaries, we considered functional verbs also aspectual, volitional, modal ones and the light verb “fare” (to do).

In particular, since BB quite systematically substituted unergative and transitive verbs by the functional verb “fare” + NP, we separately counted the occurrences of this “semantically lighter” construction.

Unaccusatives verbs were counted as quasi-functional, following the theoretical assumptions of Cardinaletti and Giusti (2001; 2003; see also Zubizarreta and Oh, 2007) and previous neuro-linguistic observations reported in Froud (2006). We will show below that BB did not have any problem in using them, confirming their (quasi)functional nature.

Given the aim of the study, we focused our attention on verbal omissions, to observe which type of verbs failed most often. In fact, if our claims are right, we expect to find a severe anomia affecting lexical verbs, and quite a complete preservation of the functional fields above the verb.

Unfortunately, we are conscious that our assumptions could be problematic because of the high frequency of functional verbs. For this reason, as it will be shown in paragraph 5.6, we analyzed our results in order to discover if a *frequency effect* could affect our hypothesis.

#### 5.4. Results

BB was diagnosed with Logopenic PPA.

The most typical features the screening revealed were: difficulties with object and compound-word naming and impairment in both oral and written comprehension of sentences. Moreover, the initial analysis revealed an expected deficit in word finding, but also some problems with syntactic interpretation/comprehension (e.g. especially with passive sentences). The administration of A.A.T. underlined a slight deterioration of BB language faculty. The worst performance concerned tasks of linguistic production, in particular compound naming, pictures descriptions and syntactic comprehension. Boston Naming Test confirmed the word finding deficit, but the Pyramids and Palm Trees Test, only very mildly impaired, excluding a semantic memory cause for the lexical problem. She scored 26 on MMSE.

Spontaneous speech production (cf. Appendix A<sub>A</sub> for the transcription of two samples of her spontaneous speech) was characterized by slow, hesitant speech with word-finding pauses. Speech in response to a picture was characterized by decreased

rate and occasional phonemic paraphasias and word-finding difficulty. Sentences were simple, but grammatically well formed and without omission of grammatic morphemes. Motor speech abilities were within normal limits, and no apraxia of speech or dysarthria was noted.

BB showed word-finding pauses in speech production and poor confrontation naming ability. Errors consisted mostly of complete anomia (no response) or phonemic paraphasias, suggesting a mixed mechanism of paraphasic and word-selection anomia, a fact already observed on the literature on logopenic PPA (cf. Gorno-Tempini et al. 2008). Comprehension at the sentence level was mildly impaired, but there was no clear evidence of a structural complexity effect. Single-word repetition was largely preserved, whereas sentence repetition was severely impaired, especially for low-probability sentences<sup>4</sup>.

Specifically concerning our experimental material in the spontaneous speech modality, first of all, we have to underline that BB produced a satisfactory number of verb in relation to her words production, if we compare BB (15.1%) with the control group (CG) (15.5 %). Given that we obtain these data taking into account the *ratio* between the number of words and number of verbs, we can also say that she produced the same number of sentences of normal speakers. Moreover, BB didn't have problems in construing the sentence and producing the verb in its correct position. On the other hand, a more detailed analysis reveals a great difference between BB and the control group, concerning the kind of verbs she uses.

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<sup>4</sup> Recent work by Wilson et al. (2010) indicates that several key characteristics of logopenic patients' spontaneous speech can be helpful in differentiating these patients from other PPA syndromes. Based on a speech sample, logopenic patients can be distinguished from nonfluent patients by a lack of speech sound distortions (although phonological paraphasias may be present) and *frank* syntactic errors. In addition, the maximum speech rate is typically greater in logopenic relative to nonfluent variant patients. The logopenic variant can be distinguished from the semantic variant by relatively slower maximum speech rate and by the presence of phonological paraphasias. These facts indicate that the logopenic variant of PPA can be differentiated from other PPA variants based on performance on a simple picture description task or other speech sample (cf. also Henry and Gorno-Tempini, 2011).

As reported in Table 1<sub>A</sub>, BB's deep anomia was confirmed by the low percentage of lexical verbs (LV) she produced (12.7% vs. 42.1%, of mean of the control group with standard deviation of [5.4]). We adopted the procedure of Crawford and Garthwaite (2002) for comparing a single case with a modestly sized control group. This procedure uses the *t*-distribution, which is more resistant to departures from normality in the control group than the standard methodology of using *z*-scores. It provides a conservative method for identifying individuals that fall below the 5th percentile of normal performance. In other words, following the methodology of Crawford and Garthwaite (2002) (cf. also Crawford, Garthwaite, Howell and Venneri, 2003) data were analyzed using a modified *t*-test procedure that treats an individual patient as a sample, allowing for comparison of the patients' test score against norms derived from control samples of small size. This procedure confirms the statistical significance of our findings ( $t = -7.53; p < 0.001$ ).

On the contrary, the patient has no hesitation with volitional, modal, and causative verbs, which we assume to be hosted in functional projections above V (no data concerning aspectual verbs emerged from BB spontaneous speech). They represent the 40.2% of her verb production.

We have also to underline that, when BB managed to retrieve a lexical verb, she actually repeats the same lexical item many times (cf. again the samples reported in Appendix A<sub>A</sub>). Doing so, it is not necessary for her to find more specific words to express new concepts: she can use the one she had already produced/retrieved before. In our data, we didn't consider these occurrences as repetitions; if we had done so, probably the number of LV produced by the patient would have been even lower. All these considerations, in addition to our empirical findings, lead us to argue that BB's lexical inventory is extremely poor.

Another striking fact is that unaccusatives / quasi-functional verbs are preserved (17,5% of correct distribution/retrieval) in BB spontaneous speech, confirming previous neuro-linguistic observations, about their (quasi)functional status (see the aforementioned work of Froud, 2006). Interestingly, the control group produced the 13.4% of unaccusative verbs on the average, showing that, not only BB has no difficulties

in retrieving this kind of verbs, but also that she somewhat prefers to use them, possibly because of their argumental *lightness*.

Subj.	% verbs/words	% FV	% QFV	% LV
<b>BB</b>	<b>15.1</b>	<b>40.2</b>	<b>17.5</b>	<b>12.7</b>
<b>C1</b>	12.8	36.9	11.9	49.4
<b>C2</b>	16.1	43.8	12.4	38.8
<b>C3</b>	13.8	37	16.8	38.1
<b>C4</b>	19.3	38.6	13.7	42.3
<b>CG mean</b>	<b>15.5</b>	<b>39</b>	<b>13.7</b>	<b>42.1</b>

Table 1<sub>A</sub>

Other interesting results come from the omissions pattern we found. In fact, as we can see in Table 2<sub>A</sub>, in the 13,2% of compound (*light verb + noun*) forms BB omitted the lexical part. In (4<sub>A</sub>), (5<sub>A</sub>) and (6<sub>A</sub>) we give some examples, drawn from BB's spontaneous speech corpus, of the omission of the lexical item in verbal compound constructions:

(4<sub>A</sub>) Doveva [omission] a mezzanotte  
*(She) must [omission] at midnight*

(5<sub>A</sub>) Dovevano [omission] tutte le le sorelle  
*(they) must [omission] all the the sisters*

(6<sub>A</sub>) La ragazza e il ragazzo fanno [omission]  
*The girl and the boy do [omission]*

The control group omitted it only in 0,7% of the times. On the contrary only 1,6% of errors/omissions, affecting functional verbs, has been detected in our patient's corpus. Only 6% (calculated on the total number of contexts requiring a verb in the sample) of omissions of the entire VP were found, supporting the idea that BB's grammatical structure was almost completely spared. Quite obviously control participants never omit the entire VP, obtaining a better result compared with BB. Further notice that the omission of VP presupposes a lack of the lexical element, whether used in a compound form or not.

Subj.	% FV +omission	% om. VP	Om. FV
<b>BB</b>	<b>13,2</b>	<b>6</b>	<b>1,6</b>
<b>C1</b>	0,62	0	0
<b>C2</b>	0	0	0
<b>C3</b>	0,6	0	0
<b>C4</b>	1,65	0	0
<b>CG mean</b>	<b>0,71</b>	<b>0</b>	<b>0</b>

Table 2<sub>A</sub>

As already said, we noticed that BB quite systematically substituted unergative and transitive verbs in their “heavy form” with the light-verb FARE (*to do*)+ N compound form.

In particular, she used the construction *FARE+NP* the 14,8% of times (calculated on total number of verbs she produced). This value includes the contexts in which BB was unable to retrieve (omitted) the N *paired* (6,4% on total *FARE+NP* contexts). Examples in (7<sub>A</sub>), (8<sub>A</sub>) and (9<sub>A</sub>) show some contexts in which FARE + NP appears in BB's corpus.

(7<sub>A</sub>) Facevo la spiegazione... vs. spiegavo  
*(I) did the explanation vs. (I) explained*

(8<sub>A</sub>) Ho fatto il tragitto con l'Alilaguna vs. ho preso  
*(I) did the trip with the boat vs. (I) took*

(9<sub>A</sub>) Ho fatto una [mani]festazione vs. *ho manifestato*  
*(I) did a demonstration vs. (I) demonstrated*

Control subjects hardly ever omitted the nominal part (we found only one case within the sample of the 4 controls) and used this construction the 5,4% of times on the average. The comparison of the results, again based on Crawford's test, is statistically significant:  $t = -4.4; p < 0.01$ ).

Finally, we want to add a simple observation; BB produced complex syntactic constructions combining two functional verbs, as shown in (10<sub>A</sub>), (11<sub>A</sub>) and (12<sub>A</sub>). This fact can be considered as further evidence that our patient had not any problem in producing these kinds of verbal elements, even in a combination/permutation.

(10<sub>A</sub>) Volevo essere egiziana  
*(I) wanted to be Egyptian*

(11<sub>A</sub>) Dovevo andare al bazaar  
*(I) had to go at-the bazaar*

(12<sub>A</sub>) Volevo andare anche al museo egiziano  
*(I) wanted to go also at-the museum Egyptian*

### 5.5. *Back and forward: A preliminary experiment to enhance spontaneous speech*

In order to confirm the assumption that BB's syntactic production was preserved, we decided to propose BB a preliminary exercise. We asked BB to describe a picture. Specifically, we used the picnic *frame* illustrated in the figure 1<sub>A</sub> below.

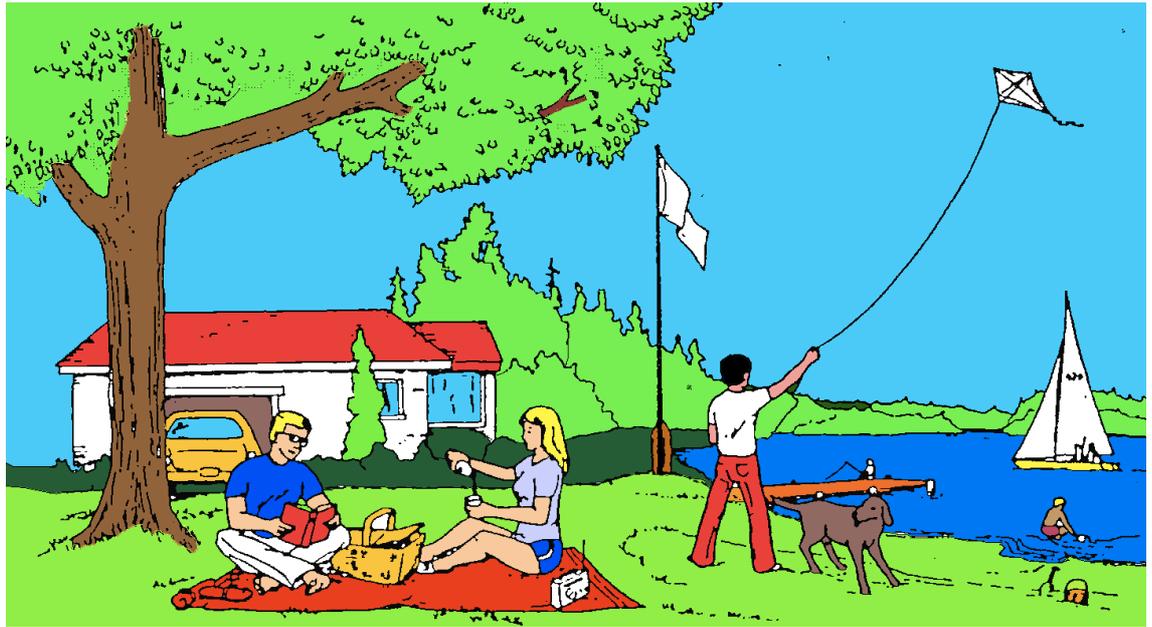


Figure 1<sub>A</sub>

Then, we added some lexical tags near objects and characters and we asked her to describe the same picture again. The tags contained *bare* nouns and infinitive verbs, as in Figure 2<sub>A</sub> below.

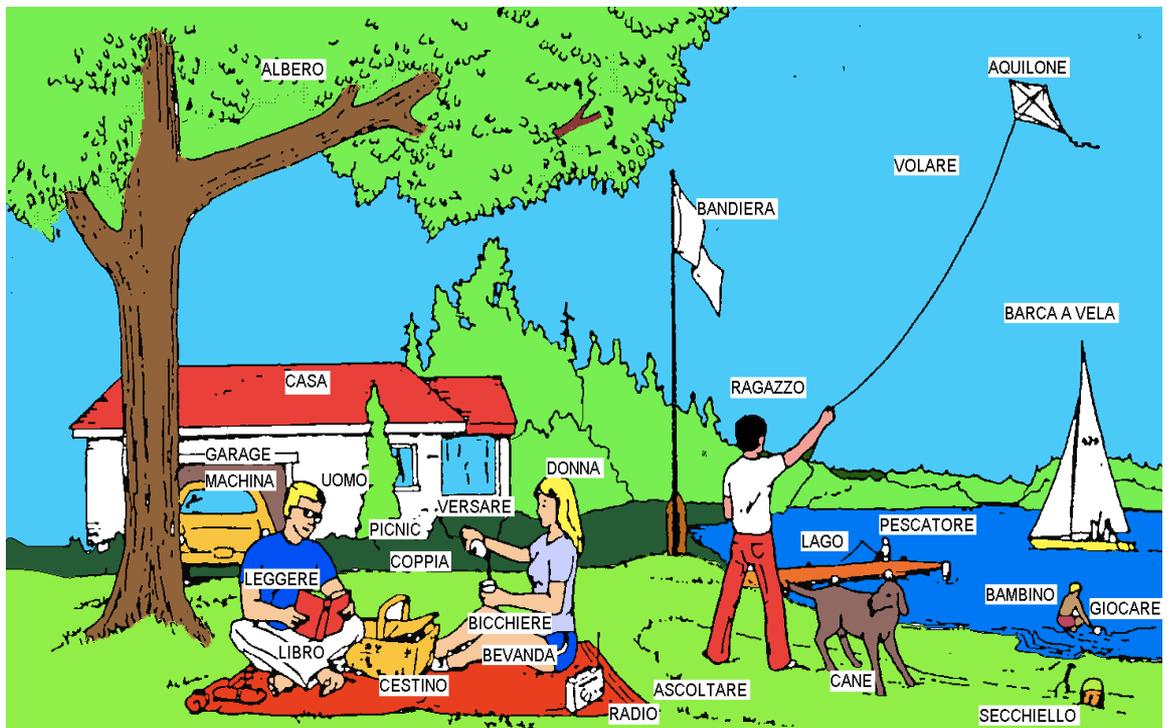


Figure 2<sub>A</sub>

Our aim was to avoid BB's anomia, supplying her with *bare* lexical entries. Our idea was the following: If syntax is really preserved, the tags probably can act as triggers and, using them, BB would be able to produce grammatical sentences (with e.g. the correct *verb-subject agreement*) without any effort. Thus, the two elicited descriptions were recorded and transcribed following the same method used for the samples of spontaneous speech. Again, we counted every verbal occurrence and then we divided them depending on the verbal type they belonged to. Finally a comparison between the two descriptions was made, in order to discover if the *lexico-semantic aid* improved the performance of the patient.

Our initial intuition was confirmed by the results of this task. During the "free" description, BB encountered many difficulties in retrieving lexical words, and, as we expected, she often resorted to a light verb + NP construction, using, in particular, the light verb *fare* (to do). On the contrary, with the tagged picture, BB's words' finding problems were avoided and the quantity of produced lexical verbs improved significantly. This observation confirms that her *functional-verb* choice was exclusively due to her anomic deficit. In addition, though we gave to the patient the infinitival form of the verb, no errors in verb-subject agreement emerged proving the absence of any serious syntactic deficit (Italian has a very rich inflectional morphology). In conclusion, we can say that if the problems were syntactic, pragmatic or semantic but not anomic, the bare lexical *clue* would not have been sufficient to solve BB's problem in words retrieving. In Table 3<sub>A</sub> the data concerning this preliminary experiment are shown.

	Light V use	Light V+NP	Light V + omission	Light V
No tagged picture	80%	30%	50%	20%
Tagged picture	14%	10%	0 %	60 %

Table 3<sub>A</sub>

## 5.6. *The frequency effect*

As we have mentioned above, we needed further investigations to account for the really higher frequency of use of grammatical verbs compared to lexical verbs. Thus, how can we discover if BB uses light verb because of their functional nature or if she simply chooses the most frequent items? In order to give an answer to this crucial (from a psycholinguistic viewpoint) question, we focused our attention on the verb *essere* (*to be*). In fact, like other functional verbs, in addition to its auxiliary function, it can be used as a *copula* combined with a noun or an adjective as in (13<sub>A</sub>) below.

(13 <sub>A</sub> )	Il	ragazzo	è	alto
	<i>The</i>	<i>boy</i>	<i>is</i>	<i>tall</i>

This form is clearly different from the auxiliary one, because it conveys a (set of) “semantic” value(s).<sup>5</sup> We needed a corpus of usage frequency that allows us to roughly quantify the distinction between the auxiliary form and the *copula* usage of *essere* verb. We found such a tool with the LIP<sup>6</sup> corpus (*Lessico dell’Italiano Parlato*), which includes 500.000 words coming from conversations involving Italian speakers living in different parts of the country. Despite its more semantic content, according to the LIP, the verb

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<sup>5</sup> Within the realm of contemporary theoretical syntax the copula is seen basically as a relator/linker providing the connection between the predicate and its subject (see Bowers, 1993, Moro, 1997; Den Dikken, 2006, among others). Higgins’s (1979) classic typology includes four types of semantic function played by the copula: *Predicational*, *Specificational*, *Identificational*, *Equative*. See the examples below in (i):

- (i)
- a. Brian is a clever guy. (Predicational)
  - b. Brian is the culprit. / The culprit is Brian. (Specificational)
  - c. Brian is that man over there. / That man over there is Brian. (Identificational)
  - d. Cicero is Tully. / Tully is Cicero. (Equative)

<sup>6</sup> See De Mauro, T., Mancini, F., Vedovelli, M. and M. Voghera. (1993). *Lessico dell’italiano parlato* (L.I.P.), Milano, Etaslibri. (on-line version at <http://badip.uni-graz.at/>)

*essere* is more frequently used as a *copula* rather than as auxiliary (3,91% vs. 0,94 % on the total occurrences of the corpus).

Interestingly, in our patient corpus we found a higher number of auxiliary form compared with copulas. In other words, BB shows an opposite pattern if compared to the wealthy speakers included in LIP corpus. As Table 4<sub>A</sub> shows, our control subjects too confirm this fact, producing a number of auxiliaries and copulas roughly in line with the LIP corpus. Again, using the aforementioned statistical procedure of Crawford and Garthwaite (2002) to compare the performance of BB with wealthy controls, we can confirm the significance of this dissociation ( $t = -3,2$ ;  $p = 0.024$ ).

Subjects	V. BB (PZ)	% Our corpus	% LIP
BB	<b>copula</b>	<b>1.52</b>	<b>3.21</b>
	<b>auxiliary</b>	<b>2.16</b>	<b>0.94</b>
C1	copula	1.60	3.21
	auxiliary	0.96	0.94
C2	copula	2.56	3.21
	auxiliary	2.32	0.94
C3	copula	1.84	3.21
	auxiliary	1.36	0.94
C4	copula	2.72	3.21
	auxiliary	1.12	0.94
CG mean	<b>Copula</b>	<b>2,18</b> (SD= 0.48)	<b>3.21</b>
	<b>Auxiliary</b>	<b>1,44</b> (SD= 0.36)	<b>0.94</b>

Table 4<sub>A</sub>

This phenomenon could also be due to the fact that in Italian (almost) only the compound form of unaccusatives verbs is introduced by the auxiliary *essere*. Given that unaccusatives are assumed to have more functional features than transitives and unergatives, it seems clear that our patient prefers a structure composed by two functional items rather than copular constructions which obligatory involve the retrieval of *lexical items* (namely the items which are semantically *linked* by the copula). Also, the verb *avere* (to have) can be either used as an auxiliary or, followed by a noun, can convey possession. Since transitive and unergative verbs (prototypically, the lexical ones) are both introduced by *avere*, we expect that, contrary to the case of *essere*, BB would use this auxiliary form less frequently.

According to the LIP the *avere* auxiliary form is the most used by Italian speakers, if compared to the “possession” one (1,4% vs 0,66% on the total occurrences of the corpus). Even if the reason is different than for *essere*, we crucially found that our patient’s production goes again in the opposite direction, compared to the behaviour of healthy speakers of LIP and of our control subjects. In fact, BB preferably uses the possession form rather than the auxiliary one. See Table 5<sub>A</sub> for data details.

subjects	V. BB (PZ)	% Our corpus	% LIP
<b>BB</b>	<b>possession</b>	<b>1.76</b>	<b>0.66</b>
	<b>auxiliary</b>	<b>1.36</b>	<b>1.4</b>
<b>C1</b>	possession	0.32	0,66
	auxiliary	0.96	1.4
<b>C2</b>	possession	0.16	0.66
	auxiliary	1.60	1.4
<b>C3</b>	possession	0.40	0.66
	auxiliary	0.96	1.4
<b>C4</b>	possession	0.96	0.66
	auxiliary	1.52	1.4
<b>CG-</b>	<b>Possession</b>	<b>0.46</b>	<b>0.66</b>
<b>mean</b>	<b>Auxiliary</b>	<b>1.26</b>	<b>1.4</b>

Table 5<sub>A</sub>

As introduced above, we explain these results by highlighting that when the verb *avere* is used as auxiliary, it introduces unergative or transitive verbs, which give many problems to BB because of their lexical nature. Moreover, given the composed form of a transitive verb, we have to produce *have + past participial of the lexical verb + object complement (noun)*. For this reason, the overproduction of *avere* form of possession could be consider an economy strategy, from a lexical point of view, chosen by BB to convey the message at any rate, avoiding the further retrieval of lexical items. In addition, even in its transitive form, *avere* is less specific and *lighter* than a content specific lexical verb. See again *table 5.* for details.

Anyway, the important fact is the following: it seems evident that the frequency of use does not influence BB in the choice of the verbs she use to build up her sentences. An

explanation which takes into consideration the different types of verbs (basically their functional vs. not functional nature), will better account for our patient's behaviour.

## 6. Discussion

With the Case study illustrated in this chapter, we have tried to prove the existence of a unique lexical category (from which the others are morpho-syntactically derived). Following Kayne (2009), we assume that the only open lexical class is represented by nouns, so that verbs (*all functional, all light*) may be seen as a closed class. We have tested this hypothesis in BB, a logopenic PPA patient with a deep anomia and a spared syntactic "module". Also, in this research, following the works of Cardinaletti and Shlonsky (2004) and Cinque (2006a) we have assumed that *functional heads* - some of them being represented in Italian by instances of modal, aspectual, volitional verbs - given the anomic dissociation (lexical vs. functional) of our patient and her quite intact syntactic production, must turn out to be unimpaired.

With our analysis of her spontaneous speech, we have observed that BB avoids the production of lexical verbs (transitive or unergative), by using the construction [functional verb + noun], and in particular *fare* + noun. In that way, BB clauses are often correct from a grammatical point of view, but lack of accuracy with respect to the meaning. These results make us think that, in this case of PPA, the progressive erosion of the lexicon left almost intact the functional domain above the Verb Phrase. In fact, the poor use of lexical verbs comes from the word-finding deficit that also affects nouns. Its origin is not syntactic in nature: despite her deep anomia, the patient never omits and has no hesitation with volitional, modal, and causative verbs, which we assume to be hosted in functional projections above the verb.

Hence, it seems that the immediate retrieval of a light verb (e.g. *fare*: to do) is forced by anomia and it constraints our patient to manifestly use the otherwise silent light verb to which nouns incorporate. On the contrary, we can exclude a morpho-syntactic deficit: for instance, BB is able to create the inflected forms of the verb from the infinitive ones (see data from our preliminary picture task).

From a theoretical point of view, the most important result is that the omission of some verbs (the lexical ones) is caused by anomia. BB's deficit selectively spares not only modal volitional and causative verbs but also auxiliaries and unaccusative verbs. For this reason we have empirically suggested that verbs belonging to this group have to be considered functional heads, hosted in a (set of) different position(s) on the syntactic skeleton. These results are coherent with the theoretical (cartographic) assumptions of Cinque (1999, 2006a), who develops a very fine-grained hierarchy of functional projections for the clause and locates different semantic subclasses of "functional" verbs within such a hierarchy. The representation below in (14<sub>A</sub>) roughly illustrates a model coherent with our empirical findings:

(14<sub>A</sub>) ... [FP ... [FP ... [FP ... [FP ... [FP ... [VP [ *lexical root* √ ]]]]]]]]

This result could be very interesting from a neuro-cognitive perspective. In fact we have obtained evidence that neurolinguistic works on the noun-verb distinction in impaired populations should account for the existence of different (intra)verbal classes and above all for a functional-lexical divide as a crucial variable.

## Appendix A<sub>A</sub> : Samples of BB spontaneous speech

### a. Description of *The Birth of Venus* (Botticelli) (8<sub>min</sub>18<sub>sec</sub> 5/2009)

...Botticelli è un ... come si chiamano ... eh la ... (*nascita di Venere*) Sì ... nascita di Venere perché allora con ... come si chiama questa (*questa qua? Questa qua è una conchiglia*) Sì conchiglia e poi... .. mamma mia ... Sì.. Venere questa è Venere e poi ci sono anche ... No... (*vuole che magari proviamo con i dettagli?*) Ehm ... ha i capelli ... ha i capelli lunghi sì allora aveva aveva un ... un aveva anche lunghi questi capelli ... capelli lunghi e poi aveva ... ehm... (*dei ramoscelli, come una collana di ramoscelli*) sì sì.. ramoscelli e poi aveva un mantello... un mantello ... un mantello pink mantello ... con sì ... con i fiori (*benissimo*) e lei Venere è nuda sì.. [ride...] però non è pratima... praticamente nuda perché ci sono... ci sono i capelli che ... che ci sono i capelli che nascondono l'intimità (*bravissima! Allora vediamo quest'altro dettaglio*)... eh... sono ci sono anche ci sono anche fiori e poi.. il vento .. (*bravissima*) sì.. e poi ha un mantello blu sì celeste [ride..] eh.. l'uomo ha l'uomo ha i capelli lunghi e poi e anche la la la ... mamma mia.. sì eh ..ma la dovevo sorella ma no... va bene e anche i capelli lunghi e ci sono le ali, eh sì!

### b. Living in Egypt (10<sub>min</sub>5<sub>sec</sub> 6/2009)

Ehm ... Il Cairo era bellissimo però avevo... andato ... dovevo andare ad Alessandria... Alessandria mah ... dovevo andare da Alessandria però perché ehm perché il marito ehm voleva andare ad Alessandria perché c'era il ... c'era il ehm.. mare .. hai capito... Sì! [ride...] eh, però ... però ehm però ehm però mamma mia ma... mamma mia ... Monofeya [regione egiziana] ahm avevo avevo Tanta avevo la città di Tanta però ehm perché avevo avevo... avevo avevo.. avevo ... ehm a Tanta una una... una di sabbia una sabbia perché non vedevo (*una tempesta di sabbia?*) sì! La tempesta di sabbia allora poi sono andata sono andata al Cairo ma il mio compagno ehm... voleva che esse... che volevo essere egiziana [fa il gesto dell'ombrello] cazzo! e allora io volevo andare i musei eccetera e poi anche il come si chiama le volevo andare anche .. eh al museo egiziano e poi le sfingi eh beh... allora e poi era pazzo perché no! era perché quando sono venuta io era in un ospedale psichiatrico... allora erano erano... erano potenti e allora l'hanno fatto fuori dall'ospedale psichiatrico eh e poi volevo vedere anche eh... prima sono andata all' Hilton però una volta una notte e poi poi... poi sono andata a eh un ristorante sì ristorante che si eh mangiava e poi man.. ehm ruotava.. allora e poi al anche al bazaar dovevo andare al bazaar però e poi e sono andata su un pullman che strapò che stra... no stra.. no come si dice (*strapieno?*) sì! allora mi e poi a fine si si si eh si si rotto si è rotto e poi dovevo dovevamo dovevamo spingere sì [ride...] allora eh sì eh ma mi facevano ehm mi mi ehm mi toccavano il culo! Sì [ride...] eh beh perché sì! Ero straniera e allora! (*Senta, sul Nilo è mai stata?*) Sì certo certo sì sì certo.. eh sono andata al sul Milo ehm perché i.. i genitori di Radi Suelam Radi erano erano ... abitavano sul Nilo... ah sì..eh...

## Chapter 3

### *Case study B*

#### *Linking Figure and Ground in Broca's aphasia.*

## 1. Encoding space in language

Central to human behaviour is the ability to coordinate actions in a spatial environment: absolute and relative locations of individuals and objects must be represented, goals for movements must be planned, origins and destinations for routes must be encoded and continuously updated. In addition to representing and processing spatial information for one's own goals, humans communicate spatial information in their linguistic interactions. The linguistic encoding of spatial relations, however appears to be restricted to a rather delimited set of spatial relational (linking) terms (Landau and Jackendoff, 1993; Jackendoff, 1997; Landau 2003). In seminal work, Talmy (1975; see also Talmy, 1985; 2000a; 2000b) showed that the linguistic expression of events in space (fixed or in motion) is cross-linguistically encoded by a small array of key linking items, but these items are grammatically expressed somewhat differently across languages. Many scholars have proposed that these components can be mirror-counterparts of the non-linguistic mental representation of events (Pustejovsky, 1991; Williams, 1981; Fillmore, 1977, 1985; Rappaport and Levin, 1988; Gruber, 1976; Jackendoff, 1983; McCawley, 1971; Ramchand, 2008; Grimshaw, 2005; Lakusta and Landau, 2005 among many others). Some have proposed that the language of space is a direct reflection of our anthropomorphic and relativistic concept of space (e.g., Clark, 1973; Miller and Johnson-Laird, 1976. See Levinson 2003 for a detailed review).

Within the domain of first-language acquisition, the proposal has also been made that the linguistic system emerges out of an earlier non-linguistic system of spatial knowledge (see e.g. Gibson and Spelke, 1983; Piaget and Inhelder, 1956). One challenge for this view is the fact that language-specific constraints in spatial cognition have been found. For example Bowerman and Choi (2001) (see also Choi and Bowerman, 1991) have found language specific differences in the acquisition of spatial semantic categories for Korean vs. English speaking children. Moreover, dissociations between language and spatial cognition have also been documented in impaired populations (see e.g. Landau and Zukowski, 2003 on Williams Syndrome).

At a gross level, language and spatial cognition appear to be supported by different neuroanatomical circuitry preferentially situated in opposite hemispheres (Chatterjee, 2001; 2008). Evidence for this gross distinction comes from the clinical finding that impairments in language are usually associated with left hemisphere damage, and impairments of spatial cognition are associated with right hemisphere damage. But, despite these broad differences in the neuroanatomy of language and space, this dichotomous split appears simplistic and implausible (Mesulam, 1998). A language network completely cut out from perception would imply a radically different neural organization in the two hemispheres. Both space and language are processed by the means of extensively distributed neural networks. At the cortical level, these networks include the posterior temporal-parietal region, and dorsolateral and medial prefrontal regions. At the sub-cortical level, networks include parts of the basal ganglia and thalamus (Chatterjee, 2001; Colby, 1998).

Talmy's crucial insight with respect to the interface of language and spatial cognition lies in the notion that *Figure* and *Ground* are two core components of the linguistic encoding of events occurring in a spatial frame of reference. Borrowing these labels from their use in Gestalt psychology, Talmy argues that natural languages select a portion of a scene, the Figure, as the focal point and describe it in relation to another portion, the Ground. The Figure–Ground distinction is a sort of metaphorical extension of the corresponding concepts in visual perception (Levinson, 1996; 2003; Marr, 1982; Kosslyn, 1994). Each event requires a moving (or possibly movable) item (i.e. the Figure) performing an action on a relatively stationary setting (i.e. the Ground). Languages seem to universally express events using Figures and Grounds. As an example, consider the sentence “the dog is running across the road”. In this simple description of a motion event, the dog acts as the Figure and road acts as the Ground.

In a Figure-Ground configuration, the Figure is geometrically simpler than the Ground, often only conceptualized as a point. It is also usually smaller, more salient, more movable. The Figure/Ground divide can also be extended metaphorically to the temporal domain. In this case, Figure denotes a more recent time frame relative to the Ground, which is more stable and denotes an earlier point in time (Langacker, 1987;

Miller and Johnson-Laird, 1976; Talmy, 2000a).

Although all languages encode the same primitive set of spatial-linguistic notions, they also vary in terms of what part of the language system is responsible for encoding them (Talmy, 2000a). The linguistic components represent the objects participating in the event, the types (manners) of motions that they undergo, and the paths along which the objects travel. Parametric factors determine what kind of information (e.g. path, manner, result) can be grammatically encoded in the parts of speech that typically express events, i.e. verbs and other grammatical categories that modify verbs. According to Talmy, languages tend to encode the path of motion in one of two ways: either in verbs (e.g. 'to enter', 'to exit') or in a related particle or "satellite" ('in', 'out'). Languages thus appear to dichotomize in preferentially verb framed vs. satellite framed languages (see recent discussions in Real Puigdollers, 2010; Folli, Harley and Karimi, 2005; Mateu and Rigau, 2010; Zubizarreta and Oh, 2007, among others).

In the Case Study reported here, we take a neurolinguistic approach to examining the figure/ground distinction. Specifically, it should be possible to find clinical dissociations in the form of preserved access/representation to one category but not the other. Drawing data from FM, an Italian 54-year-old Broca's aphasic patient, we examine how agrammatism affects the relation between Figure and Ground. This relation is typically achieved by the means of prepositions (aka linking elements as in den Dikken, 2006; or linkers/relational items as in Levinson's (2003) notion of locative prepositions as binary spatial relators in frames of reference). Following Levinson (2003), locative prepositions project arguments consisting of the Figure (or the *referent* in Levinson's terms) and the Ground (or the *relatum*). Jackendoff (1997) labelled these prepositions "Axial prepositions", the reason being that they are usually morphologically related to nouns (lexical items) that denote axial parts (e.g. back, top, front, bottom, etc.). In some proposals (e.g. Svenonius, 2006) locative prepositions form part of a separate functional syntactic category (Axial Part), which is distinct from both nouns and prepositions on the basis of a comprehensive typological survey. The findings from the present study will lend support to the proposal made on linguistic grounds for separability of locative prepositions from other word classes in the mental lexicon.

## 2. Prepositions and Aphasia

Prepositions have not received a great amount of attention in the neurolinguistic literature. Notable exceptions – from a syntactic viewpoint – include the works of Friederici and colleagues (Friederici, 1981; Friederici, 1982), Bennis, Prins, and Vermeulen (1983), Grodzinsky (1988), Lonzi and Luzzatti (1995), Lonzi, Luzzatti and Vitolo (2007), Froud, (2001), Druks and Froud (2002), Kemmerer and Tranel (2000; 2003); Tranel and Kemmerer (2004); Kemmerer. (2005).

A detailed survey of these works is given in Mätzig (2009) and Mätzig et al. (2010), which, review studies where prepositions have been found to be impaired in both Broca's and anomic aphasia. The proposed locus of the deficit is assumed to be -relying on insights from Distributed Morphology (cf. Halle and Marantz, 1993)- at the post-syntactic level of (late) Spell-Out- mainly due to the fact that both Anomic and Agrammatic speakers made predominately within-category substitution errors. Interestingly, substitutions were the major error type in the studies of Leikin (1996; 1998), where aphasia type had no statistically significant influence on the shape of these substitutions. Leikin's studies also examined child data. Age was also not a predictor of errors with prepositions in children. Nevertheless, the patterns of substitution errors were quite different in aphasic patients vs. children.

A commonly held view in neurolinguistics is that prepositions tend to be omitted in Broca's aphasia and substituted in Wernicke's aphasia (Caplan 1987; Grodzinsky 1990). However, even prior to Mätzig's work, other studies have reported prepositional substitutions in agrammatic Broca's aphasia (see e.g. Friederici 1985; Miceli et al. 1989).

An interesting study specifically addressing the behaviour of complex prepositions is Kemmerer and Tranel (2000). They tested the linguistic and perceptual/cognitive representations underlying spatial relations in two brain-damaged subjects and documented a double dissociation between linguistic vs. perceptual/cognitive representations. One subject had a right hemisphere lesion affecting many cortical and subcortical areas and was impaired on tests of non-linguistic visuo-spatial cognition, but

performed well on linguistic tests examining the comprehension and production of spatial (complex) prepositions. The second subject had a left hemisphere lesion affecting some other cortical and subcortical regions and showed the opposite pattern of performance performing poorly on linguistic tests but well on the visuo-spatial tasks.

In 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. As Mätzig et al. (2010), points out, the scarcity of studies in aphasia that specifically examine prepositions in any detail is peculiar. One reason may lie in the fact that as a grammatical class, prepositions are a hybrid set and they appear to exhibit properties of both lexical and functional categories.

In theoretical linguistics there is in fact an ongoing effort to characterize prepositions, crosslinguistically, in finer grained terms (see e.g. Grimshaw, 2005; van Riemsdijk, 1990; Kracht, 2002; Zwarts, 2005; Folli and Ramchand, 2005 and the works collected in Asbury et al. 2008 and Cinque and Rizzi, 2010b). In current linguistic terms prepositions are functional heads, in that they are caseless, and they do not usually take (technically merge with) tense–aspect–mood morphology.

A subset of prepositions (usually, simple prepositions) do not bear stress and their fixed (small) number suggest that, like pronouns and determiners, they are closed-class grammatical items. There are, however, prepositions that assign clearly defined thematic roles to their complements (e.g. spatial and temporal prepositions) whereas another subset of prepositions fulfils strict syntactic functions. The latter set includes prepositions, which assign case to their complements but not thematic roles (English of is such a “meaningless” prepositions, namely, of is inserted in order to satisfy the Case Filter when a phrase consists of nouns or adjectives) (see Mätzig et al. 2010).

In the Case Study reported here, we take a neurolinguistic approach to examining the linguistic encoding of the figure/ground distinction in locative expressions such as “the tree beside the house”. Specifically, it should be possible to find clinical dissociations in the form of preserved access/representation to one category but not the other. Drawing upon data from FM, an Italian 54-year-old Broca’s aphasic patient, we

examine how agrammaticism affects the relation between Figure and Ground as it is expressed linguistically. The findings from the present study lend support to the proposal made on linguistic grounds for the separability of locative (axial) prepositions from other word classes in the mental lexicon.

Italian represents an interesting testing ground because it allows (and in some cases requires) an array of prepositions to express locative and temporal Figure/Ground relations. The prepositional array that linguistically encodes the Figure / Ground relationship consists of an axial preposition (such as e.g. *dentro*, inside; *fuori*, out; *prima*, before etc.) followed by a simple preposition (such as e.g. *a*, to; *da*, from; *di*, of etc.). The theoretical status of axial prepositions is currently debated in the literature. On a somewhat more traditional view, prepositions divide into (at least) two classes according to their functional vs. lexical status (see e.g. Samiian, 1993 on Persian). Axial prepositions in this view are considered lexical, whereas simple prepositions are classified as functional categories. An alternative view is the ‘cartographic’ approach (e.g. Cinque, 2010a; Svenonius, 2006) where locative/temporal prepositions are considered functional items in a layered configuration.

The clinical data presented here add to the empirical data set against which to test the predictions of these two different theoretical views of the status axial prepositions, and these finer-grained distinctions among prepositions. We use the example Figure/Ground description *La strada lungo al torrente* (The road along the river) which consists of the axial preposition “lungo” and the simple preposition + definite article “al” (a + il) to pit the predictions of the two theories. On the lexical view of axial prepositions, we might expect that in individuals with agrammatic aphasia axial prepositions should be more preserved than simple prepositions: “lungo” should be more preserved than “a”. On a cartographic approach we expect agrammatism to equally impact functional prepositions irrespective of whether they are axial or simple: “lungo” and “a” should be equally impaired. To anticipate the results, the data from a classic agrammatic individual, FM, are unexpected under the *lexical* view of axial prepositions. Although *prima facie* not predicted on a straight cartographic approach, the results suggest that axial prepositions (axial parts) are functional and not lexical categories.

### **3. Methods and results**

#### *3.1. Background information*

##### *3.1.1. Clinical history*

FM is an Italian 55-year-old right-handed man, with 13 years of education, formerly employed as a sales manager in a company that produces eye-glasses. FM had a 30-year history of being a heavy smoker and a family history of cerebrovascular disease. On December 2004, at age 47, he sustained an ischemic stroke in the left middle cerebral artery territory, following an internal carotid artery dissection. A later CT angiography showed recanalization of the vessel. He began to exhibit problems with linguistic expression and was diagnosed as exhibiting 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, which began with a generalised tonic seizure. A CT scan (see fig. 1a-1f) showed, in addition to the previous injury, a left mesencephalic and brainstem lesion. FM started drug therapy with oxcarbazepine. The dosage was increased after FM sustained a second seizure. No further seizures were reported. An EEG showed minimal left hemisphere slowdown, without paroxysms. 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.

##### *3.1.2 General neuropsychological assessment*

FM underwent cognitive assessment within the constraints imposed by his severe, linguistic deficits. Formal tests were mostly taken from the Spinnler and Tognoni battery (1987). On the Raven P.M. 1947 Test, which measures general non-verbal intelligence,

FM's performance was at ceiling (36/36). In the Visual Search Test which measures attention, FM was close to the cutoff for normal performance, but exhibited long scanning times (28/60; cutoff score 30). FM's score on the Corsi's Block-Tapping test which measures Spatial Span was 4, just below the lower normal limits. On repeated presentation he was able to learn a sequence of 6. Drawing from memory and from copy was fairly good (he copied correctly 8/14 simple line drawings). There was no presence of bucco-facial apraxia (19/20). FM performed at ceiling in the imitation of gestures test of Ideomotor Apraxia (20/20). Overall, FM's performance on non-linguistic cognitive, spatial and attentional tasks suggests relative preserved non-linguistic cognition.

Raven P.M. 1947	36/36
Visual search	28/60 (cut off 30)*
Digit span Forward and Backward	0*
Spatial span	4*
Spatial supra-span	6
Bucco-facial apraxia	19/20
Ideomotor apraxia	20/20
Copy of drawings	8/14

Table 1<sub>B</sub>. General neuropsychological assessment (Spinnler and Tognoni, 1987)  
 (\* corresponds to a pathological score)

### 3.1.3 Linguistic assessment

FM's motivation and participation in communicative exchanges were pragmatically appropriate. Formal testing was performed with two standard Italian batteries for Aphasia: (a) *Batteria per l'Analisi dei Deficit Afasici* (BADA, Miceli et al., 1996) and (b) *Esame Neuropsicologico Per l'Afasia* (ENPA, Capasso and Miceli, 2001) (cf. Table 2<sub>B</sub> below). FM's spontaneous speech was non fluent and agrammatic, with long anomic and planning pauses, some semantic paraphasias and some conduite d'approche episodes. There was nothing to suggest a phonetic or phonological planning deficit. FM frequently omitted function words (especially definite and indefinite articles), and had difficulties with verbal inflection and with the production of syntactically complex sentences/structures. FM almost always resorted to the simple present or to the use of the bare infinitive form of verbs. Some semantic paraphasias were also detected in both repetition and naming tests. Interestingly, FM tended to substitute target words with less frequent ones. A Semantic Association Test was administered (Italian version, Visch Brink and Denes, 1993): this test, originally developed by Howard and Patterson (1992), involves matching two semantically associated items, chosen from an array of four pictures. FM scored 46/48 ruling out a coarse semantic problem.

FM's language comprehension appeared to be un-impaired in conversational contexts, but structured testing uncovered substantial difficulties. On the Token test (De Renzi et al., 1962) FM scored only 9/36 correct. FM also failed in the interpretation of reversible sentences and in the detection of grammaticality in auditory judgments tasks. Repetition was better for words than for non-words and was very poor for sentences. On reading tasks, phonology were quite poor, instead comprehension was preserved for nouns, less so for verbs.

Writing to dictation was impossible for FM, but this is likely due to a transcoding deficit, because he was capable of self-dictating words correctly even if his oral production consisted of syllables or fragmented, unrelated words. He was capable of

writing his signature correctly, but with much effort.

A sample of his spontaneous speech in a picture description task is reported below.

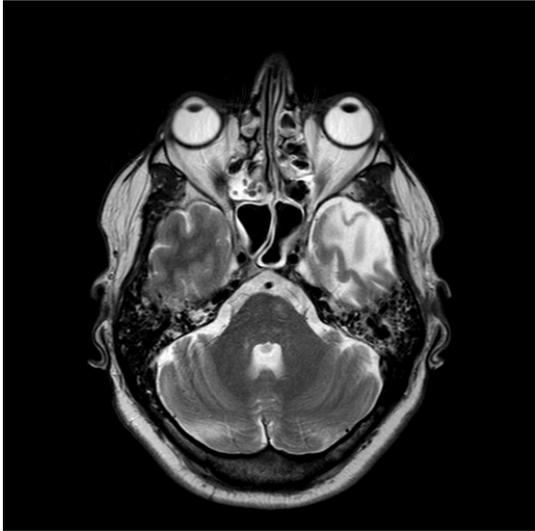
(1<sub>B</sub>) *Un ladro... due ladri, rubare & televisore no, oggetto...radio. Gioielli...eccetera. Poi. Il cane (cane, gatto) gatto, cane! La adulto leggere. Poi. Un, un, un bambino, due bambini televisore. La mamma sferruzza// & Vecchio, un vecchio due vecchi, anziano (anziano, meglio!) anziano, & dorme! Uno, due, tre tavoli. La sedia. & posta, no posta...& // cornici. // Basta*

A thief ... two thieves, stealing & television... no object ... radio. Jewellery ... and so on. Then. The dog (dog, cat) cat, dog! The<sub>fem</sub> adult<sub>male</sub> reading Then. A, a, a child, two children television. Mom is knitting // & Old, a old man two old man aged (aged, better!) aged, & sleeps! One, two, three tables. The chair. & mail, no mail ... & // frames. // Stop.

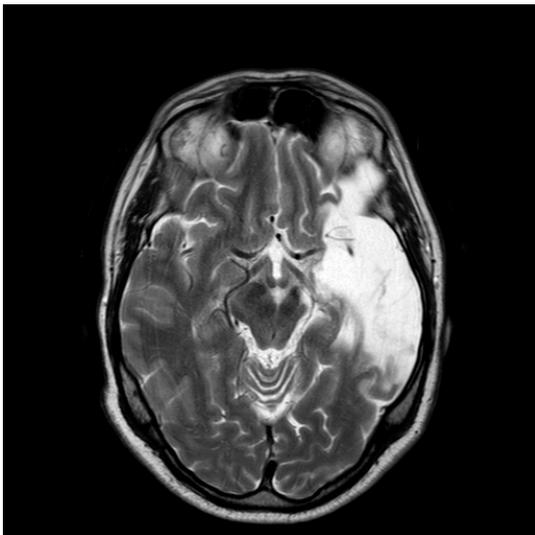
*Valutazione eloquio spontaneo -Descrizione di immagine complessa batteria E.N.P.A (Capasso and Miceli, 2001). October, 2009, Elapsed time: 1:40 min.*

<b>ENPA – Naming (Capasso and Miceli, 2001)</b>		<b>BADA (Miceli et al., 1996)</b>
Nouns	7/10	
Verbs	8/10	
Colours	5/5	
<b>ENPA - Repetition</b>		
Words	9/10	
Non words	2/5	29/35
Sentences	0/3	
<b>ENPA - Comprehension</b>		
Nouns	17/20	38/40
Verbs	20/20	
Sentences	12/14	
<b>ENPA – Phonological Reading</b>		
Words	5/10	
Non words	0/5	
Sentences	0/2	
<b>ENPA – Semantic Reading</b>		
Nouns	38/40	
Verbs	17/20	
<b>ENPA – Writing</b>		
	0	

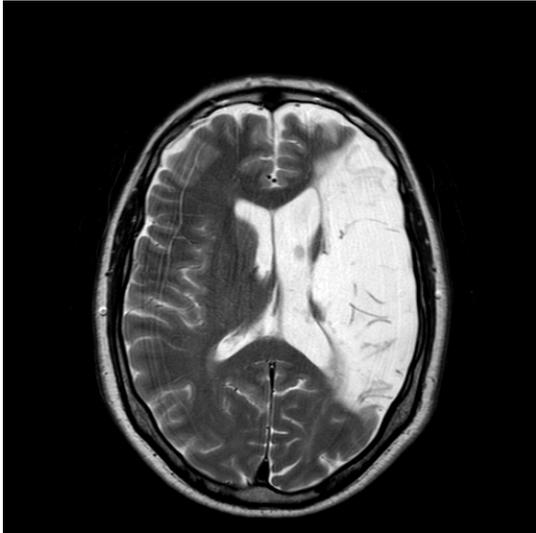
Table 2<sub>B</sub>. FM Linguistic assessment, *BADA & ENPA data*



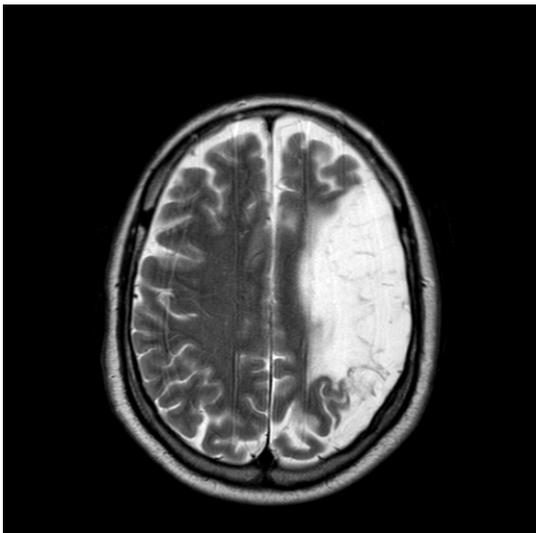
*fig. 1a<sub>B</sub>*



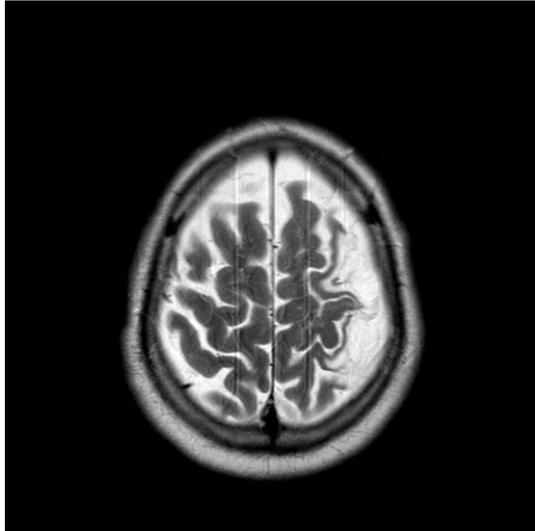
*fig. 1b<sub>B</sub>*



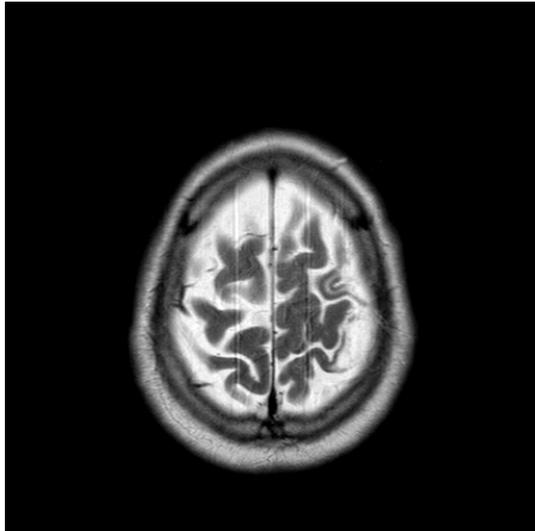
*fig 1c<sub>B</sub>*



*fig. 1d<sub>B</sub>*



*fig. 1e<sub>B</sub>*



*fig. 1f<sub>B</sub>*

### *3.2. Materials*

We administered to FM a repetition task of 82 phrases. Entire clauses were consciously avoided in order not to distress the subject. Every phrase contained two nominal elements (the Figure and the Ground) connected by a complex preposition (the nexus [Axial Part + Simple preposition]), according to an interpretation *à la* Svenonius 2006, of the type illustrated in (2<sub>B</sub>):

(2<sub>B</sub>) {L'albero<sub>Figure</sub> [ accanto<sub>Axial-Part</sub> alla<sub>prep</sub>] casa<sub>Ground</sub> }<sub>phrase</sub>

the tree [ beside to-the] house.

"The tree beside the house".

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

(3<sub>B</sub>) [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 (4).

- (4<sub>B</sub>). a. Prima di mezzanotte  
Before of midnight  
b. Dopo mezzanotte  
After midnight

In (4a<sub>B</sub>) the temporal preposition *prima* is obligatory followed by a monosyllabic preposition, while in (4b<sub>B</sub>) 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 its 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.

Every item was faithfully transcribed during the administration. Moreover, in order to avoid errors, we also recorded the patient's answers and checked transcriptions *off-line* a second time. FM was tested in a quiet room in the rehabilitation centre he attended (*Centro Medico di Foniatria*, Padua, Italy).

### 3.3. Analysis

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

Errors were classified with respect to whether they contained omissions or substitutions of one of the elements in the phrase. Omissions and substitutions were further classified with respect to which element was omitted or substituted.

### 3.4. Results

FM correctly repeated only 4,8% of the items presented. The majority of errors we detected were omissions (88.46%), while the number of substitutions was around ten times smaller (7.69%). Only a single FM's answer contained an error unrelated from both substitutions and omissions, namely the insertion of the copular verb *essere* (to be) between Figure and Axial Part (1.28%). Finally, we detected some phonological paraphasias (2.56%). See Table. 3<sub>B</sub> below:

Errors	%
Omissions	88.46
Substitutions	7.69
Insertion of the copula	1.28
Phonological paraphasias	2.56

Table. 3<sub>B</sub>. General pattern of FM's errors

Substitutions were few and not systematic in their distribution, concerning Axial Part in four cases and articles in other two circumstances.

On the contrary, omissions showed a very interesting distribution among FM's wrong answers. What emerged from our analysis, in fact, was a clear dissociation between the Figure and the Axial Part. In addition, a high preservation of Ground was observed and, quite surprisingly, simple prepositions were very rarely omitted.

### 3.4.1. Omission of Axial Part

The most frequent error we found in FM's repetitions was the omission of the Axial Part (35.89%) with preservation of Figure and Ground. Interestingly, in such a case, simple prepositions were omitted only twice (7.14%), so that the resulting structure was composed, mostly of the times, by {FIGURE + SIMPLE PREPOSITION + GROUND}. In (5<sub>B</sub>) we give an example of FM's answers.

(5 <sub>B</sub> )	a. <i>Target</i> –	Gli	studenti	<i>fuori</i>	dalle	aule.
		The	students	out	of-the	classrooms.
	b. <i>FM</i> –	*Gli	studenti	dalle	aule	
		The	students	of-the	classrooms.	

Moreover, interestingly, despite their presence, simple prepositions were often substituted with another element of the same category. These substitutions were 57.14% (16/28) of FM's answers missing the Axial Part. We also noticed that very often the target element was substituted with a more *salient* one, through which the phrase acquired a new meaning. In this way the patient tried to avoid an ungrammatical result. See for example (6<sub>B</sub>).

- (6<sub>B</sub>) 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 new preposition inserted by FM, leads to a grammatical result which also has a specific meaning different to the one conveyed by the target.

#### 3.4.2 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, in the 29.5% of contexts. See for instance, the example in (7<sub>B</sub>);

- (7<sub>B</sub>). 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. We detected only 2/23 (8.68%) omissions of simple prepositions following the Axial Part *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.

### 3.4.3 Omission of Axial Part and Figure

We also detected some repetitions of the Ground only, with omission of both the Figure and the Axial Part (15.4%). In this case, the simple preposition was most often (9/12; 75%) omitted together with Axial Part. Notice that given that a single element is retrieved, a prepositional linker would not be necessary.

The Ground resulted, therefore, the more preserved element; only four FM's repetitions lacked it (4/78; 5.12%), two of which also missed the Axial Part. Consequently, only 2/78 (2.56%) wrong answers in which the Axial Part and the Figure were present at the same time were found. In addition to the 4 correct answers the patient had been able to give and to the 11 FM's repetitions containing other errors, we have only 17/82 (20.73%) repetitions in which Figure and Axial Part coexist. In conclusion, in FM production Figure and Axial Part 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. 4<sub>B</sub> we summarize errors' distribution in FM's repetition (all the *stimuli* and FM's answers are provided in Appendix A<sub>B</sub>).

Phrase's repetition task	Number	% on total n. of errors
Total number of items	82	-
Correct repetitions	4	-
Omission of Figure	23	29,5
Omission of Axial Part and Figure	12	15,4
Omission of Axial Part	28	35,89
Omission of Ground	2	2,6
Omission of Axial Part and Ground	2	2,6
Other errors <sup>7</sup>	11	14,10
Total n. of errors	78	-

Table. 4<sub>B</sub>. Complete FM error's distribution in the experimental task

#### 4. Discussion

In our experiment, we have found 'unexpected' results, namely the *more* functional item, the simple preposition, is *more* spared than the *more* lexical item the complex preposition- labelled here Axial Part - which additionally turns out to be the most damaged component in our experimental set.

Svenonius (2006) provides an explanation, arguing that complex locative and, possibly, temporal prepositions are basically part of an independent syntactic (functional) category, distinct from both nouns and prepositions. Svenonius motivates his argumentation with a set of empirical diagnostics. Take the following examples (taken from Svenonius, 2006, 49-52):

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<sup>7</sup> Specifically, we found: 2 omissions and 2 substitution of the article, 4 substitutions of Axial Part, 1 insertion of the copula and 2 phonological paraphasias.

- (8<sub>B</sub>). a. There was a kangaroo in the front of the car.  
 b. There was a kangaroo in front of the car.

Interestingly, Froud (2001) reported the case of an aphasic subject, who was able to correctly retrieve sentences like (8a<sub>B</sub>) but was deeply impaired when producing structures like those in (8b<sub>B</sub>) (see also Cinque, 2010a, fn. 27). Notice also that Axial Parts are recruited from the *ranks* of spatial/temporal adverbials, directional particles or even quantifiers across languages and recent neurolinguistic studies (cf. Yarbby Duman and Bastiaanse, 2009; Faroqi-Shah and Dickey, 2009) have actually demonstrated problems with temporal/aspectual adverbs and directional particles in agrammatism.

According to Svenonius (2006) *front* in (8a<sub>B</sub>) acts as a relational noun (i.e. a lexical item), while in (8b<sub>B</sub>) it syntactically operates as an Axial Part. Now, we may see that when the item *front* lacks an overt DP is not able to pluralize, as shown in (9<sub>B</sub>):

- (9<sub>B</sub>) a. There were kangaroos in the fronts of the cars.  
 b. \*There were kangaroos in fronts of the cars.

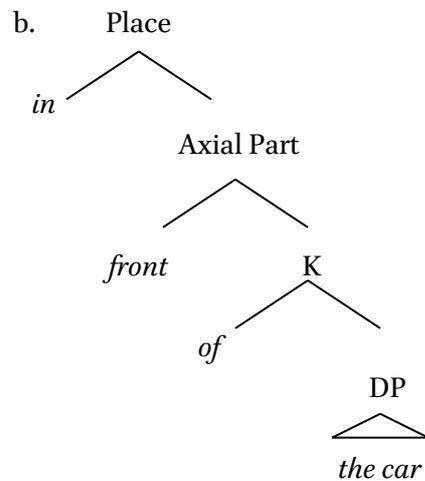
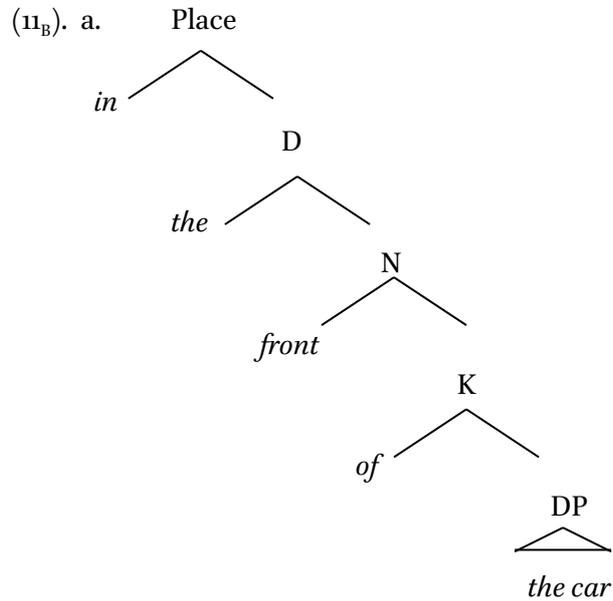
This is a first hint that we are addressing two different underlying syntactic structures; crucially *front* can pluralize only when it is employed as a relational *noun*.

Another hint is given by the fact that the relational noun *front* allows adjectival modification, while modification on Axial Parts, lacking an overt DP, leads to ungrammaticality (for a full set of diagnostics and detailed cross-linguistic investigations, motivating an ontological difference between relational nouns and axial parts, see also Takamine, 2006; Amritavalli, 2007; Fàbregas, 2007):

- (10<sub>B</sub>) 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.

Svenonius (2006, 51-52) proposes different syntactic derivations, in order to explain the asymmetric syntactic behaviour shown in the example above. See the

representation below in (11<sub>B</sub>).



As shown in (11<sub>B</sub>) above, Axial Part crucially lacks the functional structure associated with the relational noun (as illustrated in (10<sub>a<sub>B</sub></sub>)), 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.

The semantic function of the Axial Part, drawing from Talmy's (2000a,b) descriptive insights, is to identify the position of an object, the Figure, by selecting a

region (*the front, back, bottom, etc.*) of a second object, the Ground. What is crucial here is that Axial Part appears to syntactically *link* the Figure to the Ground. Indeed, Axial Part does not merely represent a semantic link between the Figure and the Ground; in fact, as Talmy himself (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. In particular, Talmy (2000a: 334) observes that Figure always “*has syntactic precedence over the Ground*”. Thus, when the Figure is the subject, the Ground is the direct object; consequently, when the Figure is in a direct object position, the Ground can only appear as an oblique indirect complement, and so on. Svenonius’ Axial Parts, extends Talmy’s proposal and motivates a layered functional bottom-up derivation, which is more suited to capture in fine-grained terms, the relation holding between Figure and Ground (see also Pantcheva, 2010).

As we have seen above, in Italian, items which correspond to Axial Part can convey locative/temporal meaning and are sometimes followed by functional prepositions such as *a* (‘at/to’) and *di* (‘of’) (es. *dietro (al)l’albero* ‘(lit.) behind (to) the tree’). Analysing Portuguese prepositions, whose structure is similar to Italian, Benucci (1992) assimilates simple prepositions that follow complex ones to subcategorized prepositions selected by verbs. If this analysis holds true, in Italian simple prepositions following Axial Part can also be considered to be selected by the same complex preposition, carrying its features and linking it to the Ground. These assumptions lead to the conclusion that the structure Figure + Axial Part + Ground recalls an *argumental* structure in which complex prepositions behave as a verb selecting the subcategorized particle and its complement (the Ground)<sup>8</sup> (see however Cinque, 2010a and Terzi, 2010 for a different analysis in which Axial Part is a modifier of a silent Place head). According

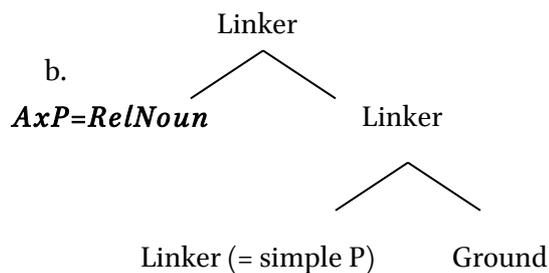
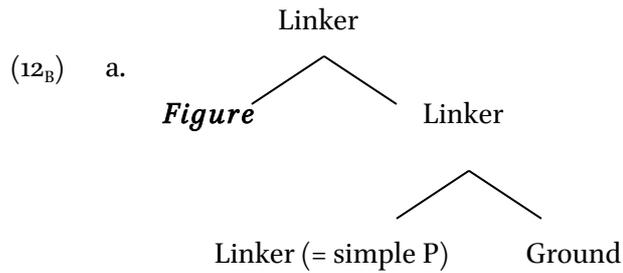
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<sup>8</sup>Notice the relevant fact that Kayne (2009), relying on Hale & Keyser (1993; 2002) argued that all verbs are functional *light verbs* and in chapter 2 (*Case study A*) above we have provided clinical evidence of such a proposal from an anomic patient affected by Logopenic Primary Progressive Aphasia, a degenerative syndrome marked by progressive deterioration of language functions and relative preservation of other cognitive domain.

to this view, the simple preposition (as a case marker) enters in a configuration reminiscent of the *marked accusative* construction in languages such as Spanish, Sicilian, Persian, etc. (see Brugé and Brugger, 1996; Aissen 2003; Iemmolo, 2010; Næss, 2004; de Hoop and Malchukov, 2007, among others). At the same time, Axial Part functions as a syntactic and semantic linker between the “subject” (the Figure) and the Ground. Notice that, as fully expected, Italian complex prepositions can also be used as nouns referring to a physical part of an object (e.g. *Il dietro della casa*; lit. *the back of-the house*). Recent developments in theoretical syntax have also shed light onto the parallelism between (light) verbs and prepositions (cf. Demirdache and Uribe-Etxebarria, 2000, Svenonius, 2007 and the ‘constructionist’ L-syntax of Hale and Keyser 2002).

Returning to our results, FM exhibits serious problems in the processing of the (locative/temporal) construction Figure + Axial Part + Ground. In particular, we have found a dissociation between Figure and Axial Part, which hardly ever coexist in FM’s repetitions. Simple prepositions are almost unaffected which is unexpected under the classical view that simple prepositions are functional elements.

Our proposal is built on the idea that, Complex prepositions can be *retrieved* from the Lexicon either as Axial parts or as relational nouns. If FM retrieves the Figure (which is necessary a *denotational* item, i.e. a noun), he needs a functional (verb-like) element in order to *link* the Figure to the Ground (the item which is the most preserved one also in accordance to a *bottom up* syntactic derivation, cf. Chomsky, 1995 and subsequent works). On the contrary if FM does not retrieve the Figure, he rearranges the complex preposition as a relational noun to obtain the same meaningful (but again, somewhat ‘crippled’) structure: [N *linker* N]. Hence, possibly, in both cases FM tries to produce at least a minimal (meaningful) configuration, somewhat similar to the basic syntactic configuration involving (mediated by) a functional linker *à la* den Dikken (2006). The ‘parallel’ derivations that we hypothesize for FM are sketched below in (12a,b)



The advantage of this proposal is that it is able to explain in a principled way the reason why Figure and ‘Axial Part’ are in complementary distribution in FM’s repetition..

Notice that the idea of a categorial *gradience* of a set of syntactic items (here the complex Prepositions) is quite well established in the theoretically oriented literature (see e.g. Ross, 1972; Corver and van Riemsdijk, 2001; Cardinaletti and Giusti, 2003; Cardinaletti and Shlonsky, 2004).

Alternatively, if we assume that Axial Part and Ground are in a local head-complement, we may hypothesize that when Axial Parts are recovered, they are automatically allowed to license (via a case marking preposition) their Ground complement. Moreover, because Axial Part constitutes a spatial/temporal portion of the Ground, it is also semantically *linked* to it. This may explain why, when FM missed the Figure, he was still able to repeat both Axial Part and Ground.

Furthermore, the same (semantic) *local* relation holding between Axial Part and Ground does not take place between Axial Part and Figure. From a semantic point of view, indeed, the Figure does not *depend* on Axial Part, being free to occupy whatever position in the spatial context of the Ground. Also, if we consider the (unimpaired) syntactic structure/derivation, the Figure behaves as an “external argument” with respect

to the complex preposition, so that its functional relationship with Axial Part is *weaker* than the one established with the Ground (cf. Starke, 2004 or Jayaseelan, 2008 for radical but well motivated implementations of a *specifier less* syntax that support this kind of ‘weakness’). What is more, unlike verbs and subjects, Figure and Axial Part are not required to satisfy an agreement condition and, therefore, their link is even *weaker*.

As a consequence, in FM’s production, when Figure is retrieved, Axial Part has to obligatorily play a functional/verbal-like role<sup>9</sup>, because a *linker* between Figure and Ground is required<sup>10</sup>. Because FM is an agrammatic individual with problems in verbal syntax, Axial Part does not easily resurface in these cases, and is most often omitted. Unexpectedly, Ground happens to be licensed via the functional simple preposition.

Traditionally, simple prepositions are considered to be more functional in nature than complex preposition which have been considered to be lexical elements. If, as we have proposed, Axial Parts are functional in nature, it might also be that it is less computationally demanding to employ one functional element instead of two to link Figure and Ground. As expected in the case of syntactic deficits, the resulting grammatical structure is *simplified* (as shown in (12) above). Under this analysis, FM selected a simple *meaningful* (in the sense of Littlefield, 2006) preposition capable of connecting Figure and Ground without the aid of other functional elements. This simple preposition also has the function of carrying an inherent semantic content. In this regard, the high number of substitutions of the simple preposition in FM’s repetitions missing Axial Part is suggestive. Substitutions occurred when the remaining simple preposition yielded an uninterpretable meaningless phrase.

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<sup>9</sup>There are many typological evidence of the ‘verbal-like’ nature of complex preposition. A paradigmatic example is given by Mosestén, an isolated language spoken in the western Bolivian lowlands (cf. Sakel, 2007).

<sup>10</sup>Notice also that the Figure seems to act as the “subject” of the construction formed by Figure + Axial Part + Ground and that Italian, being a Pro-drop language, allows constructions lacking a morphologically realized subject.

## 5. Conclusion

In this Case study we have investigated the syntax of Italian locative (and temporal) complex prepositions, drawing data from an Italian Broca's aphasic patient.

In its production - analyzed via a structured repetition task - the (locative/temporal) construction involving {Figure + Axial Part + Ground} appears to be unsettled. In particular, we have found a clear dissociation between Figure and Axial Part. Surprisingly, the simple monosyllabic preposition optionally present after the Axial Part, seems to be unaffected. This fact is surprising because it would be reasonable to consider this item as the *most* functional one (and the first candidate to be omitted in the speech of an agrammatic subject). Possibly, given the ambiguous status of complex prepositions- percolating from relational nouns to Axial parts- the patient, able to parse only crippled instances of the proposed *stimuli*, when performing a derivation along the lines of (9b), 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.

## APPENDIX A<sub>B</sub>

ITEMS	RIP. PZ (FM)	n. rip.
1. La macchina fuori strada	+	
2. Il paese fuori dalla crisi	1 <i>fuori dalla crisi</i>	R
3. Una zanzara vicino al mio orecchio	1 <b>al mio orecchio</b> – la zanzara fuori dall'orecchio / 2 la zanzara nell'orecchio	R
4. Il posto lontano da qui	1 <i>lontano da qui</i> / 2 lontano da qui	R
5. Il vento fuori da qui	+	
6. La quiete dopo la tempesta	1 <i>dopo la tempesta</i> – <b>la quiete nella tempesta</b>	R
7. Il sole prima del tramonto	1 <b>il tramonto</b> – il tramonto / 2 prima del tramonto	R
8. il lavoro dopo la laurea	+	
9. La rissa fuori da un ristorante	La rissa fuori dal ristorante	
10. Le mura di cinta davanti al castello	1 <i>fuori dal castello</i> – fuori del castello / 2 le mura fuori dal castello	R
11. L'elio dentro l'atmosfera	Elio dentro l'atmosfera	
12. le caramelle dentro la scatola blu	1 le caramelle dentro alla / 2 le caramelle dentro al muro – le caramelle dentro alla scatola	R
13. il giorno dopo il disastro	<i>Dopo il disastro</i>	R
14. Le maestre vicino a una cattedra	Le maestre fuori le mura / <b>le maestre alla cattedra</b>	R
15. L'istinto dentro di me	1 <b>l'istinto a di me</b> – le distinto dentro di me – dentro di me / 2 +	R
16. La donna dentro (a) una buca	Una donna dentro la buca	
17. Il formaggio dentro il paniere	<b>Il formaggio del paniere</b>	
18. La salute prima di tutto	La salute è dentro di me – la salute dentro di me / 2 +	R
19. La voce fuori dal coro	<b>La voce per il coro</b>	R
20. La squadra fuori dalla coppa	1 <b>dalla coppa</b> – la squadra ha perso / 2 la squadra nella coppa	R
21. Il treno fuori dalle rotaie	1 <b>il treno delle rotaie</b> – il treno a rotaie / 2 il treno a rotaie si è rotto	R
22. Il pianeta lontano dal sole	<i>Lontano dal sole</i>	
23. Il gessetto vicino alla lavagna	<i>Vicino alla lavagna</i> – <b>il gessetto alla lavagna</b>	
24. Un posto fuori dal tempo	<i>Un fuori dal tempo</i> / un posto dimenticato da Dio e dagli uomini	R
25. La protesta davanti a delle ambasciate	1 <b>ambasciate</b> – <b>la protesta ambasciata</b> – <b>la protesta nella ambasciata</b>	

26. La luce davanti agli occhi	Luce davanti agli occhi	
27. Le galline fuori dai cortili	<i>Fuori dai cortili / +</i>	
28. Il cielo prima della pioggia	<b>1 La pioggia / 2 della pioggia</b>	R
29. La carne fuori da una cella frigorifera	<b>1 la cella frigorifera / 2 la carne fuori dal frigorifero</b>	R
30. Gli elettroni lontano dal nucleo	<b>Nucleo – gli elettroni nel nucleo</b>	
31. Il presidio davanti a una scuola	<i>1 davanti a una scuola / 2 il presidio autoscuola</i>	R
32. Le case lontano da una scuola	<i>1 le strade – le strade davanti</i>	
33. Il martello vicino all'incudine	Il martello dentro all'incudine	
34. Il Cile davanti alle Elezioni	<i>1 Il Cile davanti a lezioni / 2 +</i>	R
35. L'atleta lontano dal podio	<i>1 lontano dal podio / 2 l'atleta</i>	R
36. La preghiera prima dei pasti	<b>La preghiera dei pasti – la preghiera nei pasti</b>	
37. Il corridore davanti a tutti	<i>2 davanti a tutti / 3 davanti a tutti</i>	R
38. L'alimentazione durante la gravidanza	<b>La gravidanza – limentazione alla gravidanza</b>	
39. La società italiana durante il fascismo	<b>Il fascismo - davanti al fascismo / 2 davanti al fascismo</b>	R
40. L'Egitto prima delle sabbie	<b>L'Egitto alle sabbie</b>	
41. Le informazioni lungo il viaggio	<i>Lungo il viaggio</i>	
42. Il percorso lungo la via della seta	<b>Via della seta – via dalla seta</b>	
43. Gli alberi lungo la ferrovia	<i>Lungo fa ferrovia – ferrovia</i>	
44. La stazione vicino a un paese	<i>Vicino al paese – la stazione ferrovia</i>	
45. Il fulmine prima del tuono	<b>1 Fulmine della tempesta / 2 + con aiuto</b>	R
46. La preparazione prima di una gara	L'eparazione prima della gara	R
47. La paura prima di un esame	<b>La paura dell'esame</b>	
48. Quella radura davanti a un bosco	<b>La radura nel bosco</b>	
49. Il riposo durante le giornate	<i>Durante le giornate</i>	
50. La bambina davanti alla finestra	<i>1Davanti alla finestra / 2+</i>	R
51. Gli studenti fuori dalle aule	<b>Gli studenti dalle aule</b>	R
52. Le scarpe vicino agli stivali.	Le scarpe	R
53. L'atleta davanti alle tribune.	<i>1Davanti le tribune / 2 l'atleta tribuna</i>	R
54. L'attore davanti al pubblico	<i>Davanti al pubblico</i>	
55. L'albero fuori da casa mia.	<b>L'albero a casa mia</b>	RR
56. Il bagno vicino all'uscita.	<b>Il bagno della uscita</b>	
57. Le rane davanti allo stagno.	<b>Le rane dello stagno</b>	
58. Gli impiegati davanti agli schermi.	<i>1davanti agli schermi / 2gli impiegati allo sp.</i>	R
59. L'altalena vicino allo scivolo.	<b>L'altalena con lo scivolo</b>	
60. Lo straccio vicino ai detersivi	<b>Il straccio detersivi – del detersivi</b>	

61. I turisti fuori dai musei.	<b>1I turisti dal museo / 2i turisti al museo</b>	R
62. La casa lontano dall'università	1 università / 2 la casa distante	R
63. Il viaggio lontano da Roma	<b>Un viaggio da Roma</b>	
64. Le penne fuori dall'astuccio.	<b>Le penne dall'astuccio</b>	
65. I ragazzi davanti a Marco	<b>1I ragazzi da Marco – con Marco / 2 +</b>	R
66. I cani vicino alla cuccia.	<b>I cani nella cuccia</b>	
67. Gli operai vicino alle macchine.	<b>Gli operai nella macchina</b>	R
68. Il fumo lontano dagli occhi	<b>1Il fumo negli occhi / 2il fumo uccide</b>	R
69. La biancheria fuori dagli armadi	<i>1Fuori degli armadi / 2 La biancheria fuori degli armadi</i>	R
70. Il bambino davanti alla televisione	+	
71. Lo studente vicino a Maria.	<b>1 Lo studente alla fattoria / 2 Lo studente alla Maria</b>	RR
72. Il picnic lontano dallo smog	Dallo smog - lontano dello smog	
73. La medicina lontano dai pasti	La medicina dopo i pasti	
74. L'alpinista lontano dal burrone.	<b>L'alpinista burrone</b>	
75. I tifosi fuori dallo stadio	<b>I tifosi dello stadio</b>	
76. I genitori fuori dalla scuola	I genitori fuori – <b>i genitori nella scuola</b>	R
77. Il fuoco lontano dalle piante.	<b>Il fuoco alle piante</b>	
78. La voce fuori dal coro	<b>1le voci del coro / 2fuori dal coro</b>	R
79. Gli alberi vicino al fiume.	<b>Gli alberi nel fiume</b>	
80. Le guardie davanti all'entrata.	<i>1 davanti ai ladri 2 le guardie davanti al portone</i>	R
81. I vasi davanti ai mobili.	<i>1Davanti i mobili / 2davanti ai mobili</i>	RR
82. Il bosco lontano dalla città.	<b>Il bosco nella città</b>	

## Chapter 4

### *Case study C*

#### *A-bar scrambling in repetition in Mixed Transcortical Aphasia*

## 1. Introduction

The present study deals with a sentence repetition's task in MB, an Italian patient with Mixed Transcortical Aphasia.

The term transcortical aphasia identifies a range of syndromes in which the main lesions do not involve the receptive and expressive language areas (Broca's area and Wernicke's area), but rather brain's areas in relation with the association cortex (Berthier, 1999). Crucially, patients with transcortical aphasia are able to repeat what they have heard, but have difficulty producing spontaneous speech or understanding sentences. Frequency of transcortical aphasias is relatively very low (Perdersen, Vinter and Olsen, 2004).

Two major subtypes of transcortical aphasia have been traditionally distinguished (Rubens, 1976; Davis et al., 1978; Alexander, Hiltbrunner and Fischer, 1989; Berthier et al. 1991): *transcortical motor aphasia* and *transcortical sensory aphasia*, each one presenting rather characteristic clinical manifestations (refer to Berthier, 1999, for a detailed overview). In both major subtypes, however, language repetition is preserved. Moreover, both subtypes can appear simultaneously leading to *mixed transcortical aphasia* (henceforth, MTA).

Basically, MTA (also known as the "syndrome of the isolation of the speech area") is a rare syndrome in which the patient behaves like a global aphasic but he still can repeat (Alexander and Hillis, 2008).

In patients with MTA, the linguistic output is very reduced (few words and paraphasias), often quite analogous to global aphasia, although stereotyped utterances are somewhat less usual (Alexander and Hillis, 2008). Echolalia is often present and repetition is relatively well preserved, with patients that are sometimes able to repeat surprisingly long sentences very accurately without relevant articulatory difficulties (Heilman, Tucker and Valenstein, 1976; Scott and Schoenberg, 2011). MTA patients may also show features of the *completion* phenomenon: when stimulated with the beginning

of a common phrase, they are sometimes able to repeat what has been said and even continue the phrase to completion. MTA patient's verbal output, however, often appears mechanical and unwitting (Bogousslavsky, Regli and Assal, 1988).

The most typical lesion in MTA is a very large prefrontal injury with deep extension (Bogousslavsky, Regli and Assal, 1988; Rapcsak et al., 1990; Maeshima et al., 1999). In the patient whose case report defined this syndrome, MTA was due to bilateral hypoxic neuronal loss in the arterial border zone (Geschwind, Quadfasel and Segarra, 1968; Alexander, 1997). Ischemic damage in the left border zone *de facto* cause the same disease. Many cases of MTA are actually due to large anterior thalamic lesions and have involved the anterior, ventrolateral and dorsomedial nuclei (Graff-Radford, et al., 1985; Alexandex, 1997; Berthier, 2001). Damage to these three nuclei strongly prunes the frontal lobes of thalamic *stimuli* (McFarling et al. 1982). MTA has also been described as a postictal epileptic phenomenon (Yankovsky and Treves, 2002).

Neurologic findings can vary considerably (Berthier et al. 1991). Some patients with MTA show bilateral upper motor neuron paralysis, namely a severe spastic quadriplegia showing bi-hemispheric damage (Nagaratnam and Nagaratnam, 2000). A visual field defect, usually a right hemianopsia, is present in a lot of cases (Speedie, Coslett and Heilman, 1984; Pulvermüller and Schönle, 1993; Davous and Boller, 1994; Catani and Ffytche, 2005). Other patients have right hemiplegia and sensory loss (Nagaratnam and Gilhotra, 1998). MTA is usually found in subjects with severe brain injuries, and an extended set of neurologic and neurobehavioral disorders are present (Berthier, 1999).

Recently, MTA has been suggested as striking evidence against the *mirror neuron theory* of action understanding (cf. Rizzolatti and Craighero, 2004; Rizzolatti and Arbib, 1998; Gallese et al. 1996; Di Pellegrino et al., 1992), and more specifically against the motor theory of speech perception (see e.g. Liberman, 2007; Kohler et al. 2002; Galantucci, Fowler, and Turvey, 2006; Corballis, 2010), which roughly states that phonetic portions in the acoustic speech flow activate previously stored motor commands in the brain, which in turn give rise to perception of discrete speech sounds (Hickok, 2009; Venezia and Hickok, 2009).

MTA represents a problem for the mirror neuron theory because it is a syndrome

that clearly demonstrates the *dissociability* of motor-speech functions and speech understanding, just due to the fact that it is mainly characterized by severe deficits in speech comprehension despite a well-preserved capacity in repeating complex sentences.

Specifically, lesions in the left frontal and posterior parietal regions seem to damage networks playing a role in mapping speech onto conceptual-semantic representations, while leaving the sensory-motor functions supporting repetition of speech intact (Lotto, Hickok and Holt, 2009). This dissociation, being quite opposite to the one observed in Broca's aphasics, would show that – directly counter to the motor theory of speech perception – preservation of motor speech functions is neither necessary nor sufficient for speech perception.

Furthermore, MTA has been taken as a *hint* showing that both hemispheres take their shares in language control in an unimpaired human brain (Pulvermüller and Berthier, 2008). While indeed syntactic functions do not seem to resurface in right-hemispheric language processing (Dobel et al., 2001; Moro et al. 2001; Musso et al. 2003; Crosson et al., 2005), residual right-hemispheric language functions at the lexical semantic level are clearly evident in MTA especially with clinical patterns that involve a complete lesion of the left-perisylvian areas or even hemispherectomy (Berthier, 1999; Kastrau, et al. 2005; Pulvermüller and Schönle, 1993; Mohr, Pulvermüller and Zaidel, 1994; cf. also chapter 5 and 6 for the description of a case of *agrammatic* Crossed Aphasia).

## **2. Scrambling**

Our paper analyses the performance in sentence repetition of MB, an Italian right-handed patient with MTA and especially deals with a “scrambling” phenomenon - which is very unlikely to be found in a repetition task and has not been previously investigated for the MTA syndrome, in the literature. Actually, we will show below that our patient performs “selective scrambling” when asked to repeat a given sentence.

Scrambling is still a controversial matter of debate within theoretical linguistics (Sabel and Saito, 2005). The term scrambling is commonly employed in the literature for

the phenomenon of free (or not canonical) word order (Karimi, 2003). Many languages allow considerable flexibility with respect to word order and scrambling has been investigated in details for a variety of languages, such as Japanese (Saito, 1985, 1992; Fukui, 1993), German (Fanselow, 2001; Webelhuth, 1990; Müller and Sternefeld, 1993), Italian (Frascarelli, 1999; Cardinaletti, 2004; Brunetti, 2009; Samek-Lodovici, 2009), Dutch (Neeleman, 1994), Turkish (Kural, 1992), Spanish (Torrego, 1984; Ordóñez, 1998), Icelandic (Holmberg, 1986; Haider and Rosengren, 2003), Hindi (Mahajan, 1990; 1994), Hungarian (Kiss, 1998), Warlpiri (Hale, 1983), Jingulu (Pensalfini, 2004), Serbo-Croatian (Bošković, 2001), Russian (Bailyn, 1995), Persian (Karimi, 2005; Adli, 2010).

Scrambling isn't a unified phenomenon because it involves a set of syntactic operations *within* a clause or *out of* a finite clause (and combinations of them) regarding for example object shift, topicalization/focalization, rightward movement, etc. (See the examples in (1<sub>c</sub>-5<sub>c</sub>) for Persian, adapted from Karimi, 2005: 16-18, which show only a partial set of scrambling operations available for this language).

(1<sub>c</sub>) *Scrambling of the specific object over the subject*

- a.      pirhan-o          Parviz          barâ    Kimea xarid  
           shirt-râ          P.                  for      K.          bought

'As for the shirt, Parviz bought (it) for Kimea.'

Or 'It was the SHIRT that Parviz bought for Kimea.'

- b.      Parviz goft    ke      pirhan-o          Rahjue barâ    Kimea xarid  
           P.          said    that    shirt-râ          R.          for    K.          bought

Lit. Parviz said that, as for the shirt, Rahjue bought (it) for Kimea.

Or 'Parviz said that it was the SHIRT that Rahjue bought for Kimea.'

(2<sub>c</sub>) *Scrambling of the Indirect Object over the Subject*

- a.      be      Sasan hame          mi-xand-an  
           to      S.      everyone          dur-laugh-3pl

'As for Sasan, everyone laughs at (him).' Or

Lit: It is at SASAN that everyone laughs.

b. Arezu goft ke be Sasan hame mi-xand-an  
A. said that to S. everyone dur-laugh-3pl

Lit. Arezu said that as for Sasan everyone laughs at (him).

Or Arezu said that it is at SASAN that everyone laughs.

(3c) *Long distance scrambling of the embedded subject*

Kimea pro mi-dun-am ke in film-ro did-e  
K. dur-know-1sg that this movie-râ saw-3sg

'As for Kimea, I know that (she) has seen this movie.'

(4c) *Long distance scrambling of the embedded specific direct object*

in film-ro pro mi-dun-am ke Kimea did-e  
this movie-râ dur-know-1sg that K. saw-3sg

'As for this movie, I know that Kimea has seen (it).'

(5c) *Long distance scrambling of the embedded indirect object*

be Kimea man fekr mi-kon-am ke Arezu un ketâb-ro dâd-e  
to K. I thought dur-do-1sg that A. that book-râ gave-3sg

'To Kimea I think that Arezu has given that book.'

There aren't many studies on scrambling-related phenomena within impaired populations. Bastiaanse, Koekoek and van Zonneveld (2003) studied object scrambling in Dutch Broca's Aphasia, showing that, for agrammatic patients, sentences with the scrambled word order are more difficult to produce than sentences with the basic word order, even when scrambled orders would give pragmatically more acceptable sentences

(see also Bastiaanse, 2008). Burchert, Meißner and De Bleser (2008) studied a group of German agrammatic subjects with a set of elicited canonical sentences without object movement and a set of non-canonical scrambled sentences with object movement. The results of the study show again that Broca's aphasics have a specific problem with the production of scrambled sentences. Further evidence of their study (achieved from spontaneous speech, elicitation of object relatives, questions and passives) confirms that non-canonical sentences are generally more difficult for agrammatics' production. Similar findings are reported for a case study recently conducted with an Italian Broca's aphasic (Garraffa and Grillo, 2008; Grillo, 2009; Garraffa, 2011). Furthermore, Yarbay Duman et al. (2007) compared the production of simple active sentences in base order (SOV) with active sentences in which the object moves over the subject (OSV) in Turkish for a group of eight Turkish agrammatic speakers, finding that object scrambling is impaired also in Turkish Broca's aphasics production. A recent investigation of the behaviour of Russian Broca's aphasics (Dragoy and Bastiaanse, 2010) show the same problems for scrambled sentences' production and, more specifically, the data show that Russian agrammatic speech difficulties are related to the number of operations applied to the syntactic structure of a produced sentence (or, from a different perspective, to changing the base-generated position of constituents). Similar impairments in *scrambled* non-canonical sentences have been detected within a population of Dutch and English Wernicke's aphasics (Bastiaanse and Edwards, 2004).

In the theoretical oriented literature, scrambling has been analyzed as a *stylistic* phenomenon or as a *syntactic* phenomenon (the latter approach roughly subdivided into base generated/flat analyses and movement analyses, as will be shown below). The term was coined by Ross (1967), who originally proposed the *rule* of scrambling as an operation of the stylistic component and not of (core) syntax. A key-point in the contemporary linguistic research on the topic, are the fieldworks of Kenneth Hale (1983, 1992), who addressed free word order in non-configurational languages such as the Australian language Warlpiri, observing that those languages show a whole set of intriguing features such as e.g. pro-drop and discontinuous constituents. Hale originally argued that free word order is a base (parametric) property, namely the result of various

base-generated word orders. Interestingly, various researchers on Australian languages have frequently observed the inability of speakers to repeat a sentence with the same word order (see Evans and Levinson, 2009). In particular for Warlpiri, “sentences containing the same content words in different linear arrangements count as repetitions of one another” (Hale 1983: 5) and “when asked to repeat an utterance, speakers depart from the ordering of the original more often than not” (Hale, Laughren and Simpson, 1995: 1431).

On the opposite side, it has been argued that scrambled word orders in other less exotic languages such as German and Japanese are syntactically derived from the basic word order by movement (see, for example, Saito, 1985 for Japanese, and Grewendorf and Sabel, 1999 for German), although more refined base-generation proposals have been advanced in recent years to explain the free word order phenomenon in these languages as well (see, for instance Bošković and Takahashi, 1998 for Japanese and Fanselow, 2001 for German; see also Kiss, 1998 for Hungarian). For those who pursue the movement approach, the analyses of the properties of the relevant movement operation involved in scrambling processes have become a crucial research topic (Sabel and Saito, 2005), leading, for example, to the proposal of dedicated positions for scrambled constituents within a fine grained/cartographic articulation of syntactic projections (see Rizzi, 1997; Rizzi, 2006; Rizzi and Shlonsky, 2007 or the extremely articulated/layered proposal of Benincà and Poletto, 2004).

Within the Minimalist Program (Chomsky 1995, 2000), it is assumed that the core syntactic computational system has two interfaces, the conceptual-intentional and the articulatory-perceptual, and within this contemporary framework of research, it is still debated whether scrambling is an operation in the core syntax or if it is a stylistic rule that falls outside of core syntax. Under the minimalist assumption that movement exclusively applies to check morphological features (Movement as *Last Resort*), there should be a syntactic trigger for this scrambling that could be analyzed as a feature-driven movement operation, caused either by an EPP-/scrambling-feature (Karimi, 2005) or by a topic-/focus-feature. On the opposite side, base-generation analyses consider that the phenomenon is inherently optional (hence, not *triggered*) *a priori*: different word orders obtain as different choices for the base structure are made (Sabel and Saito, 2005).

However, these differences in the interpretation of scrambling for various kinds of languages, probably, suggest that free word order phenomena are not a homogeneous phenomenon and that there is no univocal syntactic macro-parameter responsible for the absence/presence of the phenomenon. (see Baker 2001 for the description of different types of free word order languages, e.g. configurational and nonconfigurational languages, and Pensalfini 2004 for a convincing analysis of scrambling applied to Jingulu, within the paradigm of Distributed Morphology; see Halle and Marantz, 1993). Actually, detailed examinations and comparisons of specific languages would be necessary to discover the inner sources of the scrambling phenomenon. An example of the differences concerning the scrambling phenomenon that can be found among natural languages is given with respect to the locality restrictions applied on it: scrambling out of finite clauses is possible in languages such as Hindi, Korean, Japanese, Persian, Serbo-Croatian and Russian, but not in Polish, German, Dutch, and Warlpiri (Sabel and Saito, 2005). Furthermore, languages such as German, Dutch and Warlpiri have obligatory overt *wh*-movement and very restricted *wh*-scrambling. In this regard, these languages behave differently if compared e.g. with Persian Hindi, Korean Japanese, and Serbo-Croatian (see Karimi, 2005; Grewendorf and Sabel 1999 for discussion).

Finally, a crucial fact to be mentioned here is that, from a descriptive viewpoint, scrambling often applies in order to achieve information structure effects. Under this analysis, the scrambled element represents a Topic or a Focus, enhancing / triggering the syntax-pragmatic interface (Rizzi, 1997; Bocci, 2004).

### **3. Method and Materials**

#### *3.1 A preliminary observation*

As said, this is an experiment of sentence repetition in MB, an Italian patient with MTA. Patients with Transcortical aphasia have often been observed (in English) to regularize minor syntactic violation when they are asked to repeat ungrammatical sentences (Davis et al., 1978). Our first aim was to confirm this observation, thus we

administered the patient a repetition task including some ungrammatical sentences, with errors concerning simple and articulated prepositions (e.g. errors in *phi-features*, substitutions, etc.). The patient was asked to repeat every sentence exactly in the same way the examiner had pronounced it. As expected, MB tended to regularize the errors included in the sentences, giving answers containing the correct preposition, as shown in Table 1<sub>C</sub>.

	Total n. of sentences	Regularizations	
		n.	%
Ungrammatical sentences	59	23	39

Table 1<sub>C</sub>. MB performance with ungrammatical sentences

This result was expected and, as said, had already been observed for the English language. Nevertheless, a previously unobserved pattern emerged during this experiment. We noticed that MB tended to selectively perform scrambling of some constituents of the sentence. Specifically, the patient managed to repeat all the proposed phrasal chunks, even in case of complex and long sentences, but he often *recombined* the word order by moving a constituent either at the beginning of the sentence or in another non canonical position (cf. Belletti, 2004; 2005; e.g. *Gianni con rabbia ha colpito il Pallone*, *lit.* John, with anger, kicked the ball vs. *Gianni ha colpito il Pallone con rabbia*, John kicked the ball with anger).

Interestingly, he most often scrambled the constituent in which an *anomaly* had been inserted. Moreover, once he had moved the element, he was able to reorganize the sentence in order to obtain an acceptable result.

In the light of these results we thought that the ungrammatical items included in the sentences worked as trigger of scrambling and that that operation was used by the patient to better remember the elements he perceived as incorrect. Nevertheless, observing the few grammatical sentences which had been used as distracters, we noticed

that scrambling was also present, even if in minor proportion. A deeper analysis of MB's repetitions revealed, therefore, that he only moved *adjoined constituents* or (oblique) optional complements. In other words, only optional/adjoined elements were “affected” by scrambling.

This fact explains the high number of errors in the ungrammatical sentences. Anomalies, in fact, only concerned prepositional phrases, which, in Italian, are likely to introduce adjuncts or oblique complements.

To better investigate this preliminary observation, we decided to create a repetition task composed by grammatical sentences only. As we will show, the patient performed again a very high percentage of scrambling operations with optional constituents. In Table 2<sub>c</sub> we report data concerning the preliminary task, showing percentage of scrambling in ungrammatical and grammatical sentences.

<b>Sentences</b>	<b>% scrambling of the adjunct</b>
Ungrammatical sentences	43.3
Grammatical sentences	20

Table 2<sub>c</sub>. Preliminary task. Scrambling in grammatical vs. ungrammatical sentences

### 3.2 *Experimental Procedures*

#### 3.2.1 *The patient*

MB is a 49 years old right-handed man with 13 years of education. He is Italian, living in the Venice province. In February 2010 he suffered a stroke that caused a very extended lesion of the left parietal and frontal (including mesial frontal) lobes, the insula, the dorsal and ventral striatum and the anterior thalamus. BM also has a quite pronounced cerebral atrophy (see the T1w MRI brain images below in Fig.1<sub>c</sub>). His language functions

were evaluated via batteries of both standard and not-standard tests (the Italian version of AAT, Huber et al. 1983; BADA, Miceli et al. 1994). He showed very little (non-fluent) spontaneous speech with relatively spared comprehension at the time of testing, together with a deep dissociation between reading (spared) and writing (heavily impaired). The patient was also able to perform sentence repetition tasks with very minor difficulties. He was diagnosed as a case of TMA. His verbal memory resulted completely spared whereas his working memory was heavily impaired.

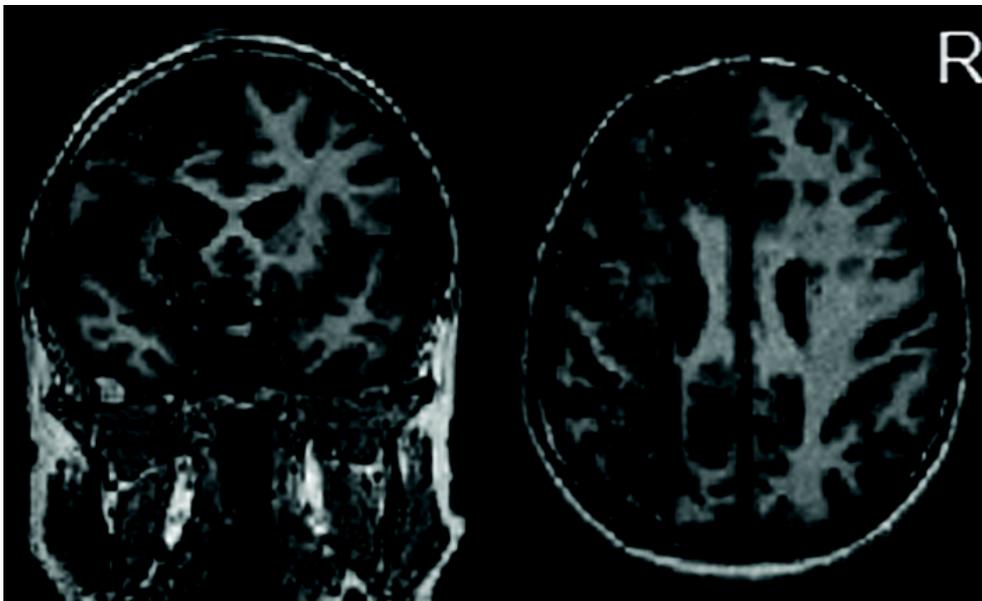


Fig. 1<sub>c</sub> Axial and coronal T1w images of MB's brain.

### 3.2.2 Materials

Our repetition task included, in all, 234 sentences. To verify our previous observation we prepared three types of sentences:

- (a) 120 sentences without adjuncts constituents or optional oblique complements;
- (b) 104 sentences containing adjuncts or optional oblique complements;

(c) *a few sentences (10) in which a constituent was already been scrambled.*

We used both short and long sentences as well as many different balanced syntactic constructions in all the three groups of items. In this way the only difference between sentences pertaining in particular to group (a) and (b) was the presence or the absence of optional constituents. At a first observation, only adjuncts or complements, which take scope on the entire sentence were scrambled by MB. Thus, optional constituents specifically related to a single element of the clause (e.g. modifiers of a noun phrase) were inserted in the first group of items.

We provide below a detailed list of all sentences (see Appendix A<sub>c</sub> for the complete sets of *stimuli*) included in the three groups of items (translations are to be considered literally, given the presence of some constructions which do not exist in English):

The set (a) included:

- (i) Simple sentences with transitive verbs (*lo specchio riflette la mia immagine, lit. the mirror reflects the my image*);
- (ii) copular constructions (*la medicina non è una scienza esatta – lit. the medicine is not a science exact*);
- (iii) passive sentences (*la porta è stata chiusa dal vento - lit. the door was closed by the wind*);
- (iv) pronominal sentences (*La macedonia si mangia col cucchiaino – lit. The fruit salad [impersonal clitic] eats with the spoon ...*);
- (v) complex sentences (hypothetical, temporal or infinitival subordinates, e.g. *anche se piangi non ti prenderò in braccio, lit. even if cry I won't pick you up*);
- (vi) sentences with unaccusative verbs (*è uscito un film interessante – An interesting film is come out*);

(vii) sentences with verbs that take three arguments, the third of which being obligatory for achieving the grammaticality of the sentence (*Gianni porta sempre suo figlio allo stadio* – John always takes his son to the stadium).

The set (b) included:

(i) sentences with transitive verbs (*i bambini aspettano l'estate con impazienza* – lit. children are waiting for the summer **with impatience**);

(ii) copular constructions (*il ventilatore è acceso in salotto* – the ventilator is working **in the living room**);

(iii) pronominal sentences (*Luca si è tagliato con la carta* – Luca cut himself **with the paper**);

(iv) sentences with unaccusative verbs (*il bicchiere è caduto dalla tavola* – the glass is fallen **from the table**),

(iv) sentences with verbs that take three arguments, the third of which being not obligatory for achieving the grammaticality of the sentence, but also including a further adjunct (*La compagnia telefonica spedirà una lettera il mese prossimo ai turisti francesi* – the telephone operator will send a letter **the next month** to French tourists).

The set (c) included:

(i) sentences in which a constituent has already been scrambled, e.g. left dislocated (*Il ladro lo ha arrestato il commissario* – lit. **The thief**, him had arrested the police chief)

### 3.2.3. *The repetition task*

Our tasks were not wearying for MB, given that he had not problems in repeating and that his verbal memory was preserved. Despite this, items were randomly organized

and presented to the patient in 5 separated sessions including about 45 sentences and lasting few minutes. The administration of a limited number of items at a time was necessary to avoid the collection of many incomplete answers. In fact, when MB began to perceive his errors, he tended to interrupt his repetition after he had pronounced one or two words of the scrambled constituent.

The patient was asked to faithfully repeat every sentence as soon as he had heard it from the examiner.

Every session was digitally audio-recorded and answers were both transcribed at the moment and checked in a second time. The examiner presented the stimuli to the patient twice only if the patient asked him to do so.

### *3.4. Analysis*

Only repetitions exactly matching with the target sentence were considered correct. Errors were classified with respect to whether they contained scrambled elements. Moreover the different types of constituents which had been moved were separately analyzed.

BM's production was also analyzed using PRAAT (Boersma, 2001), a scientific software program for the analysis of speech in phonetics/ phonology. Since BM tended to move adjuncts in non-canonical positions, which, in Italian, are normally occupied by prosodically marked (e.g. focalized) elements, we used the *ProsodyPro* script designed by Xu (2005) for PRAAT to check if BM's scrambled sentences were prosodically marked as *foci*.

## **4. Results**

As expected, MB performed in general a high number of right answers, confirming that his capacity of correctly repeating was quite spared. See Table 3<sub>c</sub> below for details.

<b>Sentences</b>	<b>%</b>
<b>Correct</b>	80.77
<b>Errors</b>	19.23

*Table 3<sub>C</sub>*. General pattern of the experimental set

Despite this fact, a deeper analysis of MB's answers revealed that the distribution of errors changed depending on the type of sentence our subject had to repeat. As shown in Table 4, in fact, the majority of wrong repetitions affected sentences which contained adjuncts or oblique optional constituents.

<b>Sentences</b>	<b>% errors</b>
Without optional constituents	7.5
With optional constituents	32.69

*Table 4<sub>C</sub>*. Sentence with optional constituents vs. sentences without optional constituents

Even more interestingly, the qualitative analysis of MB's errors revealed that the canonical word order in sentences without adjuncts or optional complements was hardly ever changed. As shown in Table 5<sub>C</sub>, only one case of scrambling was detected, while all other errors concerned sporadic omission and substitutions of both lexical and functional elements. We also noticed that the percentage of scrambling was the same than that of all other errors.

<b>Errors in sentences without optional constituents</b>	<b>Absolute n.</b>	<b>% on total n. of errors</b>
Non production	3	33.33
<b>SCRAMBLING</b>	<b>1</b>	<b>11.11</b>
Omission of a nominal modifier	1	11.11
adverb omission	1	11.11
Article omission	1	11.11
passive to active	1	11.11
Subject omission	1	11.11

Table 5c. Type of errors in sentences without optional constituents

To verify our previous assumption, we also separately analysed sentences including adjuncts strictly modifying a single phrase. As we expected, on a total of 13 sentences, no errors were detected, confirming that BM's deficit selectively affected optional elements, taking scope on the entire sentence.

On the other hand, when an optional constituent was present, MB tended to move it at the beginning of the sentence (more frequently) or in another higher non-canonical position (e.g. in a VP peripheral position within the low IP area, following the insight of Belletti, 2004). Moreover, MB often interrupted the repetition when he realized that his performance was not correct. As a consequence, we collect some incomplete answers including only one or two words which should not appear at the beginning of the sentence. We classified these answers as "beginning of scrambling". Adding these "beginning of scramble" cases to complete sentences with a scrambled constituent, we will obtain an even higher percentage [70.59 %] of occurrence of the phenomenon under discussion here.

The prosodic analysis performed with PRAAT revealed that, very surprisingly, in MB repetitions, a very high percentage [91.3%] of the scrambled constituents receives a special prosodic contour, anchored on the last word of the moved phrase, namely the

moved constituent seems to be informationally treated by our patient as a (contrastive) focus (cf. Benincà, Salvi and Frison, 1988, Rizzi, 1997, Bocci, 2004).<sup>11</sup>

In the figures below, some examples are provided where Focus peaks are easily recognisable.

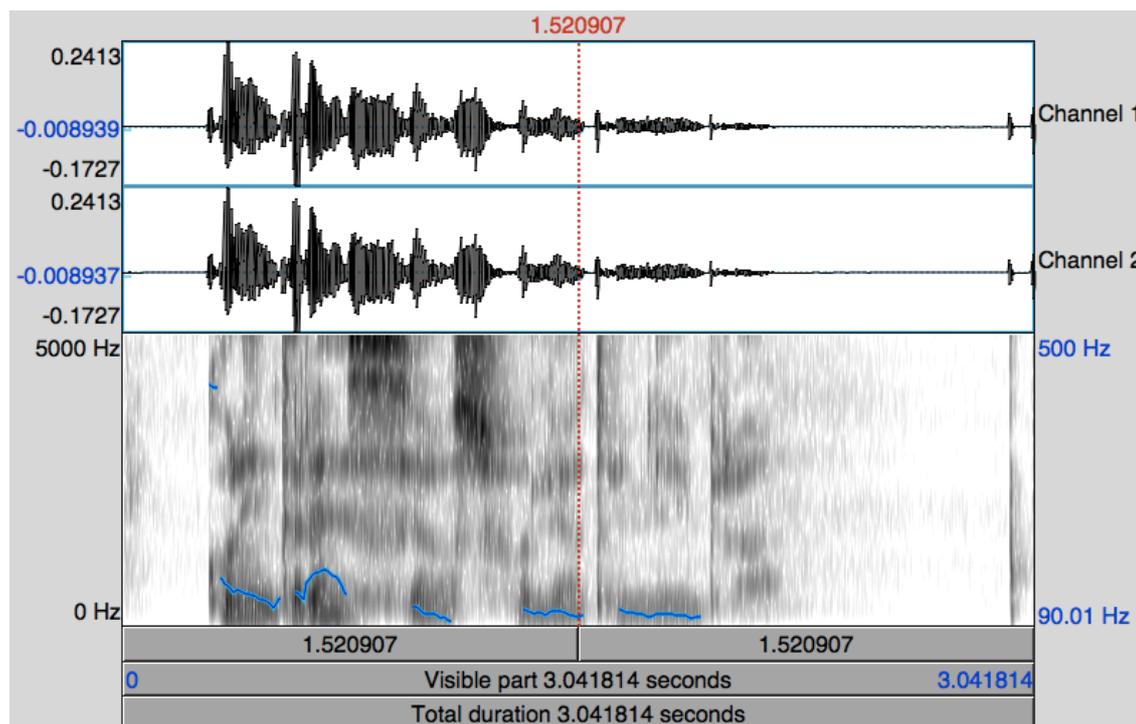


Figure 2a<sub>c</sub>. Phonetic analysis of MB sentence “Con interesse ho sfogliato il libro” [target answer: *ho sfogliato il libro con interesse*, I have read the book with interest]

<sup>11</sup> It is well known that many languages show consistent interactions between prosody and syntax: e.g., languages like Italian or Catalan use word order changes so that particular items that must be in focus can phonologically receive accent; in such languages, word order changes *must* accompany accentuation (see Bocci, 2004; Ladd 2008).

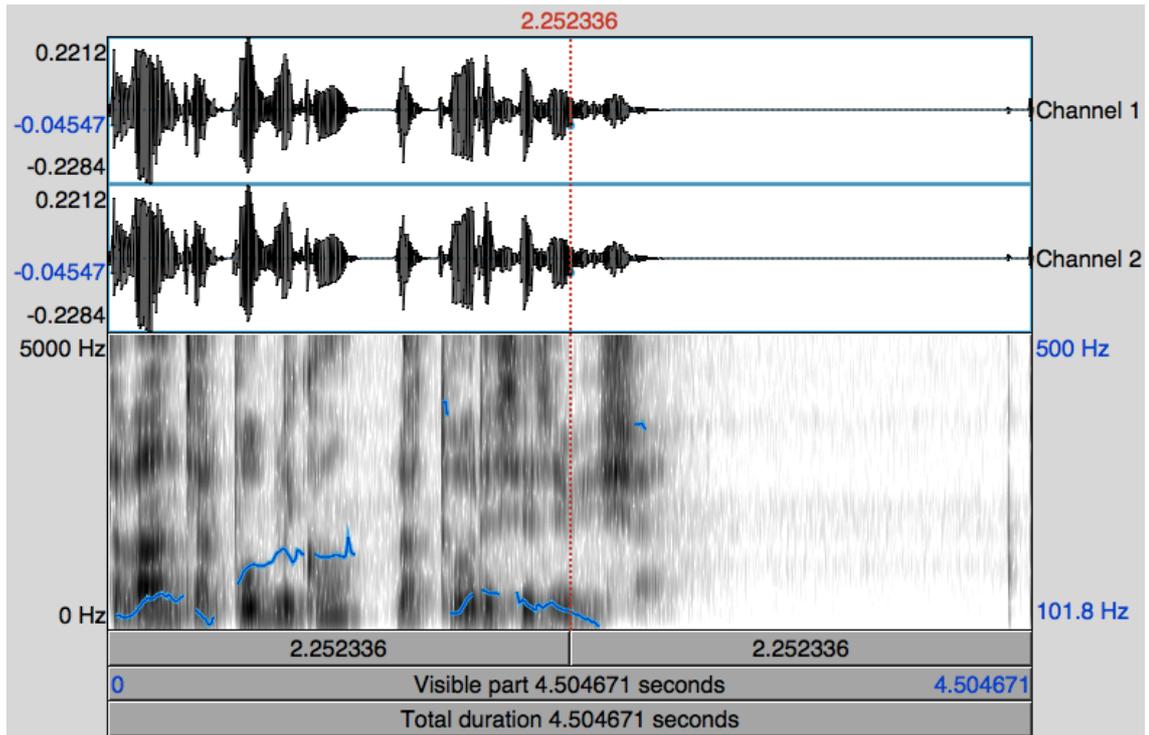


Figure 2b<sub>c</sub>. Phonetic analysis of MB sentence “davanti al pubblico l'attore si esibisce” [target answer: *l'attore si esibisce davanti al pubblico*, the actor performs in front of the audience]

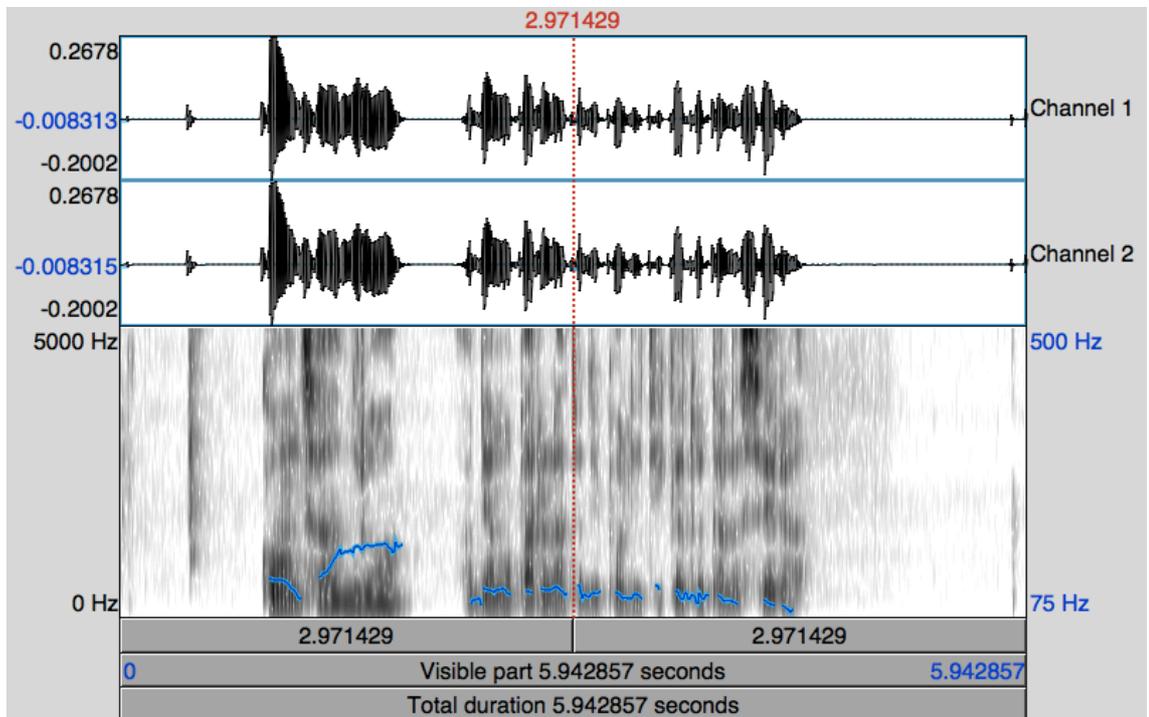


Figure 2c<sub>c</sub>. Phonetic analysis of MB sentence “Con Carlo abbiamo parlato di politica tutta la sera” [target answer: *abbiamo parlato di politica tutta la sera con Carlo*, we talked about politics all the evening with Carlo]

When MB did not move any element, he generally managed to correctly repeat the sentences. However, as in the first group of items we detected some few not systematic errors other than scrambling. In Table 6<sub>c</sub> we present the complete data concerning the sentences of the set (b) including optional constituents.

<b>Errors in sentences with adjuncts or optional complements</b>	<b>Absolute n.</b>	<b>% on total n. of errors</b>
Non production	2	5.88
<b>SCRAMBLING</b>	<b>22</b>	<b>64.71</b>
beginning of scrambling	2	5.88
adjunct omission	1	2.94
Omission of a nominal modifier	3	8.82
Verb omission	1	2.94
Subject omission	2	5.88
adjunction of a quantificational modifier	1	2.94

Table 6<sub>c</sub>. Type of errors in sentence with optional constituents.

As we may see, there is a statistically very significant difference between *scrambled* sentences in the repetition task of the set (a) vs. the set (b): [1/120 vs. 22/104:  $\chi^2$  (1) = 18.302;  $p < 0.0001$ ].

## 5. Discussion

It is arguable that MB resorts to scrambling as a syntactic strategy. In doing so, he activates projections that encode information related to the interface between syntax and discourse-pragmatics. A tentative explanation, grounded within current paradigms of syntactic research, is the following: MB switches on Focus Projections as dummy

placeholders in order to lower the processing weight of *core* Argument Structure. With this strategy, MB seems to avoid the increase of the computational load of the syntactic derivations. In fact, in sentence processing, argument-structure complexity has been shown to be one of the main factors that influence a correct retrieval (see Shapiro, Zurif, and Grimshaw, 1987; Thompson, 2003).

The availability of this linguistic strategy in a repetition task in a subject affected by MTA seems to support the idea that scrambled constructions need to be treated as associated with a set of functional projection target of A-bar movement (along the lines of Rizzi, 1997 and subsequent works). In other words, MB uses dedicated positions in the left periphery of the sentence to retrieve *peripheral* phrases, relatively far to the *core* argumental structure of the verb.

This core argument structure in canonical sentences is more resistant to working memory deficits (see Shapiro et al. 1993; Trueswell, Tanenhaus and Kello, 1993; Thompson et al., 1997), while optional elements are somewhat weaker/poorer.

MB, as we have said above, has a relatively unimpaired verbal memory, but a poor working memory, which crucially has an influence in the overall performance with syntactic derivations.

More technically, our hypothesis is that MB switches on A-bar positions in a layered CP commonly dedicated to encode clause types, focalized and topicalized items, evidentiality, points of view and so on (Rizzi 1997; Rizzi 2001; Cinque 1999 among others). All of the above mentioned facts are discourse related, and thus items displaced in a layered CP are discourse-determined (this fact also explains the reason why only phrasal adjuncts are moved by MB, while optional modifiers of the noun are correctly repeated following the proposed order).

MB seems to *reverse* the perspective: core arguments are licensed and interpreted in canonical A-positions (i.e. TP and *v*P/AspP) while the items in the layered CP are syntax-determined and, therefore, the discourse-determined field is converted as a *place* in which he conveys modifiers/adjoined constituents.

Very interestingly, when the left periphery of the clause is activated by MB, prosodic marking is necessarily involved, signalling that models such as Cartography

(Cinque and Rizzi, 2010a) which assume a deep interrelationship among phonology, syntax and pragmatics are on the right track and have psychological reality. Otherwise, MB could have activated the CP field without necessarily marking the *intonational contour* of the scrambled sentences. In other words it seems to us that adjunction/modification is a very costly operation for MB, who can therefore perform it only very high (left) in the structure because of his marked deficit in working memory. So, once he had firstly pronounced the *weakest* element (*weakest* from the point of view of the working memory buffer) in order to remember it, he uses projections dedicated to scrambled elements reorganizing the sentence and prosodically marking the moved constituent, with the aim of obtaining a grammatical result.

Thus, MB seems to build up the rest of the sentence once he had (dis)placed the adjunct, taking it as starting point to allow a correct syntactic computation.

This fact can be speculatively interpreted as justification for those theoretical models which predict a left to right / top-down parsing (derivation) of human syntax such as the ones proposed by Phillips (2003) or Chesi (2004) and Bianchi and Chesi (2010). In particular, the prosodical “activations” of MB can be also alternatively explained following a more processing oriented perspective, such as the one pursued by the strictly top-down parsing paradigm of Dynamic Syntax (DS), which roughly assumes that our linguistic parser shows inferential / anticipatory abilities at each step of a derivation until a complete proposition is achieved. (Kempson, Meyer-Viol, and Gabbay, 2001; Cann, Kempson, and Marten, 2005).<sup>12</sup>

Recent works (e.g. Kempson and Kiaer, 2010) within the framework of DS have convincingly shown that, for what concerns verb-final languages such as Korean or

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<sup>12</sup> DS is a paradigm of research that tries to explain how the human parser builds up a syntactic structure incrementally from left-to right/top-down in real-time parsing. The main challenge of DS is to arrange how the language-parser can manipulate partial information “*at each step of parsing to draw a bigger picture of the meaning of the string as early as possible*” (Kiaer & Kempson, 2005: 211). The DS framework basically adopts representationalist assumptions about the nature of mind (Fodor, 1983) and assumes that semantic interpretation is given as a structural representation of content, with trees representing predicate-argument structure in which the top node of a tree is *decorated* with a propositional formula and each dominated node is a subterm of that formula, with type-specifications indicating how the parts combine.

Japanese, the linguistic parser can incrementally build up a structure from the very beginning with the aid of prosody (and Case-marking, cf. the work of Miyamoto, 2002 for Japanese). Without entering into technical detail of DS, as said, a possible alternative hypothesis for our case study could be that MB's scrambling is the consequence of a working memory driven rearrangement of the *monotonic* structure growth processes from left to right, top down.

## 6. Conclusion

We have presented here the results of a repetition task performed by MB, an Italian man affected by MTA. We have shown that MB resorts to scrambling as a syntactic strategy. In doing so, he arguably activates projections located in the left periphery of the clause that encode information related to the interface between syntax and discourse/pragmatics.

We have argue here that MB highly reduced working memory span drives to a minimizing chunks' strategy in the syntactic module that triggers this unexpected activation of positions that encode information related to the syntax-pragmatics interface (whose reflex is visible by the mean of the prosodic contour of the scrambled constituent). A possible explanation which relies on contemporary linguistic theory is that MB activates Focus Projection, which are very unlike to be found in a repetition task, as dummy placeholders in order to lower the computational load of *core* Argument Structure, due to a marked working memory's deficit. In fact, in sentence processing, argument-structure complexity has been shown to be one of the main factors that determine a correct retrieval (e.g. Shapiro, Zurif and Grimshaw, 1987; Thompson. 2003, among many others).

APPENDIX A<sub>C</sub>.

ITEMS

SENTENCES WITHOUT ADJOINED ELEMENTS OR OPTIONAL COMPLEMENTS.

1.	La macedonia si mangia con il cucchiaino	+
2.	Lo specchio riflette la mia immagine	+
3.	La porta è stata chiusa dal vento	+
4.	Il cavallo galoppa veloce	+
5.	La paura mangia l'anima	+
6.	Gianni si è fatto giustizia da solo	+
7.	I pinguini vivono in Antartide	+
8.	La Libia è stata liberata dagli insorti	<i>Gli insorti hanno liberato la Libia</i>
9.	La medicina non è una scienza esatta	<i>Medicina non è una scienza esatta</i>
10.	Le banane contengono potassio	+
11.	I cuccioli giocano felici	+
12.	Leggere il giornale è istruttivo	+
13.	Le industrie inquinano l'ambiente	+
14.	Il gatto gioca col gomito	+
15.	A carnevale si mangiano le frittelle	+
16.	I troppi caffè ci rendono nervosi	+
17.	Gianni teme molto i fulmini	+
18.	Ti sposerò se mi sarai fedele	+
19.	Mangiare velocemente è una cattiva abitudine	+
20.	Anche se piangi non ti prenderò in braccio	+
21.	Verrò a Parigi quando sarà primavera	+
22.	Le campane iniziano a suonare alle 7 di mattina	+
23.	La foto sul muro fu la causa della rivolta	+
24.	Quell'ignorante del medico mi ha prescritto troppi antibiotici	<i>Ignorante del medico mi ha prescritto troppi antibiotici</i>
25.	E' arrivato il momento di andare via di casa	+
26.	Telefono a Maria per invitarla alla festa	+
27.	E' uscito un film interessante	+
28.	L'autobus giallo è pieno di turisti stranieri	+
29.	Marco vive nella casa bianca	+
30.	Bisogna sempre tenersi informati	+
31.	Sono molto contenta del mio nuovo lavoro	+
32.	Hanno individuato un nuovo pianeta	+
33.	Gianni ha perso l'orologio nuovo	+
34.	Hanno scoperto una nuova specie animale	+

35.	La giacca nera è nell'armadio	+
36.	Il giorno di Natale pranzo con i miei genitori	+
37.	Ho passato il capodanno da Marco	+
38.	Gianni porta sempre suo figlio allo stadio	+
39.	La protesta è organizzata dagli studenti	+
40.	Marco deve stare lontano dai guai	+
41.	Il bagno pubblico è vicino all'uscita	+
42.	Simone sta mangiando una mela	+
43.	Gianni ha assaggiato la torta che Francesca ha preparato	+
44.	Filippo guarda la televisione	+
45.	Maria prepara il pranzo mentre Gianni guarda la tv	+
46.	Maria è andata al mare	+
47.	Il buio era così fitto da non distinguere nulla	+
48.	Quell'uomo sembra mio zio	+
49.	Giacomo Leopardi era un poeta	+
50.	Mi è stato consigliato di non prendere questa strada	+
51.	Mio fratello ha le idee chiare	+
52.	E' difficile decidere quale film andare a vedere	+
53.	Andrea ha pescato una trota	+
54.	I guardiani li hanno appena notati prima che fuggissero	NO
55.	So che siete stanchi ma dobbiamo proseguire	+
56.	I geologi sono riusciti a capire quanti anni hanno queste rocce	+
57.	Nicola impazzisce per il gelato	+
58.	La lebbra è una malattia che esiste ancora nel mondo	<i>La lebbra è una malattia che esiste nel mondo</i>
59.	Ho comprato la carne di maiale	+
60.	È quasi impossibile che i democratici permettano una cosa del genere	+
61.	La città nella quale sono nato è splendida	+
62.	Il libro sul tavolo mi è stato regalato da Giovanna	NO
63.	il governo non vuole le elezioni	+
64.	Oggi pranzerò insieme a Giovanni	+
65.	Ho bevuto una birra perché avevo sete	+
66.	Quando arriverete verrò a prendervi	+
67.	La lezione di matematica era noiosa	+
68.	Sarebbe un peccato non arrivare in tempo	+
69.	Lucia adora i pistacchi	+
70.	Sono contenta che tu abbia accettato il mio invito	<i>Sono contenta che abbia accettato il mio invito</i>

71.	La maratona è stata vinta da un etiope	+
72.	Guglielmo Tell era bravo a colpire le mele	+
73.	Siena è la città del palio	+
74.	Pensai che fosse meglio dirle la verità	<i>Fosse meglio</i>
75.	Il gatto ha inseguito il topo	+
76.	Ci dispiaceva che Luigi non fosse con noi	+
77.	Mi piacciono i libri di storia	+
78.	Ieri ho incontrato il dentista di Maria	+
79.	Si è fulminata la lampadina del salotto	+
80.	L'orologio del soldato segna le due.	+
81.	Festeggiamo la promozione di Maria	+
82.	Le tradizioni della mia città sono importanti	+
83.	La barca del pescatore arriva al porto	+
84.	Marco guida la macchina di Gianni	+
85.	Sono arrivati gli amici di Maria	+
86.	Il comico ha inventato una battuta di spirito	+
87.	Mangio una frittella alla crema	+
88.	Marco prende lo sciroppo per la tosse	+
89.	La donna indossa un cappotto di lana	+
90.	Ho letto l'opera sui cavalieri medievali	<b><i>L'opera sui cavalieri medievali l'ho letta</i></b>
91.	I vichinghi sono stati grandi navigatori	+
92.	Le lontre sono animali acquatici	+
93.	Questo tramonto sembra un miracolo	+
94.	Le scale della casa sono ripide	+
95.	L'Everest è la cima più alta del mondo	+
96.	Le lezioni del prof. Ferri erano soporifere	+
97.	Gli occhi di Maria sono di un azzurro intenso	+
98.	I fenici avevano la flotta più grande del mediterraneo	+
99.	Marcello ha tre bimbi bellissimi	+
100.	I leoni hanno fame	+
101.	i colibri sono gli uccelli più piccoli del mondo	+
102.	Gianni ha molti dischi dei Beatles	+
103.	Simone ha vissuto una vita intensa	+
104.	il rinoceronte è un animale africano	+
105.	Questo sapone sa di menta	+
106.	Luca si è comportato bene	+
107.	San Francesco è il patrono d'Italia	+
108.	La battaglia è finita	+
109.	Queste foglie sono ricche di clorofilla	+

110.	I tulipani sono il simbolo dell'Olanda	+
111.	La causa della rivolta fu la foto sul muro	+
112.	la struttura dell'atomo è stata esplorata	+
113.	Il materasso è stato rubato	+
114.	La distruzione del nemico spense ogni resistenza	+
115.	I film di guerra sono brutti	+
116.	Ho sempre del denaro	+
117.	I miei sentimenti sono stati feriti	+
118.	Maurizio risponde a Michele	+
119.	Questi gatti sono matti	+
120.	Firenze è una città turistica	+

**SENTENCES WHICH CONTAINS ADJOINED CONSTITUENTS OR OPTIONAL COMPLEMENTS**

1. I bambini aspettano l'estate con impazienza	+
2. Mi sono svegliato molto presto questa mattina	<i>Questa mattina mi sono svegliato molto presto</i>
3. Ho cucinato il pollo in umido	+
4. L'aquilone vola alto nel cielo	+
5. Il ventilatore è acceso in salotto	+
6. La finestra sbatte per il vento	+
7. La nave getta l'ancora in mare	+
8. Mario ha pescato un luccio enorme nel lago	<i>Nel lago Mario ha pescato un luccio grande</i>
9. Mio zio a preso il mal di gola di nuovo	+
10. La verdura fa bene alla salute	+
11. Il vigile controlla il traffico accuratamente	+
12. Ho sfogliato il libro con interesse	<i>Con interesse ho sfogliato il libro</i>
13. Ripongo le posate nel cassetto	+
14. Il sole spunta tra le nuvole	+
15. Il camino sta acceso tutto il giorno	+
16. Il bicchiere è caduto dalla tavola	+
17. Mio marito mi aspetta davanti al negozio	+
18. Gianni va in bicicletta senza mani	+
19. Luisa ha dedicato tutto il suo tempo a Michele la scorsa settimana	<i>La scorsa settimana Luisa ha dedicato il suo tempo a Michele</i>
20. Giovanni ha caricato stamattina il camion di scatole	+
21. Il cantante ha offerto uno spettacolo bellissimo al pubblico l'altra notte	<i>Il cantante ha offerto uno spettacolo bellissimo al pubblico</i>
22. Il maestro ha dato un brutto voto nel compito in classe a Luigi	NO

23. Ho trascorso le vacanze in Sardegna per molti anni	<i>Ho trascorso in Sardegna le vacanze per molti anni</i>
24. Il cameriere ha servito con un'ora di ritardo la pizza ai clienti	<i>Il cameriere ha servito la pizza ai clienti con un quarto d'ora di ritardo</i>
25. Quel ragazzo ha imbrattato il muro di scritte oscene stanotte	<b>Stanotte</b>
26. Ho prestato il mio libro a un collega Lunedì scorso	<i>Ho prestato un libro a un collega lunedì scorso</i>
27. La compagnia telefonica spedisce una lettera il mese prossimo ai clienti francesi	<i>Ai clienti francesi la compagnia spedisce una lettera il mese prossimo.</i>
28. La mamma ha mandato i bambini dalla nonna due domeniche fa	+
29. Matteo presta con troppa facilità tutto a tutti	+
30. Ho dato al giudice la mia parola d'onore durante il processo.	<i>Ho dato al giudice la parola d'onore durante il processo</i>
31. Il reattore nucleare dà molte preoccupazioni in queste ore ai giapponesi	<i>Ai giapponesi il reattore nucleare dà molte preoccupazioni</i>
32. Ho inviato un biglietto d'auguri a Marco per Natale	+
33. Marco chiede tutti i giorni un favore a Gianni	+
34. La nonna ha donato una caramella al suo nipotino preferito	+
35. Porterò una bottiglia di vino a Marco questa sera	+
36. La guida indica la strada con l'ombrello ai turisti	+
37. I volontari distribuiscono ogni sabato gli aiuti ai poveri	+
38. Ho ricevuto una lettera Ieri dal mio amico inglese.	+
39. Giovanni ha mangiato la torta con voracità	+
40. Vorrei andare in vacanza al più presto	+
41. Gianni ha telefonato a Maria con il suo cellulare	+
42. I ragazzi bevono birra al pub	+
43. I ragazzi guardano la tv satellitare di pomeriggio	<i>I ragazzi di pomeriggio guardano la tv satellitare</i>
44. Ho pranzato con Lucia al ristorante sul lago	+
45. Andrea ha conosciuto Maria a Parigi un anno fa	+
46. Abbiamo parlato di politica tutta la sera con Sandro	<i>Con Sandro abbiamo parlato di politica tutta la sera</i>
47. Oggi ricorre il nostro anniversario	+
48. Anche questa volta la macchina non parte	+
49. La modella indossa un abito elegante per la sfilata	+
50. La Caritas conta su tanti volontari locali in India	+
51. Ho studiato molti libri per preparare l'esame d'inglese	+
52. Gianni sta camminando a piedi scalzi in giardino	+
53. Luca ha visto una stella cadente a occhio nudo	+
54. Lucia sta bollendo le patate in acqua salata	+
55. I marziani sono atterrati con la navicella spaziale	+

56. L'autista guida il camion in autostrada.	<i>Guida il camion in autostrada</i>
57. Gianni lava la macchina dietro casa sua	+
58. Il cane sotterra l'osso nel prato con astuzia.	<i>Sotterra l'osso con il prato con astuzia</i>
59. Luca si è tagliato con la carta	+
60. Ho trovato una moneta sotto il letto	<b><i>Sotto il letto ho trovato una moneta</i></b>
61. Ho giocato a domino con un mio vecchio amico	<b><i>mio vecchio amico</i></b>
62. L'uomo canta un canzone triste con il microfono	<b><i>L'uomo canta con il microfono una canzone triste</i></b>
63. La signora compra l'insalata verde al mercato	+
64. Hanno annunciato la morte del re alla televisione	<b><i>Alla televisione hanno annunciato la morte del re.</i></b>
65. Maria appoggia il quaderno grande sul tavolo	+
66. Andiamo al mare ogni anno in Sardegna	<b><i>Ogni anno andiamo al mare in Sardegna</i></b>
67. Il cane riporta l'osso al padrone	+
68. L'uccello vola sul tetto rosso della casa più alta	<i>l'uccello vola sul tetto più rosso della casa più alta</i>
69. Gianni mangia un panino in fretta	+
70. Ascolto la radio mentre guido	+
71. Il ragazzo alto parla al telefono	+
72. Maria compra un vestito rosso per la festa	<b><i>Maria per la festa compra un vestito rosso</i></b>
73. Il bambino biondo corre sul prato	+
74. Maria ha fatto una coperta di lana in due giorni	+
75. Carlo guarda un film noioso al cinema	+
76. Aspettiamo i risultati degli esami con ansia	+
77. Il papà prende il treno tutti i giorni	+
78. Il gatto salta sul divano blu	+
79. Leggo il giornale tutte le mattine	+
80. Maria nuota nell'acqua alta	+
81. Gli amici giocano a calcio insieme	+
82. La maestra corregge con la penna rossa	+
83. L'uomo legge il giornale con gli occhiali	+
84. Il treno arriva in stazione lentamente	+
85. La maestra ha dato molti compiti per casa	<i>La maestra ha dato compiti per casa</i>
86. Le rane saltano davanti allo stagno	+
87. L'atleta corre lontano dallo smog	+
88. I cani mangiano vicino alla cuccia	+
89. Mi piace lo zucchero sulle fette biscottate	+
90. Tutti i giorni raggiungo l'ufficio con l'autobus	+
91. Lo zio si prende cura delle sue nipoti	NO
92. Lo straniero compra la casa con le tende rosse	+
93. Vedo gli amici milanesi due volte all'anno	<b><i>Gli amicumilanesi vedo due volte all'anno</i></b>
94. Gli studenti parlano fuori dalle aule	+

95. Maria dimentica il telefono sul tavolo	<i>Maria il telefono sul tavolo</i>
96. Gli operai protestano per le tasse alte	<b><i>Per le tasse alte gli operai protestano</i></b>
97. Gli operai lavorano vicino alle macchine	+
98. Marco mi aspetta fuori da casa mia	<b><i>fuori da casa mia mi aspetta Marco</i></b>
99. Lo strano signore si siede vicino a Maria	+
100. L'aquilone è volato via col vento	<b><i>col vento l'aquilone è volato via</i></b>
101. Le foglie ingialliscono in autunno	<b><i>le foglie in autunno ingialliscono</i></b>
102. I marziani sono atterrati nel mio giardino	<b><i>nel mio giardino sono atterrati i marziani</i></b>
103. Matteo corre in giardino	+
104. Pietro era già stanco dopo la prima mezz'ora di lavoro	<b><i>Dopo la prima mezz'ora di lavoro Pietro era stanco</i></b>

### SENTENCES WITH AN ALREADY SCRAMBLED CONSTITUENT

1.	Il ladro lo ha arrestato il commissario	<i>lo ha arrestato il commissario</i>
2.	Quei fiori blu sono i miei preferiti	<i>i fiori blu sono i miei preferiti</i>
3.	Le zucchine mi piacciono cotte al vapore +	+
4.	Tra i frutti esotici il mango è il mio preferito +	+
5.	Il gelato lo mangio d'estate +	+
6.	Questo progetto lo finirò domani +	+
7.	La macchina l'ho lavata in cortile +	+
8.	Le favole le racconto a mio figlio +	+
9.	La musica leggera non la sopporto +	+
10.	Di pesci ce ne sono pochi nello stagno +	+

### UNGRAMMATICAL SENTENCES

1.	Il nonno gioca da carte tutte le sere.	<i>Il nonno gioca la carte tutte le sere</i>
2.	Gli sposi stampano gli inviti carta bianca	+
3.	Il nonno compra una pianta nuova per giardino	<i>Il nonno compra pianta nuova per giardino</i>
4.	I bambini attaccano i disegni con colla.	<b><i>Con colla i bambini attaccano i disegni</i></b>
5.	Gli attori provano lontano gli sguardi.	+
6.	La penna cade fuori dallo astuccio	<i>La penna cade fuori dall'astuccio</i>
7.	Compro lo zaino nuovo bambina.	<b><i>Bambina compro lo zaino nuovo</i></b>
8.	Dopo lo sbarco agli aereo sono tranquilla.	<b><i>Sono tranquilla dopo gli sbarchi agli aerei</i></b>
9.	Lo zio dorme davanti nella televisione.	<i>Lo zio dorme davanti della televisione</i>
10.	Mario cammina gli scogli e guarda l'alba.	+
11.	Marco fa le visite guidate i turisti.	<b><i>Dai turisti</i></b>
12.	Il cane è scappato il cancello principale.	NO
13.	Accendo il fuoco lontano le piante.	<b><i>Lontano le piante accendo il fuoco</i></b>
14.	La mamma aspetta Maria fuori scuola	<i>Maria aspetta la mamma fuori scuola</i>

15.	I turisti aspettano fuori sui musei.	<i>Sui musei aspettano fuori i turisti</i>
16.	I miei amici lavorano lontano Roma.	<i>Lontano Roma lavorano i miei amici</i>
17.	Le alunne ricevono un premio per le impegno.	<i>Per l'impegno</i>
18.	Le mie amiche sono tornate la spiaggia.	<i>Le amiche mie sono tornate dalla spiaggia</i>
19.	L'attore si esibisce davanti pubblico	<i>Davanti al pubblico l'attore si esibisce</i>
20.	I bambini ci salutano da finestre	<i>Dalle finestre i bambini ci salutano</i>
21.	I bambini giocano vicino dello fiume.	<i>I vicini giocano</i>
22.	L'atleta si mantiene in forma con la sport.	<i>Lo sport si mantiene in forma con l'atleta</i>
23.	Il bandito è scappato fuori lo stato.	<i>Dallo stadio è scappato fuori il bandito</i>
24.	Marco è caduto davanti alla miei occhi.	NO
25.	Durante le prove ballerò tra Maria.	<i>Tra Maria ballerò durante le prove</i>
26.	Lo studente prepara la musica con la festa.	+
27.	L'alpinista cammina lontano il burrone.	<i>L'alpinista cammina lontano dal burrone</i>
28.	Gli impiegati lavorano davanti alle schermi.	<i>Davanti agli schermi lavorano gli impiegati</i>
29.	I ragazzi si baciano davanti Marco.	<i>Davanti Marco i ragazzi si baciano</i>
30.	Mario esce tutti i sabati amici.	+
31.	I ragazzi giocano sullo spiaggia tutta l'estate.	<i>I ragazzi giocano sulla spiaggia tutta l'estate</i>
32.	Ho perso la collana bianca mamma.	<i>Mamma ho perso la collana</i>
33.	Maria ha visto la pinna di squalo	<i>La pinna di squalo è stata vista da Maria</i>
34.	Gli uomini mettono la giacca con bottoni blu.	+
35.	L'artista usa le foglie di alberi.	NO
36.	Gli storici sanno la storia tra le Maya.	<i>Tra le maya gli storici sanno la storia</i>
37.	L'altro ieri avevo un gran mal testa.	<i>Mal di testa</i>
38.	Lascio la biancheria fuori dai armadi.	<i>Lascio la biancheria fuori dagli armadi</i>
39.	La palla è finita vicino dallo scivolo.	<i>La palla è finita vicino allo scivolo</i>
40.	Il bambino è salito alle sgabello.	<i>bambina salita alle sgabello</i>
41.	I negozi vietano l'ingresso con la animali.	<i>con la animali</i>
42.	Le modelle litigano il fotografo.	+
43.	Il satellite sta vagando per spazio.	<i>Il satellite sta vagando per lo spazio</i>
44.	Gianni ha una grande passione nella animali.	<i>Gianni ha la passione per gli animali</i>
45.	Ho messo lo straccio vicino nei detersivi	<i>Dove ho messo lo straccio? Vicino ai detersivi</i>
46.	I film violenti sono vietati agli minori.	<i>Ai minori sono vietati i film violenti</i>
47.	Il treno passa lontano dal città.	<i>Dalla città il treno passa lontano</i>
48.	La nonna porta i bambini a parco.	<i>Al parco portano i bambini dalla nonna</i>
49.	Le strade sono ripulite sullo spazzino	<i>Dallo spazzino sono ripulite le strade</i>
50.	Gli ospiti vengono serviti sul camerieri.	<i>Sui camerieri vengono serviti gli ospiti</i>
51.	Lo spettacolo inizia a 20.	<i>Lo spettacolo si inizia a 20</i>
52.	Gli alunni hanno paura sul maestro.	<i>Sul maestro gli alunni hanno paura</i>
53.	Le tue scarpe sono vicino nella stivali.	<i>Nelle stivali sono le tue scarpe</i>
54.	Marta è innamorata l'amico di Luigi.	<i>L'amico di Luigi è innamorato di Marta</i>
55.	Il signore mette lo scatolone su armadio.	<i>Sull'armadio mette lo scatolone il</i>

		<i>signore</i>
56.	Maria si arrende davanti sui difficoltà.	NO
57.	Marco ha una voce fuori nel comune.	<i>dal comune</i>
58.	Le bambine si trovano davanti dell'entrata.	<i>Davanti all'entrata si trovano le bambine</i>
59.	Lo studente abita lontano università.	<i>Lontano dall'università abita lo studente</i>

## Chapter 4

### *Case study D*

*Prepositions inside words and the syntax of compounds. A case study with an Italian agrammatic speaker with Crossed Aphasia.*

## 1. Introduction

The aim of the present chapter is to investigate the performance of an Italian Agrammatic speaker with compound words, with major emphasis on the processing of (complex and simple) prepositions *inside* words, thus aiming at especially evaluating the performance with (a) prepositional compounds of the [NOUN HEAD-PREP-DEPENDANT NOUN; N-P-N] form, such as *coda di cavallo* (horse-tail) or *bocca dello stomaco* (pit of-the stomach) and (b) exocentric compounds of the [PREP-NOUN; P-N] form, such as *sopracciglio* (eyebrow). In Italian, the first type involve a grammatical/light prepositions as a linking element; the second one involve a complex preposition, with a heavier lexical content, in the left edge of the compounds (cf. Rizzi, 1988 for a comprehensive overview of the syntax of Italian prepositions).

Our patient has the peculiarity of being an agrammatic speaker with crossed aphasia (henceforth: CA). In CA -basically- the site of lesion is located in the right hemisphere in a right-handed individual. Unlike the classical and typical syndromes (e.g. Broca's Aphasia or Wernicke's Aphasia) CA is "*a rare and controversial syndrome and theoretically interesting*" (Salis and Edwards, 2007: 37). The first clinical observation of crossed aphasia was described in Bramwell (1899), and hundreds of examples have since been reported. The precise incidence of crossed aphasia, namely, the percentage of all aphasias in right-handers caused by right brain damage, is still unknown. As Alexander and Annett (1996: 213) wrote: "*Anomalous lateralization of cognitive functions is observed in a small percentage of right-handed patients with unilateral brain damage, either crossed aphasia (aphasia after right brain damage) or "crossed nonaphasia" (left brain damage without aphasia but with visuospatial and other deficits typical of right brain damage)*". It has been estimated to be between 0.38 and 3% in patients with vascular lesions (cf. Mariën et al. 2001).

It has been suggested that CA may be a mirror image of classical syndromes (Alexander, Fischette, and Fischer, 1989). Nonfluent aphasia was found to be almost as

frequent as fluent aphasia in CA (cf. Mariën, et al. 2004).

The diagnostic criteria for CA include: (i) aphasia; (ii) a lesion of vascular origin in the right unilateral hemisphere; (iii) strong right-handed preference with no familial history of left-handedness; (iv) structural integrity of the left hemisphere; and (v) absence of brain damage in childhood (cf. Coppens and Robey, 1992, Ishizaki et al. 2012). CA must not be seen as “*an isolated anomalous phenomenon. It is the most frequently recognized example of atypical cerebral dominance, but it is only one example from a broad range of atypical dominance patterns that have a common genetic basis*” (Alexander and Annett, 1996: 230).

In previous work, Mondini et al. (2005; cf. also Mondini et al. 1997) have studied the processing of Italian prepositional compounds of the N-P-N type in a group of seven agrammatic aphasic patients, with a set of different tasks (repetition, reading, writing, naming and completion). The authors have found that omissions were the most frequent errors in naming, whereas in the other tasks errors prevalently consisted of substitutions of the target preposition. With such pattern of performance, Mondini et al. argued that agrammatic patients were revealing that N-P-N forms must be decomposed somewhere along the processing, where they apparently become sensitive to the subject’s linguistic (i.e. agrammatic) impairment.

Thus, the authors proposed that the lexical retrieval of N-P-N items begins with the mental activation of the whole form<sup>13</sup> that is then decomposed before the access to its phonological representation (cf. Mondini et al. 2005: 185). According to the authors, lexical processing of N-P-N compounds is sequenced in a *dual-route procedure* as follows: (a) a single lexical unit matching the N-P-N form is activated *below* the conceptual level; but (b) the activation also involves the syntactic features of the N-P-N form and, at the

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<sup>13</sup> Their idea is *triggered* by the observation that the only adequate explanation for the retrieval of prepositions in idiosyncratic fully lexicalized N-P-N compounds (e.g., *film a colori*, lit. movie *with* colors, color movie vs. *film in bianco e nero*, lit. movie *in* black and white, black and white movie) is the lexical retrieval of the whole form as a “unitary *lemma* representation”. Italian preposition recruited in N-P-N forms are standardly *di*, *a*, *da* or *in*. Forms with other prepositions (e.g. *con* in *furto con scasso*, burglary) are attested but far more rare (cf. the *ColFis* database, Bertinetto et al. 2005).

same time, the “unconstrained” lexical and syntactic representations of each of the elements of the compound word.

No previous studies have been conducted in the neuro-psychological and neuro-linguistic literature on PN compounds, neither in Italian nor in English (e.g. with forms of the *downstairs*, *overweight* type) or in other languages in which they are quite common/productive (e.g. in other Romance languages).

From a broader viewpoint, there is, however, a big amount of neuro-linguistic literature on the processing of compound words in impaired subjects/populations in Italian. In pioneering study on Italian compounds, Dressler and Denes (1989) found intriguing asymmetries in the processing of compounds among aphasia *classic* categories. In particular, Dressler and Denes 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, finding that their subjects seemed to apply two different fundamental strategies in the identification/retrieval of compounds: (a) a *morphological* strategy using one or both parts of a given compound (telling, for instance, instead of *portalettere*, lit. ‘carries-letters’, something like “someone who carries letters” or “the man who brings the letters”), suitable only for transparent items, and (b) a *semantic* strategy using synonyms of the whole compound or descriptions without a *strict* morphological connection to any unit of the compound (e.g. telling, instead of *portalettere*, something like “employee of the post office”) (cf. also Badecker, 2001; Libben et al. 2003; and for a more general picture Semenza and Mondini, 2006). Dressler and Denes showed that all the subjects performed better in dealing with transparent compounds and Broca's patients were always superior to Wernicke's ones. Moreover, for what concerns the performance with opaque compounds, Broca's aphasics applied the appropriate (semantic) strategy more often, while Wernicke's aphasics were able to rely almost exclusively on a *defective* morphological strategy.

Subsequent works on Italian compounds in impaired subjects (cf. for instance Mondini et. al., 2002; Mondini et al. 2004, Chiarelli, Menichelli and Semenza 2007; Semenza et al. 2011a; Semenza et al. 2011b), germinating from the seminal investigation of

Semenza, Luzzatti and Carabelli (1997), have all basically shown that the knowledge of the compound status of a word seems to be *lexically stored* independently from the capacity to use compounding rules and to retrieve the appropriate phonological form.

All the results of this line of investigation seem to crucially favour the hypothesis of a (de)compositional (i.e. sub-lexical) processing of compound words. Just to give an example, Semenza, Luzzatti and Carabelli (1997) found that the performance of Broca's aphasics, that commonly share difficulty in naming actions (cf. Hillis and Caramazza, 1995; Bastiaanse and Jonkers, 1999; Jonkers and Bastiaanse 1999; Luzzatti et al. 2002, among many others), was characterized by omissions of the verb part of noun compounds in verb-noun lexical items. This finding has been considered as evidence that compounds are parsed into their sub-component in the *string* of the process of lexical retrieval.

Moreover, in recent *on-line* work with unimpaired Italian speakers, El Yagoubi et al. (2008), who used an event-related potential (ERP) technique to explore the way in which a noun–noun compound is shaped during a lexical decision task, found that error rates and reaction times were higher for compound words than for non-compound words, used as distracters. ERP data showed a more negative peak in the left anterior negativity (LAN) component<sup>14</sup> for compounds and these results, according to the authors, support again the idea of an activation of a decomposed/independent representation/retrieval of compound units (cf. also Semenza, 2011a).

Nevertheless, other on-line studies with priming and eye-tracking techniques (Marelli, Crepaldi and Luzzatti, 2009; Marelli and Luzzatti, 2012) could likely suggest that different kinds of compounds have a different representation at the mental level, possibly due to an *headness effect*: the results of these studies seem indeed to support the idea that while head-final compound words (of the *terremoto*, earthquake type) are represented with an internal head-modifier hierarchy, head-initial (such as *capobanda*, chief) and, particularly, *alleged* exocentric compounds (e.g. the very productive VN type

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<sup>14</sup> A LAN/ELAN (Early Left Anterior Negativity) most often occurs in response to linguistic stimuli that violate word-category or phrase structure rules (cf. the classic works of Friederici 1995 and Friederici, Steinhauer and Frisch, 1999).

in Romance languages) have a lexicalised, internally *flat* representation.

As an introductory consideration is worth noticing that in the experimental psycholinguistic literature these kinds of elements are often considered as fixed expressions (i.e. idioms). Consider this passage, taken from (Sprenger, 2003: 4; see also Booij, 2005): *“Fixed expressions (FEs) refer to specific combinations of two or more words that are typically used to express a specific concept. Typical examples of FEs that are referred to in the literature often have an opaque meaning or a deficient syntactic structure, for example, by and large or kick the bucket. However, these properties are not essential. The defining feature of a FE is that it is a word combination, stored in the Mental Lexicon of native speakers, that as a whole refers to a (linguistic) concept. This makes FEs “non-compositional” in the sense that the combination and structure of their elements need not be computed afresh, but can be retrieved from the Mental Lexicon. However, the degree of lexical and syntactic fixedness can vary”.*

The rationale of the present study on (the whole spectrum of) Italian prepositional compounds in an agrammatic Broca’s aphasic speaker is twofold: (a) to test Italian PN compounds - which have been previously ignored in the neurolinguistic literature - and to compare the results with the performance with N-P-N forms - that we predict to be coherent with Mondini et al (2005) findings -and with other *so-called* exocentric Italian compounds; (b) to compare the performance of N-P-N compounds with corresponding un-lexicalized forms, in order to verify the possibility of a significant *mismatch*, capable of supporting the idea of a peculiar status of N-P-N items in the mental lexicon.

## **2. Background on Romance N-P-N compounds**

As shown by Bisetto and Scalise (1999: 35), N-P-N items are somewhat opaque to syntax and they obey to a set of classic compound-hood tests (e.g. the impossible insertion of modifying material<sup>15</sup>). That is why it is also quite realistic to consider them as

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<sup>15</sup> For example, Italian N-P-N *alleged* compounds do not allow the insertion of an adjective between the head noun and the modifying prepositional phrase. Hence, as states in Semenza & Mondini 2006: 92): *“when modifying the compound noun sedia a rotelle (wheelchair [lit:*

fully productive compound words in Italian.

This type of items is fully productive in Romance languages (cf. Ralli, 2008). Moreover, Kampers-Manhe (2001) 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, their role is merely to set forth the complement of the head-noun and, in some cases, they may be even omitted (as, for instance, *robe à fleurs* ⇔ *robe-fleurs*, both, flower dress).

French N-P-N compounds (e.g. *moulin à vent*, windmill; *étoile de mer*, starfish) have been intensely studied. The linking prepositions are sometimes labelled '*prépositions incolores*' (colourless prepositions) (see Cadiot, 1991; Bartning, 1993 among others). A widespread idea (cf. Fradin, 2009) is that they are different from regular prepositions, the latter being lexically meaningful elements.

Nevertheless, there is no consensus in the literature. Many authors consider them as genuine compounds (e.g. Di Sciullo and Williams, 1987; Gross, 1996; Kampers-Manhe, 2001). In particular, the main argument of the classic work of Di Sciullo and Williams, 1987 is that N-P-N units must be considered original lexical items (with the same status of i.e. N-N or V-N words), given the fact that they *denote* a conceptual entity, within which is not possible to perform any syntactic operation. Other scholars (e.g. Corbin, 1992; Fradin, 2009: 417-420) strictly assume that compounds may not be built by syntax, and think that the authors who claim that N-P-N items are real compounds, simply confuse *compounding* with *idiomacy*.

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*chair/A<sub>prep</sub>/wheels*]) with the adjective *rotta*, 'broken<sub>jem</sub>' the adjective has to be located at the end (*sedia a rotelle rotta*, 'chair/A<sub>prep</sub>/wheels/ broken') and not after the head of the compound (\**sedia rotta a rotelle*, [lit. 'chair/broken/A<sub>prep</sub>/wheels'])). The precise set of syntactic operations which according to Bisetto and Scalise (1999: 37) cannot be applied on compound words, being, on the contrary, allowed with non-lexicalized phrases, are:

- 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)

Spanish N-*de*-N compounds (e.g. *agente de seguridad*, security officer; *barco de vapor*, steamboat) have also been a subject of interest and they are commonly known as *Compuestos improprios*. Again, there is no consensus in the literature (refer to Kornfeld, 2009 for an overview): on one hand, there are authors that consider these forms as authentic compound words (e.g. again Di Sciullo and Williams, 1987), on the other hand there are authors that assume that they are syntactic objects (see e.g. Rainer and Varela, 1992; Val Alvaro, 1999; Fabregas, 2004 and Kornfeld, 2009).

Continuing with our brief overview of Romance N-P-N items, Portuguese N-*de*-N compounds (*olhos de lince*, eagle eyes, *bilhete de identidade*, identity card) have been recently considered by Rio-Torto and Ribeiro (2009: 273) as: “*univerbation of phrases which function as a single lexical unit in the mental lexicon*”. Rio-Torto and Ribeiro, 2009: 273-274) further write that: “*The [NPrepN] configuration may correspond to the compound [[N[PP]] N or to a noun phrase of the kind [[N[PP]] NP. The [NPrepN] structure with the [N[PP]] N value has been widely used in Portuguese since the Middle Ages, but the delimitation between compounds and phrases remains a challenge in the present*”.

Romanian reference grammars (e.g. Gönczöl-Davies, 2008) show that N-P-N items (e.g. *vagon de dormit*, sleeping car; *floare de număuita*, forget-me-not) are very productive in the language.

Finally, as far as concerns Catalan N-P-N forms (e.g. *màquina de cosir*, sewing machine, *ull d'escala*, out-of-scale), Cabré Castellví (1994) argued against their *strict* morphological nature (specifically, against the ideas of Di Sciullo and Williams, 1987) and, recently, Bernal (2012: 9) argued that they are the “*result of the lexicalisation of a syntactic sequence*.”

### 2.1 Are N-P-N items a syntactic product? Is it the right question?

Given our brief outline of Romance N-P-N units, the crucial question still seem to be: “are they a syntactic (*by*)product or not?”

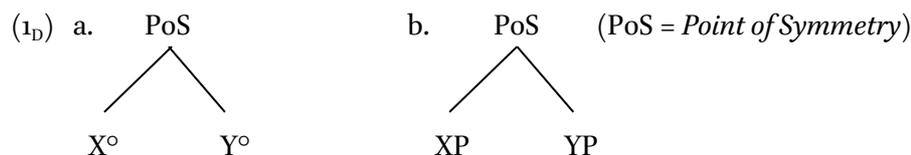
A recent interesting analysis put forth by Delfitto and Melloni, 2009 (see also Delfitto, Fábregas and Melloni, 2008), seems to reverse the perspective, asking: “are N-P-

N compounds really different from N-N compounds?” or “are N-N items really *immune* from a syntactic derivation/processing?”

Sketching briefly Delfitto and Melloni’s proposal, they argue for an analysis of NN compounding as “*the result of Parallel Merge, then it yields a point of symmetry, which is barred by the Antisymmetry requirement on Label projection (Kayne, 1994; Moro, 2000) defined as an independent condition on External Merge.*” (Delfitto and Melloni, 2009: 81).

In other words, Delfitto and Melloni believe that morpho-syntactic and interpretive properties of NN compounds can be accounted for relying on *narrow syntax* conditions on Projection and Merge, which are based fundamentally on Kayne's theory of Antisymmetry<sup>16</sup>. In particular, they think that NN compounding represents a characteristic model of the syntactic derivation (that they label the “Compound Phase”), by which two configurationally *aligned* syntactic objects get merged in a *parallel* fashion, thus affording a symmetric structure (a point of symmetry, in their terminology) that blocks label projection.

As a consequence, the representations in (1<sub>D</sub>) (drawn from Delfitto and Melloni, 2009: 82; an assumed also in Delfitto, Fabregas and Melloni, 2008) are not well-formed syntactic objects:

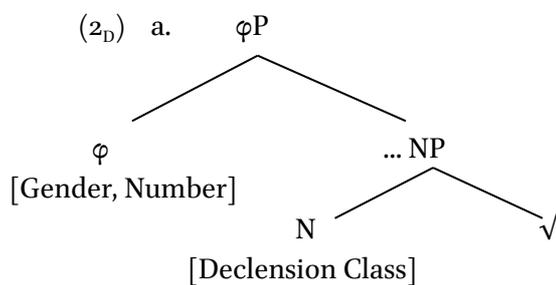



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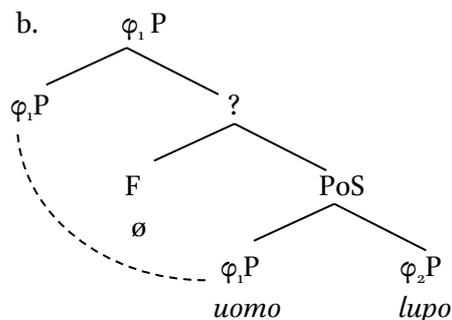
<sup>16</sup> Actually, Delfitto & Melloni’s proposal seems to be deeply influenced by Moro (2000)’s Dynamic Antisymmetry theory, which can be roughly described as a weaker version of the theory of antisymmetry. Basically, Dynamic antisymmetry allows the breeding of structures unsuitable for the Linear Correspondence Axiom (i.e. points of symmetry), before the hierarchical structure is linearized at Phonetic Form. For a partly relevant (i.e based on dynamic antisymmetrical principles) explanation of the processing of Romance VN compound, see Barrie (2011).

At this point, the derivation of a *Compound Phase* can be seen as a "repair strategy", allowing a *reboot* of the computational path in order to *catch a label* and gather at the interfaces.

Hence, the repair strategy to break the symmetry, according to Delfitto and Melloni, is specifically to insert a head (e.g. a  $\varphi$  head in Romance languages or a NP in Germanic ones<sup>17</sup>, see Delfitto and Melloni 2009: 85-92), able to attract one of the two elements of the compounds. The process and the results of such a strategy (the one argued for Romance languages) are sketched below in (2<sub>D</sub>a,b).



(Delfitto and Melloni, 2009: 91)



(Delfitto and Melloni, 2009: 93)

As it is easy to see, the resulting process combines a syntactic process with the

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<sup>17</sup> It is worth noticing that the aim of Delfitto and Melloni's paper is precisely to reduce the formal and interpretive contrasts between Germanic and Romance, and, within each language, the differences between compounds and *prototypical* syntactic constructions.

semantic properties of the members of the compound, hence leading, in the authors view, to a *Semantically Driven Compounding* (SDC), with a proposal inspired by the *Qualia Structure*<sup>18</sup> of Pustejovsky (1995)'s Generative Lexicon, sketched as follows: “Merge 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 ( $\varphi$  Ps), driving adjunction of the selected compound member to the structure obtained by applying External Merge of *F*.” (Delfitto and Melloni, 2009: 92)

But, what about N-P-N items? When the syntactic process of combining two nominal constituents is mediated by a preposition, Parallel Merge is clearly excluded. In particular, since no *Point of Symmetry* has been created, there is no need to resort to a repair strategy. Nevertheless, a *syntactic process* is to be postulated anyway in the formation of these compounds.

Specifically, the empty *F* of the representation in (2<sub>D</sub>b) seems to play the same role as a phonetically realized *light* preposition, as shown by the fact that we can obtain, interpretatively, identical results by inserting a preposition such as, for instance, the item *a*. See the examples in (3<sub>D</sub>).

- (3<sub>D</sub>) a. pesce spada > FORMAL *Quale* [YFORM (x)]  
 fish + Ø + sword ‘*swordfish*’
- b. *chiave a stella* > FORMAL *Quale* [Y FORM (x)]  
 key + a + star ‘*cross wrench*’

The *light* prepositions of N-P-N items, in Delfitto and Melloni’s view, may activate larger portions of the *Qualia* Structure on the head-noun. The reason is that they are endowed with a richer array of *valued* Qualia-related features, as shown in (4<sub>D</sub>) below.

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<sup>18</sup> 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).

- (4<sub>D</sub>) a. bandiera a scacchi > CONST Quale [PART OF (y,)]  
 flag + a + chess(pl) ‘chequered flag’
- b. bicchiere da vino > formal TELIC Quale [CONTAIN (x,y)]  
 wine + da + glass ‘wine glass’
- c. coltello da pane > Formal TELIC Quale [CUT\_res (x,y)]  
 knife + da + bread ‘bread knife’

This proposal, roughly summarized above, is an original way to reverse the traditional perspective on N-P-N (*vs.* N-N) words, which aim at demonstrating that there is no empirical reason to propose that compounds need to be generated by a non-syntactic component of grammar, such as morphology or the Lexicon.

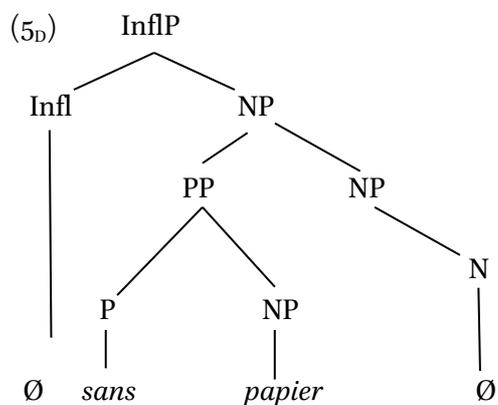
### 3. Background on Romance PN compounds

PN compounds are a less studied topic in comparison to N-P-N forms. Previous researches include some works on French compounds of the *Sans-papier*, unofficial residents or *après-communisme*, after Communism type (e.g. Zwanenburg, 1990; Kampers-Manhe, 2001; Amiot, 2004; 2005).

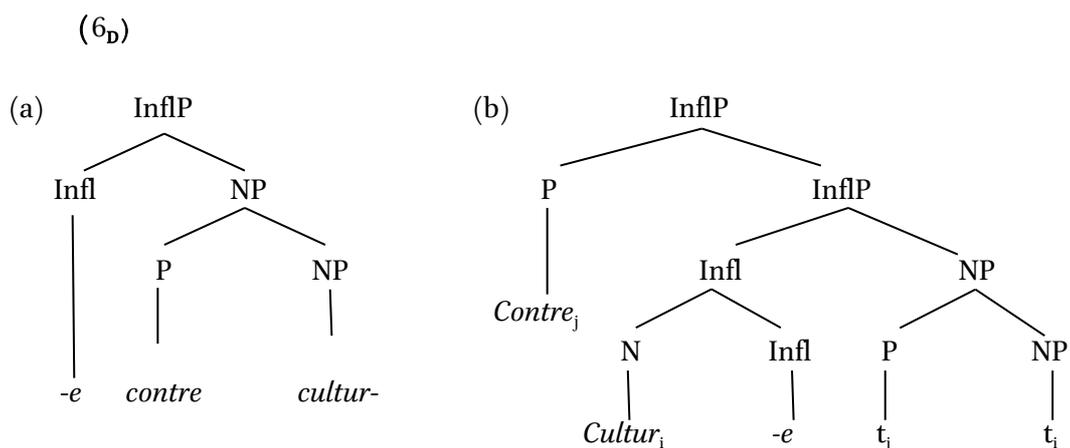
The work of Kampers-Manhe (2001: 101-102) is particularly interesting because - relying on previous observation of Zwanenburg (1990) - suggests a syntactic approach (again, like the analysis of N-P-N forms of Delfitto and Melloni illustrated above, inspired by the work of Kayne, 1994) to PN words. In particular she proposes two different representations for compounds of the *sans-cervelle*, without brain type *vs.* compounds of the *contre-culture*, counterculture type.

According to Kampers-Manhe, the relationship which holds between the preposition and the noun in words such as *sans-papier* (illegal immigrant) involve the modification of an abstract head phonetically unrealized (cf. also Kayne, 2003), basing on the simple conceptual observation that a “*sans-papier*” is a *person* without documents. Hence, here the preposition has a referential value (the same of a prepositional phrase in syntax) and acts as the head of a PP projection. A possible

representation of compounds of the *sans-papier*, *sans-cervelle* type, along the line of reasoning of Kampers-Manhe, is given in (5<sub>D</sub>) below.



On the contrary, in PN compounds of the type *contre-culture* or *surhomme*, *übermensch*, the involved preposition directly modifies the noun on the right edge of the compound: a *contre-culture* is actually a kind of culture. Kampers-Manhe considers the structure of this subtype of PN words as implying a base (adjunct PP) structure as the one depicted in (6<sub>D</sub>a). Then, the noun raises to Infl to take the inflectional affix and the preposition is adjoined to SpecInflP.



According to Kampers-Manhe both the compounds of the *sans-papier* type and the compounds of the *surhomme* type imply a syntactic process in their formation, in spite of their configurational difference. As argued by the author: “*les deux structures*

*présentées ici rendent bien compte du statut référentiel de la préposition: tête ou modificateur, elle a la même valeur référentielle que dans les syntagmes prépositionnels en syntaxe” (Kampers-Mahne, 2001: 102).*

For what concerns Italian PN of the *sottoscala*, downstairs type, there is almost no theoretical background, according to our bibliographic research. In recent work, Bisetto (2008, inspired by Ackema and Neeleman, 2004 see also Scalise, 1992) tangentially addresses the issue, considering them as *para-synthetic* structures (namely, compound formations characterized by a ternary structure, cf. Bisetto and Melloni, 2008 for an overview), characterized by a *covert* constituent,<sup>19</sup> as in (7<sub>D</sub>).

(7<sub>D</sub>) [[P N] Ø]

For the sake of the present discussion, it is worth noticing that a parasynthetic structure may represent a challenge for the widely accepted ‘binary branching’ constraint, which is standardly assumed (since Kayne, 1984) as a principle determining the structural shape of syntactic (and lexical) units.

Notice also that, for instance, in a *Figure / Ground* configuration, the Ø in (7) would be the “external argument” of the preposition (i.e. the Figure; see Svenonius, 2006 and Talmy, 2000a,b among others; refer also to Chapter 3 (Case Study B above).

## 4. Method and Materials

### 4.1 A preliminary consideration. How to detect an N-P-N compound (vs. phrases)?

Before introducing our experimental work, it is timely to present the simple criterion we have followed to detect N-P-N compounds<sup>20</sup> (vs. phrases). In our

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<sup>19</sup> Actually, the structure represented in (7) do not seem to be a clear instance of a parasynthetic structure (i.e. it is coherent with a binary branching analysis).

<sup>20</sup> The status of P-N form is dramatically less controversial.

experimental material, we have considered as N-P-N items all those units that do not allow (a) a full DP to be licensed inside the complement of the preposition and (b) the compound head to be modified (or the result of modification is marked). See the example below in (8<sub>D</sub>) (taken from Delfitto and Melloni, 2009, who have roughly adopted the same criterion). Only items behaving as the *occhiali da sole*, sunglasses type in (8<sub>D</sub>b) have been included in our N-P-N sample. The grammatical judgements have been provided by fifteen healthy native speakers of Italian (age range: 24-36 years old).

(8 <sub>D</sub> )	a.	NP	raggi di/del sole rays of-the sun	>	raggi luminosi del sole rays bright of the sun <i>'bright rays of the sun'</i>
	b.	N-P-N	occhiali da sole glasses + P + sun 'sunglasses'	i.	?*[occhiali] colorati da sole glasses + coloured + P +sun
			ii.		[occhiali da sole] colorati glasses +P + sun + coloured <i>x'coloured sun glasses'</i>

A preliminary note also concerns our base hypothesis, which is “non-neutral”. In fact, we expect to find, in an agrammatic speaker, a pattern in which N-P-N forms are more impaired, whereas PN compounds are relatively spared.

This is due to the different lexical “weight” of the prepositions involved respectively in the two types of unit. The prepositional items involved in PN compounds are heavier and alike to “relational nouns” (see Jackendoff, 1973; 1997; Zwart, 2005; den Dikken, 2010 among many others, see also chapter 3 [*Case Study B*] above).

#### 4.2 Participants.

Our patient, SM, is a 56-year-old right-handed male with 10 years of education, who suffered of a hemorrhagic stroke in February 2011. He was diagnosed with

agrammatism on the basis of standard tests (e.g. BADA, Miceli et al 1996) As said above, SM has the peculiarity of being a Crossed Aphasics.

An MRI scan performed in August 2011 showed a hemorrhagic lesion with extensive brain edema in the right middle cerebral artery territory and malacic areas, especially in the parietal cortex and basal ganglia; ventricular atrophy/traction; a thin layer of subdural hematoma (diameter 2cm max); a lesion of the cerebral peduncle in the right midbrain; in the remaining areas the scan revealed signs of atrophy and of chronic vasculopathy.

Five control subjects, two men and three women, were recruited for the present study. They matched with SM for age and age of instruction and didn't have any physical, neurological or psychological problem.

The experimental tests were video-audio taped and the results were analysed by the speech therapist and two independent examiners. The patient gave formal consent to the experiments.

#### 4.3 *The experimental design: Stimuli*

The experiment consisted of (a) *reading aloud* and (b) *repetition* task of a set of 391 words; (c) a *completion* task of a set of 50 items, administered according to two different *conditions*; (d) a further repetition task of consisting of 111 un-lexicalized phrases. For the full list of Stimuli, the reader may refer to Appendix A<sub>D</sub>.

##### 4.3.1 *Repetition and reading tasks with compound words*

The stimuli of the repetition and reading tasks consisted of a set of 391 words, articulated as follows:

- a) 80 PN (Preposition + Noun) compounds (e.g. *lungolago*, lakeside)

b) 144 N-P-N compounds, including 104 items linked by a simple preposition (e.g. *ferro da stiro*, electric iron) and 40 items linked by an articulated preposition (e.g. *occhio del ciclone*, storm centre)

c) 23 N *space* N items (two separated nouns without a linking element, e.g. *cane poliziotto*, police dog).

d) 88 *balanced* Italian compounds of the following types: 19 Verb-Noun<sup>[exocentric]</sup> (VN) (e.g. *coprifuoco*, curfew), 10 Verb-Verb<sup>[exocentric]</sup> (VV) (e.g. *bagnasciuga*, foreshore), 10 Noun-Adjective<sup>[exocentric]</sup> (NA) (e.g. *pellerossa*, redskin), 11 Adjective-Noun<sup>[exocentric]</sup> (AN) (e.g. *purosangue*, thoroughbred), 19 Noun-Noun<sup>[left-headed]</sup> (Nn) (e.g. *capobanda*, gang leader), 18 Noun-Noun<sup>[right-headed]</sup> (nN) (e.g. *fotoromanzo*, photostory).

e) 57 distracters<sup>21</sup> divided in two groups; (a) 29 items with a word embedded in their *left edge* (D1) (e.g. *cremagliera*, rack, where *crema* stands for cream); (b) 28 items with a word embedded in their *right edge* (D2) (e.g. *scarafaggio*, beetle; where *faggio* means beech).

The variables considered for a *balanced* design of the experimental set were length, frequency and neighbourhood size. Length was calculated as the total number of letters composing the stimulus. Frequency was calculated as the number of occurrences in a corpus of written Italian, *Corpus e Lessico di Frequenza dell'Italiano Scritto (CoLFIS)* (Bertinetto et al. 2005, available on-line at <http://www.ge.ilc.cnr.it/strumenti.php>). The neighborhood size of a word was calculated as the total number of words that could be formed by replacing one letter of a target word. The tasks, as said, were *Reading aloud* and *Repetition*. The items were randomly organized and administered in four sessions to avoid a learning effect. To familiarize SM with the task, each experimental session started with a practice block.

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<sup>21</sup> The distracters were inspired by the experimental material of the work of El Yagoubi et al. (2008).

#### 4.3.2 Completion tasks

Two completion tasks were performed. The two conditions have been designed as follow:

- Completion (a): a set of 49 N-P-N compounds (17 with articulated prepositions and 32 with simple prepositions) in which the linking preposition had been omitted were said aloud to SM by a speech therapist. The patient was asked to say which preposition had to be inserted between the head and the modifying noun.

- Completion (b): 30 N-P-N compounds were intermixed with 20 N-N compound fillers (50 items in total). First, SM had to say whether or not a prepositional link was required (e.g. *calzmaglia*, tights [*lit.* stocking-knit] does not require a preposition, while *mulino a vento*, windmill, requires it) and then, when required, which preposition had to be inserted.

Our completion task is based on an analogous test implemented by Mondini et al. (2005).

#### 4.3.3 Repetition task with phrases

The stimuli consisted in 111 (un-lexicalized) phrases (e.g. *i biscotti alle noci*, nut-cookies, *lit.* the cookies at-the walnut), which included:

a) 60 [N+P+N] phrases in which two nouns were linked by both simple (sP) (25) and articulated (aP) (35) preposition, recalling the structure of NPN compounds.

b) 21 [N+P+A+N] phrases in which two nouns were linked by a simple preposition not allowing the formation of the articulated form which was followed by a definite article (A).

c) 30 [N+cP+P+N] phrases in which two nouns were linked by a complex

preposition (cP, such as the ones involved in PN compounds) requiring a sP or an aP following it.

SM was asked to repeat every phrase as soon as a speech therapist had pronounced it.

## 5. Results

Our results show that N-P-N compounds are significantly more impaired than P-N compounds in our agrammatic subject. The detailed results for each of our experiments are provided in the following sections.

### *5.1 Repetition and reading tasks with compound words*

#### *5.1.1 Results of the repetition task*

The repetition task has shown the following distribution of errors.

SM's wrong answers were 60/391 (15.35%). The majority of errors 50/60 (83%) concerned NPN compounds. All other errors were randomly distributed among distracters (4/60; 6.67%), PN compounds (1/60-1.67%) and other compounds (5/60; 8.33). All control subjects performed without errors in the repetition task.

The repetition task showed that N-P-N compounds, in SM, are significantly more impaired than PN compounds, with a different ratio of performance that is statistically extremely significant (1/80 vs. 50/144, [ $\chi^2(1) = 22.8; p < .0001$ ]).

Table 1<sub>D</sub> gives a general picture of his performance.

General results				
COMPOUNDS	N. errors	% on n. items (391)	% on n. <i>intra-class</i> items	% on n. of errors
All the items	60	15.35		
D1+D2	4	1.02	7.02	6.67
<b>N-P-N</b>	<b>50</b>	<b>12.79</b>	<b>34.72</b>	<b>83.33</b>
PN	1	0.26	1.25	1.67
N-N	0	0.00	0.00	0.00
AN	0	0	0	0
NA	0	0	0	0
Nn	2	0.51	10.52	3.33
Nn	1	0.25	5.55	1.67
VV	2	0.51	20	3.33
VN	0	0	0	0

Table 1<sub>D</sub>

SM errors with NPN items are characterized by:

- a) A high number of omissions (40/50; 80%) of the entire prepositional element.
- b) Few omissions (3/50; 6%) of the article with articulate prepositions-
- c) Some paraphasias affecting the preposition (7/50-14%), which was, in general, substituted with another preposition.

SM performance with NPN compounds in repetition is sketched in Table 2<sub>D</sub>.

<i>Repetition task</i>		<b>% on total n. of NPN items</b>	<b>% on total n. of NPN errors</b>
<b>NPN</b>	144		
<b>Correct items</b>	94	65.28	
<b>errors</b>	50	34.72	
<b>omission of P</b>	40	27.78	80
<b>Substitution of P</b>	7	4.86	14
<b>Omission of article in aP</b>	3	2.08	6

Table 2<sub>D</sub>

On the contrary, with PN compounds SM performed very well, making only 1/80 (1.25%) of errors. The only error we collected, concerned a PN in which the complex preposition was substituted with another element of the same type. Thus, PN are more likely to be similar to all other compounds rather than to NPNs, according to SM performance. The few other errors we detected in our, in fact, revealed a high percentage of substitutions (5/6; 83.33%) and no omissions.

#### 5.1.2 Results of the reading task

The reading task turned out to be more difficult for SM. The total amount of errors (129/391; 32.99%), in fact, was about twice the number of errors we detected in the repetition task. NPN compounds resulted the more impaired category with 68/129 errors (52.71%). Errors concerning PN compounds were 19/129 (14.73%), many more than in the repetition task. Again, our healthy subjects made no errors and again N-P-N compounds are significantly more impaired than PN compounds in SM with a different ratio of performance that is statistically significant (19/80 vs. 68/144, [ $\chi^2(1) = 5.6; p = .0184$ ]). Below in table 3<sub>D</sub>, the reader may find a sketch of the general results of the experiment.

General results				
COMPOUNDS	n. of errors	% on n. items (391)	% on n. items of every type	% on n. of errors
All the items	129	32.99		
D1+D2	12	3.07	21.05	9.30
NPN	<b>68</b>	<b>17.39</b>	<b>47.22</b>	<b>52.71</b>
PN	19	4.86	23.75	14.73
NspaceN	6	1.53	26.09	4.65
AN	1	0.26	9.09	0.78
NA	1	0.26	10	0.78
Nn	4	1.02	21.05	3.10
nN	7	1.79	38.88	5.43
VV	4	1.02	40	3.10
VN	7	1.79	36.84	5.43

Table 3<sub>D</sub>

As in the repetition task, we found that N-P-N items were the most impaired category in SM. Omission of the preposition was the more frequent error (40/68; 58.62%). We detected also few omissions (3/68; 4.41%) of the article included in articulated prepositions (in these cases, SM retained the simple preposition despite the fact that Italian articulated prepositions are phonologically a unique word) and some substitutions affecting the simple preposition (5/68; 7.35%).

Additionally, we found some paraphasias, both phonologic (4/68; 5.88%) and verbal (5/68; 7.35%) and some substitution of one of the two nominal unit forming the compound (5/68; 7.35% for the first noun (N<sub>1</sub>) and 4/68; 5.88% for the second noun (N<sub>2</sub>)).

You may find all these data, summarized in table 4<sub>D</sub> below.

<i>Reading task</i>	n.	% on total n. of NPN items	% on total n. of NPN errors
<b>NPN</b>	144		
<b>Correct items</b>	76	52.78	
<b>Errors</b>	68	47.22	
<b>agreement</b>	1	0.69	1.47
<b>Phonologic error</b>	4	2.78	5.88
<b>Verbal paraphasia</b>	5	3.47	7.35
<b>Paraphasia of N2</b>	5	3.47	7.35
<b>Paraphasia of N1</b>	4	2.78	5.88
<b>Omission of P</b>	<b>40</b>	<b>27.78</b>	<b>58.82</b>
<b>Substitution of P</b>	5	3.47	7.35
<b>Omission of N1</b>	1	0.69	1.47
<b>Omission of article in case of aP</b>	3	2.08	4.41

Table 4<sub>D</sub>

Errors concerning PN were about ten times more numerous when SM was asked to read (19/129; 14.73%) them than when we asked him to repeat them (1/60; 1.67 %). Substitutions were the more frequent errors, affecting both prepositions (3/19; 10.53%) and nouns (5/19; 26.32%).

The noun was omitted only once (1/19; 5.26%), while omissions of the complex P were 3/19 (15.79%). The results are included in Table 5<sub>D</sub>.

<i>Reading task</i>		<b>% on total n. of PN items</b>	<b>% on total n. of PN errors</b>
<b>PN</b>	80		
<b>Correct items</b>	61	76.25	
<b>Errors</b>	<b>19</b>	<b>23.75</b>	
<b>Phonologic paraphasias</b>	1	1.25	5.26
<b>Verbal paraphasias</b>	3	3.75	15.79
<b>Paraphasias of N.</b>	5	6.25	26.32
<b>Paraphasia of P.</b>	3	2.50	10.53
<b>non production</b>	3	3.75	15.79
<b>Omission of P</b>	3	3.75	15.79
<b>Omission N.</b>	1	1.25	5.26

Table 5<sub>D</sub>

For what concerns errors with other compounds (30/129; 23.25%) we found a high number of errors (both substitutions and omissions) affecting the first element of the compound (11/30; 36.66%). No regularity is detectable among items showing these anomalies, nor the position of the head, neither the category to which the substituted element belongs. Possibly, the prevalence of errors found on the left *edge* of compound words is caused by the serious left neglect affecting our subject. See Table 6<sub>D</sub> below for a comprehensive view of the performance of SM with the *residual* compounds.

<i>Other compounds</i>	<b>% on total n. of errors</b>		<b>% on total n. of errors</b>
Agreement errors	<b>1/30 (3.33%)</b>	-	-
Complete substitution	<b>9/30 (30%)</b>	-	-
Errors on the 1 <sup>st</sup> element	<b>11/30 (36.66%)</b>	Substitutions	<b>7/30 (23.33%)</b>
		Omissions	<b>4/30 (13.33%)</b>
Errors on the 2 <sup>nd</sup> element	<b>4/30 (13.33%)</b>	Substitutions	<b>2/30 (6.66%)</b>
		Omissions	<b>2/30 (6.66%)</b>
No answer	<b>5/30 (16.66%)</b>	-	-

Table 6<sub>D</sub>

## 5.2 Results of the completion task

### 5.2.1 Completion (a)

The marked deficit of SM with linking prepositions in N-P-N compounds was confirmed. Errors were (27/49; 55.10%). No errors were detected in the control group. Simple prepositions (in NsPN compounds) were always substituted (14/15; 93.33%) with another element of the same category, except for one case in which the patient inserted an article instead of a simple preposition. For what concerns articulated prepositions (NaPN compounds), we found, 6/12 substitutions (50%), 5 of which (5/6; 83.33%) also included the omission of the article. In addition we found 5/12 (41.66) omissions of the article with the insertion of the correct preposition. Results are summarized in Table 7.1<sub>D</sub> and 7.2<sub>D</sub> where we have separately considered SM behaviour with simple and articulated prepositions.

<i>Completion (a)</i>	<b>n. of errors</b>	<b>% on n. items (32)</b>	<b>% on n. of errors</b>
<b>NsPN (32)</b>	15	55.10	
<b>Substitution with a preposition</b>	14	43.75	93.33
<b>Substitution with an article</b>	1	3.12	6.66

Table 7.1<sub>D</sub>

<i>Completion (a)</i>	<b>n. of errors</b>	<b>% on n. items (17)</b>	<b>% on n. of errors</b>
<b>NaPN (17)</b>	12	70.58	
<b>Substitution of the P</b>	1	5.88	8.33
<b>Substitution of P + omission of Art.</b>	5	29.41	41.66
<b>Omission of Art.</b>	5	29.41	41.66
<b>Non production</b>	1	5.88	8.33

Table 7.2<sub>D</sub>

### 5.2.2 Completion (b)

Interestingly, SM had no problem in identifying NN compounds. No errors were detected in the group of 20 NN we have used as *distracters*. With regard to NPN, we detected 11/30 (36.66%) cases in which SM erroneously answered that a preposition was unnecessary for completing the compound. The subjects of the control group, again, did not commit any error.

The difference ratio of performance of SM between completion of NN and completion of NPN was statistically significant ( $\chi^2(1) = 9.7$ ;  $p = .0018$ ).

Additionally, we found 3 (15.78%) errors in the remaining 19 NPN: 2/3 (66.66%) substitutions of the simple preposition and 1/3 (33.33%) omission of the article of the articulated preposition. See Table 8<sub>D</sub> below.

<i>Completion (b)</i>		
<i>Step 1 "does the compound need the P?"</i>	<b>n. of errors</b>	<b>% on n. items (30)</b>
<b>NPN (30)</b>	11	36.66
<i>Step 2 "Complete with the correct P"</i>	<b>n. of errors</b>	<b>% on n. items (19)</b>
<b>Remaining NPN to complete (19)</b>	3	15.78
<b>Substitution of P</b>	2	66.66
<b>Omission of the article of NaP</b>	1	33.33

Table 8<sub>D</sub>.

### 5.3 Results of the repetition task with phrases

SM performance with 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 error or hesitation.

About a half (43/75; 57.33%) of errors SM made, affected simple or articulated prepositions of phrases recalling/matching N-P-N compounds (N+P+N phrases). A high number of errors (18/75; 24%) concerning complex prepositions (the ones involved in the formation of PN compounds) inside phrases was detected. PN compounds, instead, as we have seen, were easily repeated in the repetition task with words. Analyzing the details of the internal composition of N+P+N errors (as said above, 43/75 ; 57.33%; consider table 9), we have interestingly detected only omissions, affecting the simple preposition (6/43; 13.95%), the articulated preposition (15/43; 34.88%) and the preposition forming part of an articulated one (6/43 – 13.95%). In the latter case, the article resulted spared.

<b>N+P+N</b>	<b>N.</b>	<b>% on total n. of items</b>	<b>% on total n. of errors</b>
<b>Items</b>	60		
<b>Correct repetitions</b>	17	28.33	
<b>Errors</b>	43	71.67	
<b>Omission of aP</b>	15	25	34.88
<b>Omission sP</b>	6	10	13.95
<b>Omission P of aP</b>	6	10	13.95
<b>Other</b>	16	26.67	37.21

Table 9<sub>D</sub>

As far as concerns errors with N+P+A+N phrases (14/75; 18.66%; namely, phrases in which two nouns were linked by a simple preposition not allowing the formation of the articulated form which was followed by a definite article, see Table 10<sub>D</sub>), the majority of errors were omissions of the simple preposition with the preservation of the definite article (3/14; 21.43%) or the omissions of both the elements (6/14; 42.86%). Only one substitution (1/14; 7.14%) of a simple preposition was found.

<b>N +P+A+N</b>	<b>N.</b>	<b>% on total n. of items</b>	<b>% on total n. of errors</b>
<b>Items</b>	21		
<b>Correct repetitions</b>	7	33.33	
<b>Errors</b>	14	66,67	
<b>Omission of sP</b>	3	14,29	21,43
<b>Omission of sP+A</b>	6	28,57	42,86
<b>Other</b>	4	19,05	28,57
<b>Substitutions of sP</b>	1	4,76	7,14

Table 10<sub>D</sub>

Finally, omissions (18/75; 24%) were again the most frequent errors with N+cP+P+N phrases (namely, phrases in which two nouns were linked by a complex preposition requiring a simple or an articulated preposition following it). A high number of errors (9/18; 50%) involved the simple or articulated preposition linking the complex one to the noun. It is a relevant fact given that, contrary to phrases with complex

prepositions, PN compounds didn't include simple prepositions.

6/18 (33.33%) errors, both substitutions and omissions, affected the complex preposition. These results are shown in Table 11<sub>D</sub>.

N+cP+aP/sP+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 11<sub>D</sub>

## 6. Discussion

Our results clearly demonstrate that SM is selectively impaired in retrieving the prepositions linking the modifying nouns to their head, and confirm previous investigations (e.g. Mondini et al. 2005). SM's deficit is consistent with the well-known difficulties with functional items shown by agrammatic subjects (e.g. Zurif and Caramazza, 1976; Berndt and Caramazza, 1980; Miceli et al. 1989; Grodzinsky, 1990; Friedmann and Grodzinsky 1997, among many others).

Moreover, our data can trigger many interesting interpretations, from a theoretical viewpoint.

First, the complex prepositions (e.g. *fuori*, outside; *sopra*, on/over; *dopo*, after) which are produced with no significant problems by SM when involved in compounds, are likely to be retrieved as *relational nouns* and not as functional *axial parts* (in the sense of e.g. Svenonius 2006; cf. also Cinque, 2010a) in the processing of Italian PN words.

Otherwise, a deficit in retrieving them correctly would be expected. Indeed, a specific Agrammatic deficit for Italian *axial parts* has been detected in Zampieri et al. (2011) (and it has been discussed here in chapter 3, Case study B). In particular, with respect to axial parts, as defined by Svenonius (2006), we know that such elements might be recruited from the *ranks* of spatial/temporal adverbials, directional particles, or quantifiers across languages and recent neurolinguistic studies (Yarbay Duman and Bastiaanse, 2009; Faroqi-Shah and Dickey, 2009) have actually demonstrated problems with temporal/aspectual adverbs and directional particles in agrammatism. This fact is confirmed by the poor performance of SM (33.33% of errors) with complex prepositions (axial parts) in the task regarding the repetition of phrases.

Second, the significant dissociation in SM performance with N-P-N words and with VN ones (for instance, in the repetition task, 50/144 vs. 0/19 errors,  $\chi^2(1) = 6.4$ ;  $p = .0114$ ) empirically undermines Ralli's (2008) recent hypothesis of a structural affinity of the two forms under consideration. Ralli's (2008) proposal is precisely that the *thematic / bare aspectual vowel* (cf. Ferrari, 2005; Vogel and Napoli 1995; Scalise, 1992) involved in the formation of Italian VN words<sup>22</sup> is a compound marker/linker just like the functional preposition in N-P-N items.

Notice also that, interestingly, our results for VN compounds are quite different from the ones collected in Semenza, Luzzatti and Carabelli (1997), where a group of six Broca's aphasics showed a significant proportion of omissions of the verb component. In our experiments, no such results emerge.

Third, SM's same behaviour/performance (generally, only very mildly impaired) with all type of exocentric compounds enhances the hypothesis that they all can have the same underlying configuration, suggesting a unified analysis. A tentative proposal, along the lines of Franco (2011b), can be that all of them originate as *reduced relative clauses*, modifying a *light* silent head noun (see Kayne 2003; Cinque 2009, 2010b). Notice

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<sup>22</sup> The empirical observation that Romance VN compounds indicate habitual (not episodic) actions seems to rule out the widespread proposal, recently updated (Progovac and Locke, 2009; Floricic, 2008), that the verbal stem in this compounds corresponds to the imperative mood (for an interesting set of further arguments against the imperative hypothesis, see Ferrari-Bridgers, 2005).

that this proposal shares some similarities with the one of Kampers-Manhe (2001), discussed above, for PN items (cf also Bok-Bennema and Kampers-Mahne, 2005 for a similar approach to VN items).

Below, we sketch a rough version of the representation of the (extended) noun phrase given in Cinque (2010b, cf. also Cinque, 2005), where (restrictive) relative clauses are assumed to be preminally merged in the specifier position of a dedicated functional projection within a layered DP:

(9<sub>D</sub>) [Q<sub>univ</sub> ... [Dem ... [Num<sub>ord</sub> ... [RC ... [Num<sub>card</sub> ... [Cl ... [A ... NP]]]]]]]]

Our idea resorts to the principle of *Phrasal Spell-Out* (Starke, 2009, Caha, 2009; see also Neeleman and Szendrői, 2007), which roughly states that any node in the tree can correspond to a lexical item, or, in other words, Spell-Out applies to syntactic phrases (e.g. it is possible to spell out a specifier together with a head). With the application of Phrasal Spell-Out, we can interpret Romance exocentric compounds as lexical items, corresponding to entire constituents “phrasally spelled-out” (namely, to reduced restrictive relative clauses). This proposal, in our view, satisfactorily reflects the *inner* modifier nature of these compounds (e.g. in Spanish *niño recogepelotas*, ballboy or in Italian *aiuola spartitraffico*, traffic island) and the syntactic relation between their both components.

Implementing such a view, syntax act as a pre-lexical system and Lexicon is merely a way of interpreting syntax. According to this orientation, exocentric compounds are lexical units, which correspond to entire (lexically-stored) constituents (namely, reduced restrictive relative clauses). An analysis of this kind *matches* Starke’s (2009) interpretation of idioms as multi-terminal expressions stored in the Lexicon as they are (see also Fillmore, Kay and O’Connor, 1988, who, from a cognitive perspective, seem to suggest a similar interpretation). Evidence for a modifying nature of Italian “exocentric” VN items are reported Ricca (2005). Further evidence may come from the attested use of this form as an adverbial modifier (e.g. *sparare a bruciapelo*, to shoot point-blank; *sapere a menadito*, to know something backward; *mangiare a crepapelle*, to eat till one bursts;

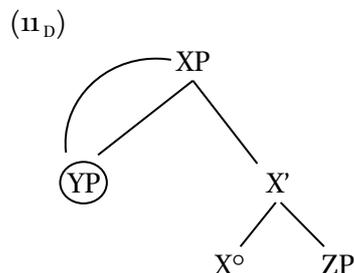
*correre a perdifiato*, to run like hell, etc., cf. Franco, 2011b; 2012a for further details).

A question raised by this kind of proposal is: but, if exocentric compounds originate as modifier why are they primarily interpreted as nouns?

Franco (2011b), relying on a set typological data made available by Dreyer (2004), explores the possibility of a criterion driving the syntactic computation, which is sketched below in (10<sub>D</sub>).

(10<sub>D</sub>) EXTENDED PROJECTION REBOOT PRINCIPLE: *If a modifier, hosted in Spec of an  $X^{\circ}$  in an extended projection ( $exP$ ) of NP, happens to be phrasally spelled-out as XP, the aforementioned  $exP$  can freeze, so that XP can inherit NP categorial status. Iff the (phrasal) modifier inherits NP status in XP,  $exP$  reset/reboot up from there.*

Crucially, the extended projection reboot principle is nothing else than a liberal version of Phrasal Spell Out and may be represented as in (11<sub>D</sub>) below:



The idea is basically that it is possible to spell-out an arbitrary stretch of the syntactic structure, as long as it forms a continuous stretch (e.g. here a *re-ranking*; *SpecXP > XP*). This is not a costly operation, from the point of view of processing, due to the fact that nodes are adjacent.

Independently of this speculative explanation, a unified analysis of Italian exocentric compounds, as suggested by our results, can turn out to be the correct path to take.

Finally, a crucial question is raised: are N-Prep-N items real compounds, since they behave very differently from N-N compounds in SM performance (e.g. see the

significance of his contrasting performance in the completion (b) task: 11/30 errors with N-P-N vs. 0/20 errors with N-N;  $\chi^2(1) = 4.857, p = 0.0275$ )?

Possibly, the same underlying architecture holds both when these items are processed as phrases and when they are processed as “lexicalized syntax<sup>23</sup>” (possibly, again we may assume that they are processes like *idioms* according to the nanosyntactic paradigm; see again Starke, 2009). SM showed, indeed, a marked deficit in correctly retrieving both N-P-N alleged words, and comparable phrases in our experiments. It might be that they are processed according to the same underlying computation - which turn out to be invariantly impaired in an agrammatic subject - and two different types (“heights”) of Spell-Out apply, hence tentatively suggesting a sort of *parameterization* of Spell Out (namely, the Phrasal Spell-Out for *idiomatized* N-P-N words vs. the Spell Out of terminal nodes for phrases). Given also the high number of substitutions emerging from the Completion (a) task (see for comparable results, the recent work of Matzig et al. 2010) and due to the very similar poor performance of SM with both N-P-N compound-like-items and analogous phrases in repetition, a unified analysis of this sort is strongly suggested by our study.

Furthermore, the different ratio of performance with N-N compounds as opposed to the one with N-P-N forms in our completion task empirically undermines the very interesting proposal of Delfitto and Melloni (2009) concerning their unified derivation, driven by the necessity to break a point of symmetry for N-N items.

In conclusion, from a broad perspective, we have seen that our results are somewhat coherent with the basic nanosyntactic idea of a (mental) lexicon mapped onto a range of syntactic trees.

Such results, which can be considered as a “probe” to check the feasibility of a nanosyntactic approach to language disorders (and its possible ‘mental reality’), are particularly interesting because there is still no clear account on the production of

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<sup>23</sup> Independent “symmetrical” support to such a ‘constructionalist’ approach to the mental lexicon can be given by the results of a recent experiment with German A-N compounds (e.g. *Rotwein* ‘red wine’) vs. A-N phrases (e.g. *grüne Bohnen* ‘green beans’) (Schlücker and Plag, 2011), which show that A-N phrases with the naming function should not be considered as isolated idiosyncratic lexicalized items, but a productive naming device in German, just as compounds.

compounds (and idioms) within the most widespread paradigms of research on lexical retrieval (see e.g. Bock and Levelt, 1994; Jescheniak and Levelt, 1994; Levelt, 1989; Caramazza, 1997; Roelof, 1992).

Further researches are needed (and, as we have shown here, worth pursuing) to check if the *Nanosyntactic* framework version of the Cartographic paradigm provides explanations tenable on empirical (i.e. neurolinguistic) grounds.

## APPENDIX A<sub>p</sub>

*Full list of items (ad administered to SM)*

Lungolago  
Sottovoce  
Cremagliera  
visopallido  
Pianoterra  
Megalite  
Controsenso  
Sottogamba  
Fuoribordo  
Controvoglia  
Temperatura  
Prezzemolo  
Dirigente  
Sottopassaggio  
Oratore  
Contromisura  
Retrosцена  
Grattacielo  
Pavimento  
moscacieca  
Tergicristallo  
Retrobottega  
Coccodrillo  
Montepremio  
Dopolavoro  
Sottobraccio  
Fuoricorso  
Sottocuoco  
fuggifuggi  
Ferrolega  
Focamonaca  
Docciaschiama  
Portachiavi  
Calciomercato  
Sottofondo  
Gelosia  
Retroguardia  
Lungofiume  
Avantielenco  
lavasciuga  
Tartaruga  
Gommapiuma

mezzaluna  
Sottovuoto  
Sottobicchiere  
Oltremare  
Contraltare  
Ceralacca  
Servosterzo  
Sottocoda  
millefoglie  
Pappagorgia  
Peperone  
Melograno  
Bordovasca  
Catastrofe  
Cavaliere  
millepiedi  
Roccaforte  
Arcobaleno  
Virulenza  
Sottobosco  
Varicella  
Melodia  
Mandragola  
Sottoscala  
Sottoveste  
Fuorionda  
gattamorta  
Semaforo  
Oltreconfine  
Toporagno  
pellerossa  
Barracuda  
Contromano  
Rotocalco  
Filastrocca  
Entrotterra  
tiremolla  
Controvento  
Oltrecortina  
Fuoriprogramma  
purosangue  
Soprattassa  
Madrepatria  
Maresciallo  
Fuorigioco  
Mercenario  
Sopracciglio  
Controluce

Meteorite  
Crocevia  
Voltafaccia  
Fuorisede  
terzogrado  
Controcorrente  
Senzatetto  
Fuoricampo  
Asciugacapelli  
pezzogrosso  
Contropiede  
Poggiatesta  
malavita  
Doposcuola  
Fuoristrada  
Controfigura  
Lavastoviglie  
Pugilato  
Catafalco  
Sottolio  
Sottosuolo  
Controfirma  
Corrimano  
Recidiva  
Camposcuola  
Soprabito  
Pirofila  
Battipanni  
Imbarazzo  
Fazzoletto  
Controcultura  
testacalda  
Discepolo  
parapiglia  
Fuorimoda  
Pellegrino  
Fondovalle  
falsariga  
mezzacartuccia  
Retroterra  
Dopobarba  
Fuorilegge  
Aspirapolvere  
Cavalcavia  
Senzadio  
Controverso  
Sottopancia  
giravolta

Collaudo  
Contronatura  
Sopraelevata  
Dopoguerra  
Scarafaggio  
Sottosterzo  
Pontefice  
Lungolinea  
Soprannome  
Patriarca  
dormiveglia  
Girocollo  
Reggiseno  
Retromarcia  
oronerò  
Salamandra  
belladonna  
Sottobanco  
Requisito  
Motosega  
pigiapigia  
Mondovisione  
Boccaporto  
Accredito  
Fuoriclasse  
bagnasciuga  
Controsole  
Barbabietola  
pecoranera  
Schiamazzo  
Luogotenente  
Lungomare  
Vegetale  
Oltreoceano  
Acquavite  
Cartamoneta  
Funerale  
Cavatappi  
verderame  
Sottopeso  
Sottochiave  
Pescespada  
Pastorizia  
musogiallo  
Fuoripista  
saliscendi  
Melanoma  
Serratura

Logaritmo  
Clorofilla  
Fotoromanzo  
Sottaceto  
Rompighiaccio  
Lustrascarpe  
Sopralluogo  
Filosofo  
Entrobordo  
Contagocce  
gattabuia  
Marzapane  
Soprammobile  
Fuoriserie  
Oltretomba  
Coprifuoco  
Calzamaglia  
Polpastrello  
Senzapatria  
toccasana  
Formalina  
Maleficio  
Soprapensiero  
Portalettere  
Pentecoste  
Paladino  
Portavoce  
generale  
compleanno  
rasoterra  
Terremoto  
tela di ragno  
fuga dei cervelli  
Fangoterapia  
banco dei pegni  
codice a barre  
Sacco a pelo  
Finecorsa  
auto civetta  
Dente di cane  
Chiodo di garofano  
carta da parati  
bocca dello stomaco  
zampe di gallina  
biglietto da visita  
palla da tennis  
mandato di cattura  
colpo di grazia

luna di miele  
vita da cani  
Cappello a cilindro  
braccio della morte  
cavallo a dondolo  
fucile a pompa  
testa di rapa  
borsa del ghiaccio  
uva spina  
arma da fuoco  
guanto di velluto  
dito d'apostolo  
bòtte da orbi  
corpo del reato  
Pepe in grani  
tiro alla fune  
braccio di ferro  
Bocca di dama  
Ferro da stiro  
messa da requiem  
testa di legno  
banca del seme  
bocca di leone  
occhio del ciclone  
Analisi del sangue  
Torso di cavolo  
Giacca a vento  
economie di scala  
auto pirata  
governo ombra  
Barca a vela  
Indice dei prezzi  
Culto della personalità  
occhio di tigre  
quartiere dormitorio  
cane poliziotto  
addio al celibato  
Castelli in aria  
canto del cigno  
testa d'uovo  
Lenti a contatto  
nave pirata  
colpo d'occhio  
decreto fantasma  
mezzo da sbarco  
lingua di terra  
Latte in polvere  
colpo di fulmine

peso gallo  
ordine del giorno  
stanza dei bottoni  
Coltello a serramanico  
pompa di benzina  
donna cannone  
marca da bollo  
Freno a mano  
Tiro a segno  
cresta dell(a) onda  
beneficio del dubbio  
Erba della regina  
Letto di morte  
concorso di colpa  
pelle d'oca  
scherzo della natura  
Messa in scena  
assegno a vuoto  
occhio di gatto  
Partenza in salita  
uccello del malaugurio  
cura del sonno  
colpo in canna  
gesto da villano  
pollo allo spiedo  
Sale in zucca  
corsa a ostacoli  
birra alla spina  
bastone da passeggio  
fuochi d'artificio  
dente del giudizio  
festa da ballo  
scherzo da prete  
orologio al quarzo  
Festa in costume  
coda di cavallo  
colpo di testa  
cavallo da corsa  
buco della serratura  
servo della gleba  
amico del cuore  
freddo cane  
foglio di via  
pugno di ferro  
idea chiave  
Pentola a pressione  
gatto delle nevi  
bistecca ai ferri

convoglio tartaruga  
medaglia al valore  
ferri da calza  
barba di capra  
uomo di paglia  
cane da caccia  
concorso a premi  
Ballo in maschera  
Acquavite  
bava alla bocca  
Mulino a vento  
rosa dei venti  
testa coda  
cono d'ombra  
Videogioco  
pezzo di ricambio  
Tenuta in curva  
battello mosca  
piaga da decubito  
tacco a spillo  
cassetta delle lettere  
intervista-bomba  
Radiocronaca  
Pantaloni alla cavallerizza  
progetto pilota  
Curva a gomito  
camicia da notte  
rete da pesca  
stato cuscinetto  
Penna a sfera  
faccia a faccia  
polvere da sparo  
piede di porco  
Treno a vapore  
cerniera lampo  
Aereo a propulsione  
colpo di scena  
Vetroresina  
schiuma da barba  
Capobanda  
Pesca a strascico  
mulo da soma  
occhio di lince  
sfera di cristallo  
collo di bottiglia  
concetto chiave  
corsa agli armamenti  
asse delle ascisse

pozzo di scienza  
Zucchero a velo  
collo dell'utero  
Bomba a mano  
salto nel buio  
abito da sposa  
topo di biblioteca  
viola mammola  
occhio di bue  
occhiali da sole  
picco di ascolto  
caso limite  
caduta massi

### *Completion A*

Sale _ zucca	in
Sacco _ pelo	a
codice _ barre	a
fuga _ cervelli	dei
chiodo _ garofano	di
dente _ cane	di
palla _ tennis	da
mandato _ cattura	di
occhiali _ sole	da
pozzo _ scienza	di
topo _ biblioteca	di
corsa _ armamenti	agli
Zucchero _ velo	a
Bomba _ mano	a
collo _ bottiglia	di
mulino _ vento	a
luna _ miele	di
braccio _ morte	della
cavallo _ dondolo	a
corpo _ reato	del
Ferro _ stiro	da
braccio _ ferro	di
arma _ fuoco	da
guanto _ velluto	di
bòtte _ orbi	da
giacca _ vento	a
castelli _ aria	in
lenti _ contatto	a
tiro _ fune	alla
bocca _ stomaco	dello
culto _ personalità	della

colpo _ fulmine	di
coltello _ serramanico	a
pompa _ benzina	di
latte _ polvere	in
scherzo _ natura	della (di)
colpo _ canna	in
pollo _ spiedo	allo
cura _ sonno	del
pelle _ oca	d'
marca _ bollo	da
stanza _ bottoni	dei
dente _ giudizio	del
festa _ costume	in
orologio _ quarzo	al
uccello _ malaugurio	del
medaglia _ valore	al
pozzo _ scienza	di
salto _ buio	nel

### *Completion B*

Croce_via	#
Bordo_vasca	#
palla _ tennis	da
campo_scuola	#
collo_utero	dell'
pugno_ferro	di
occhiali_sole	da
abito_sposa	da
madre_patria	#
sfera_cristallo	di
topo_ragno	#
colpo_scena	di
mulino_vento	a
piede_porco	di
capo_banda	#
foto_romanzo	#
treno_vapore	a
asse_ascisse	delle
bomba_mano	a
monte_premio	#
schiuma_barba	da
cerniera_lampo	#
polvere_sparo	da
progetto_pilota	#
piaga_decubito	da
pezzo_ricambio	di
pesce_speda	#

stato_cuscinetto	#
uomini_rana	#
penna_sfera	a
tacchi_spillo	a
faccia_faccia	a
cassetta_lettere	delle
occhio_lince	di
intervista_bomba	#
torso_cavolo	di
testa_uovo	d'
quartiere_dormitorio	#
freno_mano	a
concorso_colpa	di
peso_gallo	#
canto_cigno	del
letto_morte	di
nave_pirata	#
colpo_occhio	d'
cane_poliziotto	#
decreto_fantasma	#
calza_maglia	#
tiro_segno	a
colpo_canna	in

## Chapter 6

### *Case study E*

### *A probe to check Evaluative Morphology in Agrammatism*

## 1. Introduction

Evaluative Morphology (henceforth: EM), which prototypically includes diminutive, augmentative, endearing and pejorative morphemes, has been investigated in details in contemporary linguistic theory (cf. for instance Scalise 1984; Anderson 1992; Stump 1993; Cinque 2006b; 2011, among many others). As already noted by Grandi (2007: 153), evaluative affixation has been analyzed virtually from all possible research perspectives. Indeed, there are accurate descriptions (taxonomies) of evaluative markers in individual languages or language families (see for instance, Merlini Barbaresi, 2004 for Italian or Hasselrot, 1957 for an accurate description of these ‘expressive’ morphemes in Romance languages), in-depth typological surveys (cf. Bauer, 1996), works that focus on ‘interfaces’ among various linguistics sub-components (see e.g. Dressler and Merlini Barbaresi (1994)’s analysis of evaluative markers as part of a *productive* interaction between morphology and pragmatics<sup>24</sup> or the ‘morpho-semantic’ accounts<sup>25</sup> of Wierzbicka, 1991; Jurafsky, 1996; Fortin, 2011) and many diachronic investigations (cf. Grandi, 2003; Gaide 1988, among others).

Nevertheless, in the neuro-linguistic literature, to our knowledge, there are no previous attempts to systematically analyze possible deficits, specifically concerning EM in agrammatic speakers, or more generally, in aphasic populations. The aim of this study is to investigate EM in an Italian agrammatic patient.

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<sup>24</sup> As written by Dressler and Merlini Barbaresi (2001: 43): "A *morphological rule has a morphopragmatic meaning if it contains a pragmatic variable which is necessary within the description of its meaning. This implies that its basic pragmatic meaning(s) cannot be reduced to a semantic meaning. The main field of application has been the pragmatics of diminutives and augmentatives*".

<sup>25</sup> Jurafsky (1996) is possibly the most famous semantic account of diminutive forms. According to Jurafsky (1996: 535-537), the cardinal prototype among diminutives is recognized as the (semantic) meaning CHILD, from which all other meanings/applications are semantically derived.

Our agrammatic speaker has the characteristic feature of being a Crossed Aphasic, namely a right-handed individual who has developed disturbance of language after right hemisphere lesion (his clinical features have been introduced in chapter 5 above).

Scalise (1984) argued that Italian EM should be considered as a specific type of process, independent from both inflection and derivation, according to a set of peculiar features. Indeed, evaluative morphology has certain special properties which set it apart from both derivational and inflectional morphology, as has been noted in the theoretical literature, on cross-linguistic bases (cf. Carstairs-McCarthy, 1992; Stump, 1993; Jaeggli, 1980; Perlmutter, 1988; Bauer, 1996; 2004, among others).

For instance, in Italian:

- (i) EM applies to different categories (nouns, adjectives, adverbs), without changing the category of the items involved in the process (e.g. [fungo]<sub>N</sub>→[funghetto]<sub>N.Endear</sub>, *mushroom*);
- (ii) EM can apply more than once to the a single lexical unit (e.g. [orso]<sub>N</sub>→[orsetto]<sub>N.Endear</sub>→[orsettino]<sub>N.Endear.Dim</sub>, *bear*);
- (iii) EM usually does not alter the morpho-syntactic properties and/or the subcategorisation skeleton of the words it applies to (e.g. [borsa]<sub>N[-abstract]</sub>→[borstone]<sub>N.Aug[-abstract]</sub>, *bag*).<sup>26</sup>

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<sup>26</sup> The full set of properties which distinguishes evaluative processes from both derivation and inflection is reported below in (i) (Scalise, 1984: 132f.; cf. also Scalise, 1989; Stump, 1993: 3-4):

- (i)
  - (a) EM is able to change the semantics of the base.
  - (b) EM allows the consecutive application of more than one rule of the same type, and at every application the result is an existent word.
  - (c) EM is always external with respect to other derivational suffixes and internal with respect to inflectional morphemes.
  - (d) EM allows, although to a limited extent, repeated application of the same rule on adjacent cycles.
  - (e) EM does not alter the syntactic category of the base it is attached to.
  - (f) EM does not alter the (morpho)syntactic features or the subcategorization frame of the base.

Further descriptive evidence for considering EM an independent process (an autonomous morphological *sub-component*) can be the following: in Italian, it standardly occurs between derivational and inflectional morphology (e.g. [port<sub>Stem</sub>-ier<sub>Der</sub>-on<sub>EM</sub>-e<sub>Inf</sub>]<sub>N.Aug</sub>, *big/brave/good goalkeeper* from *porta, door*).

Recently, Cinque (2006; 2011), basing its analysis on a comprehensive typological survey, argued that EM is associated to the presence of a dedicated functional architecture within an extended projection. *Positional* data -in accordance to Baker's (1985; 1988; 2003b) *Mirror Principle*- provide evidence for a (partial) layered structure of the following kind, e.g. for the noun phrase: [DP...[AUG/DIMP[ENDEAR/PEJP...[NP]]]] (e.g. [orso]<sub>N</sub>→ [orsetto]<sub>N.Endear</sub>→ [orsettino]<sub>N.Endear.Dim</sub>, but \*[orsinetto]<sub>N.Dim.Endear</sub>, *bear*). A tendency to interpret evaluative formations as a *syntactic* process seems to be a current trend of research within contemporary generative linguistics and we will introduce a set of works relevant to the present discussion in paragraph 2, below.

Descriptively, it has been reported an *overload* of evaluative markers in a longitudinal study of a Polish agrammatic speaker performed by Ulatowska, Sadowska and Kądziaława (2001), who consider evaluative morphology as a derivational *process*. Precisely (cf. Ulatowska, Sadowska and Kądziaława, 2001: 331) in that study the formation of evaluative markers was elicited with a *probe* query: "*What do you call a little X?*"

The authors found some errors consisting of the substitution of the required affix with a wrong one, and the absence of alternation in the stem adding a wrong suffix, for example *kapelusz-ek* instead of *kapelus-ik* (little hat) or *krawat-ek* instead of *krawac-ik* (little tie). It was also observed a tendency to produce double diminutives, namely a sequence of two diminutive morphemes, which in Polish act as intensifiers of single diminutives, for example *dzwoneczek*, from *dzwonek* (little bell), *koteczek*, from *kotek* (little cat). Interestingly, The double diminutive was often given as the first possibility by their patient.

Ulatowska, Sadowska and Kądziaława, further noticed (2001: 331-332) that "*the tendency to use many diminutives was characteristic of the patient's speech. Several people who had frequent social contacts with the patient noticed that the tendency to use diminutives increased over time. The patient herself stated that she was aware of the highly*

*frequent use of diminutives in her speech and that she was annoyed by it because she could not control it*". Thus, the authors advanced the hypothesis that the *overabundance* of diminutives could be a 'characteristic' of the premorbid speech of their patient.

In another work on Italian, Mondini et al. (2005) *incidentally* reported the case of MB, an agrammatic speaker, who shows (morphological and semantic) difficulties in reading and repetition of evaluative formations. For instance (cf. Mondini et al. 2005: 183), MB's production was characterized by the presence of errors such as: "*industrietta* [*diminutive form of industria, plant*] read as *indu- . . . fabbrica, pero` piccola!*, factory but small!"

Whereas there is virtually no literature on 'language loss' specifically concerning EM, there are, on the contrary, many works on the *acquisition* of evaluative affixes. Most of the studies on L1 acquisition on a broad set of languages (cf. for example, the works collected in Savickienė and Dressler, 2007; cf. also Gillis, 1997 for Dutch) have shown that evaluative affixes emerge very early in child speech.

Within acquisitional studies, the *inner* nature of EM is debated (percolating between the two poles of derivational and inflectional morphology). For instance, Dressler (1994) and Dressler and Karpf (1995) have claimed that diminutives are acquired early because they belong to *non-prototypical* derivational morphology<sup>27</sup> which would be easier to acquire than prototypical derivational or inflectional morphology.

To justify the great 'diffusion' of EM in the early stages of language acquisition, it has been also argued that expressive affixes may somewhat trigger the acquisition of inflectional noun morphology and may be preferred to their base nouns for this reason (cf. Olmsted, 1994; Kempe and Brooks, 2001, among others). Interestingly, first-language acquisition studies have also shown that, for quite a long stage, diminutives are used by children without any *trace* of smallness, namely without any recognizable/univocal semantic meaning, and often in contexts where a meaning of smallness is

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<sup>27</sup> The authors' idea is precisely that extragrammatical / proto-grammatical operations are the first morphological operations acquired by the children (Dressler and Karpf, 1995: 101). Examples of extragrammaticality in children early morphological processing would include, according to Dressler and Karpf (*aberrant*) phenomema of e.g. *blending*, *backformation*, *truncation* and *reduplication*.

pragmatically/semantically excluded (See for Italian, Ceccherini, Bonifacio and Zocconi 1997; De Marco 1998).

For what concerns specifically the acquisition of Italian, the first work that addressed the development of diminutives was the longitudinal investigation of Bates and Rankin (1979). They found in a first stage of development “*no evidence of either understanding or an attempt to encode size or value concepts*” (1979: 35). Then, according to their data, in a subsequent stage, the semantics of concepts emerge, while the pragmatic value (e.g. the metaphoric sense, a *targeted* use, etc.) of diminutives is acquired quite late (very long after two years).<sup>28</sup>

In recent years, Noccetti et al. (2007), in a study of the use of diminutives in four Italian children, have found – *contra* Bates and Rankin (1979) – that the use of diminutives as a “*pragmatic variant*” (Noccetti et al. 2007: 149) of their respective base form emerges very early (in the stage of ‘proto-morphology’) and prior to the acquisition of the ‘core’ semantic meanings (i.e. smallness and related values). The explanation the authors give to these findings is basically modulated on previous observations made by Dressler and Merlini Barbaresi (1994; 2001), who motivate this *alleged* precedence of pragmatics as follows: “*Now what meaning do children assign to diminutives before they acquire the semantic meaning of smallness? Since, most of the time, it is very difficult for the observer to ascertain any precise meaning of a given diminutive that a child uses alongside its simplex base, one might hypothesize that children first use diminutives as synonymous substitutes for their simplicia*” (Dressler and Merlini Barbaresi, 2001: 52).

## **2. An overview of recent syntactic approaches to EM**

As introduced above, in recent years, there have been many works devoted to the study of evaluative morphology from a syntactic viewpoint. The aim of this section is precisely to illustrate some of these approaches. Notice how crucial experimental data

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<sup>28</sup>It should be noted here that Bates and Rankin (1979) incorrectly classified Italian diminutives as ‘inflectional’ morphology.

from agrammatic production are for checking the validity of a syntactic approach to evaluative markers. Namely, the finding of a specific deficit in the production of evaluative affixes in an agrammatic subject could be interpreted as a clear evidence that those paradigms of research which dissolve morphology into syntax (e.g. Cartography, cf. Cinque and Rizzi, 2010a, and its nanosyntactic *branching*, c.f. Starke, 2009; Distributed Morphology, cf. Halle and Marantz, 1993; Harley and Noyer, 1999; or the unifying paradigm of Manzini and Savoia, 2011) are on right track.

### 2.1 Cinque's cartographic proposal

Recently, Cinque (2006b; 2011), in accordance to the *narrow* cartographic idea that every projection available in UG architecture spells out only one precise semantic feature with +/-value,<sup>29</sup> claimed that the semantic primitives of LITTLE vs. BIG and GOOD vs. BAD are universally encoded in natural languages *via* dedicated grammatical slot (namely, a set of functional projections).

Cinque's proposal is appealing and, particularly, the idea of a dedicated functional skeleton universally available for evaluative markers in human grammar can easily explain the wide range of possibility in the way this kind of items are concealed on typological grounds (see Bauer, 1996; Stump, 1993). Consider, for instance the following example (taken from Cinque, 2011, class lectures, reported also in Gambino, 2010: 21) from *Nankina*, one of the Finisterre languages of Papua New Guinea:

- (1<sub>E</sub>) a. Wam d<sup>^</sup>v<sup>^</sup>k sek de ya-sat  
 talk short DIM one say-INT.IS  
 'I will tell a short story'
- b. K<sup>^</sup>nd<sup>^</sup>p kuonj damini wiet de jikŋ <sup>^</sup>-w<sup>^</sup>n  
 wood stick large AUG one heavy do-DS.3S  
 'The huge piece of wood was heavy...' *Nankina* (Papuan)

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<sup>29</sup> For instance, in the seminal work of Cinque (1999) the ordering of aspectual adverbs is quite 'constrained': each projection in the *fseq* has a very narrow semantic content and in general only two adverbs (one at the positive and one at the negative pole) can occupy its Specifier position.

In (1<sub>E</sub>a,b) we may see that in Nankina the diminutive *sek* and the augmentative *wiet* occur sandwiched between the numeral modifier and the size modifier. Thus, it seems plausible to consider the evaluative markers in the example above as the morphological *overt* realization of the (functional) head of an independent projection in the DP field.

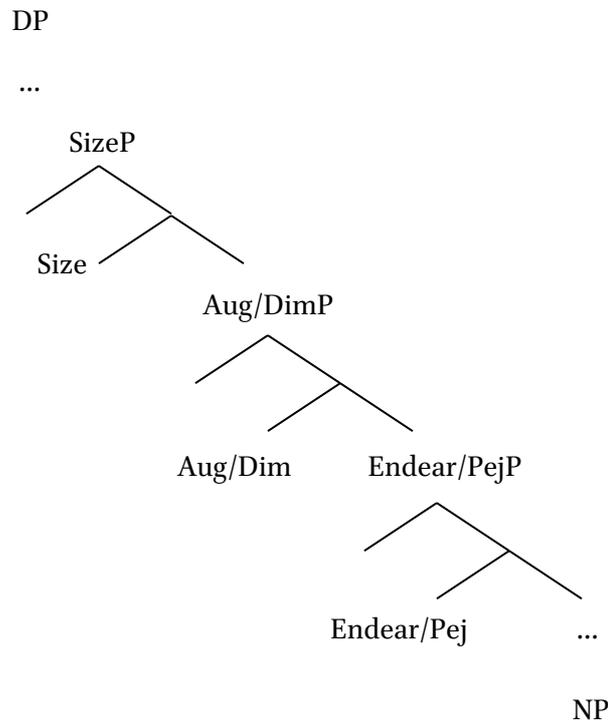
Previous work on the relative order of adjectival modifier across languages (Cinque, 1994; cf. also Scott, 2002) has shown that in the extended noun phrase it is possible to sketch a very layered hierarchy of projections *above* the noun and *below* the determiner. A partial representation is given in (2<sub>E</sub>):

(2<sub>E</sub>) [DP [Subj.CommentP [SizeP [ShapeP [ColourP [OriginP [MaterialP ... [NP ]]]]]]]]]

Building on the observation that EM, when cyclically applied to the same base, is *constrained*, namely the relative order of the evaluative markers is fixed –see (3<sub>E</sub>) below with Italian examples–, Cinque argued, on a cross-linguistic basis (and with the extensive application of Baker’s *Mirror Principle*, as said above), that the first morpheme in the noun’s extended projection is always the instantiation of a Pejorative / Endearing Projection, and the second morpheme is always the instantiation of an Augmentative / Diminutive Projection. A possible representation of the underlying structure of EM is given below in (4<sub>E</sub>).

(3 <sub>E</sub> )	a.	orso	orsetto	orsino	orsettino	*orsinetto
		<i>bear</i>	<i>bear</i> <sub>end</sub>	<i>bear</i> <sub>dim</sub>	<i>bear</i> <sub>end.dim</sub>	<i>bear</i> <sub>dim.end</sub>
	b.	barca	barchetta	barchina	barchettina	*barchinetta
		<i>boat</i>	<i>boat</i> <sub>end</sub>	<i>boat</i> <sub>dim</sub>	<i>boat</i> <sub>end.dim</sub>	<i>boat</i> <sub>dim.end</sub>
	c.	uomo	omaccio	omone	omaccione	*omanaccio
		<i>man</i>	<i>man</i> <sub>pej</sub>	<i>man</i> <sub>aug</sub>	<i>man</i> <sub>pej.aug</sub>	<i>man</i> <sub>aug.pej</sub>
	d.	capo	capoccia	capone	capoccione	*caponaccio
		<i>head</i>	<i>head</i> <sub>pej</sub>	<i>head</i> <sub>aug</sub>	<i>head</i> <sub>pej.aug</sub>	<i>head</i> <sub>aug.pej</sub>

(4<sub>E</sub>)



The cartographic approach accounts in an elegant way for the distribution of evaluative morphemes within the nominal domain and has the advantage of getting rid of the *lexicalist* implication of a special (third) subcomponent of morphology, independent from derivation and inflection.

In his PhD dissertation, Gambino (2010) has criticized Cinque's view from a *lexico-semantic* viewpoint, arguing that the distributional and morphological properties of EM are "*quite complex and variable*" (Gambino, 2010: 39). Building on Borer (2004) and De Belder (2008), he basically claims that the notions of *scularity* and *measurability* (especially the process that turns *mass* nouns into *count* nouns) are crucial for a correct explanation of EM features. However, Gambino's arguments are not very appealing. Just to make two examples, among many other possible, it seems (a) difficult to consider as an instance of the application of EM [specifically, in accordance to a *mass* to *count* phenomenon] the 'shape' of nationality/origin adjectives which, if from one side can be derived in Italian with the suffix *-ino* (from city/region/nation nouns, e.g. *Tunisia* >

*tunisino, Tunisian*), from the other side can also be derived by the mean of other suffixes (e.g. *Francia, France* > *francese, French*); (b) very difficult to assume a role of EM in *deverbal agentive nouns*, which in Italian can take the suffix *-ino* (e.g. *imbiancare, to whiten* > *imbianchino, whitewasher*), but have as a productive derivational *tool* the suffix *-tore* (*nuotare, to swim* > *nuotatore, swimmer*; *bere, to drink* > *bevitore, drinker*).

## 2.2. *Diminutives spell out LexP: the analysis of De Belder, Faust and Lampitelli*

A more interesting alternative is represented by the work of De Belder, Faust and Lampitelli (2009; 2012). Relying on the observation that crosslinguistically, diminutives can be characterized by compositional and non-compositional meanings, as shown below in (5<sub>E</sub>) for Italian, and drawing on data from Romance, Semitic, Slavic and Germanic languages, the authors claim that such a distinction can be addressed in terms of syntactic structure, proposing, as shown in (6<sub>E</sub>), two different positions for diminutives.

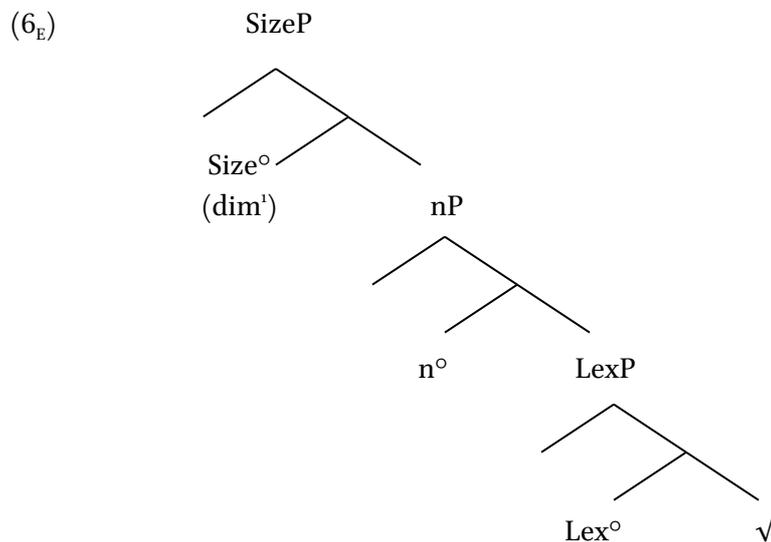
The first one (labelled by the authors *SizeP*), which can appear both in the derivational and in the inflectional domain, would be part of the functional *hierarchy* of the extended noun phrase and would be situated between the categorial head *n*<sup>o</sup> and the projection, hosting number marking<sup>30</sup>. The second one, on the contrary, would directly merge with the *root*, realizing a lexical projection *below* the categorial head (namely, it would be not restricted to nouns), and is tagged by the authors as *LexP*.

It is worth noticing that De Belder, Faust and Lampitelli adopt the (appealing) idea that *inflection* and *derivation* are both products of syntax (Marantz 1997, 2001; Harley & Noyer 1999; Arad, 2005, among others).

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<sup>30</sup> Notice that -according to De Belder, Faust and Lampitelli- being the realization of functional material the morphemes instantiated in *SizeP* would be characterized by full productivity and compositionality.

- (5<sub>E</sub>)
- a. nas-ino      compositional, *-ino* generated in *SizeP*  
*nose.DIM*  
 ‘small nose’
  - b. pan-ino      non-compositional, generated in *LexP*  
*bread.DIM*  
 ‘sandwich’, not small bread
  - c. cas-ino      non-compositional, generated in *LexP*  
*house.DIM*  
 ‘brothel’, not small house



It is also important to notice that this proposal does not rule out the cartographic view. Consider the following example, again from Italian:

- (7<sub>E</sub>)
- a. pan-in-ett-ino  
*bread.DIM.END(DIM).DIM*
  - b. tavol-in-ett-ino  
*table.DIM.END(DIM).DIM*

As shown above in the examples in (7<sub>E</sub>), which represent perfectly grammatical words in Italian, we may see two diminutives *-in*, sandwiched between an endearing morpheme *-ett* (or, following De Belder, Faust and Lampitelli a diminutive with a somewhat different *flavour*). This is clearly not possible if we admit ‘only’ two positions (a pre-lexical and a functional one) for accommodating evaluative markers: we need at least a dedicated functional slot for the endearing (or pejorative) morpheme and a dedicated functional slot for the diminutive (or augmentative) morpheme. Another fact that weakens De Belder, Faust and Lampitelli proposal is that, even if *lexicalised*, the item in (7<sub>E</sub>b) has a compositional meaning (actually, a *tavolino* is a small table).

However, consider the following fact:

- (8<sub>E</sub>) a.      *tavol-in-etto*  
                   *table.DIM.END(DIM)*
- b.      ? *tavol-ett-ino*  
                   *table.END(DIM).DIM*

Basing on a Google search, I have retrieved more than a hundred thousand of occurrences of *tavolinetto* and only 86 entries of *tavolettino*. Note that (8<sub>E</sub>a) represents an exception to the application of the *Mirror Principle* (e.g. *tavolinetto* or *paninetto* vs. *orsettino*). Hence, it is possible that some ‘evaluated’ forms (even if compositional in origin) enter autonomously in the Lexicon (or in a pre-categorial position directly merged with the root), and then the functional (hierarchical, fixed) application of EM (as a process) may take place cyclically, in accordance to the Mirror Principle.

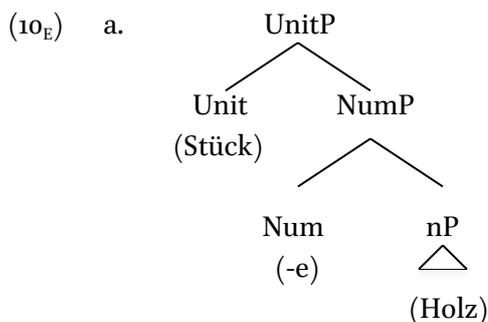
That seems to be the most reasonable explanation for e.g. forms in *-inettino* in Italian (where two morphemes in *-in* and a morpheme in *-ett* co-occur).

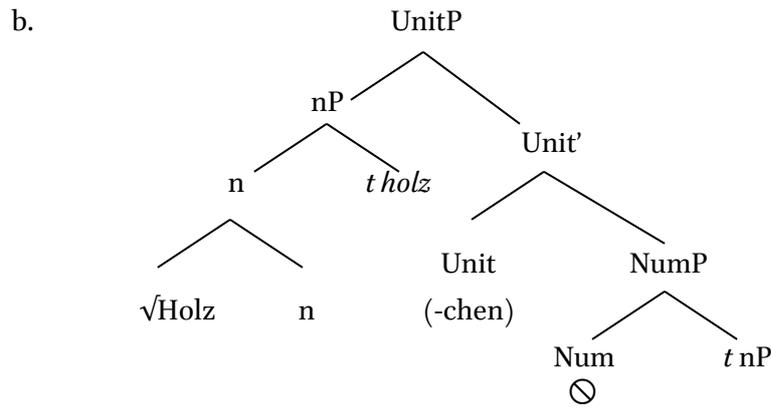
2.3 Denis Ott (2011): *diminutives as Classifiers*

Finally we will consider briefly the recent work of Dennis Ott (2011) on German in which, as shown by the author, mass nouns seem to be changed into count nouns by means of two different strategies: either by using mass words in connection with a numeral classifier, or by adding the diminutive morpheme (*-chen*). Consider the examples below adapted from Ott (2011: 3):

- (9<sub>E</sub>) a.      zwei    Hölzchen  
                  two    wood.DIM  
                  ‘two (small) pieces of wood’
- b.      zwei    Stücke          Holz  
                  two    piece.PL      wood  
                  ‘two pieces of wood’

Ott argues that the two strategies in (9<sub>E</sub>) are structurally (exactly) parallel, with “*both kinds of elements (numeral classifiers and diminutive -chen) being exponents of an individuating functional head*” (Ott, 2001: 1). Relying on previous work by Borer (2004) and De Belder (2008), he claims that in German diminutives and numeral classifiers are in competition for the same projection, namely *UnitP*, the only difference being represented by the obligatory movement of the NP triggered by the clitic-like nature of the diminutive morpheme. See the respective basic representations below in (10<sub>E</sub>a,b) (cf. Ott, 2011: 18-19):





Ott (2011: 19-28) provides a huge set of interesting and detailed examples to motivate his model, but consider the Italian examples below:

- (11<sub>E</sub>) a. due birrettine  
*two beer.DIM(END).DIM.PL*
- b. una dozzina di ovetti  
*a dozen of egg.DIM(END).PL*
- c. tre quintali di piombettini  
*three quintal.PL of sinker.DIM(END).DIM.PL*
- d. due tonnellatine di rifiutini fosforescenti  
*two ton.PL of waste.DIM.PL phosphorescent.PL*
- (retrieved from Google)

The examples above represent clear problems for a model that assumes numeral classifiers to be in competition with diminutive morphemes for the same (functional) position. In (11<sub>E</sub>a) we have two diminutives (or a diminutive and an endearing morpheme) attached to the same base and in (11<sub>E</sub>b) we have a classifier (*dozzina*) together with a noun bearing an evaluative affix (*ovetti*). Are both evaluative markers in (11<sub>E</sub>a) classifier-like (*unit*) items? And in (11<sub>E</sub>b) are the classifier and the diminutive affix really hosted by one and the same projection?

Ott is aware of this kind of facts and assumes as a possibility the ‘recursion’ of UnitP (more precisely the presence of two specifiers of UnitP). Ott’s view is however difficult to be supported considering the facts in (11<sub>E</sub>c) and (11<sub>E</sub>d), where we find, respectively, a numeral classifier together with a noun marked by the cyclic application of two evaluative morphemes and a numeral classifier and the noun independently marked by evaluative affixes.

Hence, (at least) a dedicated autonomous syntactic slot for EM must be assumed and in our view a cartographic approach is still to be preferred.

In the next section we will illustrate the experiment that we have assembled to assess EM in an agrammatic speaker.

### **3. Methods**

#### *3.1 Participants*

Our patient (SM) is a 56-year-old right-handed male with 10 years of education, who suffered of a hemorrhagic stroke in February 2011. He was diagnosed with mild agrammatism on the basis of standard tests (e.g. AAT). For a complete description of his clinical features refer to chapter 5 (*Case study D*). SM is a rare case of *crossed agrammatism*, being a right-handed individual with a right hemisphere lesion. Five control subjects, three female and two male, have been recruited for the present experiment. They matched with SM for age and age of instruction and didn’t have any physical, neurological or psychological problem at the time of the examination.

#### *3.2 Stimuli*

The stimuli consisted in:

(A) a set of 250 words, comprising 180 items (nouns, adjectives and adverbs) with evaluative suffixes (30 of them apply more than once to the same lexical stem, e.g.

[canzonettina]<sub>N.Endear.Dim</sub>, *song*; [omaccione]<sub>N.Pej.Aug</sub>, *man*, and 25 of them show evaluative prefixes, e.g. [super<sub>Aug</sub>potenza]<sub>N.Aug</sub>, *superpower*) and 70 items used as distracters, consisting of words terminating with segments which, in principle, could signal plausible evaluative suffixes ([mulino]<sub>N</sub>, *mill*, vs. [mulo]<sub>N</sub>→#[*mulino*]<sub>N.Dim</sub>, *mule* or [merletto]<sub>N</sub>, *lace*, vs.[merlo]<sub>N</sub>→[merletto]<sub>N.Endear</sub> *blackbird*). The complete set is reported in Appendix A<sub>E</sub>.

Specifically, the suffixes (applying on 125 ‘expressive’ items: 72 nouns, 36 adjective and 17 adverbs) used in our experimental task were:

- (a) –one (augmentative, e.g. *gattone*<sub>N</sub>, big cat, *benone*<sub>ADV</sub>, very well; 25 items);
- (b) –astro (pejorative, e.g. *poetaastro*<sub>N</sub>, bad poet; *verdaastro*<sub>ADJ</sub>, ‘unpure’ green, 8 items);
- (c) –ccio (pejorative, e.g. *omaccio*<sub>N</sub>, bad man, *tempaccio*<sub>N</sub>, awful weather, 18 items)
- (d) –ello (diminutive – also endearing, e.g. *stupidello*<sub>ADJ</sub>, goofy, *vinello*<sub>N</sub>, light wine, 16 items);
- (e) –etto (endearing – also diminutive, e.g. *orsetto*<sub>N</sub>, *teddy*, *pochetto*<sub>ADV</sub>, little bit, 13 items);
- (f) –uzzo (diminutive – also pejorative, e.g. *viuzza*<sub>N</sub>, narrow street, *pietruzza*<sub>N</sub>, little stone, 4 items);
- (g) –ino (diminutive, e.g. *elefantino*<sub>N</sub>, little elephant, *prestino*<sub>ADV</sub>, pretty early, 24 items);
- (h) –otto (diminutive – also endearing, e.g. *scimmiotto*<sub>N</sub>, little monkey *salsicciotto*<sub>N</sub>, hot dog, 12 items).
- (i) –colo (diminutive – also pejorative, e.g. *maestrucolo*, bad little teacher, 3 items).

The 30 items (all nouns) with affixes applying more than once to the same lexical stem were subdivided into:

- (a) 16 items with endearing>diminutive affixes (e.g. *orsettino*, little teddy);
- (b) 8 items with pejorative>augmentative affixes (e.g. *omaccione*, bad big man);
- (c) 4 items with augmentative>diminutive affixes (e.g. *portoncino*,<sup>31</sup> wicket);
- (d) 1 item with pejorative>pejorative affixes (*pasticciaccio*, very difficult situation);
- (e) 1 item with diminutive>endearing affixes (*tavolinetto*, small table).

The 25 items (20 nouns and 5 adjectives) with evaluative prefixes<sup>32</sup> include:

- (a) 6 items with the prefix *mini* (e.g. *miniappartamento*<sub>N</sub>, efficiency apartment);
- (b) 5 items with the prefix *maxi* (e.g. *maxiprocesso*<sub>N</sub>, a trial involving a large number of accused);
- (c) 3 items with the prefix *extra* (e.g. *extraurbano*<sub>ADJ</sub>, suburban);
- (d) 3 items with the prefix *super* (e.g. *superpotenza*<sub>N</sub>, superpower);
- (e) 2 items with the prefix *micro* (e.g. *microcriminalità*<sub>N</sub>, petty crime);
- (f) 2 items with the prefix *iper* (e.g. *ipertrofico*<sub>ADJ</sub>, hypertrophic);
- (g) 2 items with the prefix *arci* (e.g. *arcinoto*<sub>ADJ</sub>, very well known);
- (h) 2 item with the prefix *ultra* (e.g. *ultraterreno*<sub>ADJ</sub>, superterrestrial).

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<sup>31</sup> Notice that in Italian, bases and ‘augmented’ items ending with the suffix *-one* apply the diminutive through the allomorphic rule of inserting the unvoiced palato-alveolar affricate [č] between base and suffix: e.g. *furgon*-[č]-*ino* ‘van-dim’.

<sup>32</sup> Following Grandi and Montermini (2003), we explore the possibility that evaluative suffixes and evaluative prefixes may belong to a unified category/process. Notice that according to a cartographic view prefixes of the *maxiprocesso* type are more likely to be hosted in SizeP (cf. the grammaticality of words like *miniappartamentino*).

(B) a list of 50 words, consisting of 30 verbs with evaluative affixes (taken from examples in Bertinetto, 2004) in the infinite form (e.g. *cant*<sub>Stem</sub>-*icchi*<sub>EM</sub>-are, *to sing softly*) intermixed by 20 verbs in the infinite form which do not display markers of EM. The list of verbs used in the present experiment is available in Appendix B<sub>E</sub>.

(C) a list of 70 proper nouns, including :

(a) 31 items with an evaluative suffix (e.g. *Concett-ina*<sub>Dim</sub>, from *Concetta*; *Giuli-etta*<sub>Endear</sub> from *Giulia*; *Albert-one*<sub>Aug</sub> from *Alberto*, etc.);

(b) 11 items which ends with a *seemingly* evaluative affix (e.g. *Caterina*, which is not the diminutive of \**Catera*, a non-existent noun in Italian or *Gedeone*, which is a plausible augmentative form of \**Gedeo*, actually an unattested proper noun);

(c) 28 fillers, consisting in Italian proper nouns completely unlinked to evaluative morphology (e.g. *Bernardo*; *Renata*; *Tommaso*; *Monica*).

The full list of proper nouns used in our experiment is provided in Appendix C<sub>E</sub>.

The *rationale* of this further experiment is the well-know possible ‘double dissociation’ that have been reported in clinical investigations for Proper nouns vs. Common nouns. For instance, Semenza and Zettin (1989) describe an Italian patient who, as a result of brain damage, had a dramatic inability to retrieve proper names, being nonetheless spared in the production of common nouns. The opposite pattern, namely a selective sparing of proper names, has also been observed in the literature (cf. Warrington and McCarthy, 1987). Refer to Semenza (2006) for a comprehensive review of the literature on the topic, which definitely gives evidence for the existence of “*functionally and anatomically distinct retrieval pathways for the categories of proper and common names*” (Semenza 2006: 891).

### 3.3. *Experimental tasks*

The tasks for experiments (A), (B) and (C) were *Repetition* and *Writing*. Notice that we chose the written modality instead of a reading task, because in a previous experiment with SM (testing Italian compound words), we have found that he was only very slightly more impaired in reading than in repetition (cf. Chapter 5 above). Hence, we thought that the written modality can enhance/trigger more significant findings. Notice also that in our study we have not included a task of “elicited formation” of evaluative markers (possibly triggered with a probe query: "What do you call a little/big X?") because of the difficulty of establishing fully predictable target answers (e.g. a small sheep in Italian can be *pecorina*, but also *agnello*, lamb, a small cow can be processed as *mucchina*, but also as *vitello*, calf).

The variables considered in our experiment were length, frequency and neighbourhood size. Frequencies of the *Stimuli* were collected from COLFIS (Bertinetto et al. 2005), a digital corpus of written Italian (<http://www.ge.ilc.cnr.it/>). Notice that nouns, adverbs and adjectives have been included all together in the set (A) because commonly they share the same evaluative marker (e.g. [orsino]<sub>N.Dim</sub>, *bear*; [pochino]<sub>Adv.Dim</sub>, *little* [giallino]<sub>Adj.Dim</sub>, *yellow*).

## 4. Results

### 4.1 *The repetition task*

In the repetition task, SM performed very well and made only 2/250 errors with items of set (A), 3/50 errors with verbs of set (B) and 0/70 with the proper nouns of the set (C). The two errors with the set (A) concerned items with evaluative prefixes, but crucially the represented phonological paraphasias did not involve the prefix marker ((i) target: *microcriminalità*, petty crime, SM answer: *microchiminalità*; (ii) target: *superalcolico*, strong drink, SM answer: *supercolico*). The general performance with verbs (three errors consisting in phonological paraphasias, that did not involve the evaluative

affixes: (i) target: *visualizzare*<sub>distracter</sub> to display, SM answer *visalizzare*, (ii) target: *ammonticchiare*, to pile up, SM answer: *amonticchiare*; (iii) target: *trotterellare*, to trot; SM answer: *trottrellare*) was significantly worse than with other categories (3/50 vs. 2/250 [ $\chi^2(1)=6.4$ ;  $p=.0112$ ]), but neither verbs bearing an evaluative affix nor items in the set (A) are significantly more impaired with EM than with distracters (for verbs 2/30 vs. 1/20 [ $\chi^2(1)=.05$ ;  $p=.8186$ ]; for nouns, adjective and adverbs 2/180 vs. 0/70 [ $\chi^2(1)=.8$ ;  $p=.3786$ ]).

The control subjects did not show any problem in repetition with all the experimental tasks.

#### 4.2 The writing task.

In the writing task, unfortunately, SM in general performed extremely poorly, with only 2/50 [4%] correct answers with verbs, 39/250 [15.6%] correct answers with the words of set (A) and 12/70 [17.1%] correct answers with proper nouns. Again, these data confirmed that there are no significant traces for a specific deterioration of SM's performance with words bearing evaluative markers (for the task (A) 157/180 errors with EM vs. 54/70 error with distracters [ $\chi^2(1) = .337$ ;  $p= .5614$ ]; for the task (B) 29/30 errors with verbs bearing EM features vs. 19/20 errors with distracters [ $\chi^2(1)=.002$ ;  $p=.9664$ ]; for the task (C), 27/31 errors with evaluative proper nouns vs. 22/28 errors with distracter [ $\chi^2(1)=.0071$ ;  $p=.7906$ ] and vs. 9/11 with *lexicalized* evaluative proper nouns [ $\chi^2(1)=.0014$ ;  $p=.9045$ ]).

Again, the control group did not show any problem in all the writing tasks.

### 5. Discussion

On the basis of our tests, it is not possible to detect a (even minimal) specific deficit for evaluative morphology in an agrammatic speaker. Interestingly, if we compare our data with previous results from the other experiment conducted with SM -reported



However, if we adopt a *tree pruning* model à la Friedmann and Grodzinsky (1997)<sup>33</sup> and we *broadly* apply it to extended projections (of nouns, verbs, etc.), in principle, we may argue that the *mild* agrammatic deficit of SM spares evaluative heads, which, can be assumed to be structurally low and quite close to the *host* of an extended projection (hence, requiring only a relatively effortless movement process). Notice that a view that traces a strict parallelism between the verbal phrase and the nominal phrase is widespread in contemporary theoretical linguistics (see, among many others, Emonds, 1985; 2009 and for more ‘layered’ ideas Bittner and Hale, 1996; Caha, 2009; Franco, 2012b). Roughly, it can be sketched as follows<sup>34</sup>:

- (13<sub>E</sub>)    a.    [<sub>CP</sub> C    [<sub>TP</sub> T    [<sub>VP</sub> V    ...]]]
- b.    [<sub>PP</sub> P    [<sub>DP</sub> D    [<sub>NP</sub> N    ...]]]

Nonetheless, a *lexicalist* account for EM seems to be more natural/ecological given the results of our single case study. A population experiment is necessary to confirm our findings, but this work is by itself a valuable *probe* for experimentally investigating EM, up to now a completely neglected topic in the neurolinguistic literature.

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<sup>33</sup> Following Pollock (1989) (but contra Belletti, 1990), Friedmann and Grodzinsky (1997) assume that tense and agreement are represented as separate functional categories, with AgrP located below TP. The Tree Pruning Hypothesis specifically claims that agrammatic phrase-structure are pruned at the TP layer yielding phrase-structure trees without TP or any other functional category above TP. This fact would explain why subject-verb agreement is preserved (Agr-nodes are located lower than C-nodes); whereas tense marking and CP related phenomena are impaired in agrammatic production.

<sup>34</sup> Notice that there is an ‘alternative’ implementation of the parallelism between VP and NP, which was originally suggested by Szabolcsi (1992), who consider C as symmetrical to D and not to P, as shown in (i) below.

- (i)        a.        [<sub>CP</sub> C    [<sub>TP</sub> T    [<sub>VP</sub> V... ]]]
- b.        [<sub>DP</sub> D    [<sub>PP</sub> P    [<sub>NP</sub> N... ]]]

## Appendix A<sub>E</sub> – *Evaluative nouns, adjectives and adverbs.*

### *Evaluative, nouns, adjectives and adverbs*

figliastro	suff astro
fratellastro	suff astro
sorellastra	suff astro
pollastro	suff astro
giovinastro	suff astro
olivastro	suff astro
dolciastro	suff astro
poetaastro	suff astro
beccuccio	suff ccio
erbaccia	suff ccio
cagnaccio	suff ccio
poveraccio	suff ccio
sudaticcio	suff ccio
molliccio	suff ccio
cavalluccio	suff ccio
grassoccio	suff ccio
colpaccio	suff ccio
donnaccia	suff ccio
tettuccio	suff ccio
rossiccio	suff ccio
malaticcio	suff ccio
tempaccio	suff ccio
maschiaccio	suff ccio
pesantuccio	suff ccio
fattaccio	suff ccio
geniaccio	suff ccio
maluccio	suff ccio
peduncolo	suff colo
dunnucola	suff colo
maestrucolo	suff colo
fuocherello	suff ello
pazzerello	suff ello
saltello	suff ello
vinello	suff ello
pannicello	suff ello
gallinella	suff ello
orfanello	suff ello
monticello	suff ello

rondinella	suff ello
bastoncello	suff ello
giovincella	suff ello
ramoscello	suff ello
grandicello	suff ello
pastorella	suff ello
latticello	suff ello
carretto	suff etto
valigietta	suff etto
corsetta	suff etto
libretto	suff etto
campetto	suff etto
cuccioletto	suff etto
pompetta	suff etto
giacchetta	suff etto
pacchetto	suff etto
animaletto	suff etto
sorrisetto	suff etto
vasetto	suff etto
pochetto	suff etto
fratellino	suff ino
biondino	suff ino
professorino	suff ino
malino	suff ino
giallino	suff ino
pochino	suff ino
salottino	suff ino
costumino	suff ino
coltellino	suff ino
disegnino	suff ino
barattolino	suff ino
posticino	suff ino
caratterino	suff ino
frizzantino	suff ino
clandestino	suff ino
materassino	suff ino
tantino	suff ino
grigino	suff ino
tardino	suff ino
cetriolino	suff ino
campioncino	suff ino
benino	suff ino
bocconcino	suff ino
prestino	suff ino
topone	suff one

cervellone	suff one
manona	suff one
nebbione	suff one
cornicione	suff one
ragazzona	suff one
capannone	suff one
gabbione	suff one
cavallone	suff one
ombrellone	suff one
bambolona	suff one
pigrone	suff one
mattacchione	suff one
bacione	suff one
librone	suff one
cucchiaione	suff one
cisternone	suff one
ladrone	suff one
grassona	suff one
furbacchione	suff one
nuvolone	suff one
carrozzone	suff one
parolona	suff one
gattona	suff one
febbione	suff one
barcone	suff one
candelotto	suff one
bussolotto	suff otto
sempliciotto	suff otto
cosciotto	suff otto
lupacchiotto	suff otto
orsacchiotto	suff otto
bambolotto	suff otto
scimmiotto	suff otto
camiciotto	suff otto
salsicciotto	suff otto
aquilotto	suff otto
pagnotta	suff otto
ideuzza	suff uzzo
pietruzza	suff uzzo
viuzza	suff uzzo
pagliuzza	suff uzzo
vecchiarello	suff ello

### *Double evaluation*

cordoncino	*accr > dim
portoncino	*accr > dim
barboncino	*accr > dim
palloncino	*accr > dim
tavolinetto	*dim > vez
bamboccione	*peg > accr
omaccione	*peg > accr
sporcaccione	*peg > accr
pasticcione	*peg > accr
mollaccione	*peg > accr
tipaccione	*peg > accr
capoccione	*peg > accr
bonaccione	*peg > accr
pasticciccio	*peg > peg
collettino	*vez > dim
canzonettina	*vez > dim
novellino	*vez > dim
ramoscellino	*vez > dim
faccettina	*vez > dim
porcellino	*vez > dim
fuocherellino	*vez > dim
gonnellino	*vez > dim
Musichettina	*vez > dim
Funghettino	*vez > dim
pezzettino	*vez > dim
barettino	*vez > dim
campanellino	*vez > dim
gallinellina	*vez > dim
casettina	*vez > dim
nonnettino	*vez > dim

### *Prefixes*

extraterrestre	prefix
microeconomia	prefix
miniappartamento	prefix
extrasottile	prefix
miniconsultazione	prefix
superalcolico	prefix
super-ricercato	prefix
extraurbano	prefix
arcistufo	prefix
arcinoto	prefix
ipertensione	prefix
ipertrofico	prefix
microcriminalità	prefix

minicalcolatrice	prefix
maxiprocesso	prefix
miniabbonamento	prefix
ultraterreno	prefix
minigonna	prefix
maxitruffa	prefix
maxiretata	prefix
minibar	prefix
maxirisarcimento	prefix
maxitangente	prefix
superpotenza	prefix
ultravioletto	prefix

*Distracters/Fillers*

cappello	filler
bergamotto	filler
pressione	filler
peschereccio	filler
inquilina	filler
pipistrello	filler
complotto	filler
insetto	filler
bambina	filler
scellino	filler
collaborazione	filler
rabbino	filler
cervello	filler
puzza	filler
poliziotto	filler
struzzo	filler
dispaccio	filler
mancino	filler
cancello	filler
cruscotto	filler
imbianchino	filler
incastro	filler
biglietto	filler
cappone	filler
favella	filler
reputazione	filler
discussione	filler
ossessione	filler
assassina	filler
acquedotto	filler
cugino	filler

estinzione	filler
effetto	filler
architetto	filler
camino	filler
cittadino	filler
trasmissione	filler
timone	filler
beduino	filler
uncino	filler
progetto	filler
rispetto	filler
corbello	filler
arrotino	filler
ghiaccio	filler
giardino	filler
merluzzo	filler
setaccio	filler
grissino	filler
disastro	filler
biscotto	filler
situazione	filler
salmastro	filler
intreccio	filler
martello	filler
ragione	filler
pilastro	filler
androne	filler
ermellino	filler
destino	filler
incubazione	filler
pinguino	filler
fotomodella	filler
avambraccio	filler
intestino	filler
mulino	filler
feticcio	filler
alimentazione	filler
sorella	filler
alabastro	filler

## Appendix B<sub>E</sub> *Evaluative verbs*

1. monopolizzare	filler
2. piagnucolare	evaluative
3. visualizzare	filler
4. ristrutturare	filler
5. pieghettare	evaluative
6. minimizzare	filler
7. nascondere	filler
8. ammoniticchiare	evaluative
9. partorire	filler
10. raggiungere	filler
11. promettere	filler
12. leggiucchiare	evaluative
13. gironzolare	evaluative
14. rosicchiare	evaluative
15. guadagnare	filler
16. aggiungere	filler
17. controllare	filler
18. saltellare	evaluative
19. mangiucchiare	evaluative
20. parlottare	evaluative
21. ridacchiare	evaluative
22. picchiettare	evaluative
23. tergiversare	filler
24. magnetizzare	filler
25. restituire	filler
26. studiacchiare	evaluative
27. spennacchiare	evaluative
28. piovigginare	evaluative
29. cantarellare	evaluative
30. trotterellare	evaluative
31. accompagnare	filler
32. bruciacchiare	evaluative
33. sbaciucciare	evaluative
34. fischierellare	evaluative
35. tagliuzzare	evaluative
36. foracchiare	evaluative
37. anticipare	filler
38. lavoricchiare	evaluative
39. ridicolizzare	filler
40. bucherellare	evaluative
41. rubacchiare	evaluative
42. personalizzare	filler
43. espellere	filler
44. dormicchiare	evaluative
45. inciampicare	evaluative

46. giocherellare	evaluative
47. mordicchiare	evaluative
48. girellare	evaluative
49. dipingere	filler
50. punzecchiare	evaluative

### Appendix C<sub>E</sub> *Evaluative proper nouns*

<i>token</i>	<i>type</i>
1. Mariotto	eval
2. Loredana	filler
3. Ombretta	eval
4. Gigetto	eval
5. Gedeone	eval*
6. Paolone	eval
7. Francesca	filler
8. Valentina	eval*
9. Sabatino	eval
10. Antonino	eval
11. Andrea	filler
12. Fiammetta	eval
13. Natalina	eval
14. Bastiano	filler
15. Giulietta	eval
16. Achille	filler
17. Simonetta	eval
18. Anselmo	filler
19. Beatrice	filler
20. Carolina	eval*
21. Salomone	eval*
22. Carlotta	eval
23. Giasone	eval*
24. Orlando	filler
25. Benedetta	eval*
26. Gioacchino	eval*
27. Brunello	eval
28. Guendalina	eval
29. Agostino	eval
30. Salvatore	filler
31. Edoardo	filler
32. Caterina	eval*
33. Tiziana	filler
34. Raffaello	filler
35. Corrado	filler

36. Tommaso	filler
37. Luisella	eval
38. Renata	filler
39. Martina	eval
40. Arianna	filler
41. Sandrone	eval
42. Beniamino	eval*
43. Bernardo	filler
44. Fiorella	eval*
45. Rossella	eval*
46. Oliviero	filler
47. Donatella	eval
48. Concettina	eval
49. Natalia	filler
50. Michele	filler
51. Eleonora	filler
52. Ernestino	eval
53. Monica	filler
54. Albertone	eval
55. Evelina	eval
56. Raimondo	filler
57. Samanta	filler
58. Marcello	eval*
59. Fabietto	eval
60. Federico	filler
61. Lorella	eval*
62. Renzino	eval
63. Nicoletta	eval
64. Isotta	eval
65. Marinella	eval
66. Ludovico	filler
67. Iacopone	eval
68. Elisabetta	eval*
69. Giovanni	filler
70. Matilde	filler

*note:*

*eval:* Evaluative proper noun;

*eval\*:* 'Lexicalized' evaluative marker on proper noun.

## **Chapter 7**

## **Conclusion**

Relying on insights from theoretical linguistics, this work has tried to investigate with a set of clinical experiments some aspects of the relationship between syntax and the Lexicon.

In the first study (*Case Study A*), we have presented a case of logopenic Primary Progressive Aphasia (PPA), whose problems with verb syntax seem to support the idea of verbs as a closed class (Kayne, 2009). Previous works on PPA reported either a greater impairment for verbs than nouns, or no evidence of reduced verb production (Hillis et al. 2006; Graham, Patterson and Hodges, 2004). PPA patients are also reported to use a vocabulary that is less specific than normal speakers, with a larger use of light-verbs (Graham and Rochon, 2007). Our patient, BB, is a 59 right-handed Italian woman with 17 years of education. Standard tests (B.A.D.A., AAT) showed no difference in her production of nouns vs. verbs. A sample of her spontaneous speech of approximately 4.000 utterances showed that:

- (i) the progressive erosion of the lexicon left functional verbs almost intact . BB had no hesitation with volitional, modal, and causative verbs, which we assume to occur in positions external to the verb phrase ([FPz [Fpy [FPx [VP]]]]) (Cinque, 2004, Cardinaletti and Shlonsky, 2004);
- (ii) intransitive (unergative) and transitive verbs were quite systematically substituted by a “light-verb + N” form (e.g. fare ###: to do### instead of ##).

From a quantitative viewpoint, a different *ratio* of performance between functional verbs (preserved) and lexical verbs (impaired) was detected in our experiment. From a theoretical viewpoint, the fact that BB’s anomia selectively spares functional verbs, including light verbs, and leads to the surface’s retrieval of Hale & Keyser’s (2002) L-syntax could be considered as evidence that the noun-verb distinction

in the Lexicon may be understood as a consequence of antisymmetry (in the sense of Kayne, 2009): verbs may be seen as a closed class (all functional, all light), while nouns are the only open class. The immediate retrieval of a light verb would be forced by anomia: BB uses the otherwise silent light verb to which nouns incorporate.

In the second case study (*Case study B*), we addressed the syntax of Italian locative (and temporal) prepositions, drawing data from FM, a 54-year-old Broca's aphasic patient with 13 years of education. In 2004, FM sustained a stroke, following a left internal carotid artery dissection. His linguistic production shows semantic substitutions, functional words' omissions and great difficulties with verb inflection and syntactically complex structures. His comprehension is quite spared. Previous neuroimaging studies (e.g. Noordzij et al. 2008) have shown that processing of locative prepositions is associated with cerebral activity in the supramarginal-gyrus located in the left inferior parietal lobe.

From a theoretical viewpoint, in recent years, Svenonius (2006) has argued that locative prepositions seem to form part of a separate syntactic category, which is distinct from both nouns and prepositions. He called this class "Axial Part".

The semantic function of Axial Part, drawing on Talmy (2000), is to identify the position of an object, the Figure, by selecting a region (the front, back, bottom, etc.) of a second object, the Ground. What is crucial is that Axial Part links the Figure to the Ground. In Italian, items which correspond to AxialPart can convey locative/temporal meaning and are often followed by functional (simple) prepositions such as a ('at/to') and di ('of') (e.g. '*dietro (al)l'albero*', (lit.) behind (to) the tree').

In our experiment, we presented to FM a repetition task of 82 clauses containing two nominal elements (the Figure and the Ground) correlated by a complex preposition [the nexus Axial Part+functional preposition] (e.g. *L'albero [accantoalla] casa* – the tree [beside] the house). FM managed to correctly repeat only 4.8% of items. Among wrong answers, mostly of the time FM omitted the Figure repeating Axial Part + ground (29.5%) or he managed to produce Figure and Ground omitting Axial Part (35.9%).

Crucially, in FM production, Figure and Axial Part hardly ever co-occur. Hence, in FM production the (locative/temporal) construction Figure + Axial Part + Ground seems

to be unsettled. In particular we found a dissociation between Figure and Axial Part. Surprisingly, simple preposition seem not to be affected, though they are commonly considered the more functional ones. Our proposal builds on the idea that complex prepositions can be retrieved from the Lexicon either as Axial Parts or as *relational nouns*. If FM retrieves the Figure (which is necessarily a denotational item, i.e. a noun), he needs a functional (verb-like) element in order to link the Figure to the Ground (the item which is the most preserved one also in accordance to a bottom up syntactic derivation, cf. Chomsky, 1995 and subsequent works). On the contrary if FM does not retrieve the Figure, he rearranges the complex preposition as a relational noun to obtain the same meaningful (but again, somewhat 'crippled') structure: [N *linker* N] (cf. Den Dikken, 2006).

Moreover Axial Part, constituting a spatial/temporal portion of the Ground, is also semantically linked to it. The same local relation does not hold between Axial Part and Figure. Thus, when Figure is retrieved, Axial Part does not resurface in FM production, and Ground is licensed via a simple functional preposition. In other words, given the ambiguous status of complex prepositions – percolating??? from relational nouns to Axial parts - FM, who is able to parse only crippled instances of the proposed stimuli, is unable to fill and retain functional Axial Part. 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 according to the insight of Svenonius, 2006).

The third case study (*Case Study C*) was an experiment of sentence repetition in MB, an Italian patient with mixed transcortical aphasia. In preliminary testing, MB spontaneously resisted (in ca. 40% of the cases) accurate repetition when presented with sentences featuring morpho-syntactic violations (see Davis et al., 1978). MB also managed to repeat all the proposed phrasal chunks, even in complex sentences. Interestingly, MB tended to move the constituents with the violation (always oblique arguments/adjuncts) at the beginning of the sentence or in another non-canonical position (e.g. dislocating adjuncts immediately before verbs). Thus, he selectively performed "adjunct scrambling". In current theoretical terms, scrambling can be defined

as an operation that moves a maximal projection to the specifier of a functional head, that triggers scrambling with a given feature.

Our patient, MB, is a 48-year-old man, who suffered of a vascular lesion in the anterior and middle cerebral artery territory. He showed very little (non-fluent) spontaneous speech at the time of testing, but was able to perform sentence repetition tasks with minor difficulties.

The experiment we have designed is a repetition test, consisting of 120 sentences which did not contain adjoined constituents or optional oblique complements, 104 sentences containing adjoined constituents and facultative oblique complements of a verb taking three arguments and a few sentences in which a constituent had already been scrambled. A detailed analysis of MB 's answers revealed that he only moved adjoined constituents or facultative complements. He correctly repeated the 92.5% of sentences of the first type, making only sporadic word omissions/substitutions. In sentences of the second type, MB performed only 67.7 % correct. The majority (ca. 70%) of his wrong repetitions consisted in scrambling of adjuncts or oblique arguments, moved to a higher non-canonical position in the left periphery of the sentence. Interestingly, most of the scrambled constituents were prosodically-marked by pitch-peaks as contrastive *foci*. These facts are possible hints for the psychological reality of a model that assumes an articulated set of functional projections within the CP field (see Rizzi, 1997 and subsequent works).

Indeed, in our view, MB resorts to scrambling as a syntactic strategy. In doing so, he activates projections that encode information related to the interface between syntax and discourse-pragmatics. A tentative explanation is the following: MB switches on Focus Projections as dummy placeholders in order to lower the processing weight of core Argument Structure. With this strategy, MB seems to avoid the increase of the computational load of syntactic derivations. In fact, in sentence processing, argument-structure complexity has been shown to be one of the main factors that influence a correct retrieval (see Shapiro, Zurif and Grimshaw, 1987; Thompson, 2003).

In the fourth case report (*Case study D*) we investigated the performance of an Italian Agrammatic speaker with compound words, with major emphasis on the

processing of (complex and simple) prepositions *inside* words, thus aiming at especially evaluating the performance with prepositional compounds of the [NOUN HEAD-PREP-DEPENDANT NOUN; N-P-N] form (*coda di cavallo*, horse-tail) and (alleged) exocentric compounds of the [PREP-NOUN; P-N] form (*sopracciglio*, eyebrow). As showed by Bisetto and Scalise (1999), it is realistic to consider N-P-N items as fully productive compound words in Italian, due to the fact that they obey to a set of classic compound-hood tests.

Our patient (SM) is a 56-year-old right-handed male with 10 years of education, who suffered of a hemorrhagic stroke in 2-2011. SM was diagnosed with agrammatism on the basis of standard tests (e.g. AAT). Our patient has the peculiarity of being an agrammatic speaker with crossed aphasia. In Crossed Aphasia -basically- the site of lesion is located (unexpectedly) in the right hemisphere in a right-handed individual.

The tasks of our experiment were *Reading aloud* and *Repetition* of a set of ca. 400 Italian words, including P-Ncompounds, N-P-N compounds and a balanced number of (endocentric and *alleged* exocentric) compounds without prepositional elements. We also administered two *Completion* tasks in which, in a first condition, SM was asked to say which preposition had to be inserted between the head and the modifying noun, and in a second one, SM had to say whether or not a prepositional linker was required and, when required, which preposition had to be inserted. A further repetition task was also created, consisting of a set of 111 N-P-N (un-lexicalized) phrases.

The results of our experiment showed that N-P-N compounds are significantly more impaired than P-N compounds in our Agrammatic subject both in the repetition task and in the reading one. N-P-N errors consist almost exclusively of omission and substitution of the required prepositional linking element. Other compounds were virtually unimpaired in repetition, and only very slightly impaired in reading. The Completion task confirmed the marked deficit of SM with linking prepositions in N-P-N compounds. Finally, SM performance with phrases' repetition was quite poor. The most prevalent errors were the omission of the preposition (e.g. target: *le torte con le candeline*, the cakes with the birthday candles; SM: *le torte [Ø] candeline*).

Our results demonstrate that SM is selectively impaired in retrieving the prepositions linking the modifying nouns to their head. Furthermore, our data can

trigger interesting interpretations, from a theoretical viewpoint. In particular, complex prepositions (e.g. *fuori*, outside), which are produced with no significant problems by SM, are likely to be relational nouns and not functional Axial Parts (Svenonius, 2006) when involved in the formation of Italian P-N compounds. Otherwise, a deficit in retrieving them correctly would be expected (notice that specific Agrammatic deficits for *axial parts* have been detected in our Case study B). Moreover, a crucial question is raised: are N-Prep-N real compounds, since they behave very differently from other compounds in SM performance? Possibly, the same underlying architecture holds both when these items are processed as phrases and when they are processed as “lexicalized syntax” (Starke, 2009). Given the very similar poor performance of SM with both N-P-N compound-like-items and analogous phrases, a unified analysis of this sort is strongly suggested by our study.

Finally, the aim of our last study (*Case study E*) was to investigate Evaluative Morphology (EM), which includes diminutive, augmentative, endearing and pejorative morphemes, in an Italian agrammatic patient (the same patient of *Case study D*). In the neuro-linguistic literature, to our knowledge, there are no previous attempts to systematically analyze possible deficits, specifically concerning EM in agrammatic speakers. Previous theoretical works argued that Italian EM should be considered as a specific type of process, different from both inflection and derivation (Scalise, 1984). In particular, recently, Cinque (2006), basing its analysis on a comprehensive typological survey, argued that EM is associated to the presence of dedicated ordered series of heads within an extended projection.

Our patient is SM a 56-year-old right-handed male with 10 years of education, who suffered of a hemorrhagic stroke in February 2011 (for a sketch of his clinical features see *Case D*).

The stimuli consisted in: (A) a set of 180 items (nouns, adjectives and adverbs) with evaluative suffixes and 70 distracters, consisting of words whose final segment could be instantiated by a plausible evaluative suffix (e.g. [mulino]<sub>N</sub>, *mill*, vs. [mulo]<sub>N</sub>, *mule* → #[mulino]<sub>N.Dim</sub>, *little mule*); (B) a set of 30 infinitive verbs with evaluative affixes (e.g. cant<sub>Stem</sub>-icchi<sub>EM</sub>-are, *to sing softly*) intermixed by 20 verbs in the infinite form which do

not display markers of EM; (C) a set of 70 proper nouns, including proper nouns with evaluative affixes (e.g. *Concettina*), proper nouns with 'lexicalized' affixes (*Valentina*; \**Valenta/e*) and distracters. The tasks were *Repetition* and *Writing on dictation*.

In the repetition task, SM performed very well and made only 2/250 errors with the items in the set (A), 3/50 errors with the verbs in the set (B) and 0/70 in the set (C). In all the sets the difference between target items and distracters was not significant. In the writing task, unfortunately, SM in general performed extremely poorly, with, for instance, only 2/50 [4%] correct answers with verbs and 39/250 [15.6%] correct answers with the items included in set (A).

Again, these data confirmed that there are no significant traces for a specific deterioration of SM's performance with words bearing evaluative markers.

In conclusion, our data show that our agrammatic 'crossed' aphasic speaker doesn't show a specific deficit for evaluative morphology. This fact seems to weaken a syntactic approach *à la* Cinque to EM, where evaluative markers are treated as functional heads within an extended projection. In fact, given that agrammatic speakers are standardly assumed to be impaired with the production of morpho-syntactic functional items (see e.g. Berndt and Caramazza, 1980; Miceli et al., 1989), words with evaluative morphemes appears to be stored in the lexicon and not morpho-syntactically derived. Otherwise, if we apply a *tree pruning* model *à la* Friedmann and Grodzinsky (1997) (generalized) to extended projections (of nouns, verbs, etc.), we may argue that the mild agrammatic deficit of SM spares evaluative heads, because they are structurally low (following Cinque, 2006). Nonetheless, a *lexicalist* account seems to be quite more natural/ ecological, given the results of *Case Study E*.

## *References*

- Abney, S. (1987). *The English Noun Phrase in Its Sentential Aspect*, Ph.D. Dissertation, MIT.
- Aboh, E. (2005). Object shift, verb movement and verb reduplication. In Cinque G. and Kayne, R. S. (Eds.), *The handbook of comparative syntax*. New York, Oxford University Press, pp. 138-177.
- Aboh, E. (2009). Clause Structure and Verb Series. *Linguistic Inquiry* 40: 1-33.
- Ackema, P., and Neeleman, A. (2004). *Beyond morphology: Interface conditions on word formation*. Oxford: Oxford University Press.
- Adli, A. (2010). Constraint cumulativity and gradience: Wh-scrambling in Persian. *Lingua* 120: 2259–2294.
- Aggularo, S., Crepaldi, D., Pistarini, C., Taricco, M., and Luzzatti, C. (2006). Neuroanatomical correlates of impaired retrieval of verbs and nouns: Interaction of grammatical class, imageability and actionality. *Journal of Neurolinguistics* 19: 175–252.
- Aissen, J. (2003). Differential Object Marking: Iconicity vs. Economy. *Natural Language and Linguistic Theory* 21: 435-483.
- Alexander, M. P. (1997). Aphasia: clinical and anatomic aspects. In Feinberg, T.E. and Farah, M.J., (Eds.), *Behavioral neurology and neuropsychology*. New York: McGraw Hill, pp. 133-150.
- Alexander, M. P., and Hillis, A. E., (2008). Aphasia. In Aminoff, M. J., Boller, F., Swaab, D. F., Goldenberg, G., and Miller, B. L. (Eds.), *Handbook of Clinical Neurology, Vol. 88* Amsterdam: Elsevier, pp. 287-309.
- Alexander, M. P., Fischette, M. R., and Fischer, R. S. (1989). Crossed aphasias can be mirror image or anomalous. *Brain* 112: 953–973.
- Alexander, M.P., and Annett, M. (1996) Crossed aphasia and related anomalies of cerebral organization: case reports and a genetic hypothesis. *Brain and Language* 55: 213–39.

- Alexander, M.P., Hiltbrunner, B., and Fischer, R.S. (1989). Distributed anatomy of transcortical sensory aphasia. *Archives of Neurology* 46: 885–892.
- Amberber, M. (2010). The Structure of the Light Verb Construction in Amharic. In Amberber, M., Baker B., and Harvey, M. (Eds.), *Complex Predicates: Cross-linguistic Perspectives on Event Structure*, Cambridge: Cambridge University Press.
- Amiot, D. (2004). Préfixes ou prépositions? Le cas de sur-, sans-, contre- et les autres. *Lexique* 16: 67-83.
- Amiot, D. (2005). Between compounding and derivation: Elements of word formation corresponding to prepositions. In Dressler, W. U., Rainer, F., Kastovsky, D. and Pfeiffer, O. (eds.), *Morphology and its demarcations*. Amsterdam: John Benjamins, pp. 183-195.
- Amritavalli, R. (2007). Parts, Axial Parts, and Next Parts in Kannada. *Nordlyd* 34: 86-101.
- Anderson, S. (1992). *A-Morphous Morphology*. Cambridge: Cambridge University Press.
- Arad, M. (2005). *Roots and patterns: Hebrew Morpho-syntax*. Dordrecht: Springer.
- Asbury, A., Dotlačil, J., Gehrke, B. and Nouwen, R. (Eds.). (2008). *Syntax And Semantics Of Spatial P*. Amsterdam: John Benjamins.
- Avrutin, S. (2000). Comprehension of discourse-linked and non-discourse-linked questions by children and broca's aphasics. In Grodzinsky, Y., Shapiro, L. and Swinney, D. (Eds.), *Language and the Brain*. San Diego, CA.: Academic Press, pp. 295-313.
- Avrutin, S. (2001). Linguistics and agrammatism. *GLOT International* 5: 1-11.
- Badecker, W. (2001). Lexical composition and the production of compounds: Evidence from errors in naming. *Language and Cognitive Processes* 16: 337-366.
- Baker, M. (2001). *The Atoms of Language: The Mind's Hidden Rules of Grammar*. New York: Basic Books.
- Baker, M. (1985). The Mirror Principle and morphosyntactic explanation. *Linguistic Inquiry* 16: 373-415.
- Baker, M. (1988). *Incorporation: A theory of grammatical function changing*. Chicago: University of Chicago Press.
- Baker, M. (1989). Object sharing and projection in serial verb constructions. *Linguistic*

- Inquiry* 20: 513-533.
- Baker, M. (2003). *Lexical Categories: Verbs, Nouns, and Adjectives*. Cambridge: Cambridge University Press
- Baker, M. (2003b). Agreement, dislocation, and partial configurationality. In Carnie A., Harley, H. and Willie, M. (eds.), *Formal approaches to Function in grammar*. Amsterdam: John Benjamins, pp. 107-132.
- Barde, L., Schwartz, M. and Boronat, C. (2006). Semantic weight and verb retrieval in aphasia. *Brain and Language* 97: 266-278.
- Barner, D. and Bale, A. (2002). No nouns, no verbs: Psycholinguistic arguments in favor of lexical underspecification. *Lingua* 112: 771-791.
- Barrie, M. (2011). *Dynamic Antisymmetry and the Syntax of Noun Incorporation*. Berlin: Springer.
- Bartning, I. (1993). La préposition de et les interprétations possibles des syntagmes nominaux complexes. Essai d'approche cognitive. *Lexique* 11: 163-191.
- Bastiaanse, R. (2008). Production of verbs in base position by Dutch agrammatic speakers: Inflection versus finiteness. *Journal of Neurolinguistics* 21: 104-119.
- Bastiaanse, R., and Jonkers, R. (1998). Verb retrieval in action naming and spontaneous speech in agrammatic and anomic aphasia. *Aphasiology* 12: 951-969.
- Bastiaanse, R., and Edwards, S. (2004). Word order and finiteness in Dutch and English Broca's and Wernicke's aphasia. *Brain and Language* 89: 91-107.
- Bastiaanse, R., Koekkoek, J., and Van Zonneveld, R. (2003). Object scrambling in Dutch Broca's aphasia. *Brain and Language* 86: 287-299.
- Bates, E., and Rankin, J. (1979). Morphological development in Italian: connotation and denotation. *Journal of Child Language* 6: 29-52.
- Bauer, L. (1997). Evaluative morphology: in search of universals. *Studies in Language* 21: 533-575.
- Bauer, L. (2004). The function of word-formation and the inflection-derivation distinction. In Aertsen, H., Hannay, M., and Lyall, R. (Eds), *Words in their Places. A festschrift for J. Lachlan Mackenzie*. Amsterdam: Vrije Universiteit, pp. 283-292.

- Baylin, J. (1995). Underlying Phrase Structure and “Short” Verb Movement in Russian. *Journal of Slavic Linguistics* 3: 13-58.
- Belletti, A. (2004). Aspects of the low IP area. In Rizzi, L. (Ed.), *The structure of CP and IP. The cartography of syntactic structures, Vol. 2*. New York: Oxford University Press, pp. 16–51.
- Belletti, A. (2005). Extended doubling and the VP periphery. *Probus* 17: 1-35.
- Benedect, M. J., Christiansen, J. A., and Goodglass, H. (1998). A cross-linguistic study of grammatical morphology in Spanish- and English-speaking agrammatic patients. *Cortex* 34: 309–336.
- Benincà, P., Salvi, G., and Frison, L. (1988). L’ordine degli elementi della frase e le costruzioni marcate, In Renzi, L., Salvi, G. and Cardinaletti, A. (Eds.), *Grande Grammatica di consultazione vol. 1* Bologna: Il Mulino, pp. 115-215.
- Bennis, H., Prins, R., and Vermeulen, J. (1983). Lexical-semantic versus syntactic disorders in aphasia: the processing of prepositions. *Publikaties van het instituut voor algemene taalwetenschap, 40*, Amsterdam University, 1–32.
- Benucci, F. (1992). Prepositional particles and the portuguese personal infinitive. *University of Venice Working Papers in Linguistic, CLI*, volume I.8.
- Bernal, E. (2012). Catalan compounds. *Probus* 24: 5-27.
- Berndt, R. S., and Caramazza, A. (1980). A redefinition of the syndrome of Broca’s aphasia: Implications of a neuropsychological model of language. *Applied Psycholinguistics* 1: 225–278.
- Berthier, M. L. (1999). *Transcortical aphasias*. Hove: Psychology Press.
- Berthier, M.L., Starkstein, S.E., Leiguarda, R., Ruiz, A., Mayberg, H.S., Wagner, H., Price, T.R., and Robinson, R.G. (1991). Transcortical aphasia: importance of the nonspeech dominant hemisphere in language repetition. *Brain* 114: 1409-1427.
- Bertinetto, P. M. (2004). Verbi deverbali. In Grossmann, M. and Rainer, F. (Eds.), *La formazione delle parole in italiano*. Tübingen: Niemeyer, pp. 465-472.
- Bertinetto, P. M., Burani, C., Laudanna, A., Marconi, L., Ratti, D., Rolando, C., and Thornton, A. M. (2005). *Corpus e Lessico di Frequenza dell’Italiano Scritto (CoLFIS)*, Genova/Pisa: CNR. <http://www.ge.ilc.cnr.it/>

- Bianchi, V., and Chesi, C. (2010). Reversing the perspective on Quantifier Raising. *Rivista di Grammatica Generativa* 35: 3-38.
- Bickerton, D. (1984). The Language Bioprogram Hypothesis. *Behavioral and Brain Sciences* 7: 173-188.
- Bisetto, A. (2008). La categorizzazione dei composti esocentrici, paper presented at XLII Congresso della SLI, Scuola Normale Superiore, Pisa, 25-27 settembre 2008.
- Bisetto, A. and Melloni, C. (2008). Parasynthetic compounding. *Lingue e linguaggio* 7: 233-260.
- Bisetto, A. and Scalise, S. (1999.) Compounding, Morphology and Syntax, In Mereu, L. (Ed.), *Boundaries of Morphology and Syntax*. Amsterdam: John Benjamins, pp. 31-48.
- Bittner, M. and Hale, K. (1996). The Structural Determination of Case and Agreement. *Linguistic Inquiry* 27: 1-68.
- Bocci, G. (2004). Aspetti teorici e analisi sperimentale della focalizzazione contrastiva nella periferia sinistra della frase: sintassi, fonologia e fonetica. MA Thesis, University of Siena.
- Bock, K., and Levelt, W. (1994). Language production. Grammatical encoding. In Gernsbacher M.(ed.), *Handbook of psycholinguistics*. San Diego, CA: Academic Press, pp. 944-984.
- Bogousslavsky, J, Regli, F. and Assal, G. (1988). Acute transcortical mixed aphasia. A carotid occlusion syndrome with pial and watershed infarcts. *Brain* 111: 631-641.
- Bok-Bennema, R. and Kampers-Mahne, B. (2005). Taking a closer look at Romance VN compounds. In Nishida, C. and Montreuil, J-P. (Eds.), *New perspectives on Romance Linguistics, vol. 1: Morphology, syntax, semantics and pragmatics*. Amsterdam: John Benjamins, pp. 13-27.
- Bonner, M., Ash, S., and M. Grossman. (2010). The New Classification of Primary Progressive Aphasia into Semantic, Logopenic, or Nonfluent / Agrammatic Variants. *Current Neurology and Neuroscience Reports* 10: 484-490.
- Booij, G. (2005), Compounding and derivation: evidence for Construction Morphology. In Dressler, W. U., Rainer, F., Kastovsky, D. and Pfeiffer, O. (eds.), *Morphology and*

- its demarcations*. Amsterdam: John Benjamins, pp. 109-132.
- Borer, H. (2004). *Structuring sense*. Oxford: Oxford University Press.
- Bornkessel-Schlesewsky, I., and Schlewsky, M. (2009). *Processing syntax and morphology: A neurocognitive perspective*. Oxford: Oxford University Press.
- Bošković, Ž. (2001). *On the nature of the syntax-phonology interface*. Amsterdam: Elsevier.
- Bošković, Ž., and Takahashi, D. (1998). Scrambling and Last Resort. *Linguistic Inquiry* 29: 347–366.
- Bottari, P., Cipriani P., and Chilosi, A. M. (1993). Protosyntactic Devices in the Acquisition of Italian Free Morphology. *Language Acquisition* 3: 327-369.
- Bowerman, M., and Choi, S. (2001). Shaping meanings for language: universal and language specific in the acquisition of spatial semantic categories. In Bowerman, M. and Levinson, S. C. (Eds.), *Language Acquisition and Cognitive Development* New York: Cambridge University Press, pp. 475–511.
- Bowers, J. (1993). The syntax of predication. *Linguistic Inquiry* 24: 591–656.
- Bramwell, B. 1899. On ‘crossed aphasia’ and the factors which go to determine whether the ‘leading’ or ‘driving’ speech-centres shall be located in the left or in the right hemisphere of the brain, with notes on a case of ‘crossed’ aphasia (aphasia with right-sided hemiplegia in a left-handed man). *Lancet* 1: 1473–1479.
- Brugé, L., and Brugger, G. (1996.) On the Accusative a in Spanish. *Probus* 8: 1–51.
- Brunetti, L. (2009). On Links and Tails in Italian, *Lingua*, 119: 756-781.
- Burchert, F., Meißner, N., and De Bleser, R. (2008). Production of non-canonical sentences in agrammatic aphasia: limits in representation or rule application? *Brain and Language* 104: 170–179.
- Burzio, L. (1986). *Italian Syntax: A Government-Binding Approach*. Dordrecht: Reidel.
- Butt, M. (1995). *The Structure of Complex Predicates*, Stanford, CA: CSLI Publications.
- Cabré Castellví, M. T. (1994). *A l'entorn de la paraula: Lexicologia general*. València: D'acquesta.
- Cadiot, P. (1991). A la hache ou avec la hache? Représentation mentale, expérience située et donation du referent. *Langue Française* 91: 7-23.

- Caha, P. (2009). The Nanosyntax of Case. Ph.D. dissertation, University of Tromsø.
- Cann, R., Kempson, R., and Marten, L. (2005). *The Dynamics of Language*. Oxford: Elsevier.
- Capasso, R., and Miceli, G. (2001). *Esame Neuropsicologico Per L'Afasia: E.N.P.A*, Milan: Springer.
- Caplan, D. (1985). Syntactic and semantic structures in agrammatism. In Kean, M.-L. (ed.), *Agrammatism*. New York: Academic Press.
- Caplan, D. (1987). *Neurolinguistics and Linguistic Aphasiology*. Cambridge: Cambridge University Press.
- Cappa, S.F., Binetti, G., Pezzini, A., Padovani, A., Rozzini, L., and Trabucchi, M. (1998). Object and action naming in Alzheimer's disease and frontotemporal dementia. *Neurology* 50: 351–355.
- Caramazza, A. (1997). How Many Levels of Processing Are There in Lexical Access? *Cognitive Neuropsychology* 14: 177–208.
- Caramazza, A., and McCloskey, M. (1988). The case for single-patient studies. *Cognitive Neuropsychology* 5: 517–28.
- Cardinaletti, A., and Shlonsky, U. (2004). Clitic Positions and Restructuring in Italian. *Linguistic Inquiry* 35: 519-557.
- Cardinaletti, A. (2004). Toward a cartography of subject positions in Rizzi, L. (Eds.), *The Structure of CP and IP. The Cartography of Syntactic Structures, Volume 2*. New York: Oxford University Press, pp. 115-165.
- Cardinaletti, A., and Giusti, G. (2003). Motion verbs as functional heads. In Tortora, C. (Ed.) *The syntax of Italian dialects*. Oxford: Oxford University Press, pp. 31–49.
- Cardinaletti, A., and Giusti, G. (2001). “Semi-lexical” motion verbs in Romance and Germanic. In Corver N. and van Riemsdijk, H. (Eds.), *Semi-lexical categories: On the function of content words and content of function words*. Berlin: Mouton de Gruyter, pp. 371–414.
- Carstairs-McCarthy, A. (1992). *Current morphology*. London: Routledge.
- Carstens, V. (2002). Antisymmetry and word order in serial constructions. *Language* 78: 3–50.

- Catani, M., and Ffytche, D.H. (2005). The rises and falls of disconnection syndromes. *Brain* 128: 2224-2239.
- Ceccherini, M., Bonifacio, S., and Zocconi, E. (1997). Acquisition of diminutives in Italian (Sara). In Dressler, W. U. (Ed.), *Studies in Pre- and Protomorphology*. Vienna: Verlag der Österreichischen Akademie der Wissenschaften, pp. 157-164.
- Chatterjee, A. (2001). Language and space: Some interactions. *Trends in Cognitive Science* 5: 55-61.
- Chatterjee, A. (2008). The neural organization of spatial thought and language. *Seminars in Speech and Language* 29: 226-238.
- Chesi, C. (2004). Phases and Cartography in Linguistic Computation: toward a Cognitively Motivated Computational Model of Linguistic Competence, Ph.D. Dissertation. University of Siena.
- Chiarelli, V., Menichelli A., and Semenza C. (2007). Naming compounds in Alzheimer's disease. *The Mental Lexicon* 2: 259-269.
- Choi, S, and Bowerman, M. (1991). Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition* 41: 83-121.
- Chomsky, N. (1986). *Barriers*. Cambridge, MA: MIT Press.
- Chomsky, N. (1995). *The Minimalist Program*. Cambridge, MA: MIT Press.
- Chomsky, N. (2000). Minimalist inquiries: the framework. In Martin, R., Michaels, D. and Uriagereka, J. (Eds.), *Step by step. Essays on Minimalist Syntax in Honor of Howard Lasnik*. Cambridge, MA: MIT Press, pp. 89-155.
- Chomsky, N. (2001). Derivation by Phase. In Kenstowicz, M (ed.) *Ken Hale: A Life in Language*. Cambridge, MA: MIT Press. pp. 1- 52.
- Chomsky, N. (2005). Three Factors in Language Design. *Linguistic Inquiry* 36: 1-22.
- Chomsky, N. (2008). On Phases. In Freidin R., Oter, C. and Zubizarreta, M. L. (Eds.) *Foundational Issues in Linguistic Theory. Essays in Honor of Jean-Roger Vergnaud.*, Cambridge, MA: MIT Press, pp. 133-166.
- Cinque G. (2006a). *Restructuring and Functional Heads*. Oxford: Oxford University Press.
- Cinque G. and Rizzi, L. (2010a). The cartography of syntactic structures. In Heine, B. and

- Narrog, H. (Eds.), *Oxford Handbook of linguistic analysis*. Oxford: Oxford University Press, pp. 51-65.
- Cinque, G. (1994), Evidence for Partial N-movement in the Romance DP. In Cinque, G., Koster, J., Pollock, J-Y., and Zanuttini, R. (Eds.), *Paths towards Universal Grammar: Studies in Honor of Richard S. Kayne*, Washington, DC: Georgetown University Press, pp. 85-110.
- Cinque, G. (1999). *Adverbs and functional heads: A cross-linguistic perspective*. Oxford, Oxford University Press.
- Cinque, G. (2005). Deriving Greenberg's universal 20 and its exceptions. *Linguistic Inquiry* 36: 315-332.
- Cinque, G. (2006b). Mapping nominal functional structure: some DP/CP (non)parallelism. Handout for a talk given at the DP-internal Information Structure Workshop, 17-18/11/2006, Utrecht.
- Cinque, G. (2010a). Greenberg's Universal 23 and SVO languages. In Frascarelli, M. (Ed.) *Structures and Meanings: Cross-theoretical perspectives*. Paris/Rome: L'Harmattan, pp. 75-80.
- Cinque, G. (2010b). *The syntax of adjectives*. Cambridge, MA: MIT Press.
- Cinque, G. (2011). Advanced syntax. Class lectures, University of Venice.
- Cinque, G. and Rizzi, L. (Eds.). (2010b). *Mapping Spatial PPs. The Cartography of Linguistic Structures, volume 6*. Oxford: Oxford University Press.
- Clark, D.G., Charuvastra, A., Miller, B. L., Shapira, J. S., and Mendez, M. F. (2005). Fluent versus nonfluent primary progressive aphasia: A comparison of clinical and functional neuroimaging features, *Brain and Language* 94: 54-60.
- Clark, H. H. (1973). Space, time, semantics, and the child. In Moore, T. E. (Ed.), *Cognitive development and the acquisition of language*. New York: Academic Press, pp. 27-63.
- Colby, C.L. (1998). Action oriented spatial reference frames in cortex. *Neuron* 20: 15-24.
- Collins, C. (2002a). Multiple verb movement in  $\neq$ Hoan. *Linguistic Inquiry* 33: 1-29.
- Collins, C. (2002b). Eliminating labels. In Epstein, S. D. and Seely, T. D. (eds.) *Derivation and explanation in the minimalist program*. Oxford: Blackwell, pp. 42-64,
- Coppens, P. and Robey, R.R. (1992). Crossed aphasia: New perspectives. *Aphasiology* 6:

- 585-596.
- Corballis, M.C. (2010). Mirror neurons and the evolution of language. *Brain and Language* 112: 25-35.
- Corbin, D. (1992). Hypothèse sur les frontières de la composition nominale. *Cahiers de grammaire* 17: 25-55.
- Corver, N. and van Riemsdijk, H. (Eds.) (2001). *Semi-lexical categories: On the function of content words and content of function words*. Berlin: Mouton de Gruyter.
- Crawford, J. R., and Garthwaite, P. H. (2002). Investigation of the single case in neuropsychology: Confidence limits on the abnormality of test scores and test score differences. *Neuropsychologia* 40: 1196-1208.
- Crawford, J. R., Garthwaite, P. H., Howell, D. C., and Venneri, A. (2003). Intra-individual measures of association in neuropsychology: Inferential methods for comparing a single case with a control or normative sample. *Journal of the International Neuropsychological Society* 9: 989-1000.
- Crosson, B., Moore, A.B., Gopinath, K., White, K.D., Wierenga, C.E., Gaiefsky, M.E., Fabrizio, K.S., Peck, K.K., Soltysik, D., Milsted, C., Briggs, R.W., Conway, T.W., and Gonzalez Rothi, L.J. (2005). Role of the right and left hemispheres in recovery of function during treatment of intention in aphasia. *Journal of Cognitive Neuroscience* 17: 392-406.
- Damasio, A. R. and Tranel, D. (1993). Nouns and verbs are retrieved with differently distributed neural systems. *P.N.A.S.* 90: 4957-4960.
- Davis, L., Foldi, N.S., Gardner, H. and Zurif, E.B. (1978). Repetition in the transcortical aphasias, *Brain and Language* 6: 226-38.
- Davous, P., and Boller, F. (1994). Trancortical alexia with agraphia following a right temporo-occipital hematoma in a right-handed patient. *Neuropsychologia* 32: 1263-1272.
- de Belder, M., Faust, N. and Lampitelli, N. (2009). On a inflectional and derivational diminutive. Hand-out of a talk given at NELS 39, MIT, 13-15/11/2009.

- de Belder, M., Faust, N. and Lampitelli, N. (2012, *To appear*). On a inflectional and derivational diminutive. In: Alexiadou, A., Borer, H. and Schaefer, F. (Eds.), *The Syntax of Roots and the Roots of Syntax*. Oxford: Oxford University Press.
- De Belder, M.. 2008. Size matters: Towards a syntactic decomposition of countability. In Abner, N., and Bishop, J. (Eds.) *Proceedings of WCCFL 27*. Somerville, MA: Cascadilla Press, pp. 116–122.
- de Hoop, H., and Malchukov, A. (2007). On fluid differential case marking: a bidirectional OT approach. *Lingua* 117: 1636–1656.
- De Marco, A. (1998). The acquisition of diminutives in Italian. In Gillis, S. (Ed.), *Studies in the Acquisition of Number and Diminutive Marking* [Antwerp Papers in Linguistics 95]. Antwerpen: Universiteit Antwerpen, pp. 175–192.
- De Mauro, T., Mancini, F., Vedovelli, M. and Voghera, M. (1993). *Lessico dell'italiano parlato (L.I.P.)*, Milano: Etaslibri. (on-line version at <http://badip.uni-graz.at/>)
- De Renzi, E., and Vignolo, L. (1962). The Token Test: a sensitive test to detect receptive disturbances in aphasia. *Brain* 85: 665–678.
- de Vega, M., Rinck, M., Díaz, J.M., and León I. (2007). Figure and ground in temporal sentences: the role of the adverbs when and while. *Discourse Processes* 43: 1–23.
- de Vega, M., Rodrigo, M. J., Ato, M., Dehn, D., and Barquero, B. (2002). How nouns and prepositions fit together. An exploration of the semantics of locative sentences. *Discourse Processes* 34: 117–143.
- DeGraff, M. (Ed.) (1999). *Language creation and language change*. Cambridge, MA: MIT Press.
- Delfitto D., and Melloni, C. (2009). Compounds don't come easy. *Lingue e linguaggio* 8: 75-104.
- Delfitto D., Fabregas, A. and Melloni, C. (2008/to appear). Compounding at the interfaces. *Proceedings of 39th NELS*. Amherst, MA.: GLS.
- Demirdache, H., and Uribe-Etxebarria, M. (2000). The primitives of temporal relations. In Martin, R., Michaels, D., and Uriagereka, J. (Eds.), *Step by step. Essays on minimalist syntax in honor of Howard Lasnik*. Cambridge, MA: MIT Press, pp. 157-186.
- Den Dikken, M. (2006). *Relators and linkers*. Cambridge, MA: MIT Press.

- Den Dikken, M. (2010). On the functional structure of locative and directional PPs. In Cinque, G. and Rizzi, L. (Eds), *Mapping spatial PPs*. Oxford: Oxford University Press, pp. 74–126.
- Di Pellegrino, G., Fadiga, L., Fogassi, L., Gallese, V., and Rizzolatti, G. (1992). Understanding motor events: a neurophysiological study. *Experimental Brain Research* 91: 176–80.
- Di Sciullo, A. M., and Williams, E. (1987). *On the definition of word*. Cambridge, MA: MIT Press.
- Dixon, R. M. W. (2004). Adjective classes in typological perspective. In Dixon, R. M. W. and Aikhenvald, A. Y. (Eds.). *Adjective classes*. Oxford, Oxford University Press, pp. 1-45.
- Dobel, C., Pulvermüller, F., Härle, M., Cohen, R., Kobbel, P., Schönle, P. W., and Rockstroh, B. (2001). Syntactic and semantic processing in the healthy and aphasic human brain. *Experimental Brain Research* 140: 77–85.
- Don, J. (2004). Categories in the lexicon. *Linguistics* 42: 931-956.
- Dragoy, O. and Bastiaanse, R. (2010). Verb production and word order in Russian agrammatic speakers. *Aphasiology* 24: 28-55.
- Dressler, W. U. (1994). Evidence from first phases of morphology acquisition for linguistic theory: extragrammatic morphology and diminutives. *Acta Linguistica Hafniensia* 27: 93–105.
- Dressler, W. U., and Denes, G. (1989). Word formation in Italian-speaking Wernicke's and Broca's aphasics, in Dressler, W. U. and Stark, J. (eds), *Linguistic Analyses of Aphasic Language*. Springer: New York, pp. 69–88.
- Dressler, W. U., and Karpf, A. (1995). The theoretical relevance of pre- and protomorphology in language acquisition. In Booij, G. and Van Marle, J. (Eds.), *Yearbook of morphology 1994*. Dordrecht: Kluwer, pp. 99–122.
- Dressler, W. U., and Merlini Barbaresi, L. (2001). Morphopragmatics of diminutives and augmentatives: on the priority of pragmatics over semantics. Diminutives and intensifiers in Italian, German, and other languages. In Kenesei, I. and Harnish, R.

- (Eds.), *Perspectives on Semantics, Pragmatics and Discourse*. Amsterdam: John Benjamins, pp. 43–58.
- Dressler, W. U., and Merlini Barbaresi, L. (1994). *Morphopragmatics. Diminutives and intensifiers in Italian, German, and other languages*. Berlin: Mouton de Gruyter.
- Durreleman-Tame, S. (2008). *The syntax of Jamaican Creole: a cartographic perspective*. Amsterdam, John Benjamins.
- El Yagoubi, R.Y., Chiarelli, V., Mondini, S., Perrone, G., Danieli, D. and Semenza, C. (2008). Neural correlates of Italian compounds and potential impact of headedness effect: An ERP study. *Cognitive Neuropsychology* 25: 559-581.
- Embick, D., and A. Marantz. (2008). Architecture and blocking. *Linguistic Inquiry* 75: 1–53.
- Emonds, J. (1985). *A Unified Theory of Syntactic Categories*. Dordrecht: Foris.
- Emonds, J. (2009). Valuing V features and N features: What adjuncts tell us about case, agreement, and syntax in general. In: Brucart, J. M. et al. (Eds.). *Merging Features*. New York: Oxford University Press, pp. 194-234.
- Endo, Y. (2007). *Locality and Information Structure – A Cartographic Approach to Japanese*. Amsterdam: John Benjamins.
- Essegbey, J. (2004). Auxiliaries in serialising languages: on COME and GO verbs in Sranan and Ewe. *Lingua* 114: 473-494.
- Evans, N., and Levinson, S. (2009). The myth of language universals: Language diversity and its importance for cognitive science. *Behavioral and Brain Sciences* 32: 429–492.
- Fábregas, A. (2004). Prosodic Constraints and the Difference between Root and Word Compounding. *Lingue e Linguaggio* 2: 303-339.
- Fábregas, A. (2007). (Axial) Parts and wholes. *Nordlyd* 34: 1–32.
- Fanselow, G. (2001). Features,  $\theta$ -roles, and free constituent order. *Linguistic Inquiry* 32: 405–437.
- Faroqi-Shah, Y., and Dickey, M. W. (2009). Online Processing of tense and temporality in agrammatic aphasia. *Brain and Language* 108: 97-111.
- Ferrari-Bridgers, F. (2005). Italian [VN] compound nouns: A case for a syntactic approach to word formation. In Geerts, T., van Ginneken, I. and Jacobs, H. (eds.) *Romance*

- languages and linguistic theory 2003: Selected papers from 'Going Romance' 2003*.  
Amsterdam: John Benjamins, pp. 63-79.
- Fillmore, C. J. (1977). Topics in Lexical Semantics. In Cole, R. (Ed.), *Current Issues in Linguistic Theory*. Bloomington: Indiana University Press, pp. 76-138.
- Fillmore, C. J. (1985). Frames and the semantics of understanding. *Quaderni di semantica* 6: 222-253.
- Fillmore, C. J., Kay P., and O'Connor, M.C. (1988). Regularity and idiomaticity in grammatical constructions: the case of let alone. *Language* 64: 501-538.
- Fintel, von K. (1995). The formal semantics of grammaticalization. *Proceedings of NELS 25, Workshop on Language Change*, pp. 175-189.
- Floricc, F. (2008). The Italian verb-noun anthroponymic compounds at the Syntax/morphology interface. *Morphology* 18: 167-193.
- Fodor, J. (1983). *Modularity of Mind*. Cambridge. MIT Press.
- Folli, R., and Ramchand, G. (2005). Prepositions and Results in Italian and English: An Analysis from Event Decomposition. In van Hout, A., de Swart, H. and Verkuyl, H.J. (Eds.). *Perspectives on Aspect* Dordrecht: Kluwer, pp. 81-105.
- Folli, R., Harley, H. and Karimi, S. (2005). Determinants of event structure in Persian complex predicates. *Lingua* 115: 1365-1401.
- Folstein, M.F., Folstein, S.E., and McHugh, P.R. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of psychiatric research* 12: 189-98.
- Fortin, A. (2011). The Morphology and Semantics of Expressive Affixes. Ph.D dissertation. University of Oxford.
- Fradin, B. (2009). Indo-European, Romance: French. In Lieber, R. and Štekauer, P. (eds). *Oxford Handbook on Compounding*. Oxford: Oxford University Press, pp. 417-435.
- Franco L., Zampieri, E., Garzon, M., Meneghello, F., Cardinaletti, A. and Semenza, C. (2010). Noun-Verb Distinction as a Consequence of Antisymmetry: Evidence from Primary Progressive Aphasia. *Procedia - Social and Behavioral Sciences*, 6, 45-46.
- Franco, L. (2008). *Graph Theory and Universal Grammar*, Ph.D. dissertation, Università di Firenze.

- Franco, L. (2011a). A nanosyntactic account of Romance VN compounds. manuscript. Università di Venezia.
- Franco, L. (2011b). The *strict* asymmetry of Merge. manuscript. Università Ca' Foscari, Venezia.
- Franco, L. (2012a). The syntax of adverbs of the type of *carponi*. manuscript. Università di Venezia.
- Franco, L. (2012b). On case and clause: subordination and the spell-out of non-terminals. In Suranyi, B. and Varga D. (Eds.), *Proceedings of the First Central European Conference in Linguistics for postgraduate students*. Budapest: Pázmány Péter Catholic University, pp. 82-103.
- Frascarelli, M. (1999). The Prosody of Focus in Italian (and the Syntax-Phonology Interface). *Probus* 11: 209-238.
- Friederici, A. D. (1981). Production and comprehension of prepositions in aphasia. *Neuropsychologia* 19: 191-199.
- Friederici, A. D. (1982). Syntactic and semantic processes in aphasic deficits: the availability of prepositions. *Brain and Language* 15: 249-258.
- Friederici, A. D. (1995). The time-course of syntactic activation during language processing - A model-based on neuropsychological and neurophysiological data. *Brain and Language* 50: 259-281.
- Friederici, A. D., Steinhauer, K., and Frisch, S. (1999). Lexical integration: Sequential effects of syntactic and semantic information. *Memory and Cognition* 27: 438-453.
- Friedmann, N. and Grodzinsky, Y. (1997). Tense and Agreement in Agrammatic Production: Pruning the Syntactic Tree. *Brain and Language* 56: 397-425.
- Friedmann, N. (2001). Agrammatism and the psychological reality of the syntactic tree. *Journal of psycholinguistic* 30: 71-103.
- Froud, K. (2006). Unaccusativity as lexical argument reduction: evidence from aphasia. *Lingua* 116: 1631-1650.
- Froud, K. (2001). Prepositions and the lexical/functional divide: aphasic evidence. *Lingua* 111: 1-28.
- Fukui, N. (1993). Parameters and Optionality. *Linguistic Inquiry* 24: 399-420.

- Gaide, F. (1988). *Le substantifs masculins latins en ...(I)Ō, ...(I)ŌNIS*. Louvain/Paris: Peeters.
- Galantucci, B., Fowler, C. A., and Turvey, M. T. (2006). The motor theory of speech perception reviewed. *Psychonomic Bulletin and Review* 13: 361–377.
- Gallese, V., Fadiga, L., Fogassi, L., and Rizzolatti, G. (1996). Action recognition in the premotorcortex. *Brain* 119: 593–609.
- Gambino, M. (2010). Italian Evaluative Morphology: a syntactic approach. Ph.D dissertation. Università di Padova.
- Garraffa, M. (2011). *The Grammatical Nature of Minimal Structures: Impoverishment of Grammatical Features in a Non-fluent Aphasic Speaker*. Newcastle upon Tyne: Cambridge Scholars Publishing.
- Garraffa, M. and Grillo, N. (2008). Canonicity effects as grammatical phenomena. *Journal of Neurolinguistics* 21: 177–197.
- Geschwind, N., Quadfasel, F.A. and Segarra, J. M. (1968). Isolation of the speech area. *Neuropsychologia*, 6: 327–340.
- Gibson, E. J., and Spelke, E. S. (1983). The development of perception. In Flavell, J. H. and Markman, E. M. (Eds.), *Cognitive Development*, Vol. 3 of P. H. Mussen (Ed.), *Handbook of Child Psychology*. New York: Wiley, pp. 1-76.
- Gil, D. (1994). The Structure of Riau Indonesian, *Nordic Journal of Linguistics* 17: 179-200.
- Gil, D. (2000). Syntactic Categories, Cross-Linguistic Variation and Universal Grammar, in Vogel P. M. and B. Comrie (eds.), *Approaches to the Typology of Word Classes, Empirical Approaches to Language Typology*. Berlin: Mouton de Gruyter, pp. 173-216.
- Gönczöl-Davies, R. (2008). *Romanian: an essential grammar*. London: Routledge.
- Goodglass, H., and Wingfield, A. (1997). *Anomia: Neuroanatomical and cognitive correlates*. San Diego, CA: Academic Press.
- Gorno-Tempini, M. L., Brambati, S. M., Ginex, V., Ogar, J., Dronkers, N. F., Marcone, A., Perani, D., Garibotto, V., Cappa, S. F., and Miller, B. L. (2008). The logopenic/phonological variant of primary progressive aphasia. *Neurology* 71: 1227–1234.

- Gorno-Tempini, M. L., Dronkers, N. F., Rankin, K. P., Ogar, J. M., Phengrasamy, L., Rosen, H. J., Johnson, J. K., Weiner, M. W. and Miller, B. L. (2004). Cognition and anatomy in three variants of primary progressive aphasia. *Annals of Neurology* 55: 335–346.
- Graff-Radford, N.R., Damasio, H., Yamada, T., Eslinger, P.J., and Damasio, A.R. (1985). Nonhaemorrhagic thalamic infarction: clinical, neuropsychological and electrophysiological findings in four anatomical groups defined by computerized tomography. *Brain* 108: 485–516.
- Graham N. and Rochon, E. (2007). Verb production in sentences by patients with non-fluent progressive aphasia. *Brain and Language* 103: 69-70.
- Graham, N., Patterson, K. and Hodges, J. (2004). When more yields less: Speaking and writing deficits in nonfluent progressive aphasia. *Neurocase* 10: 141–155.
- Grandi, N., and Montermini, F. (2007). Valutativi suffissali e valutativi prefissali: un'unica categoria?, in Grossmann, M. and Thornton, A.M. (Eds.), *La formazione delle parole, Atti del XXXVII Congresso Internazionale di Studi della Società di Linguistica Italiana*. Roma: Bulzoni, pp. 271-287.
- Grandi, N. (2002). *Morfologie in contatto: Le costruzioni valutative nelle lingue del Mediterraneo*. Milano: Franco Angeli.
- Grandi, N. (2003). Mutamenti innovativi e conservativi nella morfologia valutativa dell'italiano Origine, sviluppo e diffusione del suffisso accrescitivo –one. In Maraschio, N. and Poggi Salani, T. (Eds.), *Italia linguistica anno Mille – Italia linguistica anno Duemila. Atti del XXXIV Congresso Internazionale di Studi della Società di Linguistica Italiana*. Roma: Bulzoni, pp. 243-258.
- Grandi, N. (2007). I verbi valutativi in italiano tra azione e aspetto. *Studi di Grammatica Italiana* XXIV: 153-188.
- Grewendorf, G. and Sabel, J. (1999). Scrambling in German and Japanese: Adjunction vs multiple specifiers. *Natural Language and Linguistic Theory* 17: 1–65.
- Grillo, N. (2009). Generalized Minimality: Feature impoverishment and comprehension deficits in agrammatism. *Lingua*, 119: 1426–1443.
- Grimshaw, J. (2005). *Words and Structure*. Stanford, CA: CSLI Publications.
- Grodzinsky, Y. (1988). Syntactic representations in agrammatic aphasia: the case of

- prepositions. *Language and Speech*, 31: 115–134.
- Grodzinsky, Y. (1990). *Theoretical perspectives on language deficits*. Cambridge, MA: MIT Press.
- Gross, M. (1996). Les Formes Être Prép X du Français. *Lingvisticae Investigationes* 20: 217–270.
- Grossman, M. and Ash, S. (2004). Primary progressive aphasia: a review. *Neurocase* 10: 3–18.
- Grossman, M. (2010). Primary progressive aphasia: clinicopathological correlations *Nature Reviews Neurology*, 6: 88–97.
- Gruber, J.S. (1976). *Lexical Structures in Syntax and Semantics*. Amsterdam: North-Holland.
- Hagiwara, H. (1995). The breakdown of functional categories and the economy of derivation. *Brain and Language* 50: 92–116.
- Haider, H. and Rosengren, I. (2003). Scrambling: Non-triggered Chain Formation in OV Languages. *Journal of Germanic Linguistics* 15: 203–267.
- Haig, G. (2000). Anatomy of a closed word class: Frequency, regularity and productivity of verbs in Kurdish. Paper held at the 22. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft, 1–3. März 2000, Phillips-Universität, Marburg.
- Hale K., and Keyser, S. J. (1993). On argument structure and the lexical expression of grammatical relations. In K. Hale and S. J. Keyser (Eds.), *The view from Building 20. Essays in Linguistics in Honor of Sylvain Bromberger*. Cambridge, MA: MIT Press, pp. 53–109.
- Hale K., and Keyser, S. J. (2002). *Prolegomenon to a theory of argument structure*. Cambridge, MA: MIT Press.
- Hale, K. (1983). Warlpiri and the Grammar of Non-configurational Languages. *Natural Language and Linguistic Theory*, 1, 5–47.
- Hale, K. (1992). Basic Word Order in Two “Free Word Order” Languages. In Payne, D. L. (Ed.), *Pragmatics of Word Order Flexibility*. Amsterdam/Philadelphia: John Benjamins, pp. 63–82.

- Hale, K., Laughren, M., and Simpson, J. (1995). Warlpiri. In Jacobs, J., von Stechow, A., Sternefeld, W. and Venneman, T. (Eds.), *Syntax. Ein international Handbuchzeitgenössischer Forschung An International Handbook of Contemporary Research* Berlin: Walter de Gruyter, pp. 1430-51.
- Halle, M., and Marantz, A. (1993). Distributed morphology and the pieces of inflection. In Hale, K. and Keyser, S. J. (Eds.), *The view from Building 20. Essays in Linguistics in Honor of Sylvain Bromberger*. Cambridge, MA: MIT Press, pp. 111-176.
- Harley, H. (1995). *Subjects, events, and licensing*. Ph.D. Dissertation, MIT.
- Harley, H. (2005). How do verbs get their names? Denominal verbs, manner incorporation, and the ontology of verb roots in English. In Erteschik-Shir, N. and Rapoport, T. (Eds.). *The syntax of aspect: Deriving thematic and aspectual interpretation*. New York: Oxford University Press, pp. 42-64.
- Harley, H. and Noyer, R. (1999). Distributed Morphology - State-of-the-Article. *GLOT* 4.4: 3-9.
- Haspelmath, M. (2007). Pre-established categories don't exist — Consequences for language description and typology. *Linguistic Typology* 11: 119–32.
- Hasselrot, B. (1957). *Etude sur la formation diminutive dans le langues romanes, vol. 11*, Uppsala: Uppsala Universitets Årsskrift.
- Heilman, K.M., Tucker, D.M., and Valenstein, E. (1976). A case of mixed transcortical aphasia with intact naming. *Brain* 99: 415-426.
- Henry, M.L., and Gorno-Tempini, M. L. (2011). The logopenic variant of primary progressive aphasia. *Current Opinion in Neurology* 23: 633-7.
- Hickok, G. (2009). Eight problems for the mirror neuron theory of action understanding in monkeys and humans. *Journal of Cognitive Neuroscience* 21: 1229-1243.
- Higgins, R. (1979). *The Pseudo-Cleft Construction in English*. New York: Garland.
- Hillis A., Heidler-Gary, J., Newhart, M., Chang, S., Ken, L. and Bak, T. (2006). Naming and comprehension in primary progressive aphasia. *Aphasiology* 20: 246–256.
- Hillis, A. and Caramazza, A. (1995). Representation of grammatical categories of words in the brain. *Journal of Cognitive Neuroscience*, 7: 396-407.

- Holmberg, A. (1986). Word order and syntactic features in the Scandinavian languages and English. PhD dissertation, University of Stockholm.
- Howard, D., and Patterson, K. (1992). *The Pyramid and Palm Trees Test: A Test of Semantic Access From Words and Pictures*. Bury St. Edmunds: Thames Valley Test Company.
- Huber, W., Poeck, K., Weniger, D., and Willmes, K. (1983) *Der Aachener Aphasie Test (AAT)*. Göttingen: Hogrefe.
- Iemmolo, G. (2010). Topicality and differential object marking: evidence from Romance and beyond. *Studies in Language* 34: 239-272.
- Ishizaki, M., Ueyama, H., Nishida, Y., Imamura, S., Hirano, T., and Uchino, M. (2012) Crossed aphasia following an infarction in the right corpus callosum. *Clinical Neurology and Neurosurgery* 114: 161-165.
- Jackendoff, R. (1973) The base rules for prepositional phrases. In Anderson, S. R. and Kiparsky, P. (Eds.), *Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston, pp. 345-356.
- Jackendoff, R. (1997). *The Architecture of the Language Faculty*. Cambridge, MA: MIT Press.
- Jaeggli, O. (1980). Spanish diminutives. In Nuessel, F. H., Jr (Ed.), *Contemporary studies in Romance languages*. Bloomington: Indiana University Linguistics Club, pp. 142-158.
- Jayaseelan, K. A. (2008). Bare Phrase Structure and Specifier-less Syntax. *Biolinguistics* 2: 87—106.
- Jescheniak, J.D., and Levelt, W. (1994). Word frequency effects in speech production: Retrieval of syntactic information and of phonological form. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 20: 824–843.
- Jespersen, O. (1965). *A Modern English Grammar on Historical Principles, Part VI, Morphology*. London: George Allen and Unwin Ltd.
- Jonkers, R. and Bastiaanse, R. (1998). How selective are selective word class deficits. Two case studies on action and object naming. *Aphasiology* 12: 245-256.
- Jurafsky, D. (1996). Universal tendencies in the semantics of the diminutive. *Language* 72: 533–578.
- Kampen van, J. (1997). *First Steps in Wh-movement*, Delft: Eburon.

- Kampers-Manhe, B. (2001). Le statut de la préposition dans les mots composés. *Travaux de linguistique* 42-43: 97-109.
- Kaplan, E., Goodglass, H., and Weintraub, S. (1983). *Boston Naming Test*. Philadelphia: Lee and Febiger.
- Karimi, S. (1997). Persian complex verbs: idiomatic or compositional, *Lexicology* 3: 273–318.
- Karimi, S. (2005). *A Minimalist approach to scrambling: Evidence from Persian*. Berlin: Mouton de Gruyter.
- Karimi, S. (Ed.). (2003). *Word Order and Scrambling*. London: Blackwell.
- Kastrau, F., Wolter, M., Huber, W., Block, F. (2005). Recovery from aphasia after hemispherectomy for infarction of the speech-dominant hemisphere. *Stroke* 36: 825-829.
- Kayne, R. S. (1984). *Connectedness and binary branching*. Dordrecht: Foris.
- Kayne, R. S. (1994). *The Antisymmetry of Syntax*. Cambridge, MA: MIT Press.
- Kayne, R. S. (2003). Silent Years, Silent Hours. In Delsing, L.-O., Falk, C., Josefsson, G., and Sigurðsson, H. Á. (Eds.), *Grammar in Focus: Festschrift for Christer Platzack*. Volume 2, Lund: Wallin and Dalholm, pp. 209-226. (2 Vols.).
- Kayne, R. S. (2009). Antisymmetry and the Lexicon, *Linguistic Variation Yearbook* 8: 1–32.
- Kegl, J. (1995). Levels of representation and units of access relevant to agrammatism. *Brain and Language* 50: 151–200.
- Kemmerer, D. (2005). The spatial and temporal meanings of English prepositions can be independently impaired. *Neuropsychologia* 43: 797–806.
- Kemmerer, D. and Eggleston, A. (2010). Nouns and Verbs in the Brain: Implications of linguistic typology for cognitive neuroscience. *Lingua* 120: 2686–2690.
- Kemmerer, D., and Tranel, D. (2000). A double dissociation between linguistic and perceptual representations of spatial relationships. *Cognitive Neuropsychology* 17: 393–414.
- Kemmerer, D., and Tranel, D. (2003). A double dissociation between the meanings of action verbs and locative prepositions. *Neurocase* 9: 421–435.

- Kempe V. and Brooks, P. J. (2001). The role of diminutives in Russian gender learning: Can child-directed speech facilitate the acquisition of inflectional morphology? *Language Learning* 51: 221–256.
- Kempson, R., and Kiaer, J. (2010). Multiple long-distance scrambling: Syntax as reflections of processing. *Journal of Linguistics* 46: 127-192.
- Kempson, R., Meyer-Viol, W. and Gabbay, D. (2001). *Dynamic syntax*. London: Blackwell.
- Kertesz, A., McMonagle, P., Blair, M., Davidson, W., and Munoz, D. G. (2005). The evolution and pathology of frontotemporal dementia. *Brain* 128: 1996–2005.
- Kiaer, J., and Kempson, R. (2005). Pro-active parsing of Korean scrambling. In Alderete J., Han, C-H., and Kochetov, A. (Eds.), *Proceedings of the 24th West Coast conference on formal linguistics*. Somerville, MA: Cascadilla Press, pp. 209–17.
- Kim, M., and Thompson, C. K. (2004). Verb deficits in Alzheimer's disease and agrammatism: Implications for lexical organization. *Brain and Language* 88: 1-20.
- Kim, M., and Thompson, C. K. (2000). Patterns of comprehension and production of nouns and verbs in agrammatism: Implications for lexical organization. *Brain and Language* 74: 1–25.
- Kiss, K. É. (1998), Identificational focus versus information focus, *Language* 74: 245-273.
- Knels, C., and Danek, A. (2010). Loss of word-meaning with spared object semantics in a case of mixed primary progressive aphasia. *Brain and Language* 113: 96-100.
- Kohler, E., Keysers, C., Umiltà, M. A., Fogassi, L., Gallese, V., and Rizzolatti, G. (2002). Hearing sounds, understanding actions: action representation in mirror neurons. *Science* 297: 846–848.
- Kornfeld, L. (2009). Indo-European, Romance: French. In Lieber, R. and Štekauer, P. (Eds). *Oxford Handbook on Compounding*. Oxford: Oxford University Press, pp. 436-452.
- Kosslyn, S.M. (1994). *Image and brain*. Cambridge, MA: MIT Press.
- Kracht, M. (2002). On the semantics of locatives. *Linguistics and Philosophy* 25: 157-232.
- Kural, M. (1992). Properties of scrambling in Turkish. manuscript. UCLA.
- Lakusta, L. and Landau, B. (2005). Starting at the end: The importance of goals in spatial language. *Cognition* 96: 1-33.

- Landau, B. (2003). Axes and direction in spatial language and spatial cognition. In Slack, J. and van der Zee, E. (Eds.), *Representing direction in language and space*. Oxford: Oxford University Press, pp. 18-38.
- Landau, B., and Zukowski, A. (2003). Objects, motions, and paths: Spatial language in children with Williams Syndrome. *Developmental Neuropsychology* 23: 105-137.
- Landau, B., and Jackendoff, R. (1993). 'What' and 'Where' in Spatial Language and Spatial Cognition. *Behavioral and Brain Sciences* 16: 217-238.
- Langacker, R. W. (1987). *Foundations of cognitive grammar. Vol. 1: Theoretical perspectives*. Stanford, CA: Stanford University Press.
- Larson, R. K. (1988). On the Double Object Construction. *Linguistic inquiry* 19: 335-391.
- Lee, M. and Thompson, C. K. (2004). Agrammatic aphasic production and comprehension of unaccusative verbs in sentence contexts, *Journal of Neurolinguistics* 17: 315-330.
- Lefebvre, C. (1998) *Creole genesis and the acquisition of grammar*. Cambridge: Cambridge University Press.
- Leikin, M. (1996). The application of distinctive semantic features to the production and comprehension of prepositions in different forms of aphasia. In Andrews E. and Tobin, Y. (Eds.), *Towards a Calculus of Meaning: Studies in Markedness, Distinctive Features and Deixis*. Amsterdam: John Benjamins, pp. 381-414.
- Leikin, M. (1998). Acquisition of locative preposition in Russian. *Journal of Psycholinguistic Research* 27: 91-108.
- Levelt, W. (1989). *Speaking from intention to articulation*. Cambridge, MA: MIT Press.
- Levin, B. and M. Rappaport-Hovav. (1995). *Unaccusativity: at the syntax-lexical semantics interface*. Cambridge, MA: MIT Press.
- Levinson, S.C. (1996). Language and space. *Annual Review of Anthropology* 25: 353-382.
- Levinson, S.C. (2003). *Space in language and cognition*. Cambridge: Cambridge University Press.
- Libben, G., Gibson, M., Yoon, Y. B., and Sandra, D. (2003). Compound fracture: The role of semantic transparency and morphological headedness. *Brain and Language* 84: 50-64.

- Lieberman, P. (2007). The evolution of human speech. *Current Anthropology* 48: 39–46.
- Lightfoot, D. (1999). *The Development of Language: Acquisition, Change, and Evolution*. Malden, MA: Blackwell.
- Littlefield, H. (2006). Syntax and Acquisition in the Prepositional Domain: Evidence from English for fine-grained syntactic categories. PhD Dissertation, Boston University.
- Lonzi, L., Luzzatti, C., and Vitolo, F. (2007). Recoverability of deletion in agrammatic production: the omission of prepositions. *Italian Journal of Linguistics* 18: 249–277.
- Lotto, A.J., Hickok, G.S., and Holt, L.L. (2009). Reflections on Mirror Neurons and Speech Perception. *Trends in Cognitive Sciences* 13: 110–114.
- Luzzatti, C. and Chierchia, G. (2002). On the nature of selective deficits involving nouns and verbs. *Italian Journal of Linguistics* 14: 43–71.
- Luzzatti, C., Raggi, R., Zonca, G., Pistarini, C., Contardi, A., and Pinna, G.D. (2002). Verb-noun double dissociation in aphasic lexical impairments: The role of word frequency and imageability. *Brain and Language* 81: 432–444.
- Maeshima, S., Nakagawa, M., Terada, T., Nakai, K., Itakura, T., Komai, N., and Roger, P. (1999). Transcortical mixed aphasia from ischaemic infarcts in a non-right handed patient, *Journal of Neurology* 246: 504–506.
- Mahajan, A. (1990). The A/A-bar Distinction and Movement Theory. Ph.D. dissertation, MIT.
- Mahajan, A. (1994). Toward a Unified Theory of Scrambling. In Corver N. and van Riemsdijk, H. (Eds.), *Studies on Scrambling: Movement and Non-movement approaches to Free Word-Order Phenomena*. Berlin: Mouton de Gruyter, pp. 301–333.
- Manzini, M.R. and Savoia, L. M. (2011). *Grammatical Categories: Variation in Romance Languages*. Cambridge: Cambridge University Press.
- Marantz, A. (1997). No Escape from Syntax: Don't Try Morphological Analysis in the Privacy of our Lexicon. In Dimitriadis, A., Siegel, L., Surek-Clark, C. and Williams, A. (Eds.) *Proceeding of the 21st Annual Penn Linguistics Colloquium*, pp. 221–235.
- Marantz, A. (2001). Words and things. Manuscript. MIT.
- Marelli, M., and Luzzatti, C. (2012, in press). Frequency effects in the processing of Italian

- nominal compounds: Modulation of headedness and semantic transparency. *Journal of Memory and Language*.
- Marelli, M., Crepaldi, D., and Luzzatti, C. (2009). Head position and the mental representation of nominal compounds: A constituent priming study in Italian. *The Mental Lexicon* 4: 430–454.
- Mariën, P., Engelborghs, S., Vignolo, L.A. and De Deyn, P.P. (2001). The many faces of crossed aphasia in dextrals: Report of nine cases and review of the literature. *European Journal of Neurology* 8: 643-658.
- Mariën, P., Paghera, B., De Deyn, P.P., and Vignolo, L.A. (2004). Adult crossed aphasia in dextrals revisited. *Cortex* 40: 41–74.
- Marr, D. (1982). *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*. New York: W.H. Freeman.
- Mateu, J. (2002). Argument Structure: Relational construal at the Syntax-Semantic Interface. Ph.D. dissertation, Universitat Autònoma de Barcelona.
- Mateu, J., and Rigau, G. (2010). Verb-particle constructions in Romance: A lexical-syntactic account. *Probus* 22: 241-269.
- Matushansky, O. (2006). Head movement in linguistic theory. *Linguistic Inquiry* 37: 69–109.
- Mätzig, S., (2009). Spared syntax and impaired spell-out: the case of prepositions in Broca's and anomic aphasia. Ph.D dissertation. University College London.
- Mätzig, S., Druks, J., Masterson, J., and Vigliocco, G. (2009). Noun and verb differences in picture naming: past studies and new evidence. *Cortex* 45: 738–758.
- Matzig, S., Druks, J., Neeleman, A., and Craig, G. (2010). Spared syntax and impaired spell-out: The case of prepositions. *Journal of Neurolinguistics* 23: 354-382.
- McCarthy, R., and Warrington, E.K. (1985). Category specificity in an agrammatic patient: The relative impairment of verb retrieval and comprehension. *Neuropsychologia* 23: 709–727.
- McCawley, J.D. (1971). Prelexical Syntax. In O'Brien, R.J. (Ed.), *Report of the 22nd Annual Roundtable Meeting on Linguistics and Language Studies*. Washington, DC: Georgetown University Press, pp. 19–33.

- McFarling, D., Rothi, L. J., and Heilman, K. M. (1982). Transcortical aphasia from ischaemic infarcts of the thalamus: A report of two cases. *Journal of Neurology, Neurosurgery and Psychiatry* 45: 107–112.
- Megerdoomian, K. (2002). *Beyond words and phrases: a unified theory of predicate composition*. Ph.D. Dissertation, University of Southern California.
- Menn, L., and Opler, L. (Eds.) (1990). *Agrammatic aphasia: A cross-language narrative sourcebook*. Amsterdam: John Benjamin.
- Merlini Barbaresi, L. (2004), Alterazione. In Grossmann, M. and Rainer, F. (Eds.), *La formazione delle parole in italiano*. Tübingen: Niemeyer, pp. 264-292.
- Mesulam, M-M. (1982). Primary progressive aphasia without generalized dementia. *Annals of Neurology* 11: 592–598.
- Mesulam, M-M. (1998) From sensation to cognition. *Brain* 121 : 1013–1052.
- Mesulam, M-M. (2001). Primary progressive aphasia. *Annals of neurology* 49: 425–432.
- Mesulam, M-M. (2003). Primary progressive aphasia – a language-based dementia. *New England Journal of Medicine* 349: 1535–1542.
- Mesulam, M-M. (2007). Primary Progressive Aphasia. A 25-year Retrospective. *Alzheimer Disease and Associated Disorders* 21: S8–S11.
- Mesulam, M-M., Rogalski, E., Wieneke, C., Cobia, D., Rademaker, A., Thompson, C., and Weintraub, S. (2009). Neurology of anomia in the semantic variant of primary progressive aphasia. *Brain* 132: 2553-2565.
- Miceli, G., Laudanna, A., Burani, C. and Capasso, R. (1994). *Batteria per l'analisi dei deficit afasici. BADA*. Roma: Cepsag (Università Cattolica del Sacro Cuore Policlinico Gemelli).
- Miceli, G., Silveri, M.C., Nocentini, U., and Caramazza, A. (1988). Patterns of dissociation in comprehension and production of nouns and verbs. *Aphasiology* 2: 351–358.
- Miceli, G., Silveri, M.C., Romani, C., and Caramazza, A. (1989). Variation in the pattern of omissions and substitutions of grammatical morphemes in the spontaneous speech of so-called agrammatic patients. *Brain and Language* 36: 447–492.
- Miceli, G., Silveri, M.C., Villa, G., and Caramazza, A. (1984). On the basis of the agrammatics' difficulty in producing main verbs. *Cortex* 20: 207–220.

- Miller, G. A., and Johnson-Laird, P. N. (1976). *Language and Perception*. Cambridge, MA: MIT Press.
- Miyamoto, E. T. (2002). Case markers as clause boundary inducers in Japanese. *Journal of Psycholinguistic Research* 31: 307-347.
- Mohanan, T. (2007). Grammatical Verbs (With Special Reference to Light Verbs). In Everaert, M. and van Riemsdijk, H. (Eds.), *The Blackwell Companion to Syntax*, Malden, MA: Blackwell Publishing.
- Mohr, B., Pulvermüller, F., and Zaidel, E. (1994). Lexical decision after left, right, and bilateral presentation of content words, function words, and non-words: evidence for interhemispheric interaction. *Neuropsychologia* 32: 105-124.
- Mondini, S., Luzzatti, C., Saletta P., Allamano, N. and Semenza, C. (2005). Mental representation of prepositional compounds: Evidence from Italian agrammatic patients. *Brain and Language* 94: 178-187.
- Mondini, S., Jarema, G., Luzzatti, C., Burani, C., and Semenza, C. (2002). Why is “Red Cross” different from “Yellow Cross”? A neuropsychological study of noun adjective agreement within Italian compounds. *Brain and Language* 81: 621-634.
- Mondini, S., Luzzatti, C., Semenza, C., and Calza, A. (1997). Prepositional compounds are sensitive to agrammatism: consequences for models of lexical retrieval. *Brain and Language* 60: 78-80.
- Mondini, S., Luzzatti, C., Zonca, G., Pistarini, C., and Semenza, C. (2005). The mental representation of Verb-Noun compounds in Italian: Evidence from a multiple single-case study in aphasia. *Brain and Language* 90: 470-477.
- Moro, A. (1997). *The raising of predicates*. Cambridge: Cambridge University Press.
- Moro, A. (2000). *Dynamic Antisymmetry*. Cambridge, MA: MIT Press.
- Moro, A., Tettamanti, M., Perani, D., Donati, C., Cappa, S.F., and Fazio F. (2001). Syntax and the brain: disentangling grammar by selective anomalies. *Neuroimage* 13: 110-118.
- Müller, G. and Sternefeld, W. (1993). Improper Movement and Unambiguous Binding. *Linguistic Inquiry* 24: 461-507.

- Musso, M., Moro, A., Glauche, V., Rijntjes, M., Reichenbach, J., Buchel, C., and Weiller, C. (2003). Broca's area and the language instinct. *Nature Neuroscience* 6: 774–781.
- Næss, A. (2004). What markedness marks: the markedness problem with direct objects. *Lingua* 114, 1186–1212.
- Nagaratnam, N. and Gilhotra, J. S. (1998). Acute mixed transcortical aphasia following an infarction in the left putamen, *Aphasiology* 12: 489-493.
- Nagaratnam, N. and Nagaratnam, K. (2000). Acute mixed transcortical aphasia with bihemispheric neurological deficits following diffuse cerebral dysfunction. *Aphasiology* 14: 893-899.
- Neeleman, A. (1994). Scrambling as a D-structure phenomenon. In Corver N. and van Riemsdijk, H. (Eds.), *Studies on Scrambling: Movement and Non-movement approaches to Free Word-Order Phenomena*. Berlin: Mouton de Gruyter, pp. 387–429.
- Neeleman, A., Szendrői, K. (2007). Radical pro-drop and the morphology of pronouns. *Linguistic Inquiry* 38: 671–714.
- Noccetti, S., De Marco, A., Tonelli, L., Dressler, W. U. (2007). The role of diminutives in the acquisition of Italian. In Savickienė, I. and Dressler, W. U. (Eds.), *The acquisition of diminutives. A cross-linguistic perspective*. Amsterdam: John Benjamins, pp. 125-152.
- Noordzij, M. L., Neggers, S. F. W., Ramsey, N. F., and Postma, A. (2008). Neural correlates of locative prepositions. *Neuropsychologia* 46: 1576-1580.
- Olmsted, H. (1994). Diminutive morphology of Russian children: A simplified subset of nominal declension in language acquisition. In *Alexander Lipson: In memoriam*, Columbus, Ohio: Slavica Publishers Inc, pp. 165–207.
- Ordóñez, F. (1998). The inversion construction in interrogatives in Spanish and Catalan. In Lema, J. and Treviño, E. (Eds.), *Theoretical analyses on Romance languages*. Amsterdam: John Benjamins, pp. 329-350.
- Ott, D. (2011). Diminutive-formation in German. Spelling out the classifier analysis. *Journal of Comparative Germanic Linguistics* 14: 1–46.
- Panagiotidis, P. (2005). Against category-less roots in syntax and word learning:

- objections to Barner and Bale (2002), *Lingua* 115: 1181-1194.
- Pantcheva, M. (2010). The syntactic structure of locations, goals, and sources. *Linguistics* 48: 1043–1082.
- Pawley, A. (2006). Where have all the verbs gone? Remarks on the organisation of languages with small, closed verb classes. manuscript.
- Pedersen, P.M., Vinter, K., and Olsen, T.S. (2004). Aphasia after stroke: type, severity and prognosis. The Copenhagen aphasia study. *Cerebrovascular Diseases* 17: 35–43.
- Pensalfini, R. (2004). Towards a typology of configurationality. *Natural Language and Linguistic Theory* 22: 359-408.
- Perani, D., Cappa, S.F., Schnur, T., Tettamanti, M., Collina, S., Rossa, M.M., and Fazio, F. (1999). The neural correlates of verb and noun processing. A PET study. *Brain* 122: 2337–2344.
- Perlmutter, D. (1978). Impersonal passives and the Unaccusative Hypothesis. *Proceedings Of the 4th Annual Meeting of the Berkeley Linguistics Society*. University of California Berkeley, pp. 157–189.
- Perlmutter, D. (1988). The split morphology hypothesis: evidence from Yiddish. In Hammond, M. and Noonan, M. (Eds.), *Theoretical morphology: approaches in modern linguistics*. San Diego, CA: Academic Press, pp. 79-100.
- Perlmutter, D., and Postal, P. (1984). The 1-advancement exclusiveness law. In Perlmutter, D. and Rosen, C. (Eds.), *Studies in relational grammar 2*. Chicago: University of Chicago Press, pp. 81-125.
- Pesetsky, D. (1995). *Zero Syntax*. Cambridge, MA: MIT Press.
- Phillips, C. (2003). Linear Order and Constituency. *Linguistic Inquiry* 34: 37-90.
- Piaget, J., and Inhelder, B. (1956). *The child's conception of space*. London: Routledge and Kegan Paul.
- Pollock, J-Y. (1989). Verb Movement, Universal Grammar, and the Structure of IP. *Linguistic Inquiry* 20: 365-424.
- Progovac, L., and Locke, J. (2009). The urge to merge: Ritual insult and the evolution of syntax. *Biolinguistics* 3: 337–354.

- Pulvermüller, F. and Schönle, P.-W. (1993). Behavioral and neuronal changes during treatment of mixed transcortical aphasia. *Cognition* 48: 139-161.
- Pulvermüller, F., and Berthier, M. L. (2008). Aphasia therapy on a neuroscience basis. *Aphasiology* 22: 563-599.
- Pustejovsky, J. (1991). The Syntax of Event Structure. *Cognition*, 41: 47–81.
- Pustejovsky, J. (1995). *The Generative Lexicon*. Cambridge, MA: MIT Press.
- Radford, A. (1990). *Syntactic theory and the acquisition of English syntax*. Malden, MA: Blackwell.
- Rainer, F. and Varela, S. (1992), Compounding in Spanish. *Rivista di linguistica* 4: 117-142.
- Ralli, A. (2008). Compound Markers and Parametric Variation. *STUF – Language typology and universals* 61: 19-38.
- Ramchand, G. (2008). *Verb Meaning and the Lexicon: A First-Phase Syntax*. Cambridge: Cambridge University Press.
- Rapcsak, S.Z., Krupp, L.B., Rubens, A. B., and Reim, J. (1990). Mixed transcortical aphasia without anatomic isolation of the speech area. *Stroke*, 21: 953–956.
- Rappaport, M. and Levin B. (1988). What to do with theta-roles. In Wilkins, W. (Ed.), *Thematic Relations, Syntax and Semantics*, 21. New York: Academic Press, pp. 7-36.
- Real Puigdollers, C. (2010). A microparametric approach on goal of motion constructions: properties of adpositional systems in Romance and Germanic. *Catalan Journal of Linguistics* 9: 125-150.
- Reinhart, T. (1997). Syntactic effects of lexical operations: reflexives and unaccusatives. *OTS Working Papers in Linguistics*, University of Utrecht.
- Reinhart, T. (2000). The Theta system: syntactic realization of verbal concepts. *OTS Working Papers in Linguistics*. University of Utrecht.
- Ricca, D. (2005). Al limite tra sintassi e morfologia: i composti aggettivali V-N nell'italiano contemporaneo, in Grossmann M., and Thornton A.M. (Eds.). *La formazione delle parole*. Roma: Bulzoni, pp. 465-486.
- Rio-Torto, G. and Ribeiro, S. (2009). Compounds in Portuguese. *Lingue e Linguaggio* 8: 271–291.
- Rizzi, L. (1988). Il sintagma preposizionale, in Renzi, L. Salvi, G. and Cardinaletti, A.

- (Eds.), *Grande grammatica italiana di consultazione, vol. II*, Bologna: Il Mulino, pp. 507-534. (3 Vols.)
- Rizzi, L. (1997). The Fine Structure of the Left Periphery. In Haegeman, L. (Ed.), *Elements of Grammar*. Dordrecht: Kluwer, pp. 281-337.
- Rizzi, L. (2001). On the position “Int(errogative)” in the left periphery of the clause. In Cinque, G. and Salvi, G. (Eds.) *Current studies in Italian syntax. Essays offered to Lorenzo Renzi*. Amsterdam: North Holland, pp. 287-296.
- Rizzi, L. (2006). On the form of chains: Criterial positions and ECP effects. In Cheng, L., and Corver, N. (Eds.), *Wh-Movement: Moving on*. Cambridge, MA: MIT Press, pp. 97-133.
- Rizzi, L., and Shlonsky, U. (2007). Strategies of subject extraction. In Gärtner, H-M. and Sauerland, U. (Eds.), *Interfaces + Recursion = Language?* Berlin: Mouton de Gruyter, pp. 115-160.
- Rizzolatti, G., and Arbib, M.A. (1998). Language within our grasp. *Trends in neurosciences* 21: 188-94.
- Rizzolatti, G., and Craighero, L. (2004). The Mirror-Neuron System. *Annual Review of Neuroscience* 27: 169-192.
- Roelof, A. (1992). A spreading activation theory of lemma retrieval in speaking. *Cognition* 42: 107-142.
- Roeper T. (1992). From the initial state to V2: Acquisition principles in action. In J.M. Meisel (Ed.), *The acquisition of verb placement*. Dordrecht: Kluwer, pp. 333-371.
- Rogalski, E. and Mesulam, M-M. (2007). An update on primary progressive aphasia. *Current Neurology and Neuroscience Reports*, 7: 388-92.
- Rohrer, J. D., Ridgway, G. R., Crutch, S. J., Hailstone, J., Goll, J. C., Clarkson, M. J., Mead, S., Beck, J., Mummery, C., Ourselin, S., Warrington, E. K., Rossor, M. N., and Warren, J. D. (2010). Progressive logopenic/phonological aphasia: erosion of the language network. *NeuroImage* 49: 984-993.
- Rohrer, J. D., and Warren, J. D. (2010). Phenomenology and anatomy of abnormal behaviours in primary progressive aphasia. *Journal of the Neurological Sciences* 293: 35-8.

- Rosen, H. J., Alcantar, O., Rothlind, J., Sturm, V., Kramer, J. H., Weiner, M., Miller, B.L. (2010). Neuroanatomical correlates of cognitive self-appraisal in neurodegenerative disease. *Neuroimage* 49: 3358-64.
- Ross, J. R. (1967). Constraints on Variables in Syntax. Ph.D. dissertation, MIT.
- Ross, J. R. (1972). The category squish: Endstation Hauptwort. In Peranteau, P. M., Levi, J. N. and Phares, G. C. (Eds.), *Proceedings of the Eighth Regional Meeting of the Chicago Linguistic Society*. Chicago: Chicago Linguistic Society, University of Chicago, pp. 316–338.
- Rubens, A.B. (1976). Transcortical motor aphasia. In Whitaker, H. and Whitaker, H. (Eds.), *Studies in neurolinguistics*. New York: Academic Press, pp. 293–306.
- Sabel, J. and Saito, M. (Eds.) (2005). *The free word order phenomenon: its syntactic sources and diversity*. Berlin: Mouton de Gruyter.
- Saito, M. (1985). Some Asymmetries in Japanese and their Theoretical Implications, Ph.D. dissertation, MIT.
- Saito, M. (1992). Long-distance scrambling in Japanese. *Journal of East Asian Linguistics* 1: 69–118.
- Sakel, J. (2007). The verbness markers of Mosetén complex predicates. In Wälchli B. and Miestamo, M. (Eds.), *New trends in Typology*. Berlin: Mouton de Gruyter, pp. 315-335.
- Salis, C., and Edwards, S. (2007). The manifestation of agrammatic comprehension in a case of crossed aphasia. *Brain and Language* 103: 37-38.
- Samek-Lodovici, V. (2009). Topic, Focus, and Background in Italian Clauses. In Dufter, A., and Jacob, D. (Eds.), *Focus and Background in Romance Languages* Amsterdam: John Benjamins, pp. 333-357.
- Samiian, V. (1994). The Ezafe construction: some implications for the theory of X-bar Syntax. In Marashi, M. (Ed.), *Persian Studies in North America*. Bethesda, MD: Iranbooks, pp. 17-41.
- Savickienė, I., and Dressler, W. U. (Eds.) (2007). *The acquisition of diminutives. A cross-linguistic perspective*. Amsterdam: John Benjamins.
- Scalise, S. (1984). *Generative morphology*, Dordrecht: Foris.

- Scalise, S. (1992). Compounding in Italian. *Rivista di Linguistica* 4: 175-198.
- Schlücker, B., and Plag, I. (2011). Compound or Phrase? Analogy in Naming. *Lingua* 121: 1539-1551.
- Schoenberg, M. R., and Scott, J. G. (2011). Aphasia Syndromes. In Schoenberg, M. R. and Scott, J. G. (Eds.). *The Little Black Book of Neuropsychology*. Berlin: Springer, pp. 267-292.
- Schultze-Berndt, E. (2006). Taking a closer look at function verbs: lexicon, grammar, or both? In Ameka, F.K., Dench, A., and Evans, N. (Eds.), *Catching Language. The Standing Challenge of Grammar Writing*. Berlin: Mouton de Gruyter, pp. 359-391.
- Scott, G. J. (2002), Stacked Adjectival Modification and the Structure of Nominal Phrases. In Cinque, G. (ed.), *Functional Structures in DP and IP: The Cartography of Syntactic Structures, volume 1*. Oxford: University Press, Oxford, pp. 91-120.
- Sebba, M. (1997). *Contact Languages: Pidgins and Creoles*. London: Macmillan.
- Semenza C., and Zettin M. (1989). Evidence from aphasia for the role of proper names as pure referring expressions. *Nature* 342: 678-679.
- Semenza C., and Mondini S. (2006). Neuropsychology of compound words. In Libben G. and Jarema, G. (Eds.), *The representation and processing of compound words*. Oxford: Oxford University Press, pp. 71-95.
- Semenza, C. (2006). Retrieval pathways for common and proper names. *Cortex* 42 :884-891.
- Semenza, C., Arcara, G., Facchini, S., Meneghello, F., Ferraro, M., Passarini, L., Pilosio, C., Vigato, G., and Mondini, S. (2011a) Reading compounds in neglect dyslexia: the headedness effect. *Neuropsychologia* 49: 3116-3120.
- Semenza, C., De Pellegrin, S., Battel, I., Garzon, M., Meneghello, F. and Chiarelli, V. (2011b). Compounds in different aphasia categories: A study on picture naming, *Journal of Clinical and Experimental Neuropsychology* 33: 1099-1107.
- Semenza, C., Luzzatti, C., and Carabelli, S. (1997). Morphological representation of compound nouns: A study on Italian aphasic patients. *Journal of Neurolinguistics* 10: 33-43.
- Shapiro, K.A., and Caramazza, A. (2003). Grammatical processing of nouns and verbs in

- left frontal cortex? *Neuropsychologia* 41: 1189–1198.
- Shapiro, L.P., Gordon, B., Hack, N., and Killackey, J. (1993). Verb-argument structure processing in complex sentences in Broca's and Wernicke's aphasia. *Brain and Language* 45: 423–447.
- Shapiro, L.P., Zurif, E. B., and Grimshaw, J. (1987). Sentence Processing and the Mental Representation of Verbs. *Cognition*, 27: 219-246.
- Siri, S., Tettamanti, M., Cappa, S. F., Della Rosa, P., Saccuman, C., Scifo, P. and Vigliocco, G. (2008). The Neural Substrate of Naming Events: Effects of processing Demands but not of Grammatical Class. *Cerebral Cortex* 18: 171-177.
- Sonty, S. P., Mesulam, M-M., Weintraub, S., Johnson, N. A., Parrish, T. B. and Gitelman, D. R. (2007). Altered effective connectivity within the language network in primary progressive aphasia. *Journal of Neuroscience* 27: 1334–45.
- Sonty, S. P., Mesulam, M.-M., Thompson, C. K., Johnson, N. A., Weintraub, S., Parrish, T. B. and Gitelman, D. R. (2003). Primary progressive aphasia: PPA and the language network. *Annals of Neurology* 53: 35–49.
- Speedie, L. J., Coslett, B., and Heilman, K. M. (1984). Repetition of affective prosody in mixed transcortical aphasia. *Archives of Neurology*, 41: 268–270.
- Spinnler, H, and Tognoni, G. (1987). *Standardizzazione e taratura italiana di test neuropsicologici*. Milan: Masson.
- Sprenger, S. A. (2003). Fixed expressions and the production of idioms. Ph.D. dissertation. University of Nijmegen. [MPI Series in Psycholinguistics, 21].
- Starke, M. (2004). On the inexistence of specifiers and the nature of heads. In Belletti, A. (Ed.), *The Cartography of Syntactic Structures, vol. 3: Structures and Beyond (Oxford Studies in Comparative Syntax)* New York: Oxford University Press, pp. 252-268.
- Starke, M. (2009). Nanosyntax: A short primer to a new approach to language. *Nordlyd* 36: 1-6.
- Stump, G. (1993). How peculiar is evaluative morphology? *Journal of Linguistics*, 29: 1-36.
- Stump, G. (1993). How peculiar is evaluative morphology? *Journal of Linguistics* 29: 1–36.
- Svenonius, P. (2006). The emergence of axial parts. *Nordlyd* 33: 1-22.
- Svenonius, P. (2007). Adpositions, Particles, and the Arguments they Introduce". In

- Reuland, E., Bhattacharya, T. and Spathas G. (Eds.). *Argument Structure*. Amsterdam: John Benjamins, pp. 63-103.
- Svenonius, P. (2008). "Projections of P". In: Asbury, A. et al. (eds.). *Syntax and Semantics of Spatial P*. Amsterdam: John Benjamins, pp. 63-84.
- Szabolcsi, A. (1992). Subordination: Articles and complementizers. In Kenesei, I. and Pléh, Cs. (Eds.). *Approaches to Hungarian, Vol.4: The structure of Hungarian*. Szeged: JATE, pp. 123-137.
- Takamine, K. (2006). The axial part phrase in Japanese. *Nordlyd*, 33: 78–97.
- Talmy, L. (1975). Semantics and Syntax of Motion. In Kimball, J.P. (Ed.), *Syntax and Semantics*, 4, New York: Academic Press, pp. 181-238.
- Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical form. In Shopen, T. (Ed.), *Grammatical categories and the lexicon*, Vol. 3 of *Language typology and syntactic description*, Cambridge: Cambridge University Press, pp. 57-149.
- Talmy, L. (2000a). *Toward a Cognitive Semantics, vol. I, Concept Structuring Systems*. Cambridge, MA: MIT Press.
- Talmy, L. (2000b). *Toward a Cognitive Semantics, vol. II, Typology and Process in Concept Structuring*. Cambridge, MA: MIT Press.
- Thompson, C. K. (2003). Unaccusative verb production in agrammatic aphasia: The argument structure complexity hypothesis. *Journal of Neurolinguistics* 16: 151–167.
- Thompson, C. K., Lange, K. L., Schneider, S. L., and Shapiro, L. P. (1997). Agrammatic and non-brain-damaged subjects' verb and verb argument structure production. *Aphasiology* 11: 473–490.
- Torrego, E. (1984). On Inversion in Spanish and Some of Its Effects, *Linguistic Inquiry* 15: 103-129.
- Tranel, D., and Kemmerer, D. (2004). Neuroanatomical correlates of locative prepositions. *Cognitive Neuropsychology* 21: 719–749.
- Trueswell, J. C., Tanenhaus, M. K., and Kello, C. (1993). Verb-specific constraints in sentence processing: Separating effects of lexical preference from garden-paths. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 19: 528–553.
- Tyler, L.K., Bright, P., Fletcher, P., and Stamatakis, E.A. (2004). Neural processing of nouns

- and verbs: The role of inflectional morphology. *Neuropsychologia* 42: 512–523.
- Ulatowska, H.K., Sadowska, D. & Kądziaława, D. (2001). A longitudinal study of agrammatism in Polish : A case study. *Journal of Neurolinguistics* 14: 321-336.
- Val Alvaro, J.F. (1999). La composición. In Bosque, I. and Demonte, V. (Eds.), *Gramática descriptiva de la lengua española*, Madrid: Espansa, pp. 4757-5040.
- van Riemsdijk, H. (1990). Functional prepositions. In H. Pinkster, and Gene, I. (Eds.), *Unity in diversity*. Dordrecht: Foris, pp. 229-241.
- Veenstra, T. (1996). *Serial Verbs in Saramaccan: Predication and Creole Genesis*. HIL Dissertations, 17.
- Venezia, J.H. and Hickok, G. (2009). Mirror neurons the motor system and language: From the motor theory to embodied cognition and beyond. *Language and Linguistics Compass*, 3, 1-14.
- Vigliocco, G., Vinson, D. P., Druks, J. Barber, H. and Cappa, S. (2011). Nouns and verbs in the brain: A review of behavioural, electrophysiological, neuropsychological and imaging studies, *Neuroscience and Biobehavioral Reviews* 35: 407-426.
- Vigliocco, G., Warren, J., Siri, S., Arciuli, J., Scott, S., and Wise, R. (2006). The role of semantics and grammatical class in the neural representation of words. *Cerebral Cortex* 16: 1790–1796.
- Visch-Brink, E. G. and Denes, G. (1993). A European base-line test for word-picture processing. In Stachowiak, F.J., Deloche, G., Kaschell, R., Kremin, H., North, P., Pizzamiglio, L., Robertson, I., and Wilson, B. (Eds.), *Developments in the assessment and rehabilitation of brain-damaged patients*. Tubingen: Gunter Narr Verlag, pp. 211-216.
- Vogel, I. and Napoli, D. J. (1995). The Verbal Component in Italian Compounds. In Amastae, J., Goodall, G., Montalbetti, M. and Phinney, M. (eds.), *Contemporary Research in Romance Linguistics*. Amsterdam: John Benjamins, pp. 367-381.
- Warrington, E. K., and McCarthy, R. (1987). Categories of knowledge. *Brain* 110: 1273-1296.
- Webelhuth, G. (1990). Diagnostics for Structure. In Grewendorf, G. and Sternefeld, W. (Eds.), *Scrambling and Barriers*. Amsterdam: John Benjamins, pp. 41-75.
- Wechsler, D.H. (1981). *Wechsler Adult Intelligence Scale-Revised: Manual*. New York:

- Psychological Corporation.
- Wenzlaff, M. and Clahsen, H. (2004). Tense and agreement in German agrammatism, *Brain and Language* 89: 57-68.
- Wenzlaff, M. and Clahsen, H. (2005) Finiteness and verb-second in German agrammatism, *Brain and Language* 92: 33-44.
- Wichmann S. and Wohlgemuth, J. (2008) *Loan verbs in a typological perspective*. In Stolz T., Bakker D. and R. Salas Palomo (eds.), *Aspects of Language Contact*, Berlin, Mouton de Gruyter, pp. 89-121.
- Wierzbicka, A. (1991). *Cross-cultural pragmatics. The semantics of human interaction*. Berlin: Mouton de Gruyter.
- Williams, E. (1981). On the notions 'Lexically Related' and 'Head of a Word'. *Linguistic Inquiry*, 12: 245-274.
- Wilson S., Henry M. L., Besbris, M., Ogar, J. M., Dronkers, N, Jarrold, J., Miller, B. and Gorno-Tempini, M. L. (2010). Connected speech production in three variants of primary progressive aphasia. *Brain* 133: 2069-2088.
- Xu, Y. (2005-2011). *Prosody.Pro.Praat*. Freely available for download at: <http://www.phon.ucl.ac.uk/home/yi/ProsodyPro/>.
- Yankovsky, A.E., and Treves, T.A. (2002). Postictal mixed transcortical aphasia. *Seizure*, 11: 278-279.
- Yarbay Duman, T. and Bastiaanse, R. (2009). Time reference through verb inflection in Turkish agrammatic aphasia. *Brain and Language* 108: 30-39.
- Yarbay Duman, T., Aygen, G., Ozgirgin, N. and Bastiaanse, R. (2007). Object Scrambling and Finiteness in Turkish Agrammatic Production. *Journal of Neurolinguistics* 20: 306-331.
- Zampieri, E., Franco, L., Zannoni, I., and Meneghello, F. (2011). The Interaction among Figure, Ground and Axial Part in a Case of Broca's Aphasia, *Procedia - Social and Behavioral Sciences* 23: 53-54.
- Zubizarreta, M.L. and Oh, E. (2007). *On the Syntactic Composition of Manner and Motion*. Cambridge, MA: MIT Press.
- Zuckerman, S. (2001). *The Acquisition of "Optional" Movement*. Phd dissertation,

University of Groningen.

Zurif, E. B., and Caramazza, A. (1976). Linguistic structures in aphasia: Studies in syntax and semantics. In Whitaker, H. and Whitaker, H. H. (Eds.), *Studies in neurolinguistics (Vol.2)*. New York: Academic Press.

Zwanenburg, Z. (1990) Argument structure in Derivation and Compounding. *Recherches de linguistique française et romane d'Utrecht* 9: 37-42.

Zwarts, J. (2005). Prepositional Aspect and the Algebra of Paths. *Linguistics and Philosophy* 28: 739-779.



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nato a ...Firenze..... (prov. FI ) il 3-4-1976.....  
residente a Firenze..... in Piazza San...Lorenzo..... n. 8  
Matricola (se posseduta) 955605..... Autore della tesi di dottorato dal titolo:  
The lexical/functional divide in Aphasic Production.....  
.....  
.....  
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Studente: Ludovico Franco

Dottorato: Scienze del linguaggio

Ciclo: XXIV

Titolo della tesi: *The lexical/functional divide in Aphasic Production. Five Italian case studies.*

*Estratto:* Questa tesi è strutturata come collezione di studi di caso in linguistica clinica, che hanno tutti come *focus* il rapporto tra lessico e sintassi. In questo lavoro abbiamo mostrato come diverse e poco studiate sindromi afasiche (ad esempio Afasia Lentamente Progressiva Logopenica, Afasia Trascorticale Mista, Afasia Crociata) possano essere cruciali per la verifica sperimentale di approcci correnti in linguistica teorica.

*Abstract:* The thesis is structured as a collection of case studies in clinical linguistics all addressing the relationship between Lexicon and syntax. We have showed that various less-studied aphasic syndromes (e.g. Logopenic Primary Progressive Aphasia, Mixed Trascortical Aphasia, Crossed aphasia), and not only 'classic' Broca's Aphasia can enhance findings worth to be considered in contemporary theoretical debates on the status of *traditional* categories and particularly on the lexical/functional divide in grammar.

