Morphological Variation: Synchrony and Diachrony

MMM11 Online Proceedings

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Foreword

The first Mediterranean Morphology Meeting (MMM) was held in Mytilene, Greece, in 1997. Since then, the conference has been organized biannually in various locations around the Mediterranean. The original founders and organizers were Geert Booij (Leiden University), Angela Ralli (University of Patras), and Sergio Scalise (University of Bologna). As of 2013, organization is in the hands of Jenny Audring (University of Leiden), Nikos Koutsoukos (Université catholique de Louvain / University of Patras) and Francesca Masini (University of Bologna). MMM11 was made possible thanks to the excellent local organizing committee chaired by Marianne Katsoyannou (University of Cyprus).

The aim of MMM is to provide a focused and informal setting for morphologists to present and discuss their work. The single-session setup guarantees maximal interaction between researchers, and gives young linguists the chance to present their work at a conference of moderate size, where fruitful contacts with senior linguists can be established. Eleven meetings — in 1997 (Mytilene, Greece), 1999 (Lija, Malta), 2001 (Barcelona, Spain), 2003 (Catania, Sicily), 2005 (Fréjus, France), 2007 (Ithaca, Greece), 2009 (Nicosia, Cyprus), 2011 (Cagliari, Sardinia), 2013 (Dubrovnik, Croatia), 2015 (Haifa, Israel) and 2017 (Nicosia, Cyprus) — have proven the success of this formula.

In good tradition, this volume continues the MMM Online Proceedings series with a selection of papers presented at MMM11, which took place June 22-25, 2017 in Nicosia (Cyprus). The topic of the conference was "Morphological Variation: Synchrony and Diachrony". Keynote speakers were Franz Rainer (Vienna University of Economics and Business) and Mirjam Fried (Charles University, Prague). The editors of this volume wish to thank the local hosts — the Archaeological Research Unit, University of Cyprus (http://www.ucy.ac.cy/aru/en), and its director, professor Kassianidou Vasiliki — the organizing committee consisting of Marianne Katsoyannou, Charalambos Christodoulou, Foteini Kal, Marilena Karyolemou, and Constantinos Prastitis, all attendants of MMM11, and especially the contributors to these Online Proceedings.

Abstracts

Laurie Bauer: *Metonymy and the semantics of word-formation*

A survey of the role of metonymy in word-formation is provided, with some comments on the implications of this for the theory of word-formation. The particular focus of this paper is on the polysemy of affixes deriving from metonymical interpretation and the use of derivational affixes to mark the necessity for a metonymical reading. The latter point takes up previous discussion in the literature on the validity of treating this as metonymy. The benefits of treating such matters as instances of metonymy rather than as independent patterns of word-formation, and the typological implications of doing so, are canvassed.

Keywords: metonymy, figurative interpretation, derivation, conversion, semantics

Edwige Dugas: *Constraints on the French [*non-*N] construction*

This paper aims at investigating the productivity of the [*non*-N] word-formation pattern in contemporary French (e.g. *non-qualification* 'non-qualification', *non-Italien* 'non-Italian', *non-ville* 'non-city') from a Construction Grammar perspective. On the basis of a corpus built from the nomenclature of the Trésor de la Langue Française informatisé, the Frantext database of literary texts (from 1900 onwards) and the internet/online press via the search engine GlossaNet, I show that the [*non*-N] construction can be considered very productive in contemporary French as it can host almost any noun (subject to semantics and morphological complexity). It is also demonstrated that the high productivity of the [*non*-N] construction is only apparent if we take into account the fact that it actually corresponds to three sub-constructions which have their own "constraints", namely, the semantic properties of the base noun (which often correlate with formal properties) and pragmatic information provided by the context.

Keywords: Construction morphology, prefixation, negation, productivity, French

Angeliki Efthymiou: *A morphosemantic investigation of diminutive verbs in French and Modern Greek*

Driven by a shortage of studies of evaluative verbs from a contrastive perspective, this paper examines French and Modern Greek diminutive verbs with the aim of shedding light on their morphosemantic characteristics. After an overview of the recent literature on evaluative morphology, I present an analysis of the similarities and contrasts between deverbal diminutive verbs in French and Modern Greek. It is shown that there are a lot of similarities between French and Modern Greek evaluative verbs (e.g. both French and Modern Greek verbs express various values, such as attenuation, depreciation, etc.), but at the same time, both French and Modern Greek have their own specific sub-patterns: e.g. the meaning of diminution in Modern Greek is (almost) always expressed by prefixoids and prefixes (e.g. *kutso-vlépo* 'see poorly', *psefto-δjavázo* 'to study half-heartedly'), while French evaluative verbs are mainly formed by means of suffixes (e.g. *boit-iller* 'to limp slightly', *march-otter* 'to walk with difficulty, unsteadily'). It is argued that the asymmetry between the two

languages might be linked to the degree of inflectionality of each language (French considered weakly inflecting vs. Modern Greek considered strongly inflecting language). Furthermore, it is argued that the difference between French and Modern Greek might be related the diversity of evaluative morphological means in Modern Greek, compared to the comparatively fewer ones in French. Finally, it is suggested that the asymmetry between the two languages might be linked to the fact that the derived verbal lexicon in French is rather poor in terms of (non-evaluative) derivational suffixes (e.g. *-iser*, *-ifier*, being the only verbalizing suffixes), while in Modern Greek the derived verbal lexicon is richer (see e.g. *-áro*, *-éno*, *-évo*, *-ízo*, -(*i*)*ázo*, *-óno*: Ralli 2005, Efthymiou 2014).

Keywords: diminutives, verbs, French, Modern Greek

Katrin Hein, Stefan Engelberg: *Morphological variation: the case of productivity in German compound formation*

The paper at hand discusses productivity in German compound formation – as a case of morphological variation – from a lexeme-based synchronic perspective. In particular, we focus on groups of compounds with semantically closely related head words, e.g., compounds denoting colors.

Our approach is characterized by a qualitative as well as a quantitative perspective on productivity. Taking the properties of the head lexeme as a starting point and applying corpus-based statistical methods, we try to gain new insights into compound formation, especially into potential factors which govern their productivity. In a first step, we determine the productivity of compounds on the basis of current productivity measures and data from a large corpus of German. In a second step, we try to systematically explain observable differences in productivity.

The approach presented here is one of the first attempts to apply the concept of productivity, which has been predominantly used in the domain of derivation, to compounding. Since compounding is a dominant factor for the expansion of the German lexicon, we assume that our investigation also sheds an important light on the dynamics of the lexicon.

Keywords: compound formation; morphological productivity; productivity measures; corpus-based statistical methods

M. Silvia Micheli: *Number inflection in AN and NA Italian compounds*

This paper aims at analysing a case of morphological variation in Italian, namely number inflection of two types of Italian compounds: Noun-Adjective (e.g. *rocca*$_{N}$*forte*$_{A}$ ‘stronghold’) and Adjective-Noun (e.g. *mezza*$_{A}$*luna*$_{N}$ ‘half-moon’) compounds. These compounds display both double inflection (e.g. *casse*$_{PL}$*forti*$_{PL}$ ‘safes’, *doppi*$_{PL}$*vetri*$_{PL}$ ‘double glasses’), and external inflection (e.g. *rocca*$_{SG}$*forti*$_{PL}$ ‘strongholds’, *doppio*$_{SG}$*petti*$_{PL}$ ‘double-breasted’). Furthermore, in some cases the same compound shows both kinds of inflection, i.e. ‘overabundance’ (Thornton 2012). The analysis of both quantitative and qualitative data from a corpus of Contemporary Italian (i.e. itWaC) reveals that NA compounds do not show a consistent behavior in number inflection, since they are in general ancient and infrequent forms which originate in syntax and, in some cases, undergo lexicalization. On the other hand, AN compounds represent a morphological pattern mostly consisting of (sometimes still

productive) series which display a transparent internal structure and a strong tendency to double inflection. Moreover, it appears from the examined data that although in most cases each compound seems to need an ad hoc explanation, frequency (especially for NA compounds) and belonging to a series (for AN compounds) can be considered as the most relevant factors for determining inflection.

Keywords: compounding, Italian, overabundance, number inflection

Sabrina Piccinin, Serena Dal Maso, Hélène Giraudo: *Formal variation does not affect morphological processing: evidence from Italian*

Psycholinguistic research on morphological processing has not always provided convergent evidence on the way allomorphic relationships are perceived during lexical access. In the present study we propose to further investigate this issue by focusing on Italian deverbal nominalizations in *-tura* and *-zione* and their relationship with two potential bases of derivations. Results from a masked priming study showed similar facilitation effects when *riparato* 'repaired' and *riparare* 'to repair' were presented as primes for the recognition of the target *riparazione* 'repair'. Similarly, such effects also emerged when targets such as *illusione* 'illusion' were preceded by the transparent form *illuso* 'deluded' and the more opaque *illudere* 'to delude', indicating no significant difference between primes exhibiting non-predictable allomorphy and more transparent ones. Implications for lexical access are discussed and reasons to prefer a word-based semantically informed model are provided.

Keywords: masked priming, morphological processing, allomorphy, Italian

Gergana Popova: *English Compounds with* ing*-form heads*

This paper investigates the properties of compounds with right-hand elements that have the form of present-participles, i.e. *ing*-forms. After a survey of the recent literature on argumental relations in compounds in which the *ing*-form is an event nominalisation, the paper looks at compounds embedded before another noun. Evidence from attested patterns is used to argue that argumental relations in such sequences can be explained via the embedding of different constructions.

Keywords: compounds, participles, constructions

Madeleine Voga, Georgia Nikolaou, Anna Anastassiadis-Symeonidis: *Conceptual salience of prefixes in L2 acquisition and processing: a reading-time study within context*

The paradigmatic dimension of constructed words has led to variables which have been proved to influence morphological (on-line) processing. The study presented here seeks to fill a gap in this domain by considering acquisition and processing of constructed words in Greek L2 with a self-paced reading task combined with a consistency judgment, where the critical stimuli are presented within context (and not isolated). We focus on a variable of conceptual-semantic nature, the conceptual salience of the prefix, which is crossed with semantic transparency for the purposes of the experiment. The variable 'conceptual salience' relates to the uniqueness versus multiplicity of the prefix's meanings, e.g., the prefix *προ-*, as in

προβλέπω ‘foresee’ versus the prefix *επί-*, as in *επίδειξη* ‘demonstration’. Our results show that distinguishing between consistent and inconsistent critical items is made easier for our advanced L2 participants for the salient conditions, both transparent and opaque, while the results are less conclusive amongst participants with a lower level of language proficiency. The data clearly show that the facilitatory effect of the variable ‘conceptual salience’ extends beyond prelexical or perceptual characteristics of the constructed words and underline the need to examine the role of language-specific information in word boundaries.

Keywords: constructed words, L2 Greek, prefix, conceptual salience, consistency judgement

Metonymy and the semantics of word-formation

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1. Introduction

Metonymy tends to get short shrift in traditional linguistics texts. It is seen as the diachronic motivation for the development of new meanings of extant words, such as *hand* to mean 'labourer' (Trask 1996: 44-5; Murphy 2010: 94-5), and this implies that metonymy is one of the origins of polysemy. At the same time, it is recognized that metonymy is ubiquitous in discourse, which makes matters of reference problematic in principle. Thus, for example, *Whitehall* may not refer to the location but to the British government; and a sentence like *It's not very far to where I'm parked* actually refers to the car being parked rather than the person.

This ubiquity is what makes metonymy so important for literary studies, and also what makes metonymy so important in cognitive linguistics, which has moved the study of figures such as metaphor and metonymy to centre stage, albeit as a factor connected with textual comprehension, rather than as a matter primarily concerned with diachronic development of individual words.

In this paper, I want to consider metonymy as a factor in the interpretation of lexical items rather than as a matter of interpretation of texts (though, clearly, the two are linked at some level). Much of the material from cognitive grammar is thus not relevant for the issues I shall deal with. At the same time, so much work on metonymy has been carried out within cognitive frameworks, and so many things that I will bring up have been developed with such frameworks, that it is impossible to be independent of that literature. Much of what I say has, therefore, a background in the cognitive literature, and I think that what I am proposing can be seen as a contribution within a cognitive framework.

2. Defining metonymy

There does not appear to be any generally accepted definition of metonymy, although reference by means of a word which shares "contiguity" or "proximity" with the intended referent is common (see e.g. Kövecses and Radden 1998: 39; Nerlich 2006: 108 (quoting earlier work); Allan 2008: 12). This is, in effect, an old-fashioned view of metonymy, where one word is used by metonymy for another word. More recent views of metonymy see metonymy not in words, or not only in words, but in thoughts and concepts, and across more domains than just language (see esp. Littlemore 2015). Even within the domain of language, it has been argued that all linguistic behavior is metonymical in that it uses words to stand for real-world entities, which are cognitively close (Kövecses and Radden 1998: 42 and references there). Nevertheless, with some reservations, we can use such a definition. It links *the pen* and *the sword* in *The pen is mightier than the sword* with writing and warfare, respectively. It relates *bottle* in *He took to the bottle* to alcoholic drink. It links *the crown* in *minister of the crown* to the sovereign and to the state. All these are classic cases of metonymy. The definition of "contiguity" or "proximity" seems to be slightly different in each of these instances, though, and this leads to questions as to just what is or may be

covered by such labels. This has been answered by authorities such as Kövecses and Radden (1998) by saying that "proximity" holds with an Idealized Cognitive Model (ICM). For those not familiar with this notion, for present purposes it can be read as being similar to a semantic frame, although the two are not identical. So in the ICM of reading a book there is a reader, a thing read, an action of reading, and possibly a time and place of reading (think, for example, of readings from the Bible in church). I will continue to use this notion as a guide to defining "proximity" in instances where obvious physical proximity is not involved.

First, though, there is another objection to such traditional notions of metonymy. This is summarized by Allan (2008: 11) as follows:

> To date, despite a number of studies, there is no widely accepted definition of metonymy which distinguishes it clearly from metaphor, and attempts to clarify the relationship between the two types of mapping have proved inconclusive.

Allan herself (2008: 13) proposes that there is a cline between metaphor and metonymy, each of which is a prototypical category. Another approach might be simply to draw a distinction between literal and non-literal, although even that is difficult to maintain: is *leg* in *table leg* a metaphor, indicating a resemblance to a human or animal leg, or is it a literal use of the word? Speakers might well differ in their interpretation. Since the instances I wish to discuss in this paper are less marginal than the kinds of example which give rise to the theoretical problems, I shall be able to ignore them here. If readers prefer to replace *metonymic* and its congeners with *figurative* and its congeners, nothing will be changed in my argument.

Various authors have tried to provide a list of relationships which fall under the heading of metonymy. It is not clear to me that there is any complete list of potential metonymies that can be provided, nor any unique classification of metonymies. While lists of examples such as those given by Lakoff and Johnson (1980), Kövecses and Radden (1998), Nerlich (2006), Piersman and Geeraerts (2009) and Littlemore (2015) have the positive effect of stressing the wide range of possible patterns of metonymy, and hence the degree to which metonymy is widespread in human language, I do not believe that they delimit metonymy or act as a typology for metonymies, and I refer readers who are interested to these other works. What it is worth saying is that there is a wide range of patterns of metonymy discussed in the literature, from the fairly concrete CONTENTS FOR CONTAINER (*The milk tipped over*) to more abstract types such as MANNER FOR ACTION (*He tiptoed through the hall*), and INSTRUMENT FOR AGENT (*The knife sliced easily through the cheese*).

3. Some preliminaries about word-formation

3.1 Morphemes and Humboldt's universal

In this paper, I assume a morphemic approach to the creation of new words by affixation. The notion of morpheme may not be of similar value in discussion of conversion, the shift from one part of speech to another without any overt marking, such as *the land* > *to land*, *to whisk* > *a whisk*, a construction that I shall also consider.

In some quarters (e.g. Anttila 1989: 181) there is an implication that the expected relationship between meaning and form in morphology as in syntax is one-to-one. Some scholars refer to this as Humboldt's universal (Vennemann 1972). A sentence like *The cats lie in the sun* seems to support such an analysis: each of the morphs corresponds to a single meaning, and on a morphemic level, each of those meanings regularly corresponds to that form. But such an ideal is far from general. Any instances of synonymy, homonymy or polysemy break with Humboldt's universal, and all these categories are widespread. Consider synonymy: the two sentences in (1) could both be used under the same set of circumstances,

and if one is true, the other cannot be false, even if *freedom* and *liberty* are not always mutually replaceable in sentences, as is illustrated in (2).

(1) a. The prisoners were demanding their liberty.
b. The prisoners were demanding their freedom.

(2) a. We believe in the freedom of the press.
b. We believe in the liberty of the press.
c. He's taking a liberty!
d. *He's taking a freedom.

Cricket ('a sport' or 'an insect') associates the same form with distinct meanings, and again breaches Humboldt's universal.

Head in *My head is aching* and in *The head of the bed* again associates the same form with distinct meanings, although in this case the meanings are related to each other by metonymy (the entity is used to denote the typical location of the entity).

Instances of allomorphy can be analysed as equivalent to instances of synonymy (and in a true Item and Arrangement grammar might have to be so analysed). Both take different forms and associate them with the same meaning. So /s/ and /z/ and /ən/ can all mean 'plural' in appropriate contexts.

In other words, both in syntax and morphology (or lexis and morphology, if you prefer), Humboldt's universal is at the very best a rough tendency, even if it appears to function as a principle driving children's acquisition of language (Clark 1993).

3.2 Metonymy in word-formation

In earlier papers, I have argued that metonymy plays a large part in word-formation, echoing developments within cognitive linguistics and, I hope, developing on what has been said there. In Bauer (2016) I argue that so-called exocentric compounds like *black-shirt, egg head, spoilsport* are all cases of figurative readings rather than special kinds of compound. Instances like *black-shirt* and *egg head*, traditionally known as bahuvrihi compounds, are interpreted through synecdoche, which many authorities view as a sub-type of metonymy, cases like *spoilsport* are metonymic in a wider sense (the agent is named by reference to the action). In Bauer (i.p.) I argue the case that all instances of conversion are also instances of figurative interpretation. *A whisk* from *to whisk* is naming the instrument after the action, again a form of metonymy.

Neither of these claims is novel (see Bauer 2016 for references on exocentric compounds, and Kövecses and Radden 1998 on conversion), except insofar as they claim that such interpretations are general and that they imply that there is no need to claim that specific patterns of word-formation are involved in the coinage of such innovations. If we can already explain such formations as figurative interpretations, specifically as cases of metonymy, there is no need to have sets of word-formation processes which are established precisely to provide a set of explanations for the very same forms. This is a simple application of Ockham's razor. Such instances show benefit to the study of word-formation by reducing the amount of material that has to be explained and/or generated by whatever module of the grammar deals with word-formation.

4. The development of polysemy

Just what polysemy encompasses is notoriously controversial. It is perhaps uncontroversial to say that polysemy is a claim about the semantics of an individual lexical item (as opposed to homonymy, which deals with two or more lexical items), but just where the borderline between lexical items runs is not necessarily unambiguous. Allan (1986: 149-55) makes it part of the definition that polysemic senses but not homonymic senses can be readily derived from a single underlying meaning, and are contextually dependent. It is not clear to me that such a definition automatically includes figurative extensions or excludes changes between items of different parts of speech (such as *dust* and *to dust*), which both Allan (1986: 153) and I (Bauer et al. 2013: 9) would wish to class as instances of homonymy. However, rather than try to specify more closely just where the boundaries of polysemy go – a task whose futility is amply exemplified in the literature – I shall simply say that I take figurative extension in general to give rise to polysemy.

I make the general assumption, following from Humboldt's universal, that polysemy is not something which is inherently present, but something which develops. That is, I assume that linguistic items begin as monosemous, and become polysemous with usage (even though polysemy may also be lost, leading to monosemy: see Campbell 2013: 233). Urban (2015: 379) suggests that meanings develop from a prototypical meaning to less prototypical meanings, with the prototypical meaning remaining stable.

If this is the case, then we should expect to find monosemous affixes and polysemous affixes. Monosemous affixes are, in practice, rather rare, but I suggest that at least the following English affixes are monosemous,

- *-(i)ana*, as in *Victoriana*, *Nixoniana*, *cricketana*, *tobacciana* (Bauer et al 2013: 252). The meaning can be glossed as 'collection of materials associated with ~'.
- *cis-* as in *cis-alpine*, *cis-lunar*. The prefix is extremely rare, and means 'closer to the speaker than the noun implicit in the base'.
- *step-*, as in *stepfather*, *stepson*, *step-cousin*, *step-grandmother* (see the OED). The meaning can be glossed as 'related not by birth but by law', though Bauer et al. (2013: 244) cite occasional deviations such as *step-dog* and *step-car*, which are certainly rather less prototypical, but can still all fit under a gloss of 'acquired through marriage'.
- *tera-*, as in *terabyte*, *terawatt* meaning '10^{12}'. There is a series of such prefixes (see Bauer et al. 2013: 427), with similarly technical meanings.
- *über-* (sometimes written as *ueber-* or *uber-*) as in *überbitch*, *übersensitive*. This is a new prefix (omitted in the discussions in Bauer et al. 2013) which means 'to an excessive degree'.

Typically, these affixes are rare (both in terms of types and tokens) or new or technical.

5. Introducing polysemy in derivation as metonymy

Consider the suffix *-ation* in English which produces nominalizations of verbs. We can perhaps take the expected reading of this affix to be something like 'the event of performing the action of the verb', so that a typical use of *-ation* would be that illustrated in (3).

(3) The teacher's demonstration of downstep met with great approval

However, *-ation* is used in words which denote result, product, instrument, location, agent, measure, path, patient, and state (Bauer et al. 2013: 209-12), as in the examples in (4).

(4) a. The operation was a great success.
b. The concoction combines gin, cherry brandy, grenadine and other ingredients.
c. We used the children's drawings as decoration.
d. Most of them had moved off the reservation.
e. The administration intervened in the outcome.
f. The deceleration can cause shock and concussion.
g. The continuation of the line passes through the circumference of the circle at point B.
h. Submissions must be received by 5pm on the 22nd.
i. His preoccupation with death is a worrying development.

Many of these relations fall under the notion of proximity within the ICM, as discussed in section 2. More fundamentally we would have to say that all of the person who undertakes the action, the person or thing on whom or on which the action is undertaken, the location of the action, the instrument with which the action is undertaken, the result or outcome of the action, and so on are in close (physical or mental) proximity to the action itself, and that using one for the other falls within the definition of metonymy.

As a rather more complex example of an affix which is generally held to be polysemous, consider *-er* in words like *killer, lover, mixer, retriever*, and so on. Typically, perhaps prototypically, this affix denotes a human agent (Stockwell and Minkova 2001: 196; Hamawand 2011: 126). But even the short list of examples above shows that the suffix has more meanings than that. Precisely how many meanings should be associated with *-er* is unclear, but we can distinguish at least those listed below. Hamawand (2011: 126-7) sees rather more categories, as do Ryder (1999) and Panther and Thornburg (2002); the first three de-nominal categories could be merged.

De-verbal nouns:
Human agent (a distinction can be drawn between agents, habitual agents and professional agents): *baker, driver, killer*
Non-human agent: *retriever, scorcher, warbler*
Experiencer: *beholder, smeller*
Patient: *boiler* ('boiling fowl'), *keeper* ('person or thing worthy of being kept')
Instrument: *amplifier, lighter, mixer*
Location: *diner, sleeper*
Garment: *slipper, sneaker, sweater*

De-nominal nouns:
Practitioner: *astrologer, photographer*
Professional working with ~: *hatter, miller, thatcher*
Musician: *drummer, harper, trumpeter*
Person from: *Aucklander, Icelander, New Yorker*
Male: *widower*

Nouns from other categories:
Adjective: *teetotaller*
Number: *oncer, forty-niner, tenner*
Preposition: *downer, outsider, upper*
Phrase: *all-nighter, do-gooder, out-of-towner*

Most of these semantic types fall easily into instances of metonymy. 'Male' as in *widower*, is perhaps an exception, but even then, in traditional terms people who are widowed have to be either male or female, and the male has long been seen as the marked member of the pair, the one less likely to be left alive (though perinatal mortality may have had a strong influence in the other direction). The case for metonymic processes being involved in most of these meanings is made in great detail by Panther and Thornburg (2002), and it is perhaps not necessary to reproduce their solid argumentation.

There are two ways of looking at this. Some authorities (e.g. Basilio 2009, Littlemore 2015: 66) see the metonymy as holding between the base and the affix: a teacher is an agent closely related to the action of teaching. Others (e.g. Panther and Thornburg 2002) see the metonymy as holding between the various meanings of the affix (the agent in *teacher* is related by metonymy to the instrument in *amplifier*). Without denying the first of these links, which I will consider later in this paper, I wish to align myself with the second, and say that the polysemy of the affix is (largely) determined by metonymic interpretations of the central, prototypical meaning of that affix.

Having said that, I should also like to leave open the possibility that sometimes the metonymy affects the whole word and not just the affix. Consider, for example the word *sleeper* in the sense 'tie' on a railway line. The etymology of this usage is not entirely clear, but if it arises because railway sleepers look like people sleeping between the lines (which is not what the OED implies), I would consider this a metaphor affecting the whole word *sleeper*, and not just another meaning of *-er*. *Diner* in the sense of 'location where one eats' could arise by metonymy from *diner* 'a person who eats', rather than a separate meaning of *-er*. The distinction between whole-word figurative interpretation and affixal figurative interpretation is something that needs further investigation, but I shall not attempt to deal with it here.

6. Developing the notion of affixal polysemy as deriving from metonymy

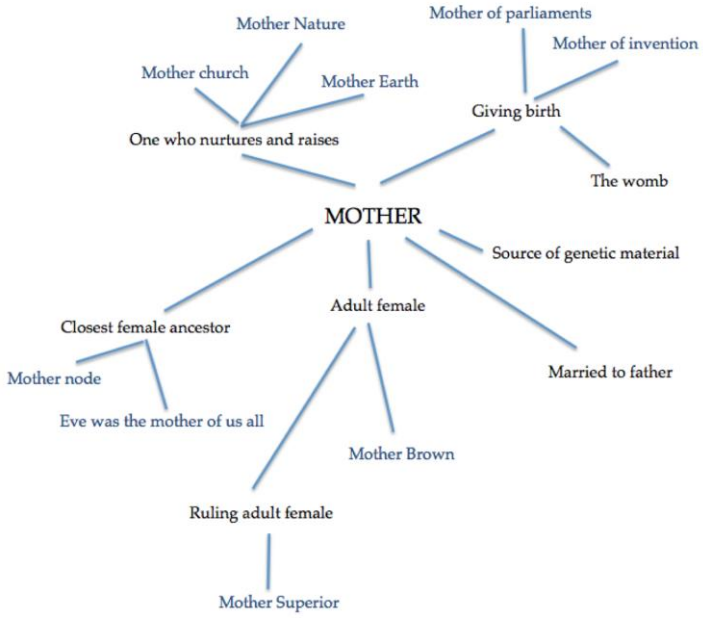
Once we have accepted the notion that the polysemy associated with affixes can be derived by figurative interpretation of that affix, and specifically by metonymy, a number of questions arise. The first question is the extent to which such derivation is preordained and unavoidable. A second question is whether the derivation of such polysemy follows predictable paths. And a third question is whether all affixal polysemy is metonymic. In this section I consider each of these questions.

6.1 The necessity of polysemy

The very fact that examples of monosemic affixation could be given (above, section 4) indicates that affixes need not develop polysemy, or at least have the possibility of a period of usage in which they are not polysemic. It may well be the case that frequent usage of a particular affix inevitably leads to polysemy, but even that is drawn into question by inflectional affixation. The third person singular present tense *-s* in English verb-forms such as *condemns, hospitalizes, invalidates* and so on retains a single (though complex) meaning. In other instances, whether or not something is considered polysemous may depend on the granularity of the semantic analysis. For example, though the prefix *un-* may be taken to indicate negativeness in *unbandaged, uncommon, undo, unearth, unperson,* and thus be monosemous, it is equally possible to see different types of negation in these various examples (contrary, gradable, reversative, privative, category-denying respectively; see Bauer et al. 2013: 364ff), so that the prefix is polysemous.

What we seem to have here is something analogous to radial polysemy (see, e.g., Fig 1) for the development of affixal meaning, but with the rider that the polysemy arises through cognitive processes driven by the interpretation of figurative usage. This has been argued for *-ation* and *-er* here, but Jurafsky's (1996) model of the semantics of diminutives seems to me to fit well into the same general model, although that is presented as universal rather than language-specific.

Figure 1: An example of radial polysemy outside word-formation



6.2 The predictability of polysemic developmental paths

Alongside the development of polysemy in *-ation*, we can consider the development of *-age*; alongside the polysemy in *-er*, we can consider the polysemy in *-ist*. In any of these cases, we find rather different paths of development of polysemy, either in terms of the distance travelled, or in terms of the direction taken.

The suffix *-age* on a verbal base can denote an event as in *carriage of goods, spillage*, an instrument in *carriage and pair*, a location as in *storage*, a result as in *cleavage*, a measure as in *shrinkage*, a patient as in *appendage, spoilage*, or sum of money as in *moorage, weighage*. Although there is a large amount of overlap between the meanings for *-ation* given above and the meanings for *-age*, there is not complete identity, with at least the sum of money meaning being peculiar to *-age*, and the agent meaning apparently missing. This implies that different suffixes may develop their polysemy to different degrees, and that they make take (slightly) different pathways.

The suffix *-ist*, like *-er*, creates nouns from verbs (*copyist*) or from other nouns, and some of the semantic categories of *-ist* formations are very similar to the *-er* categories outlines above. For example, alongside *trumpeter, drummer* and *harper*, we find *violinist, trombonist* and *harpist*, with both suffixes being used for practitioners of the relevant instrument. On the other hand, there is a set of words like *ageist, racist, sexist* which do not have any counterparts in *-er*, and there are no *-ist* formations for locations like *sleeper, diner*, or for instruments like *washer-drier, amplifier*. The suffix *-ist* attaches primarily to nouns, while *-er* attaches prototypically to verbs; both are used to denote humans closely related with the base

in some way, but the development of the polysemy is different, both in the degree of polysemy that has developed and in the path along which the polysemy has evolved.

Both of these instances indicate that even if we can predict that the polysemy of affixes will develop according to patterns of metonymy (and see immediately below for some amendment to this), we cannot predict how far the polysemy will develop for a given affix, nor a particular path of development of the metonymy. In this context, though, I should note that while predictability is important for many linguists, it is not necessarily as important within cognitive linguistics, where motivation rather than prediction has been the main focus (L. Janda, p.c.). I accept the motivational aspect willingly, but feel that prediction is also important, especially in typological contexts.

6.3 Is all affixal polysemy metonymic?

If it is the case, as suggested above, that there is a cline between metonymy and metaphor such that it can be difficult to tell where one ends and the other begins, we would expect to find the development of affixal polysemy by metonymy complemented by the development of affixal polysemy by metaphor. And there are such cases. Consider, for instance, the suffix *-itis*, whose literal meaning may be taken to be 'inflammation' as in *arthritis, laryngitis* (although the use of *larynx* as the base in the latter case is itself a case of metonymy, since it is the adjacent membrane which is inflamed rather than the cartilage of the larynx itself). In less formal usage as in *Mondayitis*, *electionitis*, it denotes, in the words of the OED, "a state of mind or tendency fancifully regarded as a disease"; in other words, there is a metaphor here, reaction to Mondays or elections being seen as like a disease. Panther and Thornburg (2002: 288) see the use of the suffix *-er* in *hoofer* 'dancer' as metaphorical, in the sense that it compares people with animals. I suspect that it is the whole word that is interpreted by metaphor here, rather than the suffix, but am happy to accept that there may be words with *-er* (and other affixes) whose interpretation arises though metaphor.

7. Typological implications

It has been argued above that the meaning of affixes tends to start from a prototypical meaning, and diversify from that via a network of figurative (especially metonymic) readings, to show a range of polysemous meanings. It has also been argued that even where the same path of metonymies is followed, different affixes do not necessarily proceed to develop the relevant polysemy to the same extent, nor, indeed, to develop polysemy in the same direction.

If this behavior is repeated across languages (as we would expect), we can expect to find polysemous affixes gaining meaning in the same kind of way. We cannot, however, expect the same prototypical meaning in an affix to develop precisely the same metonymic readings in different languages. This is, in effect, what is reported in Bauer (2013), where markers that are used for nouns marking location are considered in detail, and are shown to have different prototypical meanings and different ranges of meaning.

Consider by way of illustration agentive affixation in a small number of languages. In Maori, the agentive prefix *kai-* is added to transitive verbs to form a noun denoting a human agent, as in *kai-koorero* AGT-speak 'speaker, orator' (W. Bauer 1993: 514). Bauer specifically notes that such formations do not produce instrument nouns.

In Finnish, the suffix *-ri* can denote an agent, an instrument or a location (Hakulinen 1957, cited in Luschützky and Rainer 2013: 1308), although Karlsson (1983) notes it as being only used to mark agents, and Sulkula and Karjalainen (1992) note it as being use both for agents and for instruments. This seems to suggest that it is used most widely for agents, then for instruments and least widely for locations.

In German, *-er* can mark agents (*Lehrer* ‘teacher’, *Raucher* ‘smoker’), instruments (*Bohrer* ‘driller = drill’, *Kühler* ‘cooler = radiator’), and processes (*Schluchzer* ‘sobber = sob’) (Fleischer and Barz 2007:152-4).

In just these three languages we see that although the extension of meaning in the suffix can be described as metonymical, affixes can be monosemous and when they do extend their meaning, they do not necessarily extend along the same path. Whether there are a limited number of possible paths, or default metonymies, as suggested by some scholars (Kövecses and Radden 1998: 63) is something that would require far more study to determine.

One difficulty here is that it may not be clear what is eliminated under this theory. Kövecses and Radden (1998: 40), reflecting the cognitive literature on the subject, talk about metonymy occurring where there is an idealized cognitive model (ICM) of a situation or event, and items are close to each other in that model. Given that idea, metonymy could in principle spread to anything else involved in the ICM. Note that the model is idealized, so it deals only with the necessities, not the possibilities. Thus although we might have an agent dealing with a collection of items connected to that agent, that is unlikely to be within a single ICM, and we must predict that we are unlikely to find a language where the equivalent of English *-er* and the equivalent of English *-iana* have the same form and that formal marker is viewed as polysemous. Similarly, the same polysemous marker is unlikely to mark both a collective and a diminutive.

To some extent there is danger of circularity here. One of the reasons that most linguists consider the *-er* in *killer* and the *-er* in *colder* to be homophonous but distinct morphemes is the lack of common meaning. Similar examples abound, especially in languages where the phonological inventory of affixes is relatively limited (as it is in English inflection, at least). Consider the examples in (5) below.

(5)

absolute**ly**	friend**ly**
arriv**al**	person**al**
cat**s**	designate**s**
cord**s**	toward**s**
cup**ful**	hope**ful**
dog**s**	Deb**s**
ineligible	**in**lay
leng**th**	nineteen**th**
skinn**y**	synonym**y**

In the examples in (5), there is extra evidence in the form of the word-class of the base, the word-class of the output, the potentiation of subsequent affixation, the range of allomorphs shown by the affix. In principle, though, meaning alone would suffice to set up distinct affixes as opposed to one polysemous affix. Despite this potential problem, I do not see this as being a great practical difficulty, and I think that the notion that the diachronic expansion of affixal meaning is due to figurative readings of the original meaning of the affix (and that polysemy of affixes is thus due to figurative readings) does allow some typological prediction.

To sum up, we can say that semantic change affecting affixes is predictable to the extent that it follows patterns of metonymy or other figurative usage, but is unpredictable in the sense that the particular metonymy, the path through the semantic maze of potential metonymies, is dependent upon the perceptions and cultural expectations of speakers, and not available for external evaluation.

8. Extending the domain of metonymy

Thus far, I have argued that the polysemy of derivational affixes, to the extent that it is driven by figurative interpretations, is predictable, and if it is predictable, it does not need independent semantic apparatus to support it. Furthermore, this has implications for typology. But this is not the only claim made in the literature about metonymy in the literature. Several authors, but most especially Janda (2011), in a very carefully argued paper, see the semantic relationship between base and derivative as being ruled by metonymy, as well. This has turned out to be a controversial claim within cognitive linguistics, with Brdar and Brdar-Szabó (2014) arguing that this particular step devalues the notion of metonymy, leading to an overuse of the term (see Janda 2014 for a rebuttal).

Let us return for a moment to the major claim above that the extension of meaning in the polysemy of derivation is brought about by figurative extension (including, notably, metonymy). Brdar and Brdar-Szabó (2014: 318) agree that such a position "would make sense". Thus the agentive reading of *-ation* in *The deceleration can cause shock* (see (4f) above) is (or it would make sense to view it as) metonymy. Specifically, it is a case of the ACTION FOR AGENT metonymy. Another example of the ACTION FOR AGENT metonymy is found in the English noun *cook*, derived from the verb *to cook* by conversion. As was mentioned in section 3.2, many cognitive linguists accept conversion as an expression of metonymy. The action of cooking and the person who performs the cooking are both found within the same ICM, and the meaning is extended from the action to the agent. However, for Brdar and Brdar-Szabó (2014) the relationship between *bake* and *baker* is not a case of metonymy (while for Janda, it is). The difference between *to cook* and *a cook* on the one hand and *to bake* and *a baker* on the other is that there is an overt marker of the changed status within the lexeme *baker*, but not in *a cook* (where the overt marker of the change of status falls earlier in the DP). Brdar and Brdar-Szabó (2014: 334) justify this by saying that "metonymy is a paradigmatic operation", while the addition of a suffix is a syntagmatic operation. Even this is a controversial statement. For many scholars (perhaps most recently Kastovsky 2005), there is a suffix in *cook*, it is just a zero-suffix. For such scholars, conversion and affixation are not different in this regard. But even if this view is rejected (and I personally would reject it), there is still an objection. *Cook* the verb and *cook* the noun are not members of the same paradigm: they take different inflectional paradigms and are thus separate lexemes. Therefore, it is not clear why the relationship between conversion pairs should be considered to be metonymic, since they fail the requirement on metonymy set by Brdar and Brdar-Szabo. I foresee two possible counter-arguments. The first is that the two lexemes *cook* are identical at some deeper level, and it is this deeper level which is required for the metonymy to work. There is a problem with this, however, in that Chomsky (1970), who introduces just such a deeper level, believes that *criticize* and *criticism* are also identical at this deeper level and so fails to distinguish between conversion and affixation as well. The second possible counter-argument is that metonymy does not hold at the level of the lexeme, but at the level of the stem. However, the stem is just an overt representation of the lexeme: it so happens that in English the stem is usually homophonous with the citation form of the lexeme, while in more highly inflecting languages, some inflection has to be added to the stem to give the citation form of the lexeme. This is not significant: neither the stem nor the lexeme of the noun *cook* is in a paradigmatic relationship with the relevant part of the verb *cook*.

At this point, there are two possibilities. Either we accept that conversion is a matter of metonymy, and then allow suffixation also to be a matter of metonymy, parallel with conversion. Or we deny that conversion is metonymy at all, because derivational affixation is not metonymy and conversion is parallel to derivational affixation. In other words, either

Brdar and Brdar-Szabó (2014) are wrong, or all the people who have claimed conversion as metonymy are wrong (including Cetnarova n.d., Dirven 1999, Schönefeld 2005). As someone who has argued that there are independent grounds for seeing conversion as being metonymical (Bauer i.p.), I tend towards Janda's position of seeing derivation as producing instances of metonymy.

However, we need to consider the argument put by Brdar and Brdar-Szabó (2014: 322) that reversative negative *un-* (as in *uncover, undo, undress, unwind*) cannot be metonymical because it cannot be the case that "one state of affairs stands metonymically for its opposite". There are at least two possible responses. The first is to accept the point, and say that clearly not all derivational morphology is metonymic, but this does not deny that much of it is. The other is to argue that negation may, indeed, be metonymic. Such an argument would have to run as follows. In the ICM for undressing, we find the action of undressing, the actor in the action (which could be the same as the person who is dressed or could be someone different, a *dresser*), the person who is undressed, a location (which might be a changing room, a bedroom, or just a *dresser*), and possibly a destination for the cast-off clothing. But implicit in the notion of undressing is the notion that the person being undressed was first dressed: we cannot have the undressing without the dressing. This means that although the event of dressing and of undressing are not simultaneous, or even necessarily proximate, it is nevertheless the case that the two must be closely linked in thought, and that this link is made overt by having a reversative prefix, so that the base of dressing is present in the description of undressing.

If we accept such a position, then we run into one of Brdar and Brdar-Szabó's (2014: 314) greatest problems, that calling this (and the examples Janda uses) "metonymy" "would lead to an unconstrained use of the notion of 'metonymy', rendering it virtually vacuous". The line of argumentation on one level seems odd: metonymy is "almost as ubiquitous as metaphor" (Brdar and Brdar-Szabó 2014: 316; personally, I would have though more so), so because of its ubiquity we must limit it and make it less ubiquitous. Of course, it is open to any scholar to define metonymy in a way which allows for a greater or more constrained use of the term, but the definitions that are widespread in the literature do seem to allow for the relatively "unconstrained" reading of metonymy, and Janda is not at fault for using those definitions. Any more constrained definition has to be proposed and argued for.

Whatever we may believe about that, let us take Janda's position seriously for the moment. If Janda is right, then what derivation does, in principle, is provide overt marking of metonymy. Where affixes are monosemic, it tells listeners precisely what metonym to consider; where affixes are polysemic, it tells listeners that a metonymical interpretation is required, and leaves it to the listener's experience with the affix and pragmatic inferencing to determine precisely which metonymy is involved. If this is the case, then the fact, if it is one, that such a use of metonymy is relatively unconstrained is counterbalanced by the fact that it is overtly marked, and points the listener in the right direction for an interpretation.

9. Conclusion

In this paper, I have listed some of the ways in which metonymy is being seen as interacting with word-formation in the domain of cognitive linguistics, and I hope that I have made some minor contribution to the discussion. In the case of bahuvrihi compounds, Ockham's razor leads us to find this analysis convincing since it does away with the need of a classification of compounds as endocentric and exocentric: the distinction is already covered by figurative readings. In the case of conversion, Ockham's razor again does away with the need for a category of conversion, because the process is already covered by metonymy. In the case of the diversification of meanings of affixes, an analysis based on figurative extension constrains

the possible development of the meanings of affixes. It is not clear to what extent paths of meaning development are constrained, at the moment it looks as though they may not be, which has implications for the kinds of question we can ask in morphological typology. If affixation is the overt marking of metonymy (or, more widely, of figurative reading), then we again have constraints on affixation – always remembering that what fits into the relevant ICM is partly determined by culture and not purely by linguistic factors. This again has implications for the kinds of question we can reasonably ask in a morphological typology. The benefits in these last two cases are that we do not have to have explicit semantics for all readings of all affixes: we may need a prototypical reading, we may not even require that much. In other words, the recognition of figurative usage is making the grammar simpler.

Having said that, there may well be some interaction between lexicalization and figurative interpretation, since if the *-er* suffix in a particular form gets lexicalized with an agentive or instrumental meaning, that meaning may be passed down to subsequent derivatives. This is not, I think, an objection to the notion of metonymy in word-formation, but may require further consideration.

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Constraints on the French [*non*-N] construction

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1. Introduction

In contemporary French, the prefix *non-* can attach to nouns to form nouns ([*non*-N]) with a negative meaning, such as *non-qualification* 'non-qualification', *non-Italien* 'non-Italian', and *non-ville* 'non-city':

(1) Une **non-qualification** serait un cataclysme pour l'équipe de France, qui a disputé tous les Mondiaux depuis 1997.
'A non-qualification would be a disaster for the French team, which played all World Cups since 1997.'

(2) Pour un **non-Italien**, la cuisine italienne se résume à des plats classiques comme la pizza napoletana, les pâtes à la bolognaise ou un délicieux Tiramisu.
'For a non-Italian, the epicentre of Italian cuisine comes down to classic dishes such as pizza napoletana, pasta bolognese or a delicious tiramisu.'

(3) Sarcelles c'est l'archétype de la **non-ville**, le chef d'œuvre de l'aberration urbanistique.
'Sarcelles epitomizes the non-city, the masterpiece of urban aberration.'

[*Non*-N]s are morphological constructions where *non-* is a prefix (cf. Dugas 2016a for a discussion on the status of [*non*-N]s in French).

The goal of morphology is the study of the relationship between meaning and form in lexical items and how speakers make use of this relationship. One important question when investigating the characteristics of a morphological construction is that of the degree of productivity of this construction. Morphological productivity is a tricky issue and it can be defined several ways (cf. Bauer 2001 and references therein). In this paper, I assume that productivity (i) concerns patterns (i.e. schematic or semi-schematic constructions), not words, (ii) is, as most linguistic phenomena, a matter of degree and (iii) must be observed for a particular period of time. A construction is productive to the extent to which it leads to new coinages during a particular period of time (cf. Bauer 2001: 41).

This paper aims at investigating the productivity of the construction [*non*-N] in contemporary French (20th and 21st centuries). I am not interested in the *profitability* of the [*non*-N] pattern, but in its *availability* (Corbin 1987; Plag 1999; Bauer 2001). This preference for a qualitative approach to productivity explains why the corpus for this study consists of *types*, that is, different instances of the [*non*-N] construction. The paper, I hope, provides possible answers to the following questions: why do speakers coin new [*non*-N]s? How do speakers understand a [*non*-N] form they have never encountered before? Is the [*non*-N] pattern able to host any noun, and if not, why? Are these restrictions due to phonological, and/or semantic factors?

I will show that the construction [*non*-N] can be considered very productive in contemporary French as it can host almost any noun (subject to semantics and morphological complexity), but that the high productivity of the [*non*-N] construction is only apparent if we take into

account the fact that it actually corresponds to three sub-constructions which have their own "constraints", namely, the semantic properties of the base noun (which often correlate with formal properties) and pragmatic information provided by the context.

The paper is organized as follows. In the next section, I present the theoretical background, the data and the methodology of this study. Section 3 describes the productivity of the general [*non*-N] pattern, compared with other French negative morphological patterns. In section 4, I show that the three [*non*-N] sub-constructions (ontological, classifying and qualifying) display varying degrees of productivity. Section 5 sums up the results presented in the paper and offers perspectives for further research.

2. Theoretical background, data and methodology

2.1 Construction morphology

In a Construction Grammar sense (Fillmore et al. 1988; Croft 2001; Goldberg 2006; Booij 2010), a construction is a conventionalized and entrenched symbolic pairing of form, meaning and/or discursive function. A construction is a node in the constructicon, the network of constructions of the language (Jurafsky 1992). Constructions can be substantive (e.g. *non-violence*), schematic (e.g. [prefix-N]) or semi-schematic (e.g. [*non*-N]). Schematic and semi-schematic constructions "specify the predictible properties of classes of complex lexical items" and "how similar new words can be coined" (Booij & Hüning 2014: 589). As mentioned above, productivity must be measured on the level of schematic or semi-schematic constructions. Two constructions can be different with respect to meaning, or form, or both (*contra* Traugott & Trousdale 2013, for example): for example, two patterns which have the same morphosyntactic structure, but different semantics, qualify as two distinct constructions. I believe also that the meaning of a construction should not be restricted to semantics, but should include pragmatic information.

2.2 Data

I assume that type frequency is a good proxy for productivity. Moreover, its role in lexical prediction has been emphasized in the literature (Chapman & Skousen 2005) as well as the link between type frequency and entrenchment (Bybee 1985; Langacker 1987). The [*non*-N]s that make up the corpus come from three different sources reflecting different genres and registers: the nomenclature of the dictionary *Trésor de la Langue Française* informatisé (*TLF*i), the Frantext database of literary texts (from 1900 onwards) and the internet/online press, via the search engine GlossaNet. Table 1 indicates the number of types for each sub-corpus and the total number of types after doublets or triplets (instances of the same type in different sub-corpora) have been removed.[1]

Table 1: Number of [*non*-N]s (types)

	***TLF*i**	**Frantext**	**Internet/Online press**	**Total[2]**
Types	174	798	267	978

[1] What is called a *type* here is a [*non*-N] with a given base noun and a given interpretation. As mentioned later, some base nouns may appear in different [*non*-N]s. So, for example, a classifying [*non*-N] and a qualifying [*non*-N] with the same base noun each have a separate entry in the corpus.

[2] There are instances which can be found in two or three subcorpora ("doublets or triplets"), and which therefore have been deleted. This explains the total we get.

2.3 Annotation of the base nouns

The base noun (bN) of each [*non*-N] has been annotated for morphological complexity and semantics. The bNs were grouped into ten morphological categories:

- Deverbal nouns: nouns with the suffixes *-ade, -age, -ance/-ence, -ée, -ment, -ion, -ure* (*qualification* 'qualification'), or nouns derived by verb-noun conversion (*désir* 'desire');
- Deadjectival nouns: nouns with the suffixes *-ité, -eur, -esse, -ise, -ice, -ion, -erie, -itude, -ance/ -ence* (*tristesse* 'sadness'), or nouns derived by adjective-noun conversion (*le malade* 'the patient');
- Denominal nouns: nouns with the suffixes *-ade, -age, -ance, -aille, -at, -ier, -ure* (*candidature* 'candidacy');
- Nouns related to pronouns (*moi* 'self');
- Nouns related to infinitives (*être* 'being');
- Nouns related to past or present participles (*admis* 'admitted', *combattant* 'combatant');
- Nominal compounds (*auteur-compositeur* 'composer-songwriter');
- Polylexical nouns (*roman policier* 'police novel');
- Simplex nouns (*oiseau* 'bird'*)*;
- Proper nouns (*Kadhafi* 'Kadhafi', *Protocole de Kyoto* 'Kyoto agreement').

Some nouns could not be classified: (a) nouns with the suffixes *-isme* or *-iste*, (b) nouns such as *calcul* 'calculation' or *oubli* 'oblivion', for which the orientation of the verb-noun conversion is difficult to determine (Tribout 2010), (c) nouns in *-ance* or *-ence* (*concordance* 'concordance'*, équivalence* 'equivalence') for which one cannot decide whether they come from a verb or from an adjective (Dal & Namer 2010).

Concerning the semantics of the bNs, the following six classes have been distinguished, on the basis of tests proposed in the literature (Van de Velde 1995, 2006; Haas et al. 2008; Koehl 2009; Haas & Huyghe 2010):

- Artefacts (*chaussure* 'shoe', *livre* 'book');
- Natural entities (*oiseau* 'bird', soleil 'sun');
- Human beings (*journaliste* 'journalist', *juif* 'Jew');
- Events (*guerre* 'war', *communication* 'communication');
- Properties (*tristesse* 'sadness', *amour* 'love');
- Abstractions (*l'être* 'the being, *la beauté* 'the beauty').

Proper nouns constitute one of the ten morphological categories listed above, but they are also a separate semantic class, given that their denotation is different from that of common nouns (Kleiber 1981; Flaux 1991; Flaux & Van de Velde 2000).

Semantic annotation has been done using the meaning of the bN in its context of use (more precisely, in the context of use of the [*non*-N]). It is thus possible for a [*non*-N] to appear twice in the corpus. For example, *admissible* 'eligible' in *non admissible* 'ineligible' is classified as a human being in (4) and as an abstraction in (5):

(4) dans le même couloir, […] il y a les Trois Mousquetaires qui font passer les **non-admissibles**, pour une session de rattrapage.
'in the same corridor, […] the Three Musketeers are administering a compensatory session of tests to the **ineligible**'

(5) c'est important que cela se passe avant l'entrée en maternelle, […] avant que l'enfant soit pris dans l'admissible et le **non-admissible** par la société.
'it is important that it happens before kindergarten, […] before the child gets caught in the eligible and the **ineligible** of society'

In section 3.3, I give more details about the most frequent base nouns in the corpus.

3. A very productive pattern?

3.1 State of the art: productivity of [*non*-N] and other negative prefixation patterns

What stands out from the literature on [*non*-N]s is the relatively high productivity of the pattern, especially when compared to the other negative prefixation patterns of contemporary French. Most authors consider that the [*non*-N] pattern does not impose any (semantic, phonological) constraints on its bN. Di Sciullo and Tremblay (1993) nonetheless argue that *non-* cannot attach to pronouns or proper nouns (**le non-il* 'the non-he', **le non-Paul* 'the non-Paul'). These authors also consider that *non-* "works well" with nouns denoting events (e.g. *non-destruction, non-production*).

Yet the literature on French [*non*-N]s is scarce and a look at English [*non*-N]s may be useful. Here as well, it seems that any noun can enter the [*non*-N] construction. As in French, however, the construction has a preference for nouns denoting events, or, which is something which has not been noted for French, human beings. According to Jespersen (1917), "*non* is chiefly used with action-nouns; but it is also frequent with agent-nouns, such as *non-combatant, non-belligerent, non-communicant, non-conductor*" (Jespersen 1917: 147). We will see in section 3.2 to what extent this observation is borne out.

I would like to stress that there is a significant discrepancy between the descriptions of [*non*-N]s in grammars and in linguistics papers (this discrepancy is actually frequently observed). On the one hand, grammars give the impression that [*non*-N]s are a very marginal phenomenon and that the number of [*non*-N] types and tokens is too small (or too high? Or maybe are [*non*-N]s not seen as lexical units?) to be worthy of linguistic analysis. On the other hand, linguists consider that the [*non*-N] pattern is very productive as it does not impose any constraints on its bN. Evidence for this high degree of productivity is the fact that only a few [*non*-N]s are listed in dictionaries (Jespersen 1917; Zimmer 1964; Kalik 1971).

For example, Kalik (1971: 140) writes that "one could ask whether, in principle, words in *non-* should be listed in dictionaries. Their number is almost infinite". Kalik's observation echoes Zimmer's (1964) who, before him, had underlined the productivity of [*non*-X]s: "a listing of semantically transparent attested forms (which in any case is in practice bound to be incomplete) is hardly less futile than an attempt to count the drops in a pool during a rainstorm. Moreover, it has to some extent the effect of obscuring the fact that the process is synchronically productive" (Zimmer 1964: 32).

I wish to add here that most work on words in *non-* concerns adjectives (e.g. *non violent* 'non-violent', *non remboursable* 'non-refundable') and that, when nominal bases are studied, it is together with adjectival bases, whereas they correspond to two distinct constructions with specific characteristics (Dugas 2016a). It is therefore difficult to say whether the high productivity of *non-* words, which is assumed in the literature, apply equally to [*non*-N]s and to [*non*-Adj]s.

When it comes to forming negative nouns with nominal bases, *non-* prefixation has no real competitors in contemporary French. A number of prefixes also attach to nouns to form negative nouns: *a-, anti-, dés/dis-, in-, mal-, mé(s)-* (a. o. Staaff 1928; Guilbert 1971; Thiele 1987; Béchade 1992; Cartoni 2008; Amiot & Montermini 2009). The patterns [*dés/dis*-N], [*mal*-N] and [*mé(s)*-N] are

not productive today: they are not used to coin new negative nouns anymore. The [*a*-N] pattern forms nouns with a meaning of privation or absence, as in *anormalité* 'abnormality', *apesanteur* 'weightlessness', but it is different from the [*non*-N] pattern in several respects.

Among other things, there is very little overlap between the bases of the [*non*-N] pattern and the bases of the [*a*-N] pattern, notably because most [*a*-N] bases come from Latin or Greek and most [*a*-N]s belong to specialized languages. The [*anti*-N] pattern forms nouns with a meaning of opposition: symmetrical opposition (e.g. *anti-Liban* 'anti-Lebanon mountains'), adversative opposition (e.g. *anti-limaces* 'slug pellet'), contrary opposition (e.g. *anti-héros* 'antihero'). As we will see, [*non*-N] words lack this opposition flavor and the [*anti*-N] pattern cannot, therefore, be seen as a competitor of the [*non*-N] pattern either.

We are left with *in*- prefixation, which, semantically speaking, is very similar to *non*- prefixation as it expresses negation without the privation/opposition flavour which is displayed by the aforementioned prefixation patterns. However, *in*- prefixation mainly forms adjectives (e.g. *immangeable* 'inedible', *impossible* 'impossible'); the few attested *in*- nouns are older than *non*- nouns and it seems that today no or very few new *in*- nouns are coined: the pattern [*in*-N] cannot be said to be productive, or at least not as productive as the [*non*-N] pattern.[3]

3.2 Data: a very productive pattern?

When we look at the [*non*-N]s gathered for the corpus, it seems that any noun can enter this construction, but that some nouns are more likely to be prefixed by *non*- than others. Compared to other negative prefixation patterns and, in particular, to *in*- prefixation, the [*non*-N] construction is not very demanding regarding the noun it hosts:

(i) Semantics: all types of "referents" can be found: artefacts, natural entities, human beings, events, properties, abstract entities, even proper nouns;
(ii) Derivational history of the base: simple and derived lexemes, affixed lexemes as well as compounds, non finite verbs and pronouns converted into nouns, etc.
(iii) Phonology: there are apparently no phonological constraints, unlike the [*in*-N] construction for example (*in*- has several allomorphs, whereas *non*- has no allomorphs).

Yet as summarized in table 2, some bases are more frequent than others. In the corpus, the most (type-)frequent bases are deverbal nouns (28%), deadjectival nouns (24%), simplex nouns (21%) and nouns related to participles (10%). Most bases denote events (34%), human beings (25%) and abstractions (22%) – which is partly consistent with Di Sciullo and Tremblay's (1993) intuitions and Jespersen's (1917) for English.

Table 2: Morphosyntactic and semantic properties of the bases

Morphosyntactic properties of the bN	% of types[4]
deverbal	28.4%
deadjectival	24.1%
simple	21.5%

Semantic properties of the bN	% of types
event	34%
human being	25.3%
abstraction	22.7%

[3] For example, the *TLF*i lists 148 [*non*-N]s and only 41 [*in*-N]s; furthermore, most bNs of my corpus are not acceptable when prefixed by *in*-.
[4] As mentioned in the paper, some nouns could not be classified, which is why the total is not 100%.

participial	10.5%
polylexical	4.2%
non-finite verb	2.2%
compound	0.9%
pronoun	0.5%
denominal	0.3%
proper noun	0.3%

property	12.17%
artefact	3.2%
natural entity	1.7%
proper noun	0.3%

In a study where the 59, 334 nouns listed in the *Trésor de la Langue Française* informatisé have been automatically prefixed by *non-* and the derived [*non*-N] lexemes were/have been searched on Google, it has been shown that 25% of the *non-* nouns had no attestation (Dugas 2016b). Some bases are too infrequent to be prefixed by *non-,* because either they belong to a very specialized language, or they are dialectal, or their referent does not exist anymore (e.g. *aberrographe* (type of camera)*, gouttier* (kind of gutter), *grisoumètre* ('firedamp detector')). But other [*non*-N]s are not attested, athough there bases are not altogether infrequent (e.g. *non africanisme* 'non-Africanism', *non multicoque* 'non-multihull', *non orangeraie* 'non-orangerie'), so the question remains why they are not attested with the prefix *non-*.

4. Three different sub-constructions with their own constraints

4.1 Three interpretations

I have described above how the bNs have been annotated. Another important task has been to annotate the meaning of the [*non*-N]s: three different interpretations have been identified, which I call *ontological, classifying* and *qualifying*.

A closer examination of the [*non*-N]s of the corpus reveals that there is not only one, but three [*non*-N] patterns that differ in meaning and, to a certain extent, in form. The examples given at the outset of the paper are repeated here. In (6), the [*non*-N] refers to the absence of an entity; in (7), it refers to a class of entities and in (8), it assigns a lack of stereotypical properties to an entity:

(6) Une **non-qualification** serait un cataclysme pour l'équipe de France, qui a disputé tous les Mondiaux depuis 1997.
'A non-qualification would be a disaster for the French team, which played all World Cups since 1997.'

(7) Pour un **non-Italien**, la cuisine italienne se résume à des plats classiques comme la pizza napoletana, les pâtes à la bolognaise ou un délicieux Tiramisu.
'For a non-Italian, the epicentre of Italian cuisine comes down to classic dishes such as pizza napoletana, pasta bolognese or a delicious tiramisu.'

(8) Sarcelles c'est l'archétype de la **non-ville**, le chef d'œuvre de l'aberration urbanistique.
'Sarcelles epitomizes the non-city, the masterpiece of urban aberration.'

Constructions such as (6) will be called *ontological* [*non*-N]s, whereas (7) is an instance of *classifying* [*non*-N] and (8) an instance of *qualifying* [*non*-N]. Tests have been designed to determine the interpretation of each [*non*-N], and are summarized below.

(i) Ontological [*non*-N]s refer to something which did not happen or which is not present, in a context where its occurrence or its presence was expected:

- The [*non*-N] refers to the absence of the referent of the bN;
- The [*non*-N] and its base are in a semantic relation of contradiction (for more details on this notion, which traces back to Aristotle, see Horn 1989, and Schapansky 2002, 2010 for French).

(ii) Classifying [*non*-N]s have a categorizing function; they divide a set of entities and create two classifying sets which are construed as sub-classes (or sub-sets):

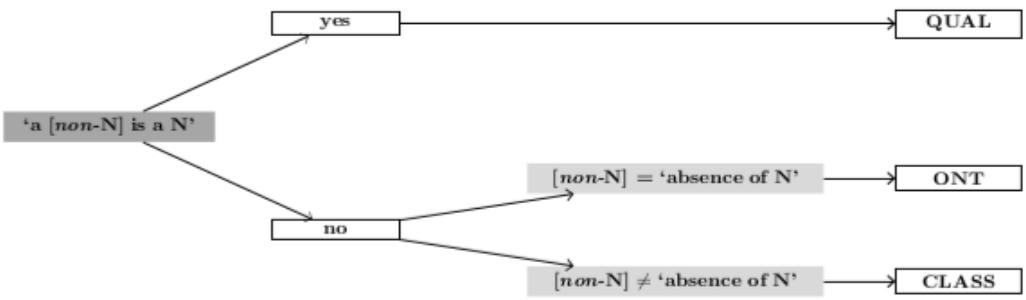
- The [*non*-N] refers to a class of entities which is complementary to the class of entities the bN refers to;
- The [*non*-N] and its base are in a semantic relation of contradiction.

(iii) Qualifying reading:

- The [*non*-N] refers to an entity which is the same entity as what is referred to by the bN;
- The referent of the [*non*-N] possesses the classifying, non-stereotypical properties of the referent of the bN, but not the stereotypical properties: for example, the non-city in (3) is a city;
- The [*non*-N] conveys a negative evaluation and is metalinguistic, since the speaker calls into question the assertability of 'the [*non*-N] is a N'.

As shown in figure 1, two tests allow us to distinguish between the three interpretations: (i) the test 'a [*non*-N] is an N' works with the qualifying interpretation only; (ii) the test 'the absence of N' works with the ontological interpretation, but not with the classifying interpretation.

Figure 1: Interpretation of the [*non*-N]s: decision tree



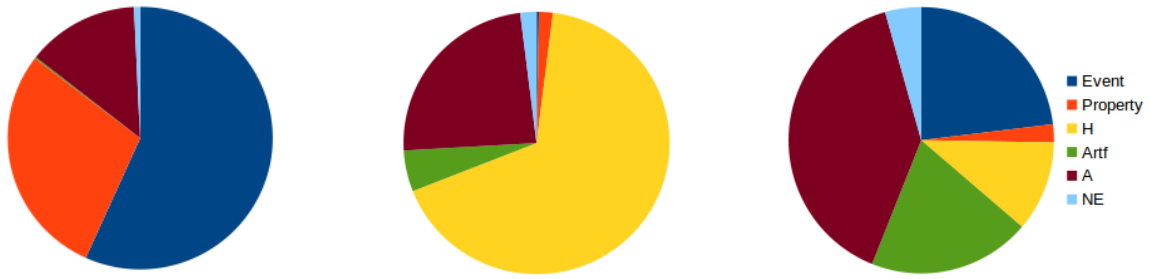
In the corpus, 73% of the [*non*-N]s have an ontological reading, 23% a classifying reading and only 4% a qualifying reading. This suggests that the three types of [*non*-N]s do not have the same productivity.

4.2 Different types of bases, varying degrees of productivity

In section 3.2, I showed that the [*non*-N] construction is very productive, but in section 4.1 we saw that it is more accurate to speak of three [*non*-N] constructions and thus to examine the productivity of each of these constructions separately. The analysis of the corpus suggests that some nouns are linked to a particular derived meaning (ontological, classifying, qualifying) with a very high probability: derived meanings collocate with particular base nouns.

Figure 2 shows the distribution of the different types of bNs according to the three interpretations. The ontological interpretation is mostly found with bases denoting events (*non-qualification* 'non-qualification', *non-mise à jour* 'non-update', *non-remboursement* 'non-refund', *non-guerre* 'non-war') and properties (*non-patriotisme* 'non-patriotism', *non-conformité* 'non-conformity'). The classifying interpretation is mostly found with bases denoting human beings (*non-Italien* 'non-Italian', *non-gréviste* 'non-striker', *non-magicien* 'non-magician') and abstractions (mostly adjectives used as nouns, e.g. *(le) non-intelligible* '(the) non-intelligible', *(le) non-sérieux* '(the) non-serious'). The qualifying interpretation does not exhibit a clear preference for a semantic type of base, although it seems that it is found mostly with bases denoting abstractions (*non-réponse* 'non-answer', *non-rapport* 'non-relation').

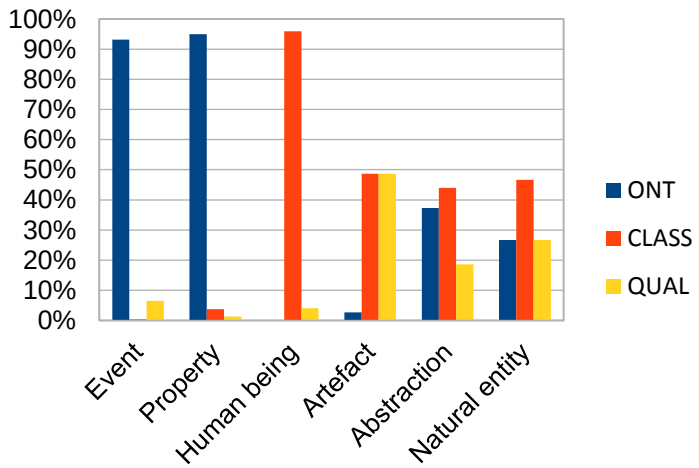
Figure 2: Semantic types of base nouns in [*non*-N]s
(events, properties, human beings, artefacts, abstractions, natural entities)



Ontological Classifying Qualifying

Similarly, figure 3 shows that nouns do not yield any interpretation equally when they are used in a [*non*-N]. This is most obvious in the case of nouns denoting events and properties, which in the vast majority of cases yield the ontological interpretation, and nouns denoting human beings, which yield the classifying interpretation.

Figure 3: Interpretation of the [*non*-N] according to base noun semantic type



These data suggest that ontological, classifying and qualifying [*non*-N]s do not put the same constraints on their bN and that it is not the case that any noun can enter any [*non*-N] construction. Yet it is not obvious why some bases are very rare in certain [*non*-N]s:

(i) Ontological interpretation: in syntax, the construction [*il n'y a pas de* + N] 'there is no/there isn't any' allows us to refer to the absence of any kind of entity (events, but also human beings, artefacts, etc.). So why, for example, are there almost no ontological [non-N]s with a bN refering to a human being? A hypothesis would be that these bNs are very frequent in classifying [non-N]s and that there is a division of labour between the two interpretations, as it were. Yet this does not explain why ontological [non-N]s do not work well with bNs denoting artefacts.

(ii) Classifying interpretation: the preference for bNs denoting human beings may be due to the fact that we tend to refer to human beings through the group(s) they belong to. Complementary [*non*-N]s are a very handy way of categorizing people. The lack of bNs refering to events can be explained by the fact that these bNs are very frequent in ontological [*non*-N]s.

(iii) That qualifying [*non*-N]s do not show a clear preference for a type of bN is not suprising, given that these [*non*-N]s, as said in section 4.1, are evaluative and metalinguistic. Any noun can enter this construction as soon as it is endowed with enough stereotypical properties by the speaker.

Not only the type of bNs, but also the context plays an important role in the interpretation of the [*non*-N]. The constraints described above are better described as *probabilities* for a bN to yield a given interpretation (or as probabilities of a given [*non*-N] to have a particular base noun). As a matter of fact, pragmatic information provided by the context can at least partially override the constraint on the semantic properties of the bN. For example, bNs denoting events usually yield ontological [*non*-N]s, but they can also yield a classifying (9) or a qualifying (10) [*non*-N]:

(9) Certaines langues […] utilisent un auxiliaire "faire" pour souligner la réalité (affirmation) ou la non réalité (négation) de ce qu'on asserte, ainsi présenté comme relevant du faire ou du **non-faire**.
'Certain languages […] use the auxiliary "to do" to emphasize the reality (assertion) or non reality (negation) of what is asserted, which is presented as pertaining to the do or the **not-do**.'

(10) Le simple fait d'aller voter n'implique pas du tout comme conséquence la mise en place de la démocratie. Malheureusement […], **non-élections** et non-informations sont manipulées et payées par les multinationales qui ne sont pas démocratiques, mais libérales. (www)
'The mere fact of voting does not necessarily imply the setting up of democracy. Unfortunately […], **non-elections** and non-information are manipulated and paid for by multinational companies which are not democratic, but liberal.'

Similarly, although bNs denoting artefacts are most likely to yield classifying or qualifying [non-N]s, they can also, although very rarely, yield ontological [non-N]s, such as in (11):

(11) [Je conseille quand même le "tu veux un coup de main" alors qu'il ne reste rien à faire hormis poser son cul pour passer à table. Ce qui prend donc la signification suivante dans la citerne de gaz qui sert de tête à Madame : "mais il se fout de ma gueule, à arriver après la bataille, avec son sourire provocateur, en plus ?", là où]
Monsieur pensait sincèrement que mettre le **non-pain** sur la table (normal, personne veut aller en acheter avec ce mistral, sans compter que Monsieur a terminé sa nuit en début d'après midi, boulange à sec de stock de Campagnette, donc), rendrait service à tout le monde. (www)
'Mister sincerely believed that putting the **non-bread** on the table (well, no one wants to go and buy some with such a strong wind, besides, Mister woke up in the afternoon, so the bakery has no baguette anymore) would be helpful to everyone.'

Finally, the role of the context is particularly obvious in the case of qualifying [non-N]s (as in 8): the same qualifying [non-N]s can have several meanings, depending on the stereotypical properties which are involved. For example, the noun *femme* 'woman' can be associated with different properties as illustrated in (12) and (13):

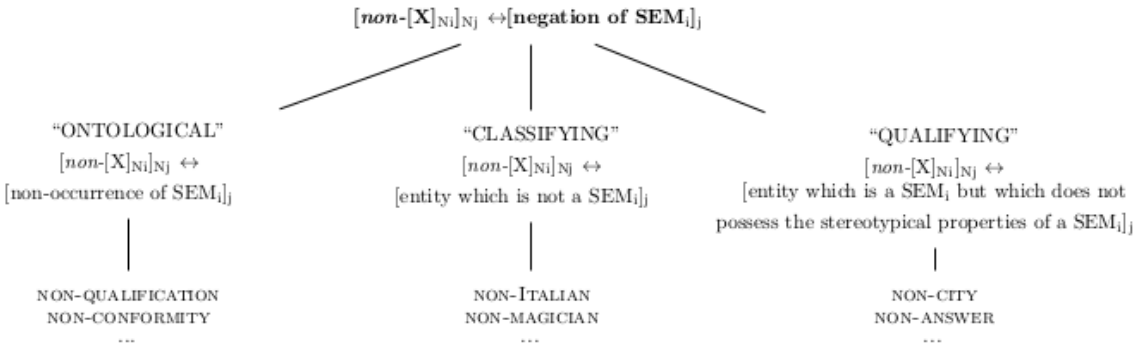
(12) Je suis petite, menue, je ne me maquille pas, je ne porte pas de jupe ni de talons. […] Mais est-ce que ça fait de moi une **non-femme** ? (www)
'I am small and thin, I don't wear make-up, I don't wear skirts or high heels. Does that make me a **non-woman**?'
(13) Je suis dingue de plantations. Les fleurs, par contre, bof, je m'en fiche ! Serais-je une **non-femme** ? (www)
'I am fond of plants. But flowers, I don't care about them. Am I a **non-woman**?

So, [*non*-N]s also nicely illustrate the role played by context in the meaning of morphological constructions; context is part and parcel of the productivity of [non-N]s.

5. Conclusion

In this paper, I have shown that the French negative construction [*non*-N] corresponds to three constructions with a more specific negative meaning and certain constraints on their bases. This network of constructions is represented in figure 4.

Figure 4: Constructional network of [*non*-N]s



Given that it is not entirely possible to predict the interpretation of a [*non*-N] from the semantics of its base, the three subconstructions have the same form [*non*-[X]N]N, with no specification as to the type of noun entering the construction. I have shown, however, how it is possible for

a speaker to understand and to use a [*non*-N] with the correct meaning; the type of base combined with information provided by the context provide the cues to decode a given [*non*-N] construction.

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A morphosemantic investigation of diminutive verbs in French and Modern Greek

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1. Introduction

Diminutive verbs are not a widespread linguistic phenomenon as opposed to their nominal and adjectival counterparts (Grandi 2009: 47). As a consequence, most works dealing with evaluation have focused on nominal and adjectival evaluatives, whereas verbal evaluatives have not been sufficiently explored across languages (cf. Greenberg 2010; Grandi 2009; Tovena & Kihm 2008; Katunar 2013; Amiot & Stosic 2014; Weidhaas & Schmid 2015; Efthymiou 2017, among others). Moreover, even in languages in which diminutive verbs display a high degree of productivity (as in Italian, French or Modern Greek), the semantic phenomena and constraints regulating their derivation are far less homogeneous than those of nominal and adjectival evaluatives (Kiefer & Németh 2015: 232). Driven by a shortage of studies on evaluative verbs, this paper examines French and Modern Greek diminutive verbs with the aim of shedding light on their morphosemantic characteristics. This choice is motivated first by the fact that French and Modern Greek are known for their rich evaluative morphology (cf. Fradin & Montermini 2009; Melissaropoulou 2015), and second by the availability of studies presenting comparable data from this language (cf. Amiot & Stosic 2014 for French; Efthymiou 2017 for Modern Greek). The paper is organized as follow: the next section presents the main properties of affixal evaluative morphology and discusses the basic characteristics of verbal diminutives, section 3 offers a brief description of diminutive verbs in French, while section 4 focuses on the description of diminutive verbs in Modern Greek. In section 5, I present an analysis of the similarities and contrasts between deverbal diminutive verbs in French and Modern Greek.

2. Evaluative morphology

Evaluative morphology is a subfield of derivational morphology that forms lexemes expressing some deviation from the "norm" or "standard" denoted by the base. It covers a range of processes (affixation, compounding, reduplication, etc.) which enable to build lexemes whose meaning consists in an evaluation (diminution, augmentation, pejoration, intensification, etc.) with respect to the base lexeme (cf. Scalise 1984; Stump 1993; Dressler & Merlini Barbaresi 1994; Jurafsky 1996; Bauer 1997; Grandi 2005, 2009; Fradin & Montermini 2009; Körtvélyessy 2014, among others):

Modern Greek
(1) *spit-áci* 'little house' (*spíti* 'house')
(2) *kata-kócinos*'totally red' (*kócinos*'red')
(3) *spitar-ón(a)* 'big house' (*spíti* 'house')
(4) *pext-ár(a)* 'great player' (*péxtis* 'player')

Italian
(5) *burro burro* 'butter, butter, real butter'
(6) *govern-icchio* 'very bad government' (*governo* 'government')

2.1 The basic characteristics of affixal evaluative morphology

The basic characteristics of evaluative morphemes include, among others, the following:

(i) They change the semantics of the base by expressing some deviation from its normal or standard meaning:

(7) a. Modern Greek *para-cimáme* 'to oversleep'
b. Modern Greek *ipo-apasxólisi* 'underemployment'

(ii) They form lexemes which belong to the same lexical category as their base:

(8) a. Modern Greek *kutso-vlépo* 'to see poorly' (*vlépo* 'to see')
b. Italian *casina* 'little house' (*casa* 'house')

(iii) The same evaluative morpheme can take as input more than one lexical category:

(9) a. French *gentill-et* 'sweetie, pleasant enough' (*gentil*$_{\text{Adj}}$ 'kind')
b. French *vol-et-er*'to flutter' (*voler*$_{\text{V}}$ 'to fly')
c. Modern Greek *psilo-ðagóno* 'to bite slightly' (*ðagóno*$_{\text{V}}$ 'to bite)
d. Modern Greek *psilo-kócinos* 'reddish' (*kócinos* $_{\text{Adj}}$ 'reddish')

(iv) They can often function as free variants, hence it is possible to find examples where these morphemes are interchangeable:

(10) a. Modern Greek *kutso-vlépo* 'to see poorly'
b. Modern Greek *psilo-vlépo* 'to see a bit'
c. Modern Greek *miso-vlépo* 'to see but not well'

(v) They allow recursive application:

(11) French *super-mega-génial* 'super-mega-great'

(vi) Their meaning frequently contains a quantitative and a qualitative dimension, which co-occur:

(12) Italian *sorelli-na* 'dear little sister'

2.2 The semantics of evaluative morphology

In this contribution, the cognitive model proposed by Körtvélyessy (2015) will be adopted. In short, according to Körtvélyessy's approach, the key issue of evaluative morphology is the capacity of a language to express morphologically the meaning of "less than/more than the standard quantity", with the concept of standard quantity being a relative one. The reference point, i.e., the standard or default value, is anchored to the fundamental cognitive categories SUBSTANCE (human beings, material objects, etc.), ACTION (processes, states, etc.), QUALITY (properties, features, etc.), and CIRCUMSTANCE (location, time, manner of action, etc.). By

implication, the specific value of standard quantity and any deviations from it may bear on the quantity of both physical and abstract objects, the quantity of actions, processes and events, the quantity of quality and features, and the quantity of particular circumstances. This establishes four basic categories of evaluative morphology: the Quantity of Substance, the Quantity of Action, the Quantity of Quality, and the Quantity of Circumstance. These cognitive categories may be expressed by nouns, verbs, adjectives, adverbs, and also pronouns (cf. also Körtvélyessy 2014: 305).

More specifically, the process of evaluation starts from extra-linguistic reality. The point of departure is a need of the speech community to evaluate an object. This need is reflected on the cognitive level. At this level, quantification is implemented by means of the basic cognitive categories (Quantity of Substance, Quantity of Action, Quantity of Quality, and Quantity of Circumstance).

Based on the metaphorical shifts SMALL IS CUTE and BIG IS NASTY, if there is a need for qualitative evaluation, the quantitative evaluation can shift to a qualitative one, e.g. pejorative, ameliorative, etc. At the level of the language system, cognitive categories are expressed by semantic categories like diminutive, augmentative, pejorative, ameliorative, pluractionality, attenuation, intensification, Aktionsart, etc.

Concrete realization of these semantic categories takes place by means of markers of evaluative morphology. A particular evaluative meaning may be implemented within two different cognitive categories, such as attenuation, which can take the form of a reduced QUALITY (see example in 9), as well as reduced ACTION (see example in 10).The output leaves the level of *langue* (language) and enters the level of *parole* (speech), where it can obtain various additional shades of emotive colouring, depending on the specific context, e.g. admiration, contempt, etc. (cf. also Körtvélyessy 2014: 305 ff.).

(13) English *reddish*
(14) Slovak *skacka* 'to perform very small jumps'

2.3 Diminutive verbs

Verbal evaluatives are cross-linguistically less diffused than nominal and adjectival evaluative constructions. Moreover, even in languages in which evaluative verbs display a high degree of productivity (as in Italian, French or Modern Greek), the semantic phenomena regulating their derivation are far from being homogeneous (Grandi 2009: 47). According to Kiefer and Németh (2015: 232) the lack of homogeneous semantic behavior is to a considerable extend connected with the fact that verbal evaluatives are always embedded in the aspect and Aktionsart system of a particular language.

Diminutive verbs show a wide variety of meanings. They do not only indicate deviation from the default value denoted by the base, but can also express a range of meanings such as the attitude of the speaker, mitigation, emotional involvement, etc. In addition to these "prototypical" and expected values, deverbal evaluatives express other values, such as pluractionality (i.e. verbal action performed several times, by several people, etc.), action performed with less effort than expected, etc. (see among others Cusic 1981; Dressler & Merlini Barbaresi 1994; Grandi 2005, 2009; Fradin & Montermini 2009; Katunar 2013; Amiot & Stosic 2014; Weidhaas & Schmid 2015; Efthymiou 2017):

(15) Italian *sonn-ecchiare* 'to sleep lightly, to snooze'
(16) Italian *dorm-icchiare* 'sleep poorly'
(17) French *mord-iller* 'to nibble'
(18) French *nage-oter* 'to swim poorly, a little'

(19) Modern Greek *psefto-ðjavázo* ‘to study half-heartedly, from time to time’
(20) Modern Greek *kutso-tróo* ‘to eat slowly, from time to time’.

As can be seen from the examples 15-20, in diminutive verbs, it is obviously difficult to discriminate between a purely descriptive (or quantitative) interpretation (e.g. ‘action performed in a way which is different from the manner it is usually carried out’) and a qualitative (or connotative) interpretation, capable of expressing the feelings of the speaker (e.g. ‘action perceived to be performed slowly, with less effort than expected, etc.’). These examples do not only show that the same evaluative verb may express more than one semantic value, but also reveal the tight link between evaluation and pluractionality. For example, the Modern Greek verb *kutso-tróo* ‘to eat slowly, from time to time’ conveys both qualitative evaluation and pluractionality. There is increase in frequency and decrease in one or more other dimensions (for similar remarks about Italian, cf. Tovena 2011: 43). To put it in other words, the repetition decreases the size or importance of the units of the action (Cusic 1981: 81-82).

This deviation from the norm (or the standard/default performance of the action), due to internal pluralization (i.e. fragmentation) of the action is what semantically justifies the use of evaluative morphemes to describe such situations in many languages (cf. Stosic 2013: 74; Grandi 2015: 105). According to Cusic (1981: 81-82), event-internal pluractionality can lead to a variety of semantic effects, such as the conative (i.e. ‘repetitive action which falls short of producing some desired result’), the incassative (i.e. ‘plurality of processes in which there is no attempt to do anything in particular, without any particular objective’), and the tentative (i.e. ‘the process is performed half-heartedly, with less effort than expected) readings (see among others, Cusic 1981: 81-83; Stosic 2013: 72-73). These readings can all be associated with the speaker (Amiot & Stosic 2014: 22).

3. Diminutive verbs in French

Diminutive verbs in French have been discussed in many studies dealing with evaluation in the verbal domain (cf. Amiot 2012; Stosic & Amiot 2011; Amiot & Stosic 2014; Plénat 1999; Tovena & Kihm 2008; Tovena 2011). These studies have shown that diminutive verbs are mainly formed by means of suffixes (e.g. *-oter, -iller*), but that there is also one prefix capable of constructing evaluative meanings, namely *sous-* (cf. Corbin 1999; Amiot 2012):

(21) a. *mord-iller* ‘to nibble’
b. *viv-oter* ‘to get by’
c. *dorm-asser* ‘to sleep lightly, for a short period of time’
b. *sous-estimer* ‘underestimate’

The most typical diminutive morphemes attached to verbs in French are listed, along with examples in Table 1:

Table 1: The most typical verbal diminutives in French

Affix	Example
-ot(er)	*nage-ot(er)* 'to swim poorly, a little'
-aill(er)[1]	*philosoph-aill(er)* 'to philosophize about unimportant topics'
-on(ner)	*mâch-onn(er)* 'to chew carelessly'
-och(er)	*bavard-och(er)* 'to prattle'
-ass(er)	*écriv-ass(er)* 'to write but not very well'
-et(er)	*vol-et(er)* 'to flutter'
-ill(er)	*mord-ill(er)* 'to nibble'
-in(er)	*pleuv-in(er)* 'to drizzle'
sous-	*sous-exloit(er)* 'to underuse'

French evaluative suffixes are mostly used in informal or spoken (colloquial) speech and show a wide variety of meanings such as quantitative or qualitative evaluation, event internal pluractionality, depreciation, etc. (cf. Stosic & Amiot 2011; Amiot & Stosic 2014):

(22) a. *pleuv-iner* 'to drizzle'
b. *nage-oter* 'to swim poorly, a little'
c. *mord-iller* 'to nibble'
c. *philosoph-ailler* 'to philosophize about unimportant topics'

More specifically, with respect to their semantic contribution to derived verbs, French evaluative suffixes typically combine quantitative and qualitative meanings (Amiot & Stosic 2014):

(i) expressing the low/reduced intensity of the event denoted by the base, e.g. *pleuv-iner* 'to rain lightly, to drizzle',
(ii) emphasizing the lower quality of the action (along dimensions such as amount of result or frequency), e.g. *nage-oter* 'to swim poorly, a little', *march-otter* 'to walk with difficulty', and/or
(iii) expressing pluractionality, e.g. *mord-iller* 'to nibble'.

In other words, under the label "diminutive verbs", one can find verbs describing plural actions with many short phases (diminutive), with insufficient effort to produce the result (conative), with undirected effort (incassative) or with less effort than expected (tentative) (cf. Tovena 2015: 109).

Furthermore, as shown by Amiot and Stosic (2014: 25), French evaluative suffixes display different semantic profiles: verbs suffixed with *-ot(er)* and *-on(er)* have a diminutive meaning, unlike *-ass(er)*, which forms verbs with depreciative meaning. On the other hand, the prepositional prefix *sous-* 'under' is typically associated with quantitative evaluation:

(23) a. *sous-estimer* 'underestimate'
b. *sous-exloiter* 'underuse'

According to Amiot (2012), the semantic contribution of *sous-* is to express the meaning of insufficiency.

[1] French suffixes have various allomorphic variants, such as *-ouiller* (allomorph of *-ailler*) or *-icher* (allomorph of *-ocher*).

4. Diminutive verbs in Modern Greek

Diminutive verbs in Modern Greek have been discussed in Babiniotis (1969) and Efthymiou (2017). As shown in Efthymiou (2017), Modern Greek diminutive verbs are mainly formed by means of prefixoids, e.g. *kutso-*, *psilo-*, but there is also one prefix capable of constructing evaluative meanings, namely *ipo-*.

(24) a. *kutso-vlépo* 'to see poorly'
b. *psilo-δagóno* 'to bite slightly'
c. *psefto-kaθarízo* 'to clean something, but not very thoroughly'
d. *kutso-perpatáo* 'to walk with difficulty'
e. *ipo-timó* 'to underestimate'

The most typical diminutive morphemes attached to verbs in Modern Greek are listed, along with examples in Table 2:

Table 2: The most typical verbal diminutives in Modern Greek

Prefix/prefixoid	Example
miso-	*miso-θimáme* 'to remember but not very well'
psilo-	*psilo-θimóno* 'to get a bit angry'
kutso-	*kutso-vlépo* 'to see poorly'
psefto-	*psefto-δjavázo* 'to study half-heartedly'
xazo-	*xazo-δulévo* 'to work half-heartedly'
negation + *poli-*	*δen poli-katalavéno* 'lit. not+much+understand, I do not understand well'
negation + *kalo-*	*δen kalo-kséro* 'lit. not+well+know, I do not know that much'
ipo-	*ipo-xrimatoδotó* 'to fund inadequately'

Psilo- 'slim', *miso-* 'half', *kutso-* 'lame, gimpy', *psefto-* 'false', *xazo-* 'stupid', *poli-* 'many, much', *kalo-* 'good, well' are prefixoids, i.e. elements, which have acquired a new more general and abstract meaning through grammaticalization. As illustrated in the examples in Table 2, all these elements, in their bound use, do not behave like parts of compounds, but function as prefixes expressing a more subjective meaning (Efthymiou 2017; cf. also Babiniotis 1969; Dimela & Melissaropoulou 2009).

As concerns their semantic contribution, in the verbal domain Modern Greek evaluative prefixoids show a wide variety of meanings, such as quantitative or qualitative evaluation, event internal pluractionality, depreciation, mitigation of the force of the utterance, etc. (Efthymiou 2017):

(25) a. *psilo-píno* 'I don't want to tell you that I drink (a lot), but I do so' (example taken from Xydopoulos 2009)
b. *kutso-tróo* 'to eat slowly, from time to time'
c. *psefto-δjavázo* 'to study half-heartedly, from time to time'.

Some of them (i.e. *poli-* and *kalo-*) attach to verbs in a quite idiosyncratic way, since they appear only in negative environments (cf. also Delveroudi & Vassilaki 1994):

(26) a. *δen poli-katalavéno* 'I barely understand'
b. *δen poli-pináo* 'I am not really hungry'
c. *δen kalo-kséro* 'I hardly know'

More specifically, with respect to their semantic contribution in derived verbs, Modern Greek evaluative morphemes can be distinguished into three types (cf. Efthymiou 2017):

(i) those that are typically associated with quantitative evaluation (e.g. *ipo-*, *miso-*)
(ii) those that typically combine both quantitative and qualitative meanings, indicating the negative or positive attitude of the speaker or (e.g. *kutso-*, *psefto-*), and
(iii) those that are typically associated with a pragmatic meaning (e.g. *psilo-*)

It is also notable that these morphemes are typically used in constructions which typically function as statements, but are not easily found in commands or requests (see example 27):

(27) ? *psilo-ánikse tin porta*!
psilo-open2SG.IMP the door
'Open the door!'

Furthermore, the investigation of the properties of these evaluative morphemes reveals that each deintensifying element is rather potential within a certain semantic domain (Efthymiou 2017): *kutso-* and *psefto-* are typically associated with qualitative interpretations, emphasizing the lower quality of the action, and *psilo-* is typically associated with the pragmatic meaning of mitigation (for the evaluative morpheme *psilo-*, cf. also Giannoulopoulou 2003; Makri-Tsilipakou 2003; Xydopoulos 2009; Savvidou 2012). On the other hand, *ipo-* 'under' is regularly associated with quantitative evaluation, expressing the meaning of insufficiency (i.e. 'under the standard or the threshold denoted by the base') without any emotional overtones.

Interestingly enough, *psilo-*, which is highly productive in Modern Greek, may share some of its meaning with *lígo* '(a) little' (Canakis 2015: 53):

(28) *δulévo lígo, típota spuδéo*
work.1SG.PRS.IND a.little nothing special
'I am working, nothing special' (example taken from Canakis 2015: 53)

According to Canakis (2015: 55), *lígo* '(a) little' can be "interpreted as a hedge, indeed as a verbal diminutivizer comparable to (yet distinct from) the increasingly used prefix *psilo-* […], as in *psilo-δulévo* '- work', *psilo-tróo* '- eat' […], which has a trivializing effect".

Finally, concerning the register properties of the Modern Greek evaluative morphemes under investigation, Efthymiou (2017) identifies three main sets:

(i) morphemes that typically occur in informal or spoken speech (e.g. *psilo-*, *kutso-*, *psefto-*, *xazo-*),
(ii) morphemes that typically occur in high register/formal or written speech (e.g. *ipo-*), and
(iii) morphemes which are stylistically neutral (e.g. *miso-*).

5. Contrastive considerations

The analysis in this paper has shown that there are explicit similarities between French and Modern Greek evaluative verbs:

(i) Both languages possess a significant set of evaluative verbs for describing actions that are performed in a non-canonical way.
(ii) Both French and Modern Greek diminutive verbs express various values, such as attenuation, depreciation, pluractionality, etc.

(iii) In both languages, diminutive morphemes attached to verbs are also used with other grammatical categories (cf. example 9).
(iv) In both languages, diminutive morphemes attached to verbs display different semantic profiles.

At the same time, both French and Modern Greek have their own specific sub-patterns. For example, the meaning of diminution in Modern Greek verbs is (almost) always expressed by prefixoids and prefixes, while French evaluative verbs are mainly formed by means of suffixes. This asymmetry between the two languages might be related to the diversity of evaluative morphological means in Modern Greek. Indeed, compared to French, Modern Greek has a very high capacity to form and use evaluative constructions, while French uses the same units to form evaluative verbs, and evaluative adjectives and nouns (see exaples 21, 24, 29, 30):

(29) French
a. *gentill-et* 'sweetie, pleasant enough' (*gentil*$_{\text{Adj}}$ 'kind')
b. *vol-et-er* 'to flutter' (*voler*$_{\text{V}}$ 'to fly')
c. *frér-ot* 'kid brother, bro' (*frère*$_{\text{N}}$ 'brother')
d. *trembl-ot-er* 'to tremble slightly' (*trembler*$_{\text{V}}$ 'to tremble')

(30) Modern Greek
a. *kal-útsikos* 'quite good' (*kalós*$_{\text{Adj}}$ 'good')
b. *aspr-iδerós* 'whitish' (*áspros*$_{\text{Adj}}$ 'white')
c. *trapez-áci* 'small table' (*trapézi*$_{\text{N}}$ 'table')
d. *tsant-úla* 'small bag' (*tsánta*$_{\text{N}}$ 'bag')
e. *kukl -ítsa* 'small doll, dolly' (*kúkla*$_{\text{N}}$ 'dol')

Moreover, the asymmetry between French and Modern Greek might be linked to the fact that these languages differ in their richness in non-evaluative verbal suffixes (cf. examples 31 and 32).

(31) French
a. *cristall-iser*'to crystalize'
b. *oss-ifier*'to ossify'

Given that in French, the derived verbal lexicon is rather poor in terms of non-evaluative derivational suffixes (e.g. *-iser, -ifier*, being the only verbalizing suffixes), it can be argued and this leaves the way open for the addition of some more verbal suffixes to the already existing stock.

On the contary,in Modern Greek, the derived verbal lexicon is rich (cf. Ralli 2005; Efthymiou 2014; cf. also example 32).

(32) Modern Greek
a. *vurts-ízo* 'to brush'
b. *vutir-óno* 'to butter'
c. *ritiδ-jázo*'to wrinkle'
d. *onom-ázo* 'to denominate'
e. *proeδr-évo* 'to chair, to preside'
f. *kond-éno* 'to shorten'
g. *stress-áro* 'to stress'
h. *oks-íno* 'to sharpen'

As a consequence, the occurrence of evaluative suffixes would affect the overall structure of the derived verbal lexicon.

Finally, it can be suggested that a direct correlation between the degree of inflectionality and the richness in the evaluative domain can be established. Greek as a strongly inflecting language has many more evaluative means than French, considered weakly inflecting languages (cf. also Stosic 2013 for similar remarks for Serbian). Crucially, though, what merits further investigation is the cross-linguistic value of our claims.

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Morphological variation: the case of productivity in German compound formation

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1. Introduction

The development of very large corpora and their constant growth has changed our picture of the lexicon considerably. The empirical turn in linguistics that is driven by corpus-based methods enables us to uncover the dynamic nature of the lexicon, i.e., the processes of constant lexical change and the mechanisms that promote this change. Three features characterize the "dynamic lexicon" in particular (cf. Engelberg 2015a):

(i) ***Size***: Even a considerably small corpus of German with about a quarter billion running words contains almost 2 million different lexemes (Evert and Baroni 2005). Although it is difficult to extrapolate these numbers to very large corpora, we can expect at least more than 10 million lexemes in large corpora like the *Deutsches Referenzkorpus* (DeReKo) (cf. Institut für Deutsche Sprache 2017) with more than 30 billion running words. Large dictionaries of contemporary German consist of about 200.000 to 300.000 lemmata. Therefore, only a very small proportion of the lexemes occurring in corpora is lexicographically described.

(ii) ***Patterns***: In contrast to theories that conceptualize language as being based on lexical entities and rules that manipulate these entities, corpus-based research gives rise to a more pattern-based organization of language. In particular, in domains like idioms, argument structure, or complex words, semi-abstract and semi-regular linguistic patterns account for the variation and productivity observed.

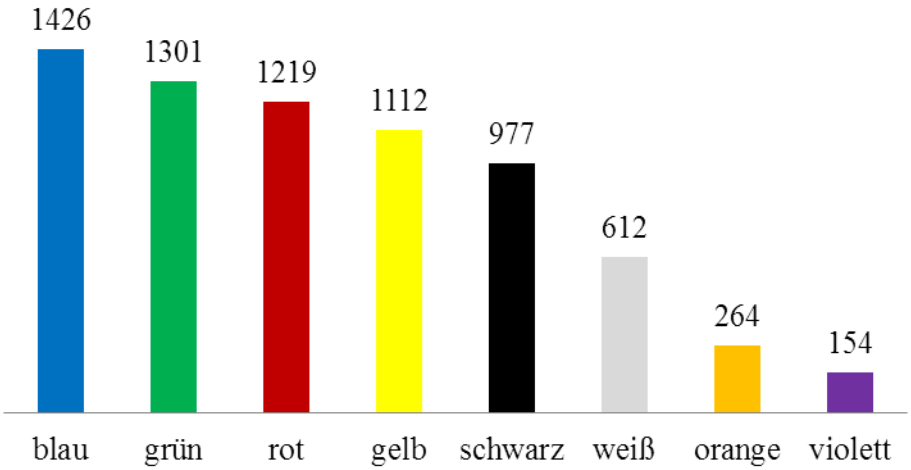
(iii) ***Distribution***: The quantitative distribution of entities in corpora allows us to reconstruct the nature of the dynamic processes in the lexicon. This comprises the changing frequencies of lexical items over time, the nature of Zipfian distributions, and the productivity of linguistic patterns.

From the perspective of lexicological theory as well as from the perspective of lexicographic language documentation, the question arises how the lexical wealth found in corpora can be adequately described and explained (cf. Engelberg 2014). Since compound formation is a dominant factor for the expansion of the German lexicon, the investigation of tendencies and idiosyncrasies in compound formation must play an important role in the investigation of the dynamic lexicon. The paper at hand discusses productivity in German compound formation. In a general way, we understand productivity as "the ease with which a linguistic process gives rise to new forms" (O'Donnell 2015: 3). We will look at compound formation from a lexeme-based synchronic perspective as a case of morphological variation. In particular, we focus on groups of compounds with semantically closely related head words, e.g., compounds with color words as heads. Our approach is characterized by a qualitative as well as a quantitative perspective on productivity. Taking the properties of the head lexeme as a starting point and applying corpus-based statistical methods, we try to gain new insights into

compound formation, especially into potential factors which govern their productivity. The approach presented here is one of the first attempts to apply the concept of productivity, which has been predominantly used in the domain of derivation, to compounding.

Our investigation starts with the observation that even semantically very similar words (e.g., *Angst* 'fear' vs. *Furcht* 'dread') or words within a semantic field (e.g., color words like *blau* 'blue' and *weiß* 'white') show strikingly different tendencies with respect to their occurrence as heads in compounds (cf. Fleischer and Barz 2012: 81f., 135). This observation is illustrated in Figure 1, which shows the simple type frequencies for German compounds whose head is a basic color word (cf. Engelberg 2015b).[1] It can be seen that, for example, *blau* 'blue' (as in *abendblau* 'evening-blue', *abgasblau* 'exhaust-blue', *acapulcoblau* 'acapulco-blue', etc.) gives rise to many more compounds than *weiß* 'white' (as in *alabasterweiß* 'alabaster-white', *albinoweiß* 'albino-white', *alaskaweiß* 'alaska-white', etc.).

Figure 1: Compounds with color words: Type count (Realized Productivity) (Engelberg 2015b)



Two questions guide our investigation:

(i) How can we measure the productivity of simplex words with respect to compound formation?
(ii) How can differences in compound productivity be explained? What are the principles that govern this variation?

2. Morphological Productivity

As "morphological productivity is one of the most contested areas in the study of word-formation" (Bauer 2001: i), this concept cannot be discussed here in full detail. We will sketch some qualitative and quantitative aspects of morphological productivity and its applicability to compounding (cf. Section 2.1). Our paper focuses on the question how empirically observable differences in compound productivity can be explained; in Section 2.2, we will discuss potential factors for productivity.

[1] The investigation of color compounds is based on a part of the German Reference Corpus (DeReKo) with a size of 5.405.723.269 running words. All words that ended in one of the ten basic color words and the respective inflectional forms of these words were extracted and stored with their token frequencies. The ten color words can be used both as adjectives and nouns.

2.1 Productivity in compound formation

Productivity in compound formation is a rather unexplored field of morphology. While it is beyond question that compounding in general is a productive process of German word formation (Olsen 2015: 364 f.), it is quite surprising that the productivity of compounding has not been investigated in more (empirical) depth, but cf. Tarasova (2013) and Roth (2014). While Roth focuses on the competition between collocations and compounds, Tarasova is interested in the productivity of compound constituents and, in particular, in the question "whether the productivity of a compound constituent on the morphological level coincides with the productivity of the semantic relation realized in the constituent family" (Tarasova 2013: iii).

Until now, the notion 'morphological productivity' has been predominantly applied to the domain of derivation (cf. Bauer 2005); cf. the (methodically similar) investigations of Gaeta and Ricca (2006, 2015) for Italian or Scherer's (2005) and Hartmann's (2016) diachronic operationalization of current productivity measures for German derivations. In what follows, we will demonstrate the fruitful applicability of the concept of morphological productivity to the domain of composition.

A question that is crucial in this context is: What does 'productive' mean? If we keep in mind that Aronoff (1976: 35) considered productivity to be "one of the central mysteries of derivational morphology", this is far from being a trivial question (cf. Bauer 2001, 2005 and Plag 1999 for a more detailed discussion). The complexity of the concept of productivity becomes evident when one looks at the six readings of productivity proposed by Rainer (Rainer 1987: 188–90, quoted from Gaeta and Ricca 2015: 843).

6 possible readings of the productivity of WFRs (word formation rules):

(i) the number of words formed with a certain WFR;
(ii) the number of new words coined with a certain WFR in a given time span;
(iii) the possibility of coining new words with a certain WFR;
(iv) the probability of coining new words with a certain WFR;
(v) the number of possible (or generatable by rule) words formed with a certain WFR;
(vi) the relation between occurring and possible words formed with a certain WFR.

Similarly, Barðdal (2008: xi) "found that not only there were different *definitions* of productivity figuring in the literature, but also that there were different *concepts* of productivity around". Correspondingly, she identifies 19 senses of "productive", more precisely adjectives that are used as synonyms for "productive" in the literature, e.g., "frequent", "rule-based", "having a wide coverage", "easily combinable", "occurring or existing", etc. (Barðdal 2008: 10 f.).

It is important to highlight that those synonyms – as well as the different readings proposed by Rainer – clearly display that productivity is in the tension between 'availability' and 'profitability', i.e., between the theoretical possibility of new coinages and the exploitation of this potential. Moreover, productivity can be considered a qualitative or a quantitative phenomenon (cf. Scherer 2005; Rainer 1987; Plag 1999: 11–35).

Our lexeme-based investigation of compounding in German proceeds from the following understanding of productivity: First, we perceive productivity as a gradual phenomenon. This means that we do not only differentiate between the two poles 'productive' vs. 'non-productive'. Second, productivity is considered to be a quantitative phenomenon (cf. Roth 2014: 167). The advantage of this view has already been formulated by Gaeta and Ricca

(2015: 484): “Different facets of this complex phenomenon may be reflected quantitatively by different statistical measures”. Consequently, “statistical work on large corpora has contributed decisively to a deeper understanding of the notion of productivity and the disentanglement of its diverse components” (Gaeta and Ricca 2015: 848).

2.2 Measuring productivity

We compute the different types of productivity of compounds on the basis of current productivity measures (cf. Baayen 1992, 1993, 2001, 2009) and data from a large corpus of German (*Deutsches Referenzkorpus*, DeReKo). The three now almost classical productivity measures from Baayen (2009) are given below:

(i) Realized Productivity: V (C, N)
The number of different types V belonging to a word formation pattern C in a corpus of N running words.

(ii) Expanding productivity: V(1, C, N) / V(1, N)
The number of different types V with a frequency of 1 belonging to a word formation pattern C in a corpus of N running words divided by the number of all types in the corpus with the frequency of 1.

(iii) Potential productivity: V(1, C, N) / N(C)
The number of different types V with a frequency of 1 belonging to a word formation pattern C in a corpus of N running words divided by the number of all tokens in the corpus belonging to word-formation pattern C.

Applied to patterns of compounds ending in one of the color words *blau* ‘blue’, *gelb* ‘yellow’, *grün* ‘green’, *orange* ‘orange’, *rot* ‘red’, *schwarz* ‘black’, *violett* ‘violet/purple’, and *weiß* ‘white’, the three measures yield the results shown in Figures 1 to 3, based on the numbers shown in Table 1 in a part of the German Reference Corpus with a size of 5.405.723.269 running words.

Table 1: Frequencies of hapax legomena and tokens for compounds with color words

head word	**hapax legomena**	**compound tokens**
blau	767	40.884
gelb	630	31.396
grün	649	42.962
orange	131	3.646
rot	624	51.159
schwarz	557	23.883
violett	74	5.344
weiß	257	33.628

The measure of Realized Productivity (Figure 1, Section 1) shows a dominance of compound patterns formed on the basis of monosyllabic, inherited color words (in contrast to loanwords) referring to primary colors (plus *green*). However, the measure only counts instances of the pattern formed in the past. It does not give an idea of the current productivity, i.e., of the number of compounds we can expect in the near future. This idea is better captured by the measure of Expanding Productivity (Figure 2) that considers the numbers of hapax legomena, i.e., the number of words that occur only once in a certain corpus. Although not every hapax is necessarily a new word, every new word in the language necessarily starts with the

frequency of one.[2] Thus, measures taking the number of hapaxes into consideration might be a good approximation to 'newness' in the lexicon. However, the fact that the number of hapaxes is the decisive factor in determining the measure of Expanding Productivity is often seen as a shortcoming of Baayen's measures. While some of those problems can be rejected by following the argumentation of Gaeta and Ricca (2015: 847), a more practical one remains: the hapax dependency requires manually checked data: "For hapaxes to be a reliable tool, however, it is necessary that corpus data are carefully and time-consumingly checked by manual inspection: a fully automatic listing of items associated with a given ending in a corpus would indeed produce huge distortions" (Gaeta and Ricca 2015: 847).

Figure 2: Compounds with color words: Expanding Productivity (simplified[3]) (Engelberg 2015b)

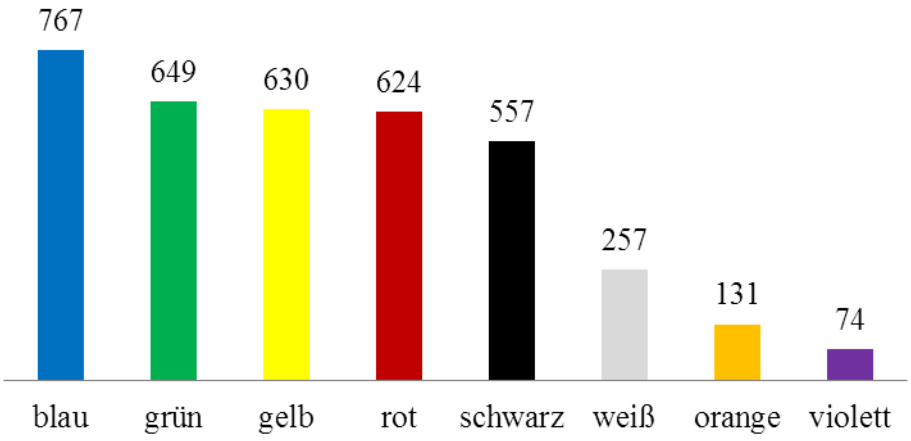
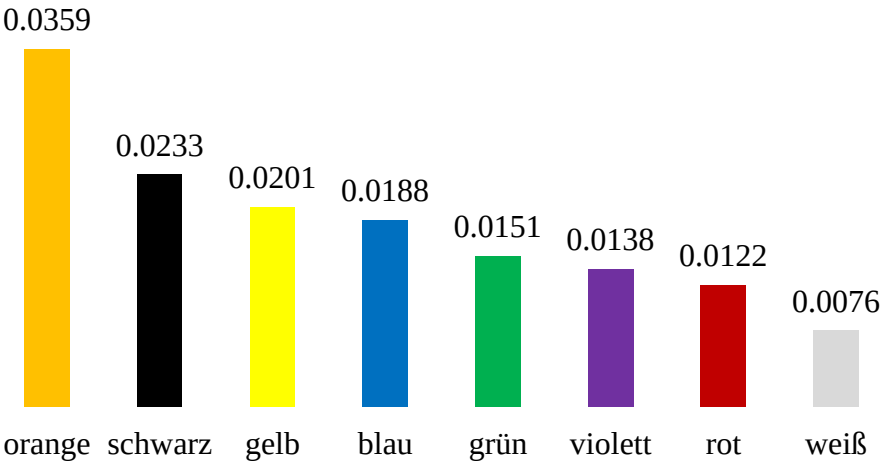


Figure 3: Compounds with color words: Potential Productivity (Engelberg 2015b)



In our example, the differences in results for Realized Productivity and Expanding Productivity are rather slight, indicating that the productivity of color compounds is not currently changing a lot. The third measure, Potential Productivity, however, yields very

[2] The chance that a hapax legomenon is indeed the first occurrence of a word depends of course on many factors like the size of the corpus, its textual composition, and its temporal resolution.

[3] Baayen's measure is simplified here. Since the number of all hapaxes in the corpus could not be computed, the mere number of hapaxes for each pattern is given. However, since the number of all hapaxes in the corpus is constant within the investigation on color compounds, the eight patterns can still be compared among each other.

different results. It is supposed to capture the degree of saturation of a word formation pattern (Baayen 2009: 902). As Figure 3 shows, in this sense of productivity, *orange* is by far the most productive color word. One might argue that since it has only produced a small number of types yet, it is indeed a less saturated pattern. However, the measure of Potential Productivity has been criticized for its token dependency: it relates the number of hapaxes of a category to the total number of tokens of that category. Gaeta and Ricca (2006: 62) argue that "the ratio h/N [hapax legomena/tokens] does not seem to give meaningful results if, in a given corpus, one compares the results obtained for affixes with very different token frequencies". Comparing categories with varying token size is problematic, because the lower the number of tokens, the higher is the value for productivity (P), as can be seen with *orange* in Figure 3. The reason for this is that for low numbers of tokens, the numbers of types increase more than with high token numbers. Consequently, the value P should only be calculated for categories with an identical or very similar number of tokens. Otherwise, an extrapolation of token numbers would become necessary. This procedure, however, also has problems when applied to actual token frequencies that are too distinct from each other (cf. Roth 2014: 169 f.).

Of course, the three measures proposed by Baayen do not exhaust the possibilities of the operationalization of different concepts of productivity. Other classical measures like the type-token-ratio can be applied to determine the lexical diversity of a category. As highly lexicalized types can distort the results, it can be revealing to know if a certain group of compounds (i.e., compounds with the head word *gelb* 'yellow') is dominated by a small group of lexicalized coinages or displays a high number of different types. Apart from that, measures of the productivity of compounds – in contrast to derivational morphology – should probably take into consideration the frequency of the head of the compound in its use as a simplex. We will not attempt to discuss these possibilities in this short article; we still aim at a deeper theoretical understanding of the different measures in terms of what facets of productivity they exactly capture.

3. How can differences in compound productivity be explained

Our brief look at the productivity of color compounds in the last section has not only shown how strongly the concept of productivity changes with its quantitative operationalizations, but it has also provided some first ideas which linguistic factors might influence productivity. Hypotheses emerging from the results in Figures 1 and 2 might be that monosyllabic headwords might be more productive than polysyllabic ones, that inherited headwords might be more productive than borrowed ones, that color words referring to primary colors might be more productive than color words referring to secondary and tertiary colors, etc. Even more interesting are tendencies that do not give rise to straightforward hypotheses. Under all measures we have tested so far, *weiß* 'white' is always less productive than *schwarz* 'black'. A central aim of our project, therefore, is to empirically carve out factors that determine the productivity of compound formation, or in other words: to empirically determine factors that govern the productivity of simplex words with regard to the formation of compounds. For this purpose, potential factors for productivity have to be outlined in a first step (Section 3.1). Subsequently, empirical evidence for these factors is determined on the basis of some pilot studies (Section 3.2).

3.1 Potential factors

We assume that productivity in compound formation might be influenced among others by the following factors. In this context, not only are the properties of the simplex in focus, but

also the properties of the unit with which the simplex is combined have to be taken into account.

(i) Morpho-phonological properties of the immediate constituents
- Syllable structure
- Properties of adjacent phonemes at the link between constituents

(ii) Morpho-syntactic properties of the immediate constituents
- Part of speech (For example, the composition of two nouns is considered to be the most productive type of composition, cf. Fleischer and Barz 2012: 81)
- Morphological complexity of constituents (While this factor influences the productivity of base words in derivation, Fleischer and Barz (2012: 81) call into question whether an increasing morphological complexity automatically is connected with a lower activity in compounding.)
- Valence properties of the head constituent, cf. Gaeta and Zeldes (2012): They investigated whether there is a strong correspondence between synthetic compounds and corresponding object-verb pairings; however, a statistically significant correlation could not be found.
- Position of constituents within the complex word: For example, Tarasova (2013: iii; cf. Fleischer and Barz 2012: 135 f.) demonstrates empirically "that a constituent is more productive in just one of the positions (modifier or head)"

(iii) Compound type (e.g., determinative compound vs. copulative compound; the former is considered to be more productive than the latter)

(iv) Semantic properties of the immediate constituents
- Meaning / semantic field
- Polysemy (According to Fleischer and Barz (2012: 82), the main reading of polysemous words is the most active with regard to word formation: For example, monomorphematic color words like *rot* ('red') or *grün* ('green') form only a few complex words in which a different reading than the reading 'color' is instantiated.)
- Aspects of taxonomy (Basic level categories in taxonomies like *mammal – dog – poodle* might be particularly productive.)
- Semantic proximity

(v) Semantic patterns of compounding
- The semantic relation between the constituents (cf. ten Hacken 2016; Hein 2015: 218–38) (In addition to computing productivity values for categories defined via the lexeme in head position, we also want to compute productivity values for semantic patterns of compounding, e.g., in color-compounds patterns like 'intensifying color compound' (*knallgelb* 'bang-yellow') versus 'comparative color compound' (*zitronengelb* 'lemon-yellow') versus color-color compound (*blaugelb* 'blue-yellow').)

(vi) Textual factors (genre, register)

(vii) Frequency and extra-linguistic relevance (This applies in particular to the simplex in head position. For example, central perception adjectives for the description of taste, like German *süß* ('sweet') or *sauer* ('sour'), show a higher activity in word formation than more peripheral adjectives like *herb* ('bitter/tart/harsh') (Fleischer and Barz 2012: 82).)

In the three pilot studies that we have conducted so far (Engelberg 2015; Hein 2016; Schneider 2016), we mainly concentrated on the evaluation of the two factors 'semantic proximity' and 'frequency of the head noun'.

3.2 Pilot studies

For all three studies, the following approach has been adopted: In the first step, we determined the productivity of the compounds with the help of different productivity measures (cf. Baayen 2009, 1992) on the basis of large corpora. In this context, we focused on groups of compounds with head words that are semantically similar or had a similar frequency as a simplex respectively.[4] In the second step, we tried to interpret and to explain the differences in productivity.[5]

3.2.1 Factor 'semantic properties of the head constituent'

We conducted two studies in which we investigated the influence of the factor 'semantic similarity' on productivity. In both cases, a part of the German Reference Corpus constituted the empirical basis. The question whether similar semantic properties of the head lexemes lead to comparable productivity values with regard to compound formation, was crucial in this context.

On the one hand, we studied compounds with a monomorphematic color word (e.g., *gelb* 'yellow') as head word, e.g., *neontextmarkergelb* 'neon-highlighter-yellow' as described in Section 2.2. On the other hand, we investigated compounds with a monomorphematic expression of a negative emotion independent of the position of the emotion word within the compound (Schneider 2016). Two pairs of semantically similar German words have been considered: *Angst* ('fear') vs. *Furcht* ('dread') and *Wut* ('anger') vs. *Zorn* ('wrath'). Moreover, we also included the nouns *Scham* ('shame') and *Hass* ('hatred').

Table 2: Frequencies of hapax legomena among compounds, compound tokens, and occurrence as a simplex for emotion words

head word	hapax legomena	compound tokens	occurrence as simplex
Angst 'fear'	2.842	141.001	748.975
Hass 'hatred'	1.276	70.219	86.730
Wut 'anger'	1.764	53.794	93.051
Furcht 'dread'	377	23.984	64.822
Zorn 'wrath'	545	20.393	74.564
Scham 'shame'	556	16.583	23.224

Regarding the relevance of the factor 'semantic proximity', both studies clearly indicate that semantic proximity between simplex words does not automatically lead to comparable productivity values with regard to the formation of compounds. As was foreshadowed in the introduction and in Section 2.2, color words like *weiß* 'white' versus *schwarz* 'black' show strikingly different tendencies to occur as a head word in compounds. The same holds for the

[4] In all groups of compounds that we focused on, we tried to control for general morpho-syntactic factors. For example, only simplex words have been considered.

[5] One of the main points of criticism in Baayen's approach, the problem of comparing productivity values for categories with a different number of tokens (cf. Section 2.2) holds at present for all three pilot studies.

semantically quite homogenous group of compounds that express emotions: The plot for their Realized Producitivity (Figure 4) shows clear differences a) between the six considered simplex words and b) within the two pairs of semantically very similar head words:

(i) *Angst* ('fear') is 7.7 times more productive in the formation of compounds than *Furcht* ('dread').
(ii) *Wut* ('anger') is 3.3 times more productive as a constituent in compounds than *Zorn* ('wrath').

Figure 4: Compounds with an expression of an emotion: Realized productivity (Schneider 2016)

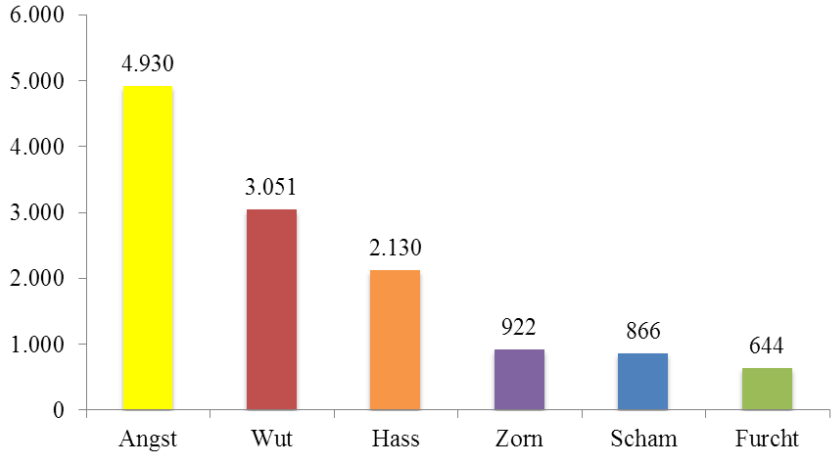


Figure 5: Compounds with an expression of an emotion: Type-Token Ratio (Schneider 2016)[6]

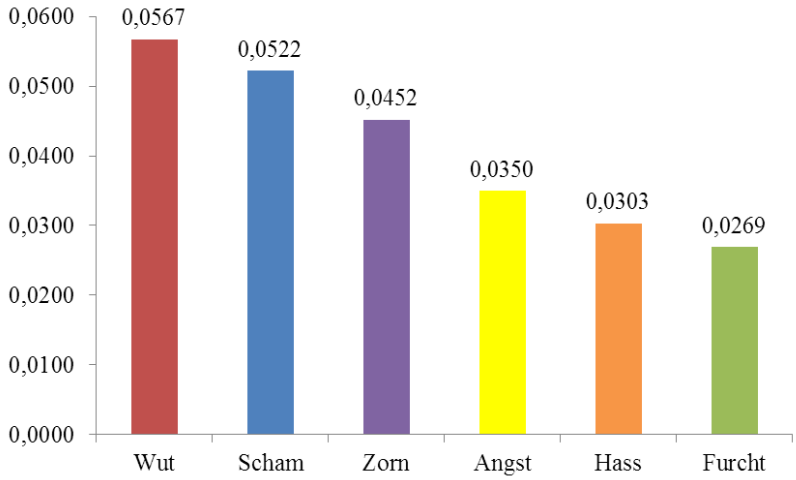


Figure 5 represents the ratio between the number of types and the number of tokens (TTR). Compared to the measure of Realized Productivity, it yields very different results.

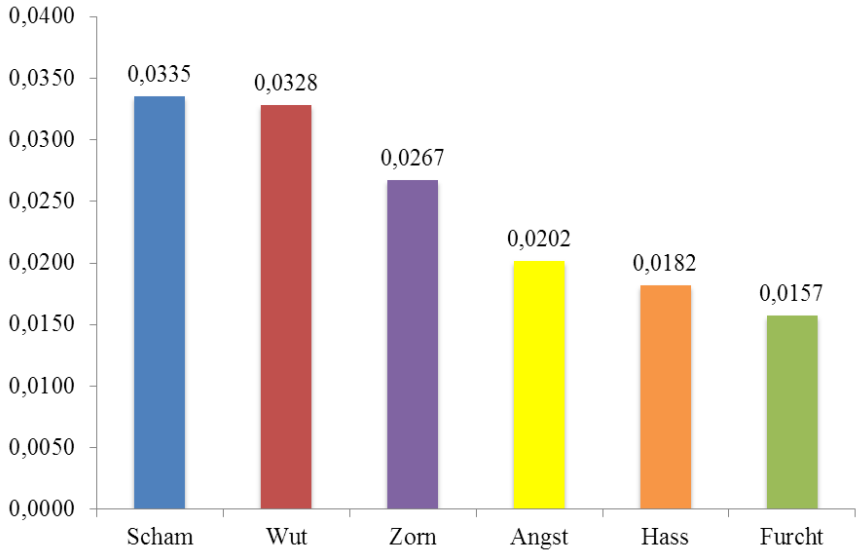
According to this measure, in contrast to the measure of Realized Productivity, *Angst* displays a rather low value, while *Wut* and *Scham* figure as the most productive expressions in the sense of providing the highest lexical diversity. Moreover, in Figure 5, the productivity

[6] It should be noted that the values for *Hass* are slightly distorted by the considerably high frequency of the proper name *Hassmann* and that the frequently occurring compound *Ehrfurcht* ('awe/reverence'), which recursively enters processes of compound formation, influences the results for *Furcht* (cf. Schneider 2016: 11).

values for the two considered pairs of semantically similar words are closer than in Figure 4 (*Angst*: TTR=0,0350 vs. *Furcht*: TTR=0,0269; *Wut*: TTR=0,0567 vs. *Zorn*: TTR=0,0452).

The results for Potential Productivity are plotted in Figure 6. On the one hand, just as in the case of color compounds (cf. Section 2.2), this measure yields very different results compared to the values of Realized Productivity (cf. Figure 4). In this reading of productivity, *Scham* ('shame') is the most productive simplex with regard to compound formation. While *Angst* ('fear') is ranked as the most productive word according to Realized Productivity, it displays a very low Potential Productivity. It should be noted that the results for Potential Productivity strongly resemble the results for TTR (cf. Schneider 2016: 23).

Figure 6: Compounds with an expression of an emotion: Potential productivity (Schneider 2016)



Instead of a clear connection between the semantic proximity of simplex words and their productivity in compound formation, both studies point at other potential connections: Semantic proximity seems to lead to comparable patterns of compounding. This holds for both studies in which the role of semantic proximity between simplex words as constituents in compounds was explicitly evaluated: The color compounds as well as the emotion compounds are dominated by a specific limited set of semantic patterns. For example, the compounds ending in *gelb* ('yellow') indicate that there are three patterns which seem to be characteristic for color compounds:

(1) Color-color compounds
rotgelb 'red-yellow'
bläulichgelb 'bluish-yellow'
rotweißschwarzgelb 'red-white-black-yellow'

(2) Intensifier compounds (intensity / tonality / shading)
knallgelb 'bang-yellow'
schrillgelb 'acute-yellow'
schreigelb 'screaming-yellow'

(3) Comparative compounds (comparison with the color of an object)
zitronengelb 'lemon-yellow'
saharagelb 'Sahara-yellow'
erdnussgelb 'peanut-yellow'

Our current work concentrates on computing productivity values for semantic patterns of this kind. This means that the category C (in Baayen's measures) is no longer defined via the lexeme in head position, but via the semantic pattern that is instantiated in the coinages within a certain group of compounds.

While semantic proximity between the head words probably leads to comparable patterns of compounding but not to comparable productivity values, the latter seem to be influenced by another factor: the frequency of a simplex in isolation. In other words, rather than assuming a connection between productivity and semantic properties, there seems to be one between the frequency of a simplex in isolation and its productivity in compound formation. It is evident from the token numbers in Table 2 and the Realized Productivity plotted in Figure 4 that the simplex with the highest frequency (in isolation), *Angst*, also produces the highest number of compound types – in this case, this not only holds for the number of compound types, but also for the number of compound tokens. The Realized Productivity values of compounds with *Wut* ('anger') and *Hass* ('hatred') confirm this observation: *Wut* and *Hass* are frequent simplex words in our investigation (ranks 2 and 3 in the frequency ranking) and also form the second highest, respectively third highest number of compound types. Nevertheless, there is no *clear* correlation between the number of simplex tokens and the number of corresponding compound types. For example, *Scham* and *Zorn* differ clearly in their occurence as simplex words but show approximately the same number of compound types.

With respect to the other productivity values, the assumed connection between the frequency of a simplex and its productivity in compound formation seems weaker: According to Potential Productivity and Type-Token-Ratio, the most frequent simplex word of our investigation, *Angst* 'fear', is one of the least productive simplex with regard to compound formation; the other way around, the least frequent simplex, *Scham* 'shame', turns out as the most productive simplex with regard to compound formation according to Potential Productivity (cf. the afore mentioned opposite results for Realized and Potential Productivity). However, Figure 6 also displays results pointing in the same direction as for Realized Productivity: The simplex *Wut* ('anger') is the second most frequent simplex of the investigation and is also the second most productive word with regard to the formation of compounds.

3.2.2 Factor 'frequency of the head constituent (in isolation)'

The influence of the factor 'frequency of a simplex' on its productivity in compound formation has been investigated in a separate study (Hein 2016). For this purpose, we have analysed binary compounds ending in simplex words from three different frequency layers:

(i) **Low** (e.g., *Ermächtigung* 'authorization'): more than 10, less than 50 occurences in our corpus[7]; extraction of 20 word-forms (by random sampling). Note that this definition of 'low' makes only sense in the context of the current study: If one considers the extreme Zipf-like distribution of word frequencies, 50 occurences have to be considered as a relative high frequency. However, for the purpose of this study it would not have been

[7] For the investigation at hand, we compiled a subcorpus consisting of 5.000 texts (9,25 million tokens) from our IDS corpora; we also included oral language (cf. DGD 2017). This, as well as the extraction of the compounds was done by our colleague Sascha Wolfer.

constructive to select only nouns with a frequency of 1 or 2 because it can be expected that such nouns produce only a very low number of compounds if any.

(ii) **Middle** (e.g., *Finger* 'finger'): more than 1.000, less than 2.000 occurences in our corpus; extraction of 20 word-forms (by random sampling).

(iii) **High** (e.g., *Kopf* 'head'): extraction of the 20 most frequent word forms from our corpus.

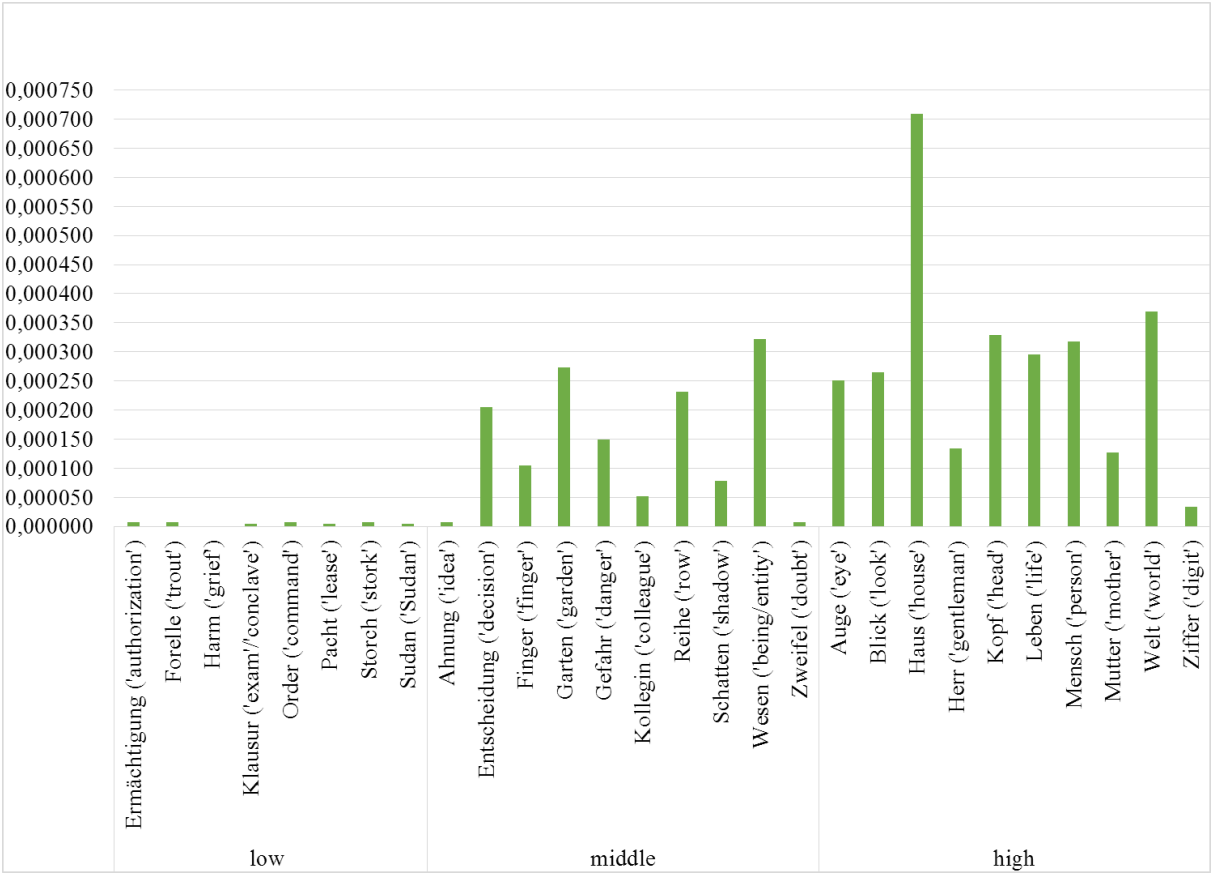
Out of this list of 60 word forms, we selected 28 lexemes by trying to consider a wide variety of different words, e.g., abstract vs. concrete nouns (e.g., *Ahnung* 'idea' vs. *Auge* 'eye') or derived (in a linguistic sence) vs. non-derived nouns (e.g., *Entscheidung* 'decision' vs. *Mensch* 'human'). In a next step, we extracted the corresponding compounds automatically, more precisely all compounds whose head word is formed by one of these 28 simplex words. The complete list of simplexes is displayed in Figure 7.

At first sight, the results seem to indicate that the parameter 'frequency of a simplex' influences the productivity in compound formation: Words that are more frequently used as a simplex are more productive in compound formation than infrequent simplex words. This is an expected finding: What is infrequent in isolation is not likely to be semantically modified by a non-head within a compound.

The connection between the frequency of a simplex and its productivity in compound formation becomes evident when one looks at the plot for Expanding Productivity in Figure 7. Expanding Productivity is supposed to give an answer to the question whether a morphological category is attracting new members, i.e., it tells us something about the near future. Expanding Productivity is the quotient of the number of hapaxes of a category C and the total number of hapaxes in a given corpus (cf. Section 2.2). The plot in Figure 7 shows the simplex words on the x-axis, grouped according to their frequency layer – and within each layer alphabetically. The values for Expanding Productivity are plotted on the y-axis.

According to this measure, the "winners" with regard to compound formation are simplex words with a middle or high frequency: *Haus* 'house' is the most productive simplex (e.g., *Barbiehaus* 'barbie house'; *Kaiserhaus* 'imperial house'; *Drei-Sterne-Haus* 'three-star house'), followed by 2) *Welt* 'world' (e.g., *Unterwelt* 'underworld'; *Vorstellungswelt* 'imaginary-world'), 3) *Kopf* 'head' (e.g., *Affenkopf* 'ape-head'; *Briefkopf* 'letterhead'; *Dickkopf* 'bullhead'*; Institutskopf* 'institution-head'), 4) *Wesen* 'being/entity' (e.g., *Bildungswesen*, lit. "entity of education" > 'education system'; *Einzelwesen* 'individual-being') and 5) *Mensch* 'person' (e.g., *Erfolgsmensch* 'success-person'; *Familienmensch* 'family-person').

Figure 7: Head words from three different frequency layers: Expanding Productivity (Hein 2016)



While the values for Realized Productivity point in the same direction – the most productive simplex words belong to the frequency layers 'high' and 'middle' (1. *Haus*; 2. *Kopf*; 3. *Welt*; 4. *Wesen*; 5. *Leben*) – the results for Potential Productivity are again the other way round (cf. Section 3.2.1).

In addition to the connection between frequency and compound productivity, the study with head words from three different frequency layers indicates the relevance of further parameters for productivity. Among others, the factor 'polysemy of the simplex in head position' seems to play a role here.[8]

This becomes clear when we look at the "winning head words" corresponding to Expanding Productivity again: *Haus* ('house'), *Welt* ('world'), *Kopf* ('head'), and *Wesen* ('being/entity') all have something in common: they can be understood as abstract nouns and as concrete nouns. Notice that the most productive head noun – *Haus* ('house') – is not the most frequent simplex of the investigation, but that it has many different readings. Among others, *Haus* can be understood as an abstract noun in the sence of 'dynasty' (cf. *Kaiserhaus*) as well as a concrete noun in the sence of 'building' (cf. *Barbiehaus*). Consequently, at first sight, head words that (in isolation) can be understood as both abstract nouns and concrete nouns seem to be more productive than head nouns that are not polysemous in that sense. However, a closer look at the corresponding compounds reveals that the basic meaning of the compounds ending in *house* is quite homogenous: they are clearly dominated by the main reading of house as 'building'. This puts into question the influence of the factor 'polysemy'

[8] However, it is known that there is a strong correlation between the frequency of a word and its polysemy, i.e., the two factors are interdependent to a certain degree.

and supports Fleischer and Barz (2012: 82) claim that the main reading of polysemous bases dominates their behavior as word formation units.

4. Outlook

At present, we are predominantly concerned with the following two issues: First, we are exploring automatic processes in the extraction and the processing of compounds. In particular, we are testing the applicability of morphologically parsing the extracted compound candidates. This should reduce the amount of manual annotation and facilitate the identification of more abstract patterns (e.g., N+N, A+N). Second, we are trying to gain a better understanding of the explanatory power of different possible measures for the productivity of compounds. Among other things, this requires us to have a better understanding of one of the problems of Baayen's productivity measures, namely, the dependency on the number of tokens, which makes it difficult to compare productivity values of categories with varying token size (cf. Section 2.2).

As was already mentioned in Section 3.1, in a next step, we will determine productivity values for semantic patterns of compounding, and we will investigate other potential factors for productivity (e.g., part of speech of the immediate constituents). In the long run, we also aim at gaining more general insights into the nature of composition with the help of the analysis of selected simplex words, semantic patterns, and their corresponding compounds.

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Number inflection in AN and NA Italian compounds

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1. Introduction

Although number inflection of Italian compound words is generally considered to be an irregular phenomenon, it has often been neglected in the literature devoted to morphological variation. In this paper, our aim is to provide a deeper analysis of the number inflection of two types of Italian compounds, i.e. Noun-Adjective (e.g. *rocca*$_{N}$*forte*$_{A}$ 'stronghold') and Adjective-Noun (e.g. *mezza*$_{A}$*luna*$_{N}$ 'half-moon') compounds. These kinds of forms are generally considered to be compounds by grammars and dictionaries, even though they are often the result of the lexicalization of originally syntactic expressions (e.g. *camposanto* 'cemetery', lit. 'holy field'). As in many other cases, the boundary between syntax and compounding is not so clear. With regard to number inflection, these forms are very interesting since they display both cases of double inflection (e.g. *casse*$_{PL}$*forti*$_{PL}$ 'safes', *doppi*$_{PL}$*vetri*$_{PL}$ 'double glasses'), in which there are two plural markers, and cases of external inflection (e.g. *rocca*$_{SG}$*forti*$_{PL}$ 'strongholds', *doppio*$_{SG}$*petti*$_{PL}$ 'double-breasted'), in which the plural marker of the word is in the canonical position, namely on the right. Furthermore, in some cases the same compound shows both kinds of inflection: e.g. *caposaldo* 'cornerstone' (pl. *capo*$_{SG}$*saldi*$_{PL}$ – *capi*$_{PL}$*saldi*$_{PL}$) or *terracotta* 'terracotta' (pl. *terra*$_{SG}$*cotte*$_{PL}$ – *terre*$_{PL}$*cotte*$_{PL}$). These cases can be considered as instances of 'overabundance', i.e. "the situation in which there are two or more forms available to realize the same cell in an inflectional paradigm" (Thornton 2012: 183).

This work aims at describing this twofold variation through the analysis of both quantitative and qualitative data from a corpus of Contemporary Italian, i.e. itWaC (Baroni *et al*. 2009). By investigating the number inflection of AN and NA Italian compounds, we hope to enrich the description of these forms which seem to be halfway between syntax and morphology.

The paper is organized as follows. In sections 2 and 3, we provide a general introduction on Italian compounding and the plural inflection of compound words. Section 4 is devoted to the data retrieval and the parameters of the analysis. In section 5, we illustrate the results of the analysis of AN and NA compounds, focusing on the most relevant factors which can impact their number inflection. Finally, in section 6 we sum up our findings and provide some theoretical remarks on compounding in Italian.

2. AN and NA Italian compounds

Compounding in Italian (as in other Romance languages) is generally considered not to be very productive,[1] especially compared to derivation, which represents the most productive word formation mechanism throughout the history of the Italian language.

[1] For an overview of Italian compounding see Masini and Scalise (2012).

As in other Romance languages, the most productive compound type is the Verb Noun pattern (e.g. *portachiavi* 'keyring', *giradischi* 'record player'), which represents also the most accurately described pattern from both a synchronic and a diachronic point of view (Ricca 2010, 2005; Štichauer 2015a-b). Except for this pattern, which is arguably the result of a purely morphological mechanism, for the other main compound types (i.e. AN, NA, NN, AA) the boundary between word formation and syntax is problematic.[2] As far as compounds involving adjectives are concerned, i.e. AN and NA, it is often hard to distinguish between compounds (1) and phrasal lexemes (2).[3]

(1) acquasanta [NA]$_N$
water:F.SG-holy:F.SG
'holy water'

(2) tessera sanitaria [NA]$_{NP}$
card:F.SG health.F.SG
'health card'

Although these two forms seem very similar from a formal point of view, the former is generally considered by Italian dictionaries to be a compound, whereas the latter is seen as a phrasal lexeme. Unlike languages such as Russian (Benigni and Masini 2010), in which compounds and phrasal lexemes can be distinguished from a formal point of view, since the former display a bound form as first constituent whereas the latter display an autonomous word, in Italian both compounds and phrasal lexemes are made up of two juxtaposed independent words.

The criteria which have been proposed in order to distinguish between compounds and phrasal lexemes vary from language to language.[4] As shown in Booij (2009), the agreement inflection on the adjective represents a criterion for distinguishing AN compounds and AN phrasal lexemes in Dutch from a formal point of view. As already pointed out by Masini and Scalise (2012: 74), the agreement criterion in Italian is not as efficient as in Dutch, since agreement (at least gender agreement) appears in both compounds and in phrasal lexemes.

3. Number inflection in Italian compound words

Unlike other languages such as English, the plural marker in Italian compounds appears not only in its canonical position (3), namely on the right (as in simple words: sg. *can*e 'dog' – pl. *can*i 'dogs'), but also inside the compound word (4) or in both constituents (5):

[2] They represent problematic phenomena if we assume that morphology and syntax are two distinct modules of grammar. Because of their in-between status, this kind of forms (for Germanic languages see Schlücker and Hüning 2009; Hüning 2010) has been effectively analyzed within a framework that treats lexicon and grammar (as well as word formation and syntax) as a continuum, i.e. Construction Grammar (Goldberg 2003). In this approach, grammar is seen as an inventory of constructions, i.e. conventionalized pairings of form and meaning components. Thus, both phrases and compounds can be considered as constructions.

[3] See Booij (2009) for a cross-linguistic overview on phrasal lexemes. Masini (2012, 2009) for Italian.

[4] The criteria which are generally adopted for distinguishing between compounds and phrasal lexemes in Italian are essentially three: 1) internal agreement; 2) the presence of a conjunction or a preposition, which are typically used in syntax, between the two constituents; 3) the presence of elements from other minor lexical categories. See Masini and Scalise (2012: 73) for a more detailed discussion of these parameters.

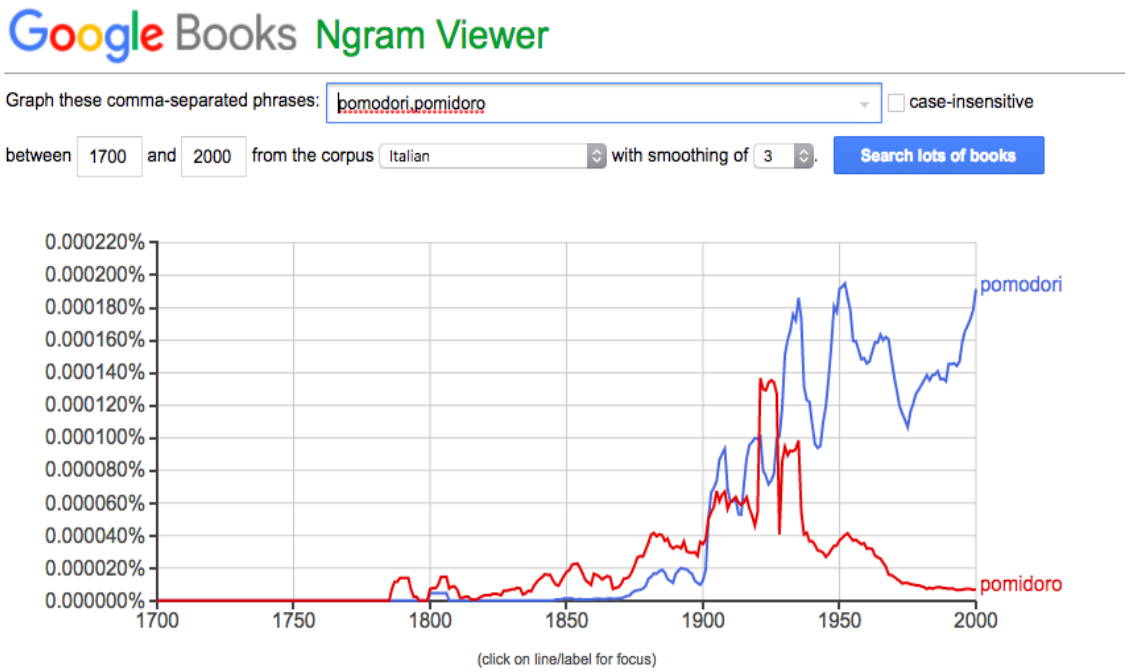
(3) banconota — banconote
bank:SG-note:SG — bank:SG-note:PL
'banknote' — 'banknotes'

(4) capostazione — capistazione
chief:SG-station:SG — chief:PL-station:SG
'station master' — 'station masters'

(5) cassaforte — casseforti
box:SG-strong:SG — box:PL-strong:PL
'safe' — 'safes'

Thus, Italian compound words display three kinds of inflection, i.e. internal, external and double. The first case is due to the fact that inflection generally operates on the head of the compound, which is usually the left constituent in Italian. As already pointed out by Gaeta (2011: 79-80), the internal inflection represents an anomaly within the Italian inflectional system, as in simple and derived words the plural marker is always external. Diachronically, such an anomaly can be solved by means of the so-called "externalization of inflection" (Haspelmath 1994), through which the internal plural marker is moved to the right constituent, as shown in Figure 1, which is produced by Google books Ngram Viewer by querying for *pomidoro* 'tomatoes' (apple:PL-golden:SG) and *pomodori* (apple:SG-golden:PL)

Figure 1: Number inflection of *pomodoro* 'tomato' on Google Ngram Viewers corpus



Externalization of the inflection goes together with univerbation and loss of transparency of the internal structure of the compound word, which is interpreted (and inflected) as a simple word. This process affects especially very frequent and no longer productive compounds.

As shown in Micheli (2016a), both formal (i.e. syntactic category and gender of the constituents, head position) and semantic (i.e. semantic transparency of the constituents, semantic relation between them) factors are involved in the inflection of compound words.

Although these factors cannot be easily organized in a hierarchy, semantic factors seem to be more relevant. However, while formal factors can be analysed from both a qualitative and a quantitative point of view, semantic factors (especially semantic transparency) cannot be measured and are crucially dependent on the speakers' interpretation.

In Micheli (2016b), the analysis of the inflection of compounds with *capo-* 'chief' as first constituent shows that they have different inflections depending on the position of the head and the different meanings conveyed by *capo-*.[5] When *capo-* means 'chief' and represents the head of a subordinative compound (e.g. *capostazione* 'stationmaster'), the inflection is almost always internal, even in very frequent compounds. When *capo-* means 'main', as in *capolavoro* 'masterpiece' or *capoluogo* 'principal town', the inflection is always external, since in these cases the head is on the right. In coordinative compounds meaning 'x is the chief among x_1, x_2, x_3…' (e.g. *capocuoco* 'head chef'), the inflection can be both double and external. In some cases, the same compound has two plural forms. For instance, overabundance is shown by *caporedattore* 'editor-in-chief' which has both double inflection (*capiredattori*, 72 occurrences on itWaC corpus) and external inflection (*caporedattori*, 64 occurrences on itWaC corpus).

There are many other exceptions which are pointed out by grammarians but not sufficiently well examined. In this paper, we will investigate two case studies, in order to enrich the description and the explanation of this case of morphological variation. The first case concerns AN compounds, e.g. compounds made up of *alto-* 'high' and *basso-* 'low' as first constituents, which present both double and external inflection. Such a scenario is also shown by NA compounds, e.g. compounds made up of *–forte* 'strong' as second constituent.

4. Methodology

The data for this study have been manually retrieved from a Contemporary Italian dictionary, i.e. *Devoto Oli* (2015), and from the wordlist of a reference corpus, i.e. the *New Basic Vocabulary* corpus (Chiari and De Mauro 2014; henceforth NVDB).[6] The sample was made up of 83 NA compounds and 150 AN compounds. However, compounds in which the first constituent lacks the inflectional marker because of elision or apocope (e.g. *buonsenso* 'common sense'), have not been taken into account in the analysis. Thus, the final sample was made up of 50 NA compounds and 90 AN compounds. Since compound words in Italian are not very frequent, we have retrieved quantitative data from a large web corpus of Contemporary Italian, i.e. itWaC. In order to detect all kinds of inflection, we have checked each compound in all possible plural forms, e.g. in the case of *altopiano* 'upland', itWaC has been queried for *altopiani* and *altipiani*. Furthermore, since compound words in Italian can occur in three orthographic variants (i.e. juxtaposed, univerbated and hyphenated), each plural form has been checked in three different spellings, e.g. *alto piani*, *altopiani* and *alto-piani*.

We have grouped compounds into three groups, depending on whether they show double inflection, external inflection or both. Each compound has been analyzed from both a quantitative and a qualitative point of view. The parameters which have been taken into consideration are the following. From a quantitative standpoint, we have focused on whole-compound frequency (in both singular and plural forms). From a qualitative point of view, we have considered whether each compound shows a compositional or a non-compositional meaning. From a diachronic point of view, we have investigated whether compounds are

[5] Here we have adopted the semantic classification of *capo-* compounds provided by Serianni (1989: 153).

[6] The corpus is not yet freely available. I would like to thank Isabella Chiari for allowing me to use it for this study.

calques from other languages and when they have been attested for the first time. Furthermore, we have considered whether each compound belongs to a series with a lexically specified constituent.

5. Results

5.1 NA compounds

NA compounds are not very productive in Contemporary Italian. Since they follow the constituent order which is canonical for syntax, it is often hard to distinguish them from phrasal lexemes or phrases. However, it is possible identify some groups of compounds (i.e. series) which share one constituent, even though they are often not still productive in Contemporary Italian. As an instance, we can think of compounds made up of *–forte* as second constituent (e.g. *roccaforte* 'stronghold' or *cassaforte* 'safe') or *acqua-* as first constituent (e.g. *acquasanta* 'holy water' or *acquacotta* 'soup', lit. 'water+cooked'). In the former case, compounds with *-forte* can be considered as 'constructional idioms' (in the sense of Booij 2009) in which one position is lexically specified and shows a specific meaning; i.e. in these compounds *-forte* means 'impregnable'. Thus, they seem to be closer to morphology than to syntax. However, except for these and very few other cases, NA compounds are isolated forms which do not belong to any series: they originate in syntax and, in some cases, undergo a lexicalization process, with a meaning which is not completely compositional anymore. For instance, *bancarotta* 'bankrupt' originates at the syntactic level (originally, it referred to a failed bank whose stall was broken) and shows a lexicalized meaning, but it does not form any series.

As regards the number inflection, NA compounds show overabundance in 22 cases, as shown in Table 1.

Table 1: Distribution of NA compounds with regard to plural type

Double inflection	External inflection	Overabundance	Total
22	6	22	50
44%	12%	44%	100%

Most of the NA compounds that show two kinds of plural are feminine (i.e. 72%) and belong to the inflectional class *-a*/*-e* (50%). They are native compounds, except for two forms which are calques from French (i.e. *cassaforte* 'safe' from *coffre-fort* and *manomorta* 'mortmain' from *mainmorte*). Table 2 illustrates the frequency of the different cell-mates of some NA compounds which show overabundance. Following Thornton (2012) and Fehringer (2004), we have established the strength of overabundance taking as a measure the ratio between tokens in two cell-mates. Following Thornton (2012: 189), we have also assumed that in a given synchronic corpus ratios in the range of units indicate existence of overabundance, ratios in the range of tens indicate that overabundance is on the verge of extinction or has recently ceased to exist, and higher ratios indicate complete extinction of overabundance in the synchronic stage represented by the corpus.

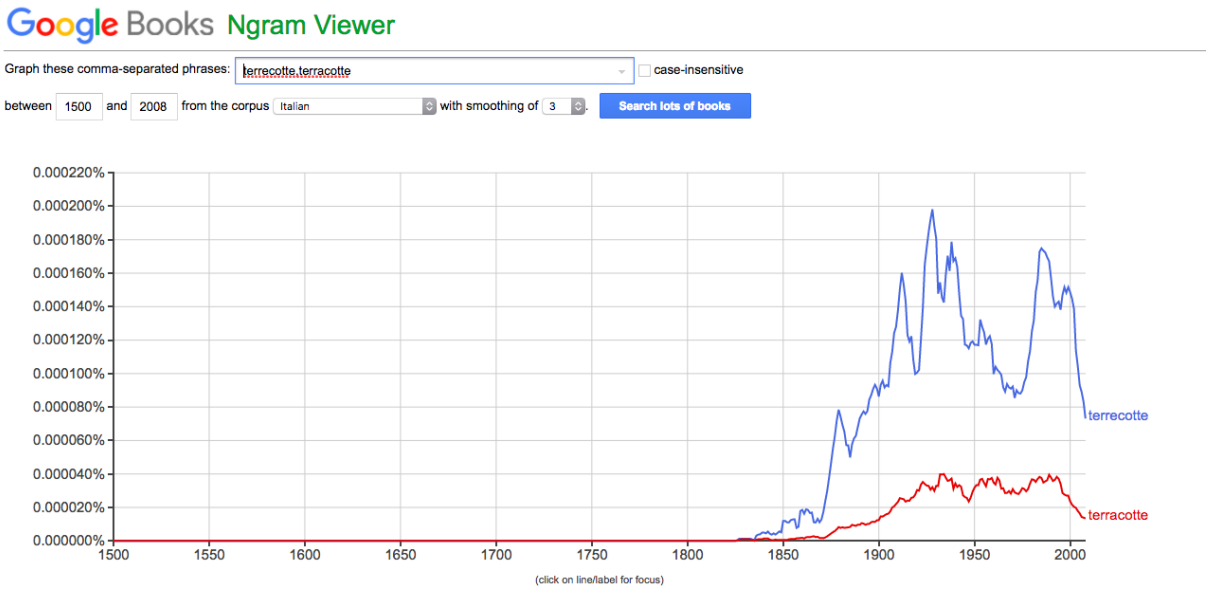
Table 2: NA compounds which show overabundance

Compound	External inflection	Double inflection	*Ratio* external infl. : double infl.	Freq. of the citation form	First occurrence	Calque
acquamarina water+marine 'aquamarine'	8	23	1 : 2,8	249	1571	no
acquatinta water+dyed 'engraving technique'	7	56	1 : 8	204	1875	no
camposanto filed+holy 'cemetery'	44	9	4,9 : 1	722	XIV cent.	no
cartapesta paper+crushed 'papier-mâché'	10	2	5 : 1	2078	XVII cent.	no
cassaforte box+strong 'safe'	72	547	1 : 7,6	4920	1866	yes
manomorta hand+dead 'mortmain'	17	35	1 : 2	244	1676	yes
piazzaforte square+strong 'fortified town'	13	122	1 : 9,4	503	1551	no
roccaforte hold+strong 'stronghold'	693	81	8,5 : 1	3049	XIII cent.	no
terracotta earth+fired 'terracotta'	143	639	1 : 4,5	4705	1342	no
terraferma land+still 'dryland'	1	10	1 : 10	3962	XIII cent.	no

Table 2 shows NA compounds in which there is overabundance in Contemporary Italian. The highest strength of overabundance (ratio < 5) is shown by *acquamarina* 'aquamarine', *manomorta* 'mortmain', *camposanto* 'cemetery' and *terracotta* 'terracotta'. Thornton (2012: 191-197) discusses the following factors which help to preserve overabundance: 1) the fact that overabundant cells belong to an independently established morphomic pattern; 2) the existence of particular constructions that require a given form; 3) the fact the forms in overabundant cells are 'learned late' by speakers; 4) frequency. The first two cannot explain the maintenance of overabundance in these Italian compounds. On the other hand, the factor of late learning can be invoked for these NA compounds (except for *camposanto* and *cassaforte*), as they do not belong to the New Basic Vocabulary and often are used in specialized varieties. If we analyze the Italian data for the last parameter, i.e. frequency, we can observe that it can explain the maintenance of overabundance of *acquamarina*, *camposanto*, *manomorta*, as these compounds have a low overall lexeme frequency. However, it cannot explain the overabundance of *terracotta*, which has the second highest frequency but does not have the highest ratio between the two cell-mates in its overabundant cells. From a diachronic point of view, it is interesting to note that this case of overabundance

is stable over time: as shown in Figure 2, which is produced by Google books Ngram Viewer by querying for *terrecotte* and *terracotte* in the Italian corpus, the two plural forms coexisted permanently during the last two centuries of the history of written Italian. Also, it is worth noting that compounds which belong to a series, i.e. compounds that share *–forte* as second constituent, show overabundance. It appears from the data examined until now that none of these factors can explain the maintenance of overabundance on its own; instead, each case seems to need an *ad hoc* explanation.

Figure 2: Number inflection of *terracotta* 'terracotta' on Google Ngram Viewers corpus



As regards the NA compounds that always show external inflection (Table 3), we can observe that they are isolated and lexicalized. In two cases, i.e. *bancarotta* 'bankrupt' and *terrapieno* 'enbankment', they also show high frequency. In the latter case, the external inflection can be due to two facts, i.e. it is a calque from the right-headed Medieval Latin compound *terraplenum* and the two constituents have different genders.

Table 3: NA compounds which show external inflection

Compounds	Double infl.	External infl.	Frequency of the citation form	First occ.	Calque
bancarotta bank+broken 'bankrupt'	0	149	4744	XVI cent.	no
terrapieno earth+full 'embarkment'	0	334	1102	XVI cent.	yes
gattabuia tunnel+dark 'clink'	0	3	206	1850	no
ceramolle wax+soft 'wax'	0	1	20	XIX cent.	no
beccofrusone beak+cone-shaped 'waxwing'	0	11	21	XIX cent.	no

The remaining NA compounds (around 44%) show double inflection. This makes it very hard to distinguish them from phrasal lexemes or noun phrases. Around one half (i.e. 52%) is made up of isolated forms, while the other half is made up of compounds which belong to a series that is no longer productive, i.e. compounds which have *acqua-* (e.g. *acquamarina* 'aquamarine') or *carta-* (e.g. *cartavelina* 'tissue paper') as first constituent. The data seem to suggest that when NA compounds are part of a series, even though it is no longer productive, they tend to form the plural by inflecting both constituents. However, this represents merely a tendency and not a systematic behavior, as shown by the compound series with *–forte* as second constituent, whose members present overabundance. Further, it is worth noting that the time of first occurrence of these compounds does not seem to affect their inflection, since they are all rather ancient words but show different behaviors.

5.2 AN compounds

AN compounds can be considered as closer to morphological structures than NA compounds, as they show a marked constituent order and, in most cases (around 83%), belong to series. Table 3 illustrates the size of these series,[7] i.e. the number of compounds which share a common first constituent. It is worth noting that, whereas series of NA compounds may share both first and second constituent, the shared constituent in AN compounds series is always the adjective.

Table 4: AN compound series

First constituents	Num. of compounds which share the first constituent	Examples
alto- 'high'	6	altopiano high+plain 'plateau'
basso- 'low'	5	bassorilievo low+relief 'bas-relief'
buono- 'good'	6	buonafede good+faith 'good faith'
doppio- 'double'	7	doppiopetto double+chest 'double-breasted jacket'
falso- 'false'	4	falsopiano false+plain 'slight slope'
madre- 'mother'	3	madreperla mother+pearl 'mother-of-pearl'
malo- 'bad'	21	malafede bad+faith 'bad faith'
mezzo- 'half'	23	mezzobusto half+bust 'bust'

[7] We have considered as 'series' the compound groups which contain at least 3 compounds sharing a common constituent.

Except for *malo-* 'bad', each first constituent reported in Table 4 is attested as a free lexeme and belongs to the New Basic Vocabulary of Italian. In Contemporary Italian, *malo-* (especially in its feminine form *mala*) occurs only as first constituent of compounds;[8] as shown in Micheli (in prep.), it can be considered as an affixoid, in the sense of Booij and Hüning (2014).

Table 5 : Distribution of AN compounds with respect to plural type

Double inflection	External inflection	Overabundance	Total
45	14	31	90
50%	15,5%	34,4%	100%

As shown in Table 5, also in number inflection of AN compounds there are many cases of overabundance, though within this compound category the double inflection represents the most frequent plural type. The fourth column of Table 6 illustrates to what extent overabundance is spread among the series examined in Table 4.

Table 6: Number inflection in AN series

Series	Double inflection	External inflection	Overabundance	Total
alto-	1 16,6%	1 16,6%	4 66,7%	6
basso-	2 40%	0	3 60%	5
buono-	4 66,7%	0	2 33,3%	6
doppio-	4 57%	0	3 43%	7
falso-	2 50%	0	2 50%	4
madre-	0	1 33,3%	2 66,7%	3
malo-	13 62%	1 5%	7 33%	21
mezzo-	15 65%	3 13%	5 22%	23

It appears from the data in Table 6 that overabundance is frequent in AN compounds with *alto-* and *basso-* as first constituent. These compounds show irregular behavior also in the singular form: in analogy to AN Latin compounds,[9] their first constituent sometimes ends in the vowel *–i* (i.e. *altipiano* or *bassipiano*), which has the same spelling as the plural marker for masculine nouns.

[8] The construction [*malo-* 'bad' + Noun] can be considered quite productive in Contemporary Italian, as shown by many neologisms such as *mala-sanità* (lit. 'bad health service'), *mala-finanza* (lit. 'bad finance'), etc.

[9] In Latin compounding, the vowel *–i* functions as the most common linking element between the two constituents. Following Ralli (2006), it can be considered as a compound marker that identifies the compounding process. According to Oniga (1992), it is the result of the phonetic change of the thematic vowel of the first constituent.

On the other hand, it is worth noting that the two largest series, i.e. compounds with *malo-* and *mezzo-*, show a strong tendency to maintain double inflection. Furthermore, we can observe that in AN compounds that form a series external inflection is very exceptional.

Instead, if we analyze AN compounds which do not belong to a series, we notice that they frequently show external inflection.

Table 7: Number inflection of isolated AN compounds

Double inflection	External inflection	Overabundance	Total
4 28,6%	7 50%	3 21,4%	14
albogatto (1) biancospino (617) drittofilo (4) primadonna (694)	bellosguardo (1) cortometraggio (9.878) mediocredito (34) mediometraggio (277) piattabanda (94) piattaforma (54.441) vanagloria (612)	biancofiore (53) cortocircuito (3.016) primogenitore (9)	

Table 7 illustrates the distribution of isolated AN compounds with regard to the plural type. For each plural type, compounds with their frequency in brackets (i.e. frequency of the citation form on itWaC corpus) are reported. It should be noted that *piattaforma* 'platform' and *piattabanda* 'lintel' come from French (i.e. *plateforme* and *plate-bande*) and *vanagloria* 'boastfulness' originates from Latin (i.e. *vanagloria*): they are probably quite opaque to speakers and thus inflected as simple words. For *cortometraggio* 'short film' and *piattaforma*, frequency seems to be the most important factor in explaining the external inflection. As far as compounds with an adjective belonging to the *–o* inflectional class are concerned (i.e. singular masculine; e.g. *medio* 'middle' or *corto* 'short'), it can be noticed that this *–o* is homophonous to the linking element in AA compounds (e.g. *italo-americano* 'Italian-American'), as shown in Grossmann and Rainer (2009) and D'Achille and Grossmann (2009). Since the number inflection in these compounds is always external, we can assume that *cortometraggio*, *mediometraggio* 'medium-length film' and *mediocredito* 'medium-term credit' show external inflection in analogy with AA constructions.

6. Discussion

Based on descriptions provided in the previous sections, in what follows we will discuss our findings on number inflection in NA and AN compounds and some theoretical issues with regard to their status.

NA compounds do not show a clear tendency, as they present many cases of both double inflection (44%) and overabundance (44%). External inflection is displayed only by fully lexicalized and frequent compounds (e.g. *bancarotta*). Frequency seems to be crucial for both external inflection and overabundance, as very frequent words tend to be interpreted as simple words and therefore to be inflected as such.[10] On the other hand, compounds which are part of a series tend to maintain double inflection. This unclear picture can be accounted for by the fact that this type of compounds is very heterogeneous, as it contains both lexicalized units (e.g. *bancarotta* or *cassaforte*) and combinations of a noun and an adjective which show a (at least partially) compositional meaning (e.g. *camposanto*, *terracotta*). The data seem to

[10] The link between high frequency and loss of semantic transparency has been shown by several psycholinguistic experiments (specifically for Italian compounds, see, among others, Marelli and Luzzatti 2012).

suggest that the combination of a noun and an adjective in Italian is productively exploited only to create phrasal lexemes, which in some cases, due to high frequency, lose their semantic transparency, increase in cohesion from a formal point of view and show word-like behavior (e.g. they are graphically univerbated and display external inflection). Thus, it seems that a truely morphological (and productive) mechanism for creating NA compounds does not exist in Contemporary Italian.

AN compounds show a more regular behavior in number inflection. They often belong to a series and form the plural by inflecting both constituents. The more productive the series is, the stronger the tendency towards double inflection, as we saw for compounds with *malo-* and *mezzo-*. Thus, double inflection seems to be a feature that is codified within these constructions.

According to the data analyzed in this study, we claim that, as far as Italian is concerned, number inflection does not represent an effective criterion for distinguishing between AN and NA compounds and phrasal lexemes (or phrases). On the other hand, double inflection seems to be a characteristic of productive series of AN compounds. We therefore suggest that, although in most cases each compound seems to need an *ad hoc* explanation, frequency (especially for NA compounds) and belonging to a series (for AN compounds) are the most relevant factors for determining inflection.

7. Conclusions

In this paper, we have investigated the number inflection of AN and NA compounds, by basing our analysis on quantitative data from a corpus of Contemporary Italian, i.e. itWaC. We have shown that NA compounds are mostly ancient and infrequent forms which originate in syntax and, in some cases, undergo lexicalization. They are probably quite opaque to speakers and interpreted as simple words. Thus, this group of forms is made up of lexical units which are not the result of a productive morphological mechanism, but rather a repository of isolated lexicalized combinations of a noun and an adjective, which do not show consistent behavior in number inflection. On the other hand, AN compounds represent a more morphological pattern mostly consisting of (sometimes still productive) series which still display a transparent internal structure and a strong tendency for double inflection.

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Formal variation does not affect morphological processing: evidence from Italian

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1. Introduction

Psycholinguistic research on morphological processing conducted on a number of different languages has provided evidence for the role of morphology in the organization of the mental lexicon, at least when formal and semantic relationships among words are transparent, e.g. *dark - darkness*. When phonological/orthographical variation (allomorphy) occurs, however, the picture seems to be less clear, as contrasting evidence, mainly based on primed lexical decision tasks, has been produced. The investigation of the nature of allomorphic relations among inflected and derived words and their bases, e.g. *fall - fell*, *broad - breadth*, is of special interest for the understanding of how words are organized in the mental lexicon.

Traditional theoretical frameworks (mainly, generative approaches) account for allomorphic phenomena by either listing all possible stem variants in an arbitrary way or hypothesizing the existence of a stored underlying form from which all its possible surface realizations can be computed. According to the latter, existent allomorphs are not assumed to be stored, except for extreme cases such as those represented by strong suppletion, e.g. *go - went*, which will be necessarily stored in the lexicon. On the other hand, most usage-based theories differ in this respect, as they do not posit a clear-cut distinction between lexicon and rules. Rather, all complex words would be stored with varying degrees of morphological connections arising among them. That is, all types of formal variants will also be stored, embedded in the inflected or derivative forms that contain them. In particular, schema-based models of morphology view the lexicon as a highly structured ensemble organized in terms of paradigmatic relationships arising among morphologically related words, which cluster together in morphological families and morphological series (Bybee 1985, 1995; Booij 2010). While in these accounts morphological relatedness is perceived as a consequence of systematic form-meaning correspondences, formal variation is not assumed to block the perception of morphological schemas among words, which is instead considered a "robust process […] not impeded by phonological differences" (Booij 2010: 251), at least as long as semantic consistency among forms is preserved.

Similarly, controversies also arise as far as the psychological implementations of such views are concerned. On the one hand, word-based models of lexical access, such as the supralexical model proposed by Giraudo and Grainger (2000, 2001; see also Giraudo & Voga 2014 for its revised version), assume an abstract morphological level arising from the connections establishing among whole words in the lexicon. Importantly, this level would emerge despite phonological/orthographic variations found among related words. On the other hand, morpheme-based models (Taft & Forster 1975; Rastle et al. 2004) posit an obligatory morphemic decomposition which should fail to occur with stem alternants, such as those found in *fall - fell* or *broad - breadth*. A third possibility is represented by connectionist accounts, in which no explicit morphological level is assumed. In these models, it is only the degree of formal and semantic overlap among words to determine the establishment of the relationships arising among them.

So far, the debate on the impact produced by allomorphic variation on the recognition of morphological relations among words has mainly concentrated on the domain of inflection and tends to coincide with the regular *versus* irregular debate, in which the controversy has centred on the specific *casus belli* represented by irregular past tense forms, e.g. *teach - taught*. In the present study, we focus on the more neglected field of derivation, for which evidence about this specific issue is still scarce. More specifically, we considered the case of Italian derived nominalizations in *-tura* and *-zione* and their relationship with two of their potential bases of derivation, namely, the past participle and the infinitive form. As will be explained in more detail later, this choice has been motivated by the possibility to explore the relationship between two possible bases showing different degrees of formal transparency with respect to the same derivative, which should shed more light on the role played by allomorphic variation in morphological processing.

2. Previous studies on allomorphic relationships

Most studies investigated this issue by means of priming methodologies, which are particularly suited to the exploration of relationships among words, given that they involve the presentation of pairs of stimuli and assess the facilitation induced by one on the recognition of the other. Briefly, when the priming protocol is combined with a lexical decision task (the most common task in psycholinguistic studies), subjects are asked to decide as quickly and accurately as possible whether a stimulus (target) presented on a screen is a word or not. Target stimuli are preceded by so-called prime stimuli (which can be visible or not depending on the amount of time they remain on the screen) that can determine subjects' latencies depending on their relationship with the prime. Primes which are related to the targets will determine faster reaction times and fewer errors, while unrelated ones will trigger slowest responses. Priming methods have been widely used to investigate factors which can alter the perception of morphological relatedness among words and will therefore be exploited in the present work too. Before presenting our study, we will first discuss the main findings which emerged from priming studies on the issue of allomorphic variation.

2.1 Inflection

As hinted above, previous studies concerning the processing of allomorphic relationships have mainly concentrated on inflection, and especially on irregular past tense forms and the relationship with their verbal stem. The seminal study by Stanners et al. (1979) was among the first to investigate this issue by means of a lexical decision task with a long-lag priming design, where primes are visible to participants but separated from their targets by a number of intervening items, in order to reduce subjects' development of response strategies. In their study, Stanners et al. (1979) presented verbs which could be preceded by either regular, e.g. *pour - poured*, or irregular, e.g. *hang - hung*, past tense forms. While priming effects arose in both cases, the facilitation effect induced by regular bases was stronger than the one produced by bases exhibiting stem allomorphy, as revealed the comparison of these effects with those determined by an identity condition, where the prime is equal to the target and, therefore, fastest reaction times are usually observed. Similar empirical findings emerged in studies investigating different languages and using different priming protocols.[1] Such results were taken as evidence

[1] Cf. on English: Napps (1989), Marslen-Wilson (1999), Marslen-Wilson et al. (1995) with cross-modal and masked priming; on German: Sonnestuhl et al. (1999) with cross-modal priming; on Hebrew: Frost et al. (2000) with masked priming.

for the existence of two different mechanisms driving lexical access. Specifically, proponents of so-called dual-model accounts (Pinker 1991; Clahsen 1999) argued that structural properties of words should converge with their processing properties (Clahsen 1999: 996). Thus, regular forms (combinations of stem + affix) would be decomposed upon lexical access and only the stem would be accessed. Repeated access to the same shared stem would then produce its full activation. On the contrary, irregular forms would not be connected with their present forms via a shared stem, but through a set of associative links yielding reduced priming.

This picture is, however, complicated by the numerous studies in which equivalent facilitation effects triggered by regular and irregular forms were found.[2] While it is difficult to explain such disparate findings, Pastizzo and Feldman (2002) proposed to reconsider the framework within which such studies are interpreted; instead of positing a rigid dichotomy between regular and irregular categories, such results could be analyzed as a continuum of regularity. In this respect, an interesting insight can be gained from their study; they considered the priming effects of regular and irregular English past forms, by further dividing the set of irregular verbs into two subsets, according to their degree of formal overlap with the base. Interestingly, they obtained priming effects for regular and irregular forms with similar degrees of overlap, e.g. *hatched - hatch* and *fell - fall*, both sharing around 68% of their letters, but no effect was found for those irregular forms which are more formally distant from their base, e.g. *taught - teach* (56% of overlap). Their proposal entails that it is not the fact of being irregular *versus* regular to affect priming, but rather other dimensions, such as the degree of formal similarity, in which words may differ in a crucially gradient way.

2.2 Derivation

When we consider derivation, however, the picture is less clear, mainly due to the scarcity of studies on the issue of formal variation within the realm of derivation. There are good reasons to consider derivation separately from inflection. Even if we do not ascribe to the view proposed by certain types of dual-mechanism models (among others, Clahsen et al. 2003) which posit categorical differences between the two domains, there is no doubt that derivation and inflection exhibit different properties. Most notably, the semantic complexity derivational processes often add to the newly created word is generally greater than that brought about by inflection. Given that, in most cases, inflected forms are more tightly related to their base from a semantic point of view, it may be not surprising to find that the relationship between, for example, *fell* and *fall* is not affected by the formal disruption of the stem (Pastizzo & Feldman 2002; Crepaldi et al. 2010). Indeed, usage-based models typically predict semantic associations to be stronger than phonological ones in determining morphological relatedness. In addition, inflectional verbal paradigms benefit from the fact that their members belong to the same syntactic category, which could further reinforce the perceived degree of relatedness among their forms. Derivatives, on the other hand, can show greater variation in semantic complexity, both if compared to inflection, but also when derived pairs are examined (consider, for instance, cases of lexicalizations such as *department*).

Having said that, there are only a few studies, mainly on English, which have concentrated specifically on the issue of allomorphy in derivation. The above-mentioned study by Stanners et al. (1979) also compared the priming effects of inflection and derivation. The results that emerged highlighted that both derived words involving allomorphy, e.g. *describe - description*,

[2] Cf. on English: Pastizzo and Feldman (2002) with masked priming; on Italian: Orsolini and Marslen-Wilson (1997) with cross-modal priming; on French: Meunier and Marslen-Wilson (2004) with both cross modal and masked priming; on German: Smolka et al. (2007) with overt visual priming.

and inflected words, e.g. *burn - burned*, do prime the recognition of their stems, albeit only partially, i.e. to a significant lesser extent than identity primes do. In contrast, Fowler et al. (1985), using the same methodology and testing the same language (English), found equivalent priming effects for both allomorphic and non-allomorphic primes. In their study, the allomorphic variation could involve both the orthographic and phonological dimensions, e.g. *clear - clarify*, or only the phonological one, e.g. *heal - health*. No difference was found in both kinds of allomorphic variation compared to the facilitation produced by a transparent prime on the same target (*heal – healer*, *clear - clearly*). Similar results were obtained by Marslen-Wilson et al. (1994) through a cross-modal priming design (where the prime is auditory and the target is visual). Their study compared the priming effects triggered by formally transparent (*friendly - friend*) and opaque derivations (*elusive - elude*, *vanity - vain*), finding that these were equivalent.[3] Importantly, they also included an orthographically (but not morphologically) related set of items (*tinsel - tin*) and demonstrated that the effects found for truly morphological relatives were not due to their degree of formal overlap.

Two more recent studies investigated further the issue of allomorphic processes using a masked priming methodology, in which participants do not consciously see the prime. This methodology, which is also used in the present study, can therefore provide a picture of the early phases of lexical access which could crucially differ from the one emerging from studies where the prime is visible, such as the above-mentioned. The first study was conducted on English by McCormick et al. (2008) and focused mainly on minor formal alterations occurring at the boundary between stems and affixes that impede perfect segmentation. Specifically, the study considered derivatives exhibiting: (i) a missing 'e' at the morpheme boundary, e.g. *adorable - adore*, (ii) a shared 'e' at the morpheme boundary, e.g. *lover - love*, (iii) a duplicated consonant at the morpheme boundary, e.g. *wrapper - wrap*. Interestingly, the priming effects induced by morphologically complex stimuli characterized by such orthographic alterations were found to be equivalent in magnitude to those induced by morphologically complex stimuli that can be parsed perfectly into their morphemic constituents. However, as noted by the authors themselves, the types of formal change considered in this study are highly predictable, to the point that they can be used productively in word formation (McCormick et al. 2008: 309). On the basis of such results, the authors conclude that a process of obligatory decomposition can take place during the early stages of word recognition despite the presence of minor orthographic alterations, at least when these can be predicted. The orthographic representations of the stems are thus claimed to be underspecified.

Interesting developments of this line of research were provided by the study by Orfanidou et al. (2011), which focused on cases exhibiting more disruptive stem changes in Greek complex words. The study aimed at exploring two stages of lexical access, by using both a masked priming and a delayed priming design. In the masked priming experiment, derivations containing allomorphic stems did not prime their verbal stem (e.g., *poto - pino*, 'drink - I drink'), contrary to what happened in formally transparent derivatives (e.g., *grafi - grafo*, 'writing - I write'). Notably, non-morphological and semantically unrelated prime-target pairs exhibiting the same degree of orthographic overlap of pairs like, e.g. *tricha - trivo* 'hair - I rub', did not prime each other either, while semantically unrelated, but orthographically transparent forms primed their targets, e.g. *mania - mana* 'mania - mother'.

On the other hand, both types of morphological primes facilitated the recognition of their targets in the delayed priming experiment, i.e. when the prime was fully visible, while both types of non-morphological and semantically opaque primes (*tricha* and *mania*) failed to

[3] See also Marslen-Wilson and Zhou (1999) for analogous findings using an intra-modal auditory priming protocol.

facilitate their targets (*trivo* and *mana*). From these results, it seems that, when formal stem alterations are more extensive, the relationship between base and derivative is impaired, but only in the early phases of lexical access. At later stages, semantics would come into play ensuring priming in the *poto* - *pino* cases and inhibiting it in the *mania* - *mana* pairs.

Taken together, the interpretation arising from the findings from both studies is that, at early stages of word recognition, morphological relatives exhibiting minor and predictable formal changes would be flexible enough to undergo morpho-orthographic segmentation. Crucially, according to both studies, it is not the contribution of semantics that ensures priming effects, but merely a superficially 'morphological' structure exhibited by the prime words. When changes in the stems are more disruptive, however, this mechanism would be impaired, and, given that semantics plays no role according to the approach proposed by both studies,[4] there would be no source of facilitation for the recognition of the targets.

3. The present study

Given the scarce amount of evidence concerning derivation, we propose to further contribute to the debate, focusing on Italian, a language for which evidence from priming studies is even less available (see, however, Orsolini & Marslen-Wilson 1997 for inflection). In particular, we focus on deverbal nominalizations in *-tura* and *-zione*. From a synchronic point of view, the base of derivation of most derivatives with these suffixes can be considered to be either the verbal theme or the past participle form, e.g. *bocciatura* 'failure' might equally derive from the past participle *bocciato* 'failed' or the verbal theme in the infinitival *bocciare* 'to fail'; similarly, *riparazione* 'repair' might equally derive from *riparato* 'repaired' or *riparare* 'to repair'. Analyses which take the infinitival stem or the participial stem have been proposed and can account for the formation of many such nominalizations.[5] However, a number of nominalizations in *-tura* and *-zione* can only be thought of as derived from the past participle form of the verb (as many of them are in fact learned borrowings from the Latin past participle) and not from the verbal theme, e.g. *scritto* 'written' - *scrittura* 'writing', but not *scrivere* 'to write' - *scrittura*; *illuso* 'deluded' - *illusione* 'illusion', but not *illudere* 'to deceive' - *illusione* 'illusion'. To elaborate, in the first set of verbs, both the past participle and the infinitival form hold a transparent relationship with the nominalization. In the second set of verbs, however, formal transparency is ensured only with respect to the participial stem, but not to the infinitival one, where the phonological shape appears to be altered.

On such grounds, our research question is centered on the understanding of whether the different amount of formal overlap found in given verbal paradigms can affect the perception and the recognition of a morphological relationship. In other words, we wonder whether such difference can influence the recognition of *illusione* when primed by *illuso* and by *illudere*. In order to investigate this question, we made use of a lexical decision task combined with the masked priming technique, in which we compared latencies to derived nominalizations of both types preceded by past participle and infinitival forms of the base verb. According to a morpheme-based view of lexical access, we should expect facilitation to arise only for the pair *illuso* - *illusione*, since the stem *illus-* should be pre-activated by the presentation of the prime and latencies should benefit from repeated stem activation. On the other hand, in a word-based model characterized by connections among words, positive links would be established among

[4] Their interpretation, specifically, follows the morpho-orthographic segmentation account originally proposed by Rastle et al. (2004), and Rastle and Davis (2008).

[5] See Thornton (2015), for a review of the debate on which one should be considered the base and her own proposal of an abstract stem formally coinciding with the imperative form.

all forms participating in the same morphological family and inflectional paradigms. Therefore, *delusione* is predicted to be connected with both *deluso* and *deludere* and, accordingly, priming effects should be observed among the two forms and the derivative.

3.1 Method

3.1.1 Participants

40 native speakers of Italian, 14 males and 26 females, aged from 20 to 33 years (mean age: 22,8), with normal or corrected-to-normal vision, participated in the experiment. All of them had high-school or university education and took part in the experiment voluntarily.

3.1.2 Stimuli and design

We selected 80 nominalizations in *-tura* and *-zione* as critical items to be used as targets in this experiment. They were further divided into two subsets, so that half of them (40) held a transparent relationship with both stem allomorphs and the other half was transparent only with respect to the participial stem. The experimental design comprised five prime conditions: (i) an identity condition, (ii) a morphological condition represented by past participle forms, (iii) another morphological condition represented by infinitival forms, (iv) an orthographic condition, and (v) an unrelated condition. For the purpose of the task, 80 non-words were constructed through the combination of a non-existent root and an existent suffix (either *-tura* or *-zione*, to prevent participants to develop response strategies), such as *crellosazione*, which, in the two morphological conditions, could be preceded by *crellosato* or *crellosare*. Five experimental lists were created, each containing 160 items, in which the prime conditions were rotated by means of a Latin square design. Each target word appeared only once in each list, primed by one of the possible primes (identity, morphological past participle, morphological infinitive, orthographic, and unrelated), so none of the participants saw the same target twice. The experimental design is summarized below:

Table 1: Experimental design

Condition	Transparent set	Opaque set
Identity	violazione/VIOLAZIONE	illusione/ILLUSIONE
Morphological (P. Part.)	violato/VIOLAZIONE	illuso/ILLUSIONE
Morphological (Inf.)	violare/VIOLAZIONE	illudere/ILLUSIONE
Orthographic	violino/VIOLAZIONE	illustre/ILLUSIONE
Unrelated	scadere/VIOLAZIONE	condire/ILLUSIONE

For the selection of the critical items, some criteria were followed: (i) we excluded cases where neither the verbal theme nor the participle form can be considered the base, e.g. *aggressione* 'aggression', which synchronically can be derived from neither *aggredire* 'to assault' nor *aggredito* 'assaulted', (ii) even though many of these deverbal nouns often have more than one semantic value, we avoided cases of semantic drift in which no explicit semantic link is present and semantic compositionality is lost, e.g. *statura* 'height', diachronically derived from *stare* 'stay'. Moreover, all prime stimuli in both sets were carefully matched for frequency, with frequency estimates taken from the ItWac corpus. Word length was also controlled, so that

primes for the same target could differ in maximum two letters. Mean frequency and length values are given in table 2:

Table 2: Mean frequency and length values for primes

Overall		
Prime type	**Frequency**	**Length**
Morphological (P. Part.)	3,74	7,4
Morphological (Inf.)	3,65	8,3
Orthographic	3,64	7,9
Unrelated	3,69	7,6
Opaque set		
Prime type	**Frequency**	**Length**
Morphological (P. Part.)	3,79	6,7
Morphological (Inf.)	3,65	8,5
Orthographic	3,61	8,0
Unrelated	3,69	7,5
Transparent set		
Prime type	**Frequency**	**Length**
Morphological (P. Part.)	3,69	8,1
Morphological (Inf.)	3,66	8,1
Orthographic	3,67	7,8
Unrelated	3,70	7,7

Since a key feature of this experiment was the degree of formal overlap between primes and targets, particular attention was devoted to this aspect. On the one hand, transparent and opaque primes had to exhibit different degrees of orthographic overlap with their targets, for the experiment to be able to shed light on potential differences in facilitation effects. On the other hand, we tried to match the orthographic primes in both sets in order to distinguish form from form-and-meaning associations and to be able to evaluate their consequences for the recognition of the targets. Computation of formal overlap was performed using the MatchCalculator application by Davis and Bowers (2006). The relevant information is shown in table 3:

Table 3: Mean degree of overlap exhibited by primes and targets

Mean degree of overlap between primes and targets		
	Transparent set	**Opaque set**
Morphological (P. Part.)	0,77	0,82
Morphological (Inf.)	0,78	0,58
Orthographic	0,56	0,59

3.1.3 Procedure and apparatus

The experiment was run on a PC computer using the DMDX software (Forster & Forster 2003). Each trial consisted of three visual events: the first was a forward mask made up of a series of hash marks that appeared on the screen for 500ms. The mask was immediately followed by the prime, which appeared on the screen for 66ms. The target word was then presented and remained on the screen until participants responded or timed-out (after 3000 ms). To minimize visual overlap, primes were presented in lowercase and targets in uppercase, both in Arial 16. Participants were instructed to decide as quickly and accurately as possible whether the target stimuli they saw were words or not, by pressing the appropriate buttons on the keyboard. They were not aware that a prime word was presented. After 20 practice trials, participants received the 160 items in two blocks.

4. Results

Correct response times (RTs) were averaged across participants after excluding outliers (RTs that were two standard deviations above and below the mean, 4,63% of the data). Results are presented in Table 4. An ANOVA was performed on the data with prime type factor (identity, past participle, infinitive, orthographic, and unrelated) and transparency factor as within-participant factors. Since a Latin Square design was used, we did not perform separate subject and item analyses, but only a F1 statistic test, as recommended by Raaijmakers et al. (1999).

The analysis of RTs latencies showed a main effect for Transparency, $F1(1,39)= 24.24$, $p < .0001$ and Prime Type, $F1(4,156)= 15.42$, $p < .0001$. The interaction of transparency by prime was not significant, $F1(4,156)=2.26$, $p > .05$. Significant differences ($p < .05$), as revealed by pairwise comparisons, are indicated in Table 4. An analysis of the error rates showed no main effect (All $Fs < 1$).

Table 4: Reaction Times and SD (in milliseconds), error rates (in %) for lexical decisions to word targets in each transparency and priming condition, with net priming effects relative to the identity, orthographic and the unrelated prime conditions. *: $p < .05$

	Prime type	**RTs (SD)**	**Errors**	**U-I**	**O-I**	**U-Mpp**	**U-Mi**	**O-Mpp**	**O-Mi**	**Mpp-Mi**
Opaque set	Identity	577(86)	1,25%	19*	22*	20*	21*	23*	24*	1
	Morphological pp	575(88)	0,94%							
	Morphological inf	575(74)	2,19%							
	Orthographic	599(92)	0,94%							
	Unrelated	595(79)	2,50%							
Transparent set	Identity	589(95)	0%	42*	29*	41*	46*	28*	33*	5
	Morphological pp	590(84)	1,88%							
	Morphological inf	585(85)	1,56%							
	Orthographic	618(95)	1,88%							
	Unrelated	631(98)	2,50%							

Significant facilitation effects arose when the target was preceded by both types of morphological primes, suggesting that morphological relatedness is strongly perceived between nominalizations and both the possible bases in the verbal paradigm. Importantly, this was true for both transparent and opaque sets, indicating no advantage of more transparent primes in determining facilitation effects on the recognition of the derived form. Morphological effects were significant when compared to both the unrelated and the orthographic control conditions.

Moreover, there was no significant difference between the effects induced by the past participle and the infinitive primes in both sets. Priming effects induced by morphological primes in both the transparent and the opaque set did neither differ significantly from those triggered by identity primes, suggesting comparable magnitudes of facilitation.

5. General discussion

The findings that emerged from the present experiment clearly show equivalent amounts of facilitation induced by both past participle and infinitival primes in the recognition of Italian deverbal forms with *-zione* and *-tura*, irrespective of their formal transparency. This seems to indicate that the degree of morphological relatedness between two forms is not impaired when phonological alterations occur, as predicted by the above-mentioned word-based models of morphology. According to morpheme-based approaches, only the transparent stem *illus-* should be contacted during processing and, therefore, facilitation effects should be observed only when *illuso* is presented as a prime for *illusione*. However, the fact that even the less transparent form *illudere* yields significant priming would seem to suggest that access does not actually proceed through segmentation of morphemic constituents and identification of the stem.

The observed pattern of facilitation effects is in line with most research studies investigating allomorphic relationships through priming techniques. However, it is worth reminding that, in these works, facilitation effects were mainly observed through the use of cross-modal and overt priming methodologies, which, crucially, are supposed to reflect later stages of lexical access, tapping into a more central level of lexical representations. However, Orfanidou et al. (2011) obtained different patterns of facilitation effects depending on the methodology used; crucially, formally opaque morphological forms primed their targets in the delayed priming task, but failed to do so in the masked priming task. At this point, it is worth highlighting that while masked priming effects with allomorphic variants are not predicted within purely morpheme-based decompositional approaches, they have indeed been observed and accounted for by Crepaldi et al. (2010), as far as inflection is concerned. Using a masked priming experiment, the authors observed that, in English, a form such as *fell* facilitates the recognition of its base *fall* more than an orthographically-matched form, e.g. *fill*, and an unrelated control item, e.g. *hope*. To account for such results, Crepaldi et al. (2010) hypothesize the existence of a higher-level mediating between a semantic and a morpho-orthographic level, a so-called "lemma level", where inflected words share their representation irrespective of orthographic transparency. Interestingly, according to this view, the lemma level would not have the primary role of capturing form-meaning covariation, but rather of storing individual lexical entries defined by a specific meaning and a set of lexical-syntactic properties. For this reason, the lemma level would concern only inflected words, while derived words would have independent representations.

In a similar vein, Orfanidou et al. (2011) propose to account for their data by assuming separate orthographic representations for the two allomorph stems, which share some features at a higher semantically informed level. According to the interpretation proposed by the authors, morphological relatedness among formally opaque items would not be perceived during the early phases of morphological processing, but would arise at later stages. They explain these findings by advocating the fact that semantics would only come into play at this later stage, while semantically-blind morphemic decomposition would operate at early phases. Variations in the phonological shape of the stem would determine failure for this decompositional process to apply, given that superficial phonological/orthographic consistency between the stem and its realization in the derivative is fundamental in this approach to acknowledging morphological relations, since no reliance on semantics is possible. Within this line of interpretation, facilitation found in the study by McCormick et al. (2008) is explained by proposing that this

segmentation is tolerant to predictable phonological changes, but not to more disruptive and unpredictable variations in the stem.

This approach cannot, however, account for the results presented in our study. Specifically, it is hard to reconcile the lack of reliance on semantics with the observed effects, since it seems unlikely that formal similarity alone can be sufficient to trigger priming effects, when the degree of such formal similarity is lessened, especially when we consider that orthographic control primes (matched for degree of overlap) did not induce significant facilitation. What is more, the kind of variation investigated here is not phonologically motivated and, therefore, not predictable. We propose, instead, that a word-based semantically informed model of lexical access such as the one proposed by Giraudo and Grainger (2000, 2001) can better integrate the present findings. In this model, the facilitation effects emerging with both the formally transparent (e.g., *illuso*) and the opaque (e.g., *illudere*) primes might be due to the fact that both forms, irrespective of their degree of transparency, activate the target by virtue of their connections with it, by means of the morphological schemas in which they participate. In fact, *illudere*, *illuso* and *illusione* can be conceived of as members of the same morphological family and, in addition, *illuso* and *illudere* also participate in a verbal paradigm, which, in Italian, constitutes a very rich inflectional pattern. This could further strengthen the relationship between the more opaque form *illudere* and the derivative *illusione*, therefore boosting facilitation effects among them. In this model, importantly, words would be accessed through their whole-form and priming effects would arise as a consequence of an abstract level of morphological representation emerging from connections among word units organized around morphological families, inflectional paradigms, and morphological series. Given the robustness of morphological family size effects (DeJong et al. 2000) and the fact that these have been shown to be semantic in nature, i.e. they are significantly stronger when only semantically consistent members of a family are taken into consideration, it seems more likely that priming effects among members of the same family derive from a morphological level informed by semantics. If no abstract symbolic level was present, on the other hand, we should have observed graded priming effects arising only as a consequence of the different degrees of formal overlap between primes and targets. Since this was not the case, our findings seem also to rule out a strong version of connectionist models which do not acknowledge an abstract morphological level.

Finally, it is to be noted that it is not necessarily the case that our data contradict those obtained by Orfanidou et al. (2011). In fact, although both studies made use of a masked priming methodology, different prime durations were used: 66 ms in the present work *versus* 42 ms in the Orfanidou et al. study. To elaborate, an alternative proposal could take into consideration the time-course of morphological priming effects. In other words, it may well be the case that the two studies reflect different windows in early phases of lexical access. Clearly, further evidence based on masked priming experiments is needed to settle this issue.

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English compounds with *ing*-form heads

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1. Introduction

This paper arose from an interest in compounds whose right-hand element, typically the head in English compounds, is a form which would traditionally be labelled "participle", i.e. either the present participle or *ing*-form as in *student reading*, or a passive participle or *ed*-form as in *student led* (seminar). All English verbs have *ing*-forms and *ed*-forms, so these are often considered part of the verbal paradigm (Bauer, Lieber & Plag 2013: 62). Both forms are part of constructions which can also be seen to be part of the verbal paradigm (progressive and perfect). But both also have a range of other functions, so in some contexts labels like "noun" (for *ing*-forms) or "adjective" (for both *ing* and *ed* forms) might be more appropriate to their use (see also Huddleston and Pullum 2002: 78-83). This makes "participle" a problematic term and so in most cases where no claim is made about syntactic categories the labels *ing*-form or *ed*-form will be preferred. What follows is devoted entirely to compounds whose second element is an *ing*-form, and so the discussion will touch upon the range of functions that can be performed by an *ing*-form when compounded with another element. Compounds with an *ing*-form as a second element have been called synthetic, since they have, alongside other forms, a deverbal second element (see Lieber 1983 and 2004, for example). Some of these X-V*ing* compounds are also argumental, i.e. the left-hand element X (usually a N(oun)) is an argument of the verb from which the *ing*-form (i.e. V*ing*) is derived.

This paper assumes that it is possible and advantageous to model compounds as constructions, i.e. form-meaning pairings, as in Booij (2010) and Hilpert (2015). Another assumption made here as in Hilpert (2015) is that constructions enter into relationships with each other, e.g. the *ing*-form or the *ed*-form-headed compound constructions can inherit some properties from the *ing*-form or the *ed*-form themselves.

Two more specific questions will be explored here: What are the possible types of compound constructions headed by an *ing*-form? What are the relationships between these types and how can such relationships account for the possibility/impossibility of constructions?

The next section summarises some observations about compounds headed by an *ing*-form from the research literature relevant to the current study, which is presented in section 3.

2. Some properties of compounds headed by an *ing*-form

The initial observation that prompted this research was that compounds with an *ed*-form element or an *ing*-form element seem to be possible with a wider range of elements as a left-hand element than suggested in much of the literature. The research was subsequently restricted to compounds with an *ing*-form as a right-hand element (henceforth often referred to with the shorthand X-V*ing*). Given this interest and starting point, the data for this investigation was gathered from corpus searches, in most cases the BNC, but also COCA. Searches aimed to explore what can precede or follow an *ing*-form and so the search strings were along the lines of *-*ing or *-*ing _NN*. As in the approach employed by Hilpert (2015), a hyphen was included in the searches as a way of limiting the results to compounded forms. This of course meant that results were partial. However, as the aim was simply to find

what patterns were attested, without attention to frequency and distribution, no compensatory mechanism for this was sought. The data returned by the searches was investigated manually, looking for instantiated patterns. The research reported here is similar to an extent to the research reported in Lieber (2016). The results of that study will be directly relevant and will be summarised next.

As mentioned above already, *ing*-forms are generally recognised to have three functions: nominal use, adjectival use and verbal use. The same three functions have been discerned in compounds headed by *ing*-forms, see for instance below (all examples from the BNC). Further discussion and examples can be found in Lieber (1983).

(1) So, no doubt as a result of some **string-pulling** from Bletchley, Harold's local recruiting office was instructed by the War Office to recruit him into the Intelligence Corps. (BNC)

(2) . . . The journey through the lava forest ends at the town, a **fish-smelling** old port, and in need of a coat of paint, yet vibrant and friendly.

(3) The male will not tolerate any disturbance from his prospective mate while he is **nest-building**.

What restrictions there are on the left-hand element in a X-V*ing* compound has been scrutinised in earlier studies, e.g. Roeper and Siegel (1978), Lieber (1983), Lieber (2016), and references therein. Various constraints have been put forward, summarised succinctly in Lieber (2016: 517). Amongst those relevant to X-V*ing* nominalisations with event interpretation she lists the prohibition of the left-hand element being a subject of the event underlying the V*ing* nominalisation, the tendency for the left-hand element in a compound to be the "closest sister" of the verbal base (citing Selkirk 1982), and the condition that all internal arguments of the verb should be satisfied within the compound, as well as the impossibility of event properties with synthetic compounds (citing Borer 2013, see original for further details).

Lieber (2016) tests these restrictions against corpus data and concludes that the possibilities are more varied than previously observed. She gives the following examples showing that the N in an N-V*ing* compound can be interpreted not only as the object of V, but also as the subject of V (the examples below are adapted from Lieber (2016: 529-530); see original for full examples and sources):

(4) Grapheme-phoneme correspondence is used during **braille reading by beginning readers**, less-skilled readers, and skilled readers when the text is relatively difficult.

(5) It has been reported that both announced and unannounced quizzes increase attendance (...), increase **student reading of assigned material** (. . .) and increase studying in between exams (. . .)

As the above show, the left-hand element in an X-V*ing* compound can have both object and subject reading. Not only is the range of the first element in a compound wider than previously attested, but as (Lieber 2016: 529-530) points out, arguments of the underlying event can be expressed both within the compound and in its external syntax.

The availability of the arguments of the underlying verb to the *ing*-nominals is taken as evidence that the nominal has inherited the argument structure of the verb, and so Lieber

(2016: 520) points out that complex event readings are available to N-V*ing* compounds and gives the following examples:

(6) The significance of positive, competent **role modelling by teachers** to assist students in forming desired practices is both known and accepted.

(7) **Soil Eating by Animals** to Correct Mineral Deficiencies

The lack of restrictions on the argumental configurations of X-V*ing* compounds is accounted for by Lieber (2016) via the assumption that the *ing*-nominalisation inherits the argument structure of the base verb:

$$\text{read}_i \quad \leftrightarrow \quad [E_i(\text{SUBJ},\text{OBJ})]$$

$$\Downarrow$$

$$\text{reading}_i \quad \leftrightarrow \quad [E_i(\text{SUBJ},\text{OBJ})]$$

Assuming this argument structure for the *ing*-nominalisation, Lieber's (2016) analysis then runs as follows (adapted): The N non-head in an N-V*ing* nominal compound is co-indexed to the highest available argument by default, or otherwise to the semantically compatible argument in V*ing*'s argument structure:

(8) a. $\text{student}_j\text{-reading}_i \leftrightarrow [E_i(\text{SUBJ}_j,\text{OBJ})]$
b. $\text{braille}_j\text{-reading}_i \leftrightarrow [E_i(\text{SUBJ},\text{OBJ}_j)]$

The left-hand element in the compounds above links to the subject in (8a) because this is the preferred option, but to the object in (8b) because linking to the subject is semantically odd (braille can't be the agent of a reading event).

3. This study

The current study extends the focus on X-V*ing* compounds to look at those cases where the X-V*ing* compound is embedded before another noun, i.e. it looks at cases where we have X-V*ing* N. In many of these cases the X in X-V*ing* is also a noun, so we have a sequence of three elements with the middle being an *ing*-form. These are structures like the following:

(9) There is **PCB-burning capacity** in Sweden, Finland, Germany and France, of which only the last is, like Britain, prepared to import such waste. (BNC)

(10) ... So too were **fee-fixing agreements** covering securities dealing.

(11) Unfortunately, more and more schools are moving towards **decision-making structures** that will actually assist this diverted focus. (BNC)

As can be seen from these examples, the N in the embedded N-V*ing* sequence can be an object of the underlying event, even though the N-V*ing* sequence itself may resist eventive modification (i.e. we can't say **frequent decision-making structures*). The N underlying the N-V*ing* sequence can also be interpreted as the underlying subject, as in the examples below:

(12) Before the hypotheses could be tested, MANOVA was used to determine if a significant difference existed between the experimental and control groups in **student reading level** and level of metacognition. (COCA)

(13) The primary goals of an independent **student reading policy** are to improve literacy achievement among adolescents and cultivate a lifelong habit of reading a variety of genres (. . .) (COCA)

We can derive this behaviour by assuming that the construction inherits from two constructions simultaneously, or that two constructions are joined together. The first construction is the one we already encountered when discussing X-V*ing* compounds with eventive semantics. The other construction is the N_1N_2 compound construction, where N_1 is said to be in some semantic relation to N_2. Crucially, however, the N_2 is not an argument of the event underlying the compounded N-V*ing*. The noun in the N-V*ing* compound can be the subject of the underlying event, as sketched below:

$\text{student}_j\text{-reading}_i$ + $N_1\ N_2$
[E*i*(SUBJ*j*,OBJ)] [N_1 in some Relation to N_2]

⇓

$[[\text{student}_i\text{-reading}_i]\ N_2\ ]$
$[E_i(\text{SUBJ}_j)$ in some relation to $N_2]$

Alternatively, the noun in the N-V*ing* compound can be the object of the underlying event:

$\text{braille}_j\text{-reading}_i$ + N_1N_2
$[E_i(\text{SUBJ},\text{OBJ}_j)]$ [N_1 in some Relation to N_2]

⇓

$[[\text{braille}_j\text{-reading}_i]\ N_2]$
$[E_i(\text{OBJ}_j)$ in some relation to $N_2]$

However, we sometimes find cases where the rightmost N in the N-V*ing* N structure is also an argument of the underlying event. Such constructions are illustrated by the following examples:

(14) I have encountered **Arena-reading Young Conservatives** who get on The Smiths and Sex Pistols (. . .) (BNC)
(15) In **'harem'-forming societies** the non-reproductive male population may form a 'bachelor' section of the social unit (. . .) (BNC)

When we have such argumental N-V*ing* N sequences, where both the N preceding the V*ing* and the N to the right of V*ing* can be interpreted as arguments of the event underlying the deverbal *ing*-form, we can interpret the rightmost nouns as subject and the left-hand noun as object, but, it would seem, not the other way round. So we can say *book-reading student*, but we can't say **student-reading book*.

This would not be surprising if we think of the compound N-V*ing* as a modifier. According to Bauer, Lieber and Plag (2013: 310), when used as modifiers, V*ing* participles from transitive verbs tend to be "strongly subject-referencing", i.e. tend to be predicated of the subject of the underlying event, which licenses *reading student*, *swimming fish*, *annoying neighbour*. In other words, in such constructions we have a participle which inherits some event semantics from the underlying verb and is able to bind the underlying subject to the noun it modifies:

$$[V_i\text{-ing } N_j] \leftrightarrow [E_i(SUBJ_j)]$$

A compounded N-V*ing* construction can be embedded in such a construction, but only if the rightmost noun binds the underlying subject, leaving the leftmost noun to bind an underlying object where relevant. This is sketched below:

$\text{braille}_j\text{-reading}_i$	+	$V_i\text{-ing } N_j$
$[E_i(SUBJ,OBJ_j)]$		$[E_i(SUBJ_j)]$

$$\Downarrow$$

$$[[\text{braille}_j\text{-reading}_i]\ N_k]\ [E_i(SUBJ_k,OBJ_j)]$$

The paper started with the observation that V-*ing* forms can be nominal, adjectival, or verbal and that the same is true of the compounded X-V*ing* forms. So far, however, we have encountered mostly N-V*ing* forms which can be nominal, or possibly adjectival, but we haven't seen any candidates for a verbal use of a N-V*ing* construction. This paper will have little to say about such constructions. However, some possible instances were found in the BNC or via Google searches:

(16) The male will not tolerate any disturbance from his prospective mate while he is **nest-building**. (BNC)

(17) I was **fire-watching** in the coal yard. (BNC)

(18) You are not **gun-running** or anything, are you?

(19) I was **track-running** and playing rugby, yet my father never received one sports report from school, he said. (BNC)

(20) My old woman is **house-hunting**, she'd like this.

The question, of course, arises whether we are dealing here with the progressive construction, or with a predicative use of an adjectival X-V*ing* construction.[1] What might weigh the scales towards a progressive interpretation at least in some of the examples above is, for example, the embedding of the N-V*ing* construction after a temporal *while* in (16), the modification for

[1] Special thanks to the MMM11 audience for discussion of this point.

place in (17), and the coordination with a clear progressive in (19). At the same time the examples above do not permit modification by *very* or *too*, or a replacement of the verb *be* with a verb like *seem*, which would indicate adjectival status (see Huddleston and Pullum 2002). If a progressive interpretation turns out to be valid, then it would appear that in the progressive construction too the left-hand element in the compound can be an argument of the event underlying the verb (contra observations in Lieber 1983). Such candidates for progressive constructions with an argumental relationship between the left-hand element and the V*ing* form are not easy to find. This isn't surprising given the paucity of compounds headed by verbs in English generally (see Plag 2003, for example).

4. Conclusion

This paper looked at compounds with an *ing*-form head. If understood as constructions, the properties of such compounds can be modelled as falling out of a network of such constructions. As in previous research, constructions are assumed to inherit properties from each other. For example, inheritance by the participle of the eventive semantics of the verb and the verb's argument structure provides an explanation for the freedom in interpretation of N-V*ing* argumental nominal compounds. However, this paper also assumes that properties of constructions are additionally dependent on some relationship of embedding or conjoining. Such a merger of the N-V*ing* argumental construction with other constructions can help explain the different patterns of argument interpretation in N-V*ing* N sequences.

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Conceptual salience of prefixes in L2 acquisition and processing: a reading-time study within context

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1. Introduction

The basic idea of this study is related to the fact that a large part of current psycholinguistic literature seeking to determine the representation and processing of constructed words has somehow neglected to take into account both their internal structure and the relationships they bear with other lexical units. The wealth of linguistic literature on the field of morphology (among others, Corbin 1987/1991; Aronoff 1994, 2007; Aronoff & Fudeman 2005; Blevins 2006; Marantz 2013 and many others) provides us with an uncontroversial definition: morphology deals both with the internal structure of words (i.e., syntagmatic dimension) and the systematic form-meaning correspondences between them (i.e., paradigmatic dimension). Aside from linguistic debates about which dimension is responsible for the other, i.e., lexeme-based approach *vs* morpheme-based approach, the study of the cognitive processes underlying recognition and comprehension of complex words has to take into account both aspects, i.e., the internal structure and the various kinds of relationships morphologically complex words bear with each other.

At this point it has to be noted that the strict dichotomy between bottom-up (perception) and top-down (production) models has not helped to take into account this double aspect of constructed words. This dichotomy has been so strong that it has somehow prevented researchers from working on phenomena and through materials/conditions likely to make observations and generate data from a "window" situated in an intermediate position.

It is acknowledged that lexical access studies usually adopt an exclusively orthographic bottom-up view, which is quite restrictive for studying the central levels of L2 processing, given that the priority is given to form and visual factors. On the other hand, top-down protocols (e.g., word production) seem difficult to apply to particular categories of words, e.g. morphologically complex words, as well as to the study of cross-linguistic differences or similarities (among others, Dijkstra et al. 2010), which could be very enlightening with respect to the question of the organising principles of the bilingual lexicon. We therefore observe that in the domain of morphological processing, the bottom-up approach[1] starting from perception (lexical access) data, attributes the primacy to the levels situated at the first stages of processing, i.e., to the formal levels. As a consequence, it focuses mostly on orthographic processes (i.e., Casaponsa & Duñabeitia 2016, on language activation with bilinguals), neglecting the conceptual and semantic levels.

This approach has clearly been dominant in the debates about morphological processing for at least twenty years, and has led to various versions of the decompositional account (among others, Rastle et al. 2004; Amenta & Crepaldi 2012), positing mandatory and more or less blind decomposition as the basic mechanism of morphological processing, independently of constructed words' linguistic characteristics, i.e., lexical frequency, lexical or non-lexical

[1] For a review, see Baayen (2014), Voga and Giraudo (2017).

status of the constructed (or pseudo-constructed) words, and others (for a detailed review, see Voga & Giraudo 2017). As Giraudo and Dal Maso (2016b: 6) underline "the issue of the relative prominence of the whole word and its morphological components has been overshadowed by the fact that psycholinguistic research has progressively focused on purely formal and superficial features of words, drawing researchers' attention away from what morphology really is: systematic mappings between form and meaning".

This paradigmatic dimension of constructed words has nevertheless led to variables which have been proved to influence morphological processing: the Morphological Family Size (for L1, De Jong et al. 2000; for L2, Voga 2015; Voga & Giraudo forthcoming), typological variation related to verb usage (Voga et al. 2012, monolingual Greek experiments) or word status of morphologically complex stimuli constructed with French bound-stems (Giraudo & Voga 2016).

In what follows, we propose to study a novel variable of conceptual-semantic nature, namely the conceptual salience of the prefix, by examining processing of constructed words not taken in isolation, i.e., presented individually (without context) as the vast majority of morphological processing studies does, but within context. This methodology, based on the self-paced reading technique, is not frequent for the study of constructed words. Nevertheless, there are some recent studies, essentially in production, presenting pictures to L2 participants within-context (among others, Starreveld et al. 2014).

The focus of this study is on parallel language activation. The experimental setting using sentence context is chosen in order to boost the activation of all elements in the target language system, as compared with the in-isolation condition (without context). This boost stems from the appropriate "language cue" activated when pictures are presented in context (Starrenveld et al. 2014: 271). Under these conditions, a part or the whole of the upcoming picture's semantic representation is preactivated, particularly for what the authors call the "low-constraint sentence" context. By doing this, Starrenveld et al. (2014) place their experiments in a configuration which is the exact opposite of the low-level orthographic processing of words in isolation (among others, Casaponsa & Duñabeitia 2016). Starrenveld et al. (2014) study a situation where the "language cue" (provided by the context) allows to directly grasp the central levels of processing, given that it allows the lexical processor to consider words exclusively from the language indicated by the script, operating a kind of "selection" (for a similar explanation, see Gollan et al. 1997; La Heij 2005).

Our study also examines words within-context, for two particular reasons; the first one is that the constructed words tested here with L2 participants are not very frequent, and their morphologically complex (prefixed) status may render them difficult for our L2 subjects to process, recognise, and correctly distinguish them from the inconsistent item (as we shall see further), in order to make a consistency judgment. The second reason is that, if one seeks to explore the role of a variable of conceptual nature, it is difficult to imagine how the semantic central-level representation of the word can be contacted (or activated), if the meaning of the word in its natural conditions of occurrence, i.e., in sentences, is elusive. In other words, examining our constructed words within context allows us to adopt the most favourable configuration to study conceptual and semantic factors.

2. The variables under study

2.1 The variable conceptual salience (of the prefix)

As shown above, the literature on L2 processing has somehow neglected the variables of paradigmatic nature that could influence morphological segmentation and processing. This is probably related to the reasons already mentioned in the introduction, but also to the fact that

English is not the most appropriate ground for morphological analysis (Anastassiadis-Symeonidis & Mitsiaki 2010).

The idea of morphological salience refers to the prominence of a morpheme (stem or affix) in a morphologically complex word and has been dealt with, implicitly or explicitly, in several ways and definitions, from (token/type/relative) frequency (among others, Voga & Giraudo 2009), productivity, contribution of the constituents to the meaning of the complex word (among others, Plag 2003), to surface characteristics (among others, pseudo-derivation effect, Longtin & Meunier 2005) and their perception (Giraudo & Dal Maso 2016a,b). However, in many of these cases, morphological salience is related to form.

In a recent study, Giraudo & Dal Maso (2016a) examine the salience of the suffix *-etto* along with the distributional properties of the suffixes (morphological series): the suffix *-etto* (e.g., *albergo* 'hostel' – albergetto 'small hostel') is a suffix in only 40% containing this sequence, and presents non-protorypical semantic and functional properties. Consequently, the presence of this suffix renders the identification of the base more difficult for the L1 speakers, since the participant cannot easily decide if the form preceding *-etto* is a base or not. This situation is exactly the opposite to what happens with a suffix such as *-tore*, e.g. *pescatore* 'fisher', which leads to a completely different priming pattern. The pattern of masked priming effects of this study demonstrates the influence of the variable "salience": reduced salience corresponding to the suffix *-etto* leads to slower reaction times and to no effect for the base condition, whereas the effect of the base condition is significant for the constructed words containing *-tore* and *-ico.*

In what follows, we decided to focus on the semantic aspects of salience, studying the salience of the prefix. This salience is related to morphosyntactic iconicity, as it has been defined in the framework of Natural Morphology (Kilani-Schoch & Dressler 2005), and more generally, in Natural Morphology (Dressler et al. 1987), where iconicity is the factor which structures the French inflectional morphology and can be motivated by linguistic cues independent of frequency. As Nobile (2014) observes, in morpho-syntax, most of researchers adopt the binary distinction between *diagrammatic iconicity*, which is perceived as being morpho-syntactic and in which relationships between *signifiants* (signifiers) represent relationships between *signifiés* (signified), and *imagic iconicity* which is essentially considered as being phonological.

However, this definition, starting from form and relating multiplicity to reduced iconicity, does not reflect in a satisfactory way the role of the variable we examine here, which concerns the semantic and conceptual level and not the form. Therefore, our definition of salience has to be completed by the notion of the embodiment according to the grounded cognition approach, as has been defined by Barsalou (1999, 2016) and, at the level of neurolinguistic study, by Binder (2016). Such a definition leaves the possibility of having multimodal representations, i.e., representations that do not occur through one and unique modality, but through several modalities, covering a wide spectrum of meanings. Our definition of salience implies the role of these distributed representations, as opposed to localist representations.

Our definition of the conceptual salience of a prefix is related to the multiplicity of the prefix's semantic instruction meanings.

(1) a. *προνήπιο* [pro´nipio] 'prekindergarten'
b. *προβλέπω* [pro´vlepo] 'foresee'
c. *υπεραγαπώ* [iperaγa´po] 'to treasure'

In (a)-(c), the prefixes *προ-* and *υπερ-* are salient, because they encode only one semantic instruction meaning.

(2) a. *επίδειξη* [e΄piδiksi] ‘demonstration’
b. *επικίνδυνος* [epi΄cinδinos] ‘dangerous’

In 2 (a)-(b), the multiplicity of the prefix’s *επι-* semantic instruction meanings reduces salience. The number of meanings of the semantic instruction is estimated with the help of the *Liddell, Scott, Jones (1996)* AG dictionary and above all the *Dictionary of Standard Modern Greek* (1998); this multiplicity can be viewed as an epiphenomenon, since what counts is the degree of homogeneity of the prefix’s semantic instruction, which can be obscured by various factors, e.g., the application of metaphoric or metonymic semantic rules on the base-word before that of Word Construction Rules (Corbin 1987/1991).

2.2 Semantic Transparency

Given that the prefix forms only a part of the constructed word, it would not have been correct to define salience independently of the whole, i.e., the constructed word, which means that conceptual salience cannot be examined without reference to the transparency of the constructed word. If we consider the constructed words with *προ-* [pro] *προηγουμένως* [proiγu΄menos] ‘previously’, *προπονητής* [proponi΄tis] ‘trainer’, *προνόμια* [pro΄nomia] ‘privileges’ and *προοπτική* [proopti΄ci] ‘perspective’ on one hand, and *προκατασκευασμένο* [prokatasceva΄zmeno] ‘prefabricated’, *προβλέπουμε* [pro΄vlepume] ‘we predict’, *προνήπιο* [pro΄nipio] ‘prekindergarden’ and *πρόπερσι* [΄propersi] ‘two years before’, on the other hand, we observe that the meaning of the words of the 2nd group is easier than that of the 1st group. This difference does not arise from the prefix, but from the opacity of the constructed lexeme (prefixed word). The variable transparency was therefore included in the experiment. The two variables, conceptual salience (of the prefix) and semantic transparency (of the lexeme), have been crossed. We obtain thus the following conditions:

(i) Non transparent words with a salient prefix, (S+T-), e.g. *προνόμια* [pro΄nomia] or *προαγωγή* [proaγo΄ji]
(ii) Transparent words with a salient prefix (S+T+), e.g. *υπεραγαπώ* [iperaγa΄po] or *προνήπιο* [pro΄nipio]
(iii) Transparent words with a non-salient prefix (S-T+), e.g. *διαδίκτυο* [δia΄δiktio] or *επικάλυψη* [epi΄kalipsi]
(iv) Non transparent words with a non-salient prefix (S-T-), e.g. *επίδειξη* [e΄piδiksi] or *διαπρέπω* [δia΄prepo] (see table 1 for examples).

2.3 Working Hypotheses

The homogeneity of the semantic instruction of the prefix (conceptual salience) will ease the perception of the meaning of the morphologically complex word. Prefixes such as *υπο-* [i΄po] and *υπερ-* [i΄per] or *προ-* [pro] are more salient than *απο-* [a΄po] and *δια-* [δi΄a], and will give rise to consistency effects of larger amplitude.

The effect of conceptual salience should be of larger amplitude for transparent conditions than for the opaque ones (S+T+ > S+T- > S-T+ > S-T-).

3. The experiment: Self-paced reading experiment in L2 Greek with context

3.1 The participants

The participants are 23 foreign advanced learners of Greek who have been living in Greece for at least 6 months. Their countries of origin are: Serbia, Bulgaria, Czech Republic, Ukraine, Belarus, Russia, Hungary and U.S.A. All of the participants are adults aged 22-39 years.

3.2 The stimuli

64 contexts-stories were used as stimuli. Each one of them contained a critical item, which appeared as the last word of the context-story. For every context-story, two critical items were created, the first one was consistent and the second one was inconsistent (see Table 1 for examples). The context-story was as simple as possible.

Table 1: Context-stories and items

	Context-story containing a consistent critical item	Non-consistent item
S+T-	*Η Μαρία είναι φίλη μου και την αγαπώ πολύ. Όσο και να λες κακά πράγματα γι' αυτήν, εγώ θα την* ***υπερασπίζομαι [ipera΄spizome]*** 'Maria is a friend of mine. I will keep on **defending** her no matter what you say about her'	***υπεραμύνομαι [ipera΄minome]*** 'ward of attacks from'
S+T+	*Η Ελλάδα έχει πολύ μεγάλο δημόσιο χρέος, δηλ. πρέπει να πληρώνει κάθε μήνα τα δάνεια που έχει πάρει. Το χρέος της Ελλάδας είναι* ***υπέρμετρο [i΄permetro]*** 'Greece has got an enormous public dept, meaning that the country has to repay its loans on a monthly basis. The Greek dept is **excessive**'	***αναλογικό [analoji΄ko]*** 'proportional'
S-T+	*Παλιά για να φτάσει ένα γράμμα από τη μία χώρα στην άλλη ήθελε τουλάχιστον πέντε μέρες. Τώρα γίνεται αυτόματα, γιατί έχουμε το* ***διαδίκτυο [δια΄δiktio]*** 'In the past it took at least five days for the mail to reach its destination. Today everything happens automatically thanks to the **Internet**'	***διάστημα [δι΄astima]*** 'space'
S-T-	*Οι εφημερίδες γράφουν για τον υπουργό ότι έχει κάνει σκάνδαλα και παρανομίες. Αυτός όμως λέει ότι έχει γίνει στόχος* ***επίθεσης [e΄piθesis]*** 'Newspapers have made allegations of scandal and illegality against the minister. However he claims that he has been the target of **attack**'	***κατάθεσης [ka΄taθesis]*** 'deposit'

3.3 The procedure

The 64 phrases containing the critical items were presented to subjects in a self-paced reading protocol, i.e., fragment by fragment on the computer screen with a non-mobile window. Every time the subject pressed the spacebar, the next fragment appeared and the previous one disappeared, so that they could read only one fragment at a time, and going back was not possible. The stimuli were presented and reaction times were recorded through the DMDX program (Forster & Forster 2003). The critical item (consistent or inconsistent – C/NC)

appeared at the end of the phrase-context. Participants were asked to make a consistency judgment (Yes/No), and their reaction times, i.e., the time the subject needed to answer if the item was C or NC), were recorded. Two lists were created for this experiment, in such a way that each subject saw all phrases with either the C (half of the phrases) or the NC item, without ever seeing both in the same phrase-context. Subjects had a brief training session before the experiment.

3.4 The results

Mean reading times per condition were calculated (see Table 2) after excluding errors and outliers (<800ms and >7000ms). We ran an analysis of variance (ANOVA), with the factors A (consistency, C/NC), L (salience, L+/L-) and T (transparency, T+/T-) as independent variables, according to the experimental plan S23*A2*L2*T2. The main effect of consistency was significant [F1(1, 22) = 14.01, p<.001], but the main effects of salience and transparency were not (both Fs>1). The interaction between the three variables was not statistically significant, F1(1, 22) = 2.69. The interaction between consistency and transparency showed a trend to significance [F1(1, 22) = 3.46].

Table 2: Reaction times (RT) in milliseconds (ms) for the 8 experimental conditions and net consistency effects (NC-C) of exp. 1 (B1-B2 level)

	Consistent (ms)	Non-consistent (ms)	Consistency effect (NC – C)
S+T+	3643	3789	145
S+T-	3243	4056	813*
S-T+	3367	3928	560*
S-T-	3515	3879	364

The significant consistency main effect means that globally the processing of the consistent items was significantly faster than that of the inconsistent ones. Planned comparisons show us which ones of the consistency effects are significant and which are not. This will allow us to estimate the facilitation induced by the consistent condition (relatively to the inconsistent condition) and compare these facilitation effects obtained for each category of critical items (S+T+, S+T-, S-T+, S-T-) between them.

Planned comparisons revealed that only the S+T- and the S-T+ consistency effects (813ms and 560ms respectively) were significant [F1(1, 22) = 8.07, p<.01, and F1(1, 22) = 9.46, p<.01, respectively]. The other two conditions, S+T+ and S-T-, did not yield any significant consistency effects [F1<1, and F1(1, 22) = 2.92, respectively], as shown in Table 2 (significant effects are denoted by an asterisk). This pattern of results can be interpreted as following: for the participants of Exp. 1, the "easiest" conditions to process are the S+T- and the S-T+ conditions, i.e., salience without transparency and transparency without salience. What is somewhat surprising is that the S+T+ conditions, which were supposed to be the easiest ones to process, did not manage to yield any effect. The S-T- conditions induced no effect, which is exactly what we expected. Before presenting a general discussion, we consider it necessary to compare these results to previous results, where participants were learners of Greek at a more advanced level.

4. Comparison to previous results (Voga, Nikolaou & Anastassiadis-Symeonidis 2017)

We compare the above results to those of Voga, Nikolaou & Anastassiadis-Symeonidis (2017), where exactly the same stimuli and exactly the same protocol were used, with a reduced number of subjects (16 subjects, from the same pool, i.e., students in the School of Modern Greek Language in Thessaloniki). The only difference was the linguistic competence of the subjects: C1-C2 level for exp. 2 *vs* B1-B2 level for exp. 1.

Table 3: Reaction times (RT) in milliseconds (ms) for the 8 experimental conditions and net consistency effects (NC-C) of exp. 2 (C1-C2 level)

	Consistent (ms)	Non-consistent (ms)	Consistency effect (NC – C)
S+T+	3511	4030	519*
S+T-	2824	3594	770*
S-T+	3264	3627	363
S-T-	3357	3342	-15

The results were processed exactly in the same way as for exp. 1. Mean reading times per condition were calculated (see Table 3) after excluding errors and outliers (<800ms and >7000ms). We ran an analysis of variance (ANOVA), with the factors A (consistency, C/NC), L (salience, L+/L-) and T (transparency, T+/T-) as independent variables, according to the experimental plan S16*A2*L2*T2. The main effect of consistency was significant [$F1(1, 15) = 11.78$, $p<.001$], while the main effect of salience was not ($F<1$). The main effect of transparency showed a trend towards significance [$F1(1, 15) = 3.02$]. The interaction between S and T shows a (small) trend towards significance, despite the small number of participants, [$F1(1, 15) = 2.69$]. Planned comparisons show that the 519ms effect for S+T+ conditions was significant [$F1(1, 15) = 4.61$, $p<.05$], as well as the 770ms effect for the S+T- conditions [$F1(1, 15) = 10.32$, $p<.001$]. The difference between C and NC conditions was not significant for the two other conditions S-T+, $F1(1, 15) = 1.37$ and $F<1$ for the S-T- condition.

The first conclusion from exp. 2 is that the participants of C1-C2 level exhibit significant consistency effects for the salient conditions (S+T+ and S+T-), but not for the non-salient ones. In other words, the "easiest" conditions to process are the salient ones (S+T+ and S+T-), whether they are transparent or not. However, we cannot say that the variable salience affects the reaction times of our subjects in a completely independent way with respect to transparency, given the trend towards significance of the interaction between these two variables. What is clear is that we cannot, on the basis of the results of a reduced number of subjects, exclude the role of transparency in interaction with salience. These results (exp. 1 and 2) will be discussed in the following section.

5. Discussion

We examine the implications of our findings for the following issues: how do L2 learners process complex words and what kind of variables influence morphological segmentation in L2 (Anastassiadis-Symeonidis & Mitsiaki 2010)? The two experiments reported above examined the role of the salience of the prefix, related to the multiplicity of the prefix's semantic instruction. This variable is of paradigmatic nature, extending beyond the limits of the constructed word(s) under examination. In our experiments, this variable is crossed to

semantic transparency, a classic variable in morphological processing, referring to the constructed word itself, independently of the relationship it bears with other lexical units. The statistical analysis of the reaction times showed that, in exp. 2 (with C1-C2 learners) the salient conditions induce facilitatory consistency effects, whereas the non-salient ones do not. In exp. 1, with intermediate learners of Greek as an L2, two conditions out of four manage to induce facilitatory consistency effects (the S+T- and the S-T+ condition).

Before going any further, we need to point out that the experiment presented above was not an easy one: the task (consistency judgment) that our participants had to fulfil required full comprehension of the meaning of the word, and could not be (correctly) answered on the basis of familiarity or other variables of this type. Not only did the subjects have to identify the word, but they also had to identify its exact meaning and distinguish this meaning from that of another word having approximately the same frequency, the same prefix – in most of the cases – and the same length. Most of the research on processing constructed words, in L1 and L2 alike, is conducted by using protocols where the participant sees words in isolation (one by one) and has to make a quick decision on the lexicality of the stimuli presented in the middle of the screen (lexical decision), name the stimulus (naming task), type it, etc. In all these situations, we cannot be sure that the language system has really processed the meaning of the word, although all protocols of lexical decision are not equivalent with respect to the degree in which they assess the meaning of the word (cf. Voga & Giraudo 2017, for more details).

If we consider for instance the lexical decision task, according to the Multiple Read-out Model (MROM, Grainger & Jacobs 1996; see also Hoffmann & Jacobs 2014), a classic computational model of orthographic processing in visual word recognition based on the interactive activation model (IAM; McClelland & Rumelhart 1981), a "WORD" response is given when the activation exceeds a certain criterion value. However, correct lexical decisions (Yes/No) can also be made without such lexical access to a certain word representation. This so-called first-pass judgment or fast-guess mechanism is generally said to be based on stimulus familiarity (Jacobs et al. 2003), which is, parenthetically, exactly what several pieces of data interpreted in decompositional terms are doing: nonwords such as *sportation*, *quickify*, related to a familiar base, e.g., *sport*, *quick*, lead to correct lexical decisions (or delay rejection times), on the basis of orthographic bottom-up activation, without necessarily involving what linguists call morphology, which is supposed to be related to semantics, one way or another (Voga & Giraudo 2017: 243). Therefore, the most important contribution of our study is to evaluate the role of the variable tested in an ecologically valid manner, i.e., in a protocol where the meaning of the word has to be assessed in order to respond to the consistency judgment.

The main effect of consistency was significant for both levels of participants, which means that not only the more advanced learners but also the B1-B2 learners are able to correctly distinguish morphologically complex words and exhibit facilitatory effects for the consistent conditions. Our results show that the distinction between consistent and inconsistent words is facilitated for the salient items in exp. 2 (advanced level students), showing 519ms and 770ms of facilitation for the salient conditions, both transparent and opaque. In exp. 1 however, with participants with a lower level of language proficiency who have not been particularly exposed to morphological analysis, we cannot say if it is transparency, salience, or both variables that facilitate processing, given that the conditions that induce significant facilitation are the S+T- and S-T+ conditions, i.e., salience without transparency and transparency without salience. There is, in both experiments, an indication of the interaction between these two variables (although this interaction is not significant, there is a trend instead), which could point towards another aspect of what is usually called “transparency” and admittedly encompasses several aspects of semantic and conceptual characteristics. From this point of

view, the conceptual salience of the prefix we examined here could be another one of these characteristics.

If we go back to our results, the students of the C1-C2 level of competence (exp. 2) seem to have acquired a (more or less conscious) strategy based on salience of the prefix and semantic transparency of the constructed word, which does not seem to be the case for the B1-B2 group. This result can be taken as evidence that the competence of the C1-C2 students is qualitatively different from that of B1-B2 students, since C1-C2 students seem to be sensitive to a variable arising from the conceptual level. This result, i.e., sensibility to morphology based on variables of paradigmatic nature, is compatible with approaches in which the central levels of the system play a role through morphological variables, e.g. the multiplicity of the prefix's semantic instruction meanings (Morphologie Constructionelle, Corbin forthcoming; Bybee's Network Model 1985, 1988, 1995; Booij 2010, 2016).

This result is also compatible with any approach attributing more importance to lexical and semantic factors than to orthographic-perceptual ones, such as the Revised Hierarchical Model (RHM, Kroll & Stewart 1994; Kroll et al. 2010). One of the basic assumptions of the RHM, which is a model of L2 competence based on production data, is that the strength of the connections between the lexical and the conceptual level becomes greater as L2 acquisition progresses.

The above findings undermine any account based on sublexical decomposition into morphemes in which the segmentation into morphemes occurs independently of the characteristics of the words (among others, Rastle et al. 2004 for monolingual processing; Duñabeitia et al. 2013 for bilingual processing). If this were the case, the different categories of base+prefix words tested in our experiments should give rise to equivalent effects (or at least similar effects for transparent and non-transparent words).

Our results suggest in fact the opposite, i.e., that the facilitatory effect induced by the stimuli categories tested here depends on, or is influenced by, variables that extend far beyond prelexical characteristics, besides the fact that the words tested here, at least the transparent ones, are all equally decomposable. This provides evidence that the locus of the consistency effect for L2 constructed words is not situated at a sublexical (prelexical) level. Our results, at least for the C1-C2 group (and partly for the B1-B2 group), show that the locus of our effects is situated at the lexical level and above, given that the conceptual salience of the prefix influences participants' responses. The supralexical model and its extensions (for monolinguals see Giraudo & Grainger 2001, 2003; for bilingual processing see Voga 2014, 2015; Voga & Giraudo forthcoming) could fit these data. In a supralexical approach, the morphological level is situated above the lexical level, in such a way that what happens at the lexical level is constrained by the feedback of the morphological level, which is the level where information related to morphology is coded.

In the case of the variable tested here, the feedback from the semantic level leads to a higher activation within the morphological level: the conceptually salient stimuli will thus receive a higher amount of activation than those with a non-salient prefix (exp. 2). Note however that this type of account, in terms of cognitive processes taking place in the mental lexicon, is to be completed by variables/elements related to a 'mind-external' dimension. In the experiments reported above, the multiplicity of features, i.e. the multiplicity of the prefix's semantic instruction meanings, e.g., of the prefix *επί-*, as in *επίδειξη* 'demonstration' (versus *προ-*, as in *προβλέπω* 'foresee'), are not just ways to describe the grammatical or syntacticosemantic properties organized in a word's paradigm, but constitute these properties themselves by their semantic content and the manner of their combination (Acquaviva, 2016: 137). Consequently, the experimental data presented here can be seen as a demonstration of the role and influence of lexical atoms (Acquaviva, 2014; 2016) during L2 acquisition of a morphologically rich language. From another point of view, our data suggest that "processes"

do not tell the whole story and that language specific information about word boundaries may influence the ease of L2 acquisition, including in terms of "informativity" (Geertzen et al. 2016).

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