Where did the Italian Verbal-Nexus N+N compounds come from?

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1. Introduction

This article aims to trace the origin and development of Italian Verbal-Nexus N+N compounds (henceforth VNX NNs), such as *trasporto merci* – 'transport of goods', based on the Google n-grams frequency lists (2020), which are the most extensive diachronic linguistic data currently available.

Italian VNX NNs represent a prominent – and probably the only productive – higher-order subordinate NN construction in Romance (Rainer 2016, Baroni, Guevara & Zamparelli 2009, Radimský 2018) and it is considered, along with others subordinate Italian NNs, a very recent innovation. Indeed, the existing literature does not report cases of subordinate N+N Italian compounds attested before 1950 (Tolemache 1945, Micheli 2020a, 2020b). The first examples are assumed to appear around the 1970s (Dardano 2009:226-229), presumably under a certain influence of American English, they tend to be associated with specific contexts of use, namely with telegraphic language of journalism (journal titles) and the style of bureaucratic documents, while in spoken Italian they are rather sparse (Baroni et al. 2009). However, to the best of my knowledge, the diachronic evolution of Italian subordinate NNs has not yet been empirically investigated on large corpora. In order to fill this gap, the present article provides a detailed analysis of a large sample of Italian VNX NNs in the most recent version of Google n-grams (2020) data, within the theoretical framework of Construction Morphology (CM, Booij 2010, 2016, Traugott & Trousdale 2013) and Relational Morphology (RM, Jackendoff & Audring 2020).

The paper is organized as follows: Section 2 will outline basic properties of Italian VNX NNs, Section 3 will sketch the theoretical background and hypotheses concerning the diachronic emergence of this pattern within the CM and RM framework; Section 4 will discuss the data-gathering process and Section 5 will present in turn results concerning the diachronic profile of the whole sample (relative type and token frequency, 5.1.), data about the first/last appearance of individual compounds (5.2.) and diachronic profiles concerning the most prominent N-1 and N-2 based families or 'semi-schematic constructions' (5.3.).

Although the technical processing as well as the interpretation of such a large data is very challenging, two important conclusions emerge from this analysis. First, we will show that Italian VNX NNs are older than previously assumed, their emergence is linked to the bureaucratic language of the newly established Italian kingdom in the mid-19th century and the pattern was popular especially during the Fascist period. Second, we will attempt to put forward hypotheses about the respective roles of N1(head)-based and N2(argument)-based families in the process of creation of the VNX NN compounding pattern, which may be of a more general interest.

2. Italian verbal-nexus NNs

Italian *Verbal-nexus NNs* (also referred to as *Argumental NNs*) represent a subtype of endocentric subordinate compounds consisting of a deverbal head and a non-head element which is interpreted as its argument. Over the past decade, a number of studies have been devoted to them, focusing on three questions in particular, namely:

(i) Should they be analyzed rather as morphological constructions, i.e. compounds (cf. Gaeta & Ricca 2009, Masini & Scalise 2012, Radimský 2015, Lami & Weijer 2022), as compound-like syntactic phrases (Bisetto-Scalise 1999, Delfitto & Paradisi 2009) or as a heterogenous class (Baroni, Guevara & Zamparelli 2009)?
(ii) How to delimit this category? First of all, should it only cover cases where the non-head element is the internal argument of the deverbal head – that is, in terms of Generative grammar, the direct object or the subject of the underlying unaccusative verb – (Baroni, Guevara & Zamparelli 2009, Baroni, Guevara & Pirrelli 2009), or should it include also other types of predicate-argument (or even predicate-adjunct) relationship (Scalise & Bisetto 2009, Radimský 2015)?
(iii) What morphological (e.g. inflection) and syntactic (syntactic atomicity) properties do they have (Bisetto-Scalise 1999, Baroni, Guevara & Zamparelli 2009, Radimský 2015, Lami & Weijer 2022)?

In this paper, I will leave aside the question (iii) concerning morphological and syntactic properties of VNX NNs and as for the point (i), all VNX NNs will be treated as a homogeneous group of subordinate compounds that represents one morphological higher-level construction.[1] As for the delimitation of the VNX NNs (ii), I will adopt a permissive approach in line with Scalise and Bisetto (2009) that involve all different types of predicate-argument or predicate-adjunct relationship. However, the core group of 'canonical' VNX NNs in line with Baroni, Guevara and Zamparelli (2009) will be predominant in the data, as it is also in current use.

Indeed, the starting point of this research is a sample of 1,364 VNX NNs collected by Radimský (2015), where 80% of types (let us call them "canonical VNX NNs") feature a deverbal event noun as head and the non-head (its argument) corresponds to the direct object of the underlying verb. The head may be either a zero-derived (1a-1b) or a suffixed (1c) noun.

(1) a. *noleggio auto* (rental_car) – 'car rental'
b. *trasporto merci* (transport_goods.pl) – 'goods transport'
c. *trattamento rifiuti* (treatment_vaste.pl) – 'waste treatment'

The remaining 20% of the sample represent various non-canonical VNX NNs, be it with respect to the properties of the non-head or the head element. That is, the non-head may have a different role than the direct object (2-6), the head may be a (deverbal) result noun (7) or a deadjectival noun (8).

(2) *caduta massi* – "rockfall" (non-head = subject of an unaccusative verb)
(3) *attacco hacker* – "hacker attack" (non-head = subject of a transitive verb)
(4) *accusa maltrattamento* – "allegation of ill-treatment" (non-head = indirect object)
(5) *applicazione laser* – "laser application" (non-head = adjunct)
(6) *uscita autostrada* – "highway exit" (non-head = adjunct)

[1] Notice that within the Construction grammar framework adopted here, all constructions are of the same nature, be they morphological or syntactic, so the dilemma is irrelevant.

(7) *deposito bagagli* – "luggage [storage room]" (the head is a result noun)
(8) *pericolo terrorismo* – "terrorism danger" (the head is deadjectival)

Canonical VNX NNs, i.e., examples (1a-1c), may be described in terms of Construction and Relational morphology as a pair of sister constructions schematized in (8). As various scholars agree, this pattern represents a prominent higher-order subordinate NN construction available in Romance (Rainer 2016; Baroni, Guevara & Zamparelli 2009).

(8) $[N_iN_j]_{Nk} \leftrightarrow [V_i{>}N_{i\text{-head}}\ \mathbf{RELx}\ N_{j\text{-non-head}}]_k$
$[V_iN_j]_{Nk} \leftrightarrow [V_i\ \mathbf{RELx}\ N_{j\text{-direct\_object}}]_k$

Single instances of VNX NNs are also attested in French (9), but by far lacking the regularity present in Italian data (Radimský 2018).

(9) Fr. *exposition photos* – "photography exhibition"

3. Theoretical bacground

Construction Morphology as well as Relational Morphology are conceived of as usage-based models, which entails that schemas available in the Constructicon capture generalizations over a critical mass of already attested words. In other terms, when it comes to the emergence of new constructions in a diachronic perspective, "constructionalization" must be based on previous individual "innovation" (in the sense of Traugott & Trousdale 2013). It is not the aim of this study to find out where the various individual Italian "innovations" – i.e. first examples of VNX NNs – came from, but to date their origin and to trace the process of "constructionalization" that led to the emergence of the productive schema of VNX NNs described in (8) above.

The process of constructionalization is not a matter of just one schema, but of the whole hierarchical network of schemas in the constructicon. In our case, the subordinate VNX NN construction (10c) represents a specific case of the subordinate NN construction (10b) which is in turn an instance of the more general left-headed NN pattern (10a). A similar hierarchy can be observed in the reverse direction, because between the general VNX SUB NN schema (10c) and the individual instances of compounds (10e) we can assume the existence of semi-schematic VNX SUB NN constructions (10d) based either on the same head noun (10d1) or on the same non-head noun (10d2).

(10) a. Left-headed NN construction
$[N_iN_j]_{Nk} \leftrightarrow [N_{i\text{-head}}\ N_{j\text{-non-head}}]_k$

b. SUB NN construction
$[N_iN_j]_{Nk} \leftrightarrow [N_{i\text{-head}}\ \text{REL}\ N_{j\text{-non-head}}]_k$

c. VNX SUB NN construction
$[N_iN_j]_{Nk} \leftrightarrow [V_i{>}N_{i\text{-head}}\ \text{REL}_X\ N_{j\text{-non-head}}]_k$
$[V_iN_j]_{Nk} \leftrightarrow [V_i\ \text{REL}_X\ N_{j\text{-direct\_object}}]_k$

d. SUB NN semi-schematic constructions
d.1 SUB NN semi-schematic constructions based on the same N1
$[\textbf{\textit{trasporto}}\ N_j]_{Nk} \leftrightarrow [\text{TRASPORTO}_{i\text{-head}}\ \text{REL}\ N_{j\text{-non-head}}]_k$
...

d.2 SUB NN semi-schematic constructions based on the same N2
$[N_i$ ***merci*****$_j]_{Nk}$** ↔ $[N_{i\text{-head}}$ REL *merci* $_{j\text{-non-head}}]_k$
...

e. **Individual instances of NNs**
e.1 *noleggio auto* (‘car rental’)
e.2 *trasporto* ***merci*** (‘freight transport’)
e.3 *trattamento rifiuti* (‘waste treatment’)
e.4 *scarico* ***merci*** (‘goods unloading’)
e.5 ***trasporto*** *persone* (‘passenger transport’)
...

To the question of the interrelation of hierarchical constructions in the process of constructionalization, recent research in the framework of Construction Grammar gives a fairly unambiguous answer: it is a bottom-up process, where new schemas correspond to areas in which examples encountered so far cluster (cf. the notion of *coverage* by Goldberg 2019: 51-73), while increasing type frequencies of lower-order schemas do not automatically strenghten the mental representation of higher-order schemas (cf. Hilpert 2015 for compounds).

A similar view is also offered by Relational Morphology, which does not yet have a comprehensive model of diachronic language development, but whose premisses about constructionalization in language acquisition can be easilly applied to the language change (Jackendoff & Audring 2020: 218-232). Constructionalization in Relational Morphology consists of two steps. First, relational links between the existing words must be built through the process of “Structural Intersection”, and then it is necessay to determine whether these new relational schemas are productive. The key operation of Structural Intersection (Jackendoff & Audring 2020: 223-225) is quite straightforward in the case of derivation, where the shared phonological material corresponds to the affix, and the shared morphosyntactic as well as semantic properties must also be associated with it, at least in some way. When it comes to compounds, however, we encounter a serious difficulty, because between the individual instances of compounds (10e) and the closest schematic construction (10c) there is no shared phonological material, which entails that Structural Intersection would have to be entirely based on very abstract semantic and/or morphosyntactic categories and relations. It therefore seems reasonable to hypothesize that semi-schematic constructions, such as those in (10d), may play a prominent role in the proces of compounds constructionalization. Such a view is not new: it is consistent with the assumption of Laurie Bauer (2017: 74) that “*it is not the N+N pattern of compounding which is productive, but patterns with individual lexemes within that*“, as well as with the observation of Franz Rainer (2016:2714) that within Italian N+N compounds, “*neologisms tend to follow analogues or series of analogues with the same first or second constituent*.” Although it may seem counterintuitive from a functional point of view, a quantitative study on French N+N compounds has shown that such family-size effect is prominent with both N1 (=head noun) based and N2 (non-head noun) based families (Radimský 2020). One of the questions addressed in this investigation will therefore be: what is the role of semi-specified constructions (families) in diachrony?

4. Data gathering

The research is based on extensive diachronic data drawn from the *Google books* corpus that has been made available by Google in the form of raw frequency lists as the 3rd version of

Italian *Google n-grams*.[2] The size of the underlying Google books corpus is 120,410,089,963 tokens from 1,209,932 volumes,[3] which – by a simple extrapolation of figures provided by Lin et al. (2012) – may represent roughly 16% of volumes ever published before 2010. Data for the extraction of N+N compounds come from bigrams and trigrams (in order to capture compounds with space-separated and hyphen-separated components, respectively) that were pre-treated and merged together into the it2020_bi dataset[4] using the procedure described in detail by Radimský (2022). The whole it2020_bi dataset from which function words have been filtered out comprises 19,319,372 non-lemmatized types.

The starting point for subsequent data filtering was the sample of 1,364 contemporary VNX NN compounds (lemmas) identified in the ItWac corpus by Radimský (2015). On this basis, a sample of 1,185 VNX compounds (words) was retrieved in the it2020_bi dataset. In order to achieve a higer accuracy, most compounds have been checked back manually in Google books and many false positives have been eliminated. Word forms rather than lemmas have been used as basic units, because it turned out that by virtue of morphological ambiguity, some inflected forms are a frequent source of false positives in real texts, as exemplified in (11).

(11) a. *valutazione*$_{.sg}$ *danno*$_{.\mathbf{N.sg}/V.pl.}$ (NN) 'damage assessment' – true positive
b. *valutazione*$_{.sg}$ *danni*$_{.N.pl}$ (NN) 'damage assessment' – true positive
c. *valutazioni*$_{.pl}$ *danno*$_{.N.sg/\mathbf{V.pl.}}$ (NV) 'provide evaluation' – false positive

False positives due to syntactic ambiguity, such as (12), have also been filtered out.

(12) a. *[uscita merci]*$_{?}$?'goods exit'
b. *[se vengono dichiarate [per l'**uscita**]] [**merci** di cui non occorre che sia provata l'esportazione]* – 'If goods whose export is not to be proved are declared for exit'

On the other hand, a number of new compounds were added to the sample due to the fact that additional types could be retrieved manually for prominent semi-specified constructions (families).

For the final sample of 1,185 VNX compounds, dated numbers of occurrences in Google books were available from 1850 to the present with a year-by-year precision.

5. Results

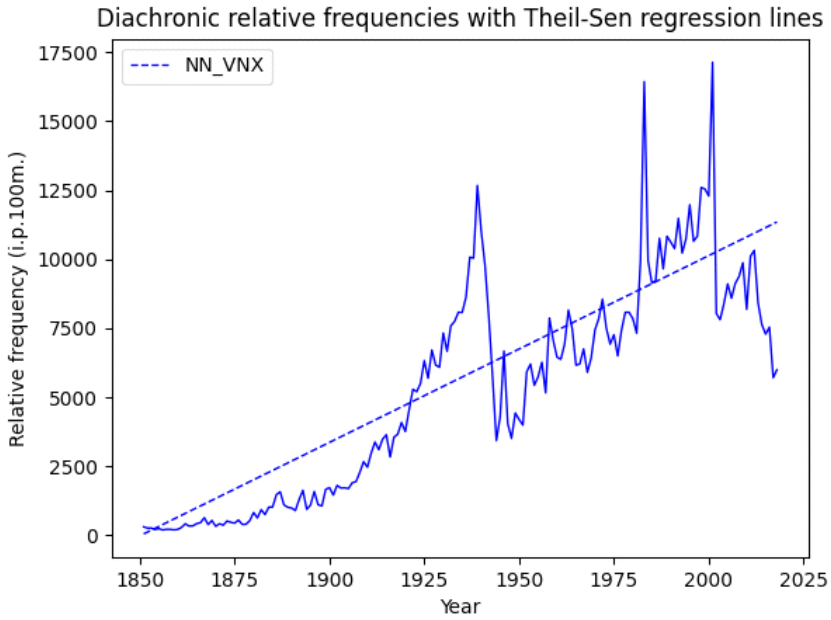
5.1. Diachronic profile of the whole sample

A comprehensive diachronic overview of the use of Italian VNX NNs is illustrated by Figures 1 and 2 that provide, respectively, the sum of relative token frequencies and the relative type frequency for all the compounds in our sample. To identify diachronic trends and draw regression lines, Theil-Sen estimator was used and supplemented, where necessary, with the Mann-Kendall test for significance testing (cf. Kovář & Herman 2013, Python implementation by Hussain & Ishtiak 2019).[5]

[2] https://storage.googleapis.com/books/ngrams/books/datasetsv3.html
[3] "Volumes" in Google books are intuitively associated with "books", but a qualitative look at the data shows that nowadays, Google books contain also other types of printed and published materials.
[4] The it2020-bi dataset is available for download at: https://osf.io/46qcd/
[5] As Kovář & Herman (2013) point out, the Theil-Sen estimator is a rank-based non-parametric method suitable to test any form of dependence (not only linear). Since it does not assume a normal distribution of errors, it is not sensible to outliers and therefore it is particularly suitable for trend identification of word usage in diachronic corpora.

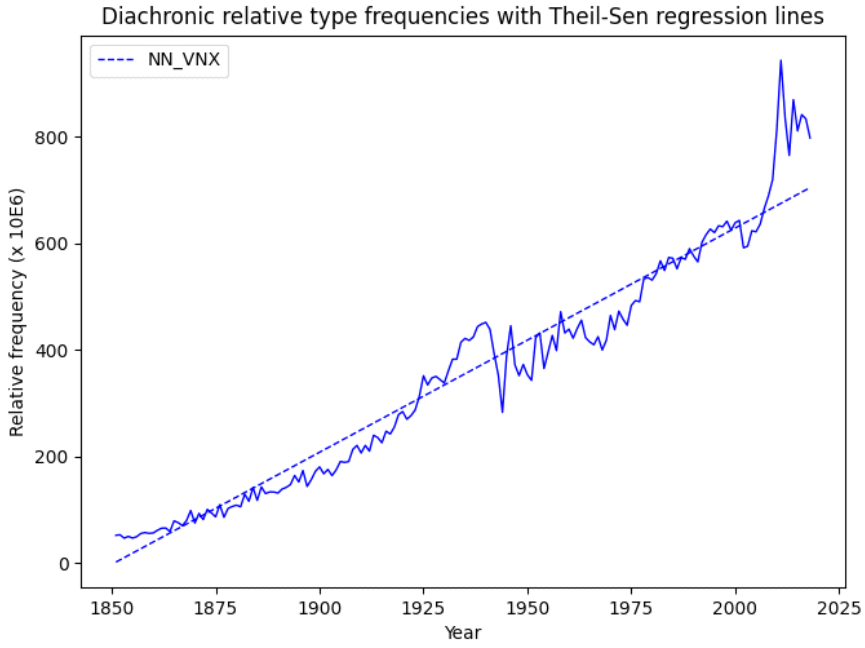
Figure 1 shows that the use of VNX NNs in Italian steadily increases between 1850 and 2000 with three major peaks in 1930's-1940's (the fascist period), 1980's and 2000's, respectively. We will not attempt to interpret the subsequent drop in frequency, since data for the period after 2010 might be strongly biased by a different composition of the underlying Google books corpus as a result of copyrights issues. The essential point in any case is that the history of Italian VNX NNs is roughly 100 years longer that assumed.

Figure 1: Relative token frequency of Italian VNX NNs



The relative type frequency curve in Figure 2 confirms the steady increase of the Italian VNX NN pattern since 1850's. Between 2000 and 2010, an interesting phenomenon occurs: the type frequency of the VNX NN construction exponentially increases, although its overall token frequency decreases. The question arises whether this could be considered a sign of "productivity upgrade" of the VNX NN pattern, which would mean that the solely relational schema (10c) is shifting towards a productive status in that period of time (Jackendoff & Audring 2020:228-231).

Figure 2: Relative type frequency of Italian VNX NNs



5.2. First and last appearance of VNX NN compounds

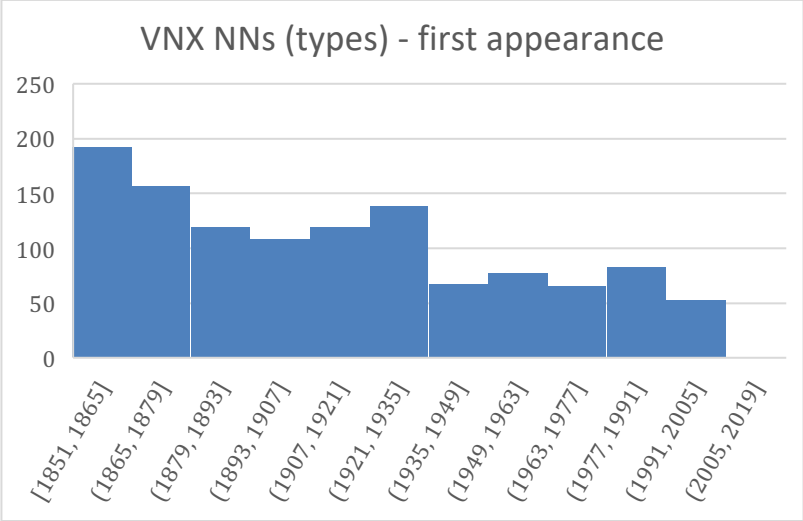
The diachronic evolution of VNX NN compounds can also be observed from a different perspective by examining years of the first and the last appearance of the types from the sample. The mean and the median of these figures are given in Table 1, while the graph in Figure 3 displays absolute numbers of types that appeared for the first time in the different 14-year periods that evenly cover the entire time span under investigation.

As for the years of first attested occurrences, the mean and the median are suprisingly low, considering that the first examples of VNX NNs were assumed to appear around the 1970s (Dardano 2009:226-229). The graph in Figure 3 confirms this observation and shows that most of the types (approximately 2/3) were attested for the first time already before the year 1935. Since 1935 there has been a slower but steady inflow of new types.

Table 1: Mean and median of years of the first and the last appearance of VNX NN compounds

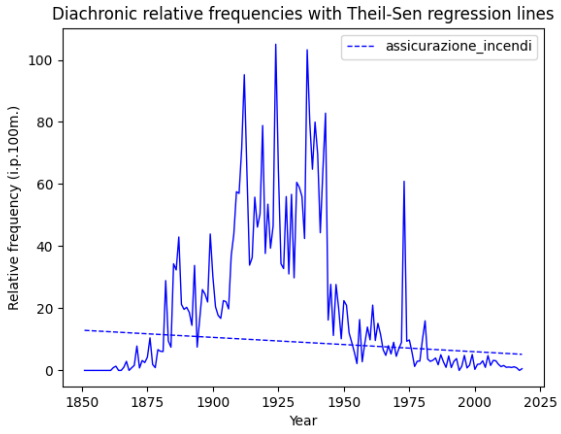
	First appearance	**Last appearance**
Mean	1912,853	2017,55
Median	1909	2019

Figure 3: Absolute number of VNX NN types appeared for the first time in the given time span



Conversely, the figures concerning years of the last attested occurrences given in Table 1 are very high, which entails that almost all types persist in usage until the present time. This naturally does not mean that they have the same or increasing token frequency – many of them had their "period of glory" in the past and their token frequency decreases, as illustrated by the example in Figure 4.

Figure 4: Diachronic token fq. of *assicurazione incendi* ("fire insurance")



5.3. Role of semi-schematic constructions

In this section we will attempt to empirically examine the role of semi-schematic constructions (also refered to as *N-1 and N-2 based families*) in the diachronic evolution of VNX NN compounds. Diachronic type frequency curve of the 7 most prominent N-1 and N-2 based families is given in Figures 5 and 6, respectively.

Figure 5: Diachronic type frequency of the 7 most prominent N1-based families ('risk', 'management', 'organization', 'transport', 'request', 'management', 'change')

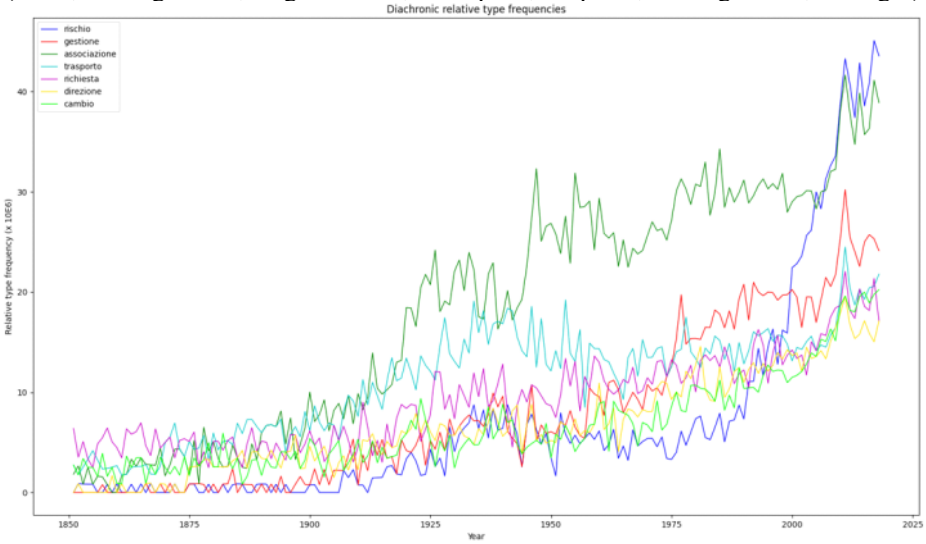
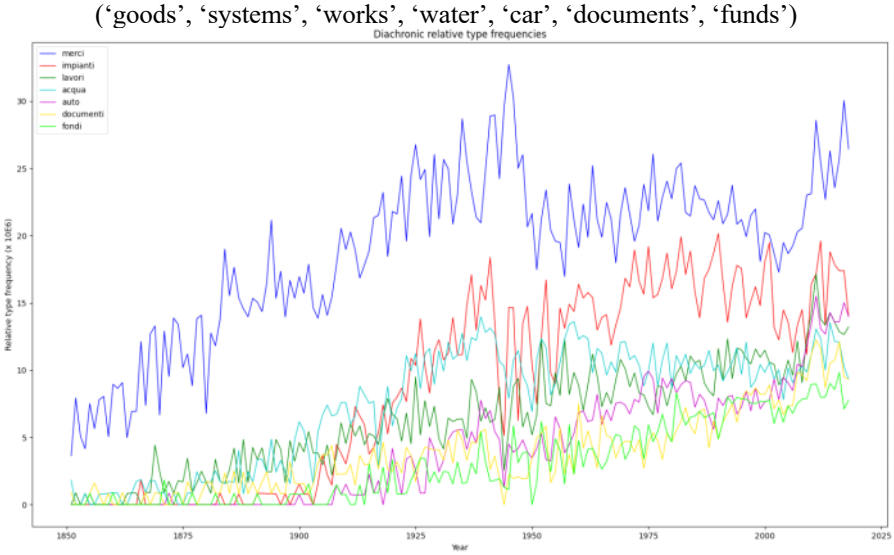


Figure 6: Diachronic type frequency of the 7 most prominent N2-based families ('goods', 'systems', 'works', 'water', 'car', 'documents', 'funds')



One might intuitively expect that the leading role in the process would be played by head-based families, i.e. by semi-schematic constructions with a specified N1. However, the picture given by Figures 5-6 is more complicated. The difference between N-1 and N-2 based families is not a quantitative one, because N2-based families display similar type frequencies as N-1 based families do, but the respective curves are differently distributed in time.

The type frequency of some N1-based families begins to increase slowly after 1910 (*associazione* – 'organization', *trasporto* – 'transport'), but a clear and rapid growth of all seven N1-based families takes place only after 1975 (trend = increasing with $p < 2x10^{-6}$ and slope between 0,136 – 1,0). Conversely, the growth of N2-based families took place earlier and slowed down considerably after 1950. Notice that until 1925, the type frequency of the leading construction $[N_i \; \boldsymbol{merci_j}]_{Nk}$ ('goods') outperforms all the others, including the N1 families, and it is already fully saturated around 1950. The frequency of the other N-2 based constructions also increases until 1950. But after 1975, when a rapid growth of N1-based families takes place, the type frequency of the seven N-2 based families display either no significant trend (*merci* – 'goods', *impianti* – 'systems', *acqua* – 'water') or only a slow increase (*lavori* – 'works', *auto*

– 'car'*, documenti* – 'documents'*, fondi* – 'funds'), with respective slopes between -0,05 and 0,14.

The aggregate type frequency data for all families from the sample also lead to the same conclusion. Table 2 provides the mean and the median of years in which each family of the sample reached the highest type frequency.

Table 2: Mean and median of years of the highest type frequency of all N-1 and N-2 based families

	N1	**N2**
Mean	1978,9	1973,3
Median	2010	1951

Although the means are quite similar, the medians are very different, which entails that many N2-based families displayed the highest type frequency already in the early 20th century, while N1-based families contributing to today's growth of the VNX NN pattern became more saturated in the second half of the 20th century.

Such a difference between the diachronic role of N-1 and N-2 based families might be explained in functional terms. Since argument nouns (N2s), such as *merci* ('goods'), *impianti* ('systems') or *acqua* ('water'), are closely related to concrete topics and therefore to concrete genres and texts, it is likely that they will be easier to replicate in these areas within similar structures – i.e. that they will more easilly begin to form semi-schematic constructions. Conversely, head nouns (N1s) are less linked to concrete topics, so it can be expected that N-1 based semi-schematic constructions will need more time and more source examples before they emerge. And since argument nouns have, for obvious semantic reasons, a more restricted combinability than common deverbal heads in purely quantitative terms, N2-based constructions will reach full saturation quite early, so that their type frequency can no longer continue to grow.

6. Conclusions

As this first large scale diachronic investigation on the topic suggests, the history of Italian VNX NNs is more intriguing than assumed in previous literature. First instances ('innovations') of this type dit not appear around 1950's – 1970's (Micheli 2020a, 2020b, Dardano 2009), but at least already since 1850's. A qualitative look into the data reveals that they were emerging especially in the context of the bureaucratic and economic language of the newly established Italian kingdom in the mid-19th century. Besides that, the particular popularity of the VNX NN pattern during the fascist period in 1930's – 1940's might also be accounted for by the fascist regime's affinity for Marinettian futuristic aesthetics that glorified speed, directness and simplicity in language, so that no useless function words, such as prepositions, were particularly welcome. It was only in the second half of the 20th century that VNX NNs fully penetrate into journalistic language – which is entirely consistent with the widely shared assumption that the bureaucratic language of the newly formed Italian state was an important source of innovations that were later conventionalized in the journalistic language and in other registers of Italian (cf. Viale 2008:91-94).

Analyses of type and token frequency curves suggest that the pattern has steadily grown during the whole period since 1850's to the present, with two periods of particularly rapid type frequency increase (1930's-40's and since 2000). The latter, correlated even with a token frequency decrease, might perhaps be considered as a progressive shift of the relational VNX NN construction towards a productive state in terms of Relational morphology (Jackendoff & Audring 2020: 228-231). We have also analyzed the different role of N-1 and N-2 based semi-schematic constructions in the complex process of construction~~n~~nalization, showing that the type

frequency of N-2 based constructions grew earlier than the type frequency of N1-based families. Therefore, it might be hypothesized that only after 2000's the whole VNX NN pattern reached the necessary coverage (in terms of Goldberg 2019: 51-73) by various individual instances and semi-schematic constructions in order to be ready for a 'productivity shift' observed on the global type frequency curve.

Finally, it has to be emphasized that the investigation presented in this paper certainly does not tell the whole story about the emergence of Italian VNX NNs. Besides obvious methodological issues (such as subsequent reduction of false positives, qualitative identification of contexts and genres, not to speak about the still problematic composition of the underlying Google books corpus), the research will need to be complemented in the future by at least two aspects. First, other prominent Italian NN compounds (i.e. coordinate, attributive and grounding) have to be studied in diachrony, including their interaction with the VNX NN pattern. Second, diachronic competition between the VNX NNs and the respective prepositional NPN structures have to be examined thoroughly, since any Italian VNX NN, such as *trasporto merci*, has a licit NPN equivalent (*trasporto di merci*). To put it differently, the emergence of the Italian VNX NN pattern is a prominent illustration of the fact that "grammatical constructions tend to emerge in domains that are already relatively well represented by other constructions" (Hilpert 2021:149). It would be tempting to understand why this occurs.

References

Baroni, Marco, Emiliano Guevara & Roberto Zamparelli. 2009. The dual nature of Deverbal Nominal Constructions: Evidence from acceptability ratings and corpus analysis. *Corpus Linguistics and Linguistic Theory* 5(1). 27–60. doi:10.1515/CLLT.2009.002.

Baroni, Marco, Emiliano Guevara & Vito Pirrelli 2009. Sulla tipologia dei composti N+N in italiano : principi categoriali ed evidenza distribuzionale a confronto. *Linguistica e modelli tecnologici di ricerca : atti del XL Congresso internazionale di studi della Società di linguistica italiana (SLI) : Vercelli, 21-23 settembre 2006*. 73-96. Bulzoni Editore.

Bauer, Laurie 2017. *Compounds and Compounding*. Cambridge University Press. doi:10.1017/9781108235679.

Bisetto, Antonietta, & Scalise, Sergio 1999. Compounding: Morphology and/or syntax? In Lunella Mereu (ed.), *Boundaries of Morphology and Syntax*, 31-48. Amsterdam: Benjamins.

Booij, Geert E. 2010. *Construction morphology* (Oxford linguistics). Oxford & New York: Oxford University Press.

Booij, Geert 2016. Construction Morphology. In Andrew Hippisley & Gregory Stump (Eds), *The Cambridge Handbook of Morphology*, 424-448. Cambridge: Cambridge University Press. doi:10.1017/9781139814720.016.

Dardano, Maurizio 2009. *Costruire parole: la morfologia derivativa dell'italiano* (Itinerari). Bologna: il Mulino.

Gaeta, Livio & Davide Ricca 2009. Composita solvantur: Compounds as lexical units or morphological objects? *Italian Journal of Linguistics* 21(1). 35–70.

Goldberg, Adele E. 2019. *Explain me this: creativity, competition, and the partial productivity of constructions*. Princeton, New Jersey: Princeton University Press.

Hilpert, Martin 2015. From hand-carved to computer-based: Noun-participle compounding and the upward strengthening hypothesis. *Cognitive Linguistics* 26(1). 113–147. doi:10.1515/cog-2014-0001.

Hilpert, Martin 2021. *Ten lectures on diachronic construction grammar* (Distinguished lectures in cognitive linguistics vol. 26). Leiden & Boston: Brill.

Hussain, Md. & Ishtiak Mahmud 2019. pyMannKendall: a python package for non parametric Mann Kendall family of trend tests. *Journal of Open Source Software* 4(39). 1556. doi:10.21105/joss.01556.

Jackendoff, Ray & Jenny Audring 2020. *The texture of the lexicon: relational morphology and the parallel architecture*. Oxford & New York: Oxford University Press.

Kovář, Vojtěch & Ondřej Herman 2013. *Methods for Detection of Word Usage over Time*. Tribun EU.

Lami, Irene & Joost van de Weijer 2022. Compound-internal anaphora: evidence from acceptability judgements on Italian argumental compounds. *Morphology* 32. 359–388. doi:10.1007/s11525-022-09398-w.

Lin, Yuri, Jean-Baptiste Michel, Erez Lieberman Aiden, Jon Orwant, Will Brockman & Slav Petrov 2012. Syntactic annotations for the Google Books Ngram Corpus. *Proceedings of the ACL 2012 System Demonstrations* (ACL '12), 169–174. USA: Association for Computational Linguistics.

Masini, Francesca & Sergio Scalise 2012. Italian compounds. *Probus* 24(1). 61–91. doi:10.1515/probus-2012-0004.

Micheli, M. Silvia 2020a. *Composizione italiana in diacronia: Le parole composte dell'italiano nel quadro della Morfologia delle Costruzioni*. Berlin / Boston: De Gruyter. doi:10.1515/9783110652161.

Micheli, M. Silvia 2020b. *La formazione delle parole: italiano e altre lingue* (Studi superiori ; Linguistica 1237). Roma: Carocci editore.

Radimský, Jan 2015. *Noun+Noun compounds in Italian: a corpus-based study* (Episteme. Theoria). Vydání 1. České Budějovice: Jihočeská univerzita v Českých Budějovicích.

Radimský, Jan 2018. Does French have verbal-nexus Noun+Noun compounds? *Lingvisticae Investigationes* 41(2). 213–223. doi:10.1075/li.00020.rad.

Radimský, Jan 2020. A paradigmatic account of lexical innovation: the role of repeated components in French N+N compounds. In Jenny Audring, Nikos Kousoukos & Christina Manouilidou (eds.) *Mediterranean Morphology Meetings; Vol 12 (2019): Rules, patterns, schemas and analogy*. Patras. 77-91. doi:10.26220/mmm.3251.

Radimský, Jan 2022. Towards a diachronic analysis of Romance morphology through Google n-grams. *Corpus* (23) doi:10.4000/corpus.7205.

Rainer, Franz 2016. Italian. In Peter O. Müller, Ingeborg Ohnheiser, Susan Olsen & Franz Rainer (eds.), *Word-Formation. An International Handbook of the Languages of Europe*, vol. 4, 2712–2731. De Gruyter Mouton. doi:10.1515/9783110379082-017.

Scalise, Sergio & Antonietta Bisetto 2009. The Classification of Compounds. In Rochelle Lieber & Pavol Štekauer (Eds.), *The Oxford Handbook of Compounding*. Oxford: Oxford University Press. doi:10.1093/oxfordhb/9780199695720.013.0003.

Traugott, Elizabeth Closs & Graeme Trousdale. 2013. *Constructionalization and constructional changes* (Oxford linguistics 6). Oxford: Oxford University Press.

Viale, Matteo. 2008. *Studi e ricerche sul linguaggio amministrativo*. Padova: CLEUP.