

## Italian V+N compounds, inflectional features and conceptual structure

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**Abstract** Italian V+N compounds, such as *portalettere* ‘mailman’, *apriscatole* ‘can opener’ and *spartineve* ‘snow plough’ are exocentric and denote an Agent or an Instrument. Their morphological structure is intensively discussed and has raised many controversies. In this paper, we focus on the inflectional features Number, Gender and the Thematic Role the compound refers to (Agent or Instrument). We argue that the assignment of these features is conditioned by conceptual structure. Thus the morphological building of these compounds has to interact not only with lexical semantics but also with the independent tier of conceptual structure in a systematic way. We provide an analysis of this interaction in terms of a two level semantics with indices.

**Keywords** Compounding · Inflectional features · Two-level semantics · Lexical semantics

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## 1 Introduction: descriptive analysis, research questions, and hypotheses

Italian, like other Romance languages (except Romanian), has a peculiar kind of nominal compounds, verb-plus-noun compounds (VNCs) consisting of a verb and a noun; examples for Italian, Spanish and French are:<sup>1</sup>

- (1) *lanciafiamme, lanzallamas, lance-flamme* ‘flame thrower’ / *lance-flammes* ‘flame throwers’  
*apriscatola, abrelatas, ouvre-boîte* ‘can opener’ / *ouvre-boîtes* ‘can openers’  
*spazzaneve, quitanieves, chasse-neige* ‘snowplow’ / *chasse-neiges* ‘snowplows’

Italian VNCs consist of a verbal and a nominal root, each of which is followed by a vowel, thus the internal structure of *portalettere* is (2):

- (2)  $[[port_{\vee} a_{\text{vowel1}}] [letter_{\text{N}} e_{\text{vowel2}}]]$   
 ‘to carry’ ‘letter’

The vowel of the verb is totally predictable: it varies dependent on the verb’s inflectional class. We consider this vowel to be functionally empty. In fact, we suspect that its presence has phonological reasons. The data suggest that each of the two members of a VNC must be a complete trochaic or dactylic foot, which makes the presence of a final vowel necessary. The choice of these vowels, however, is morphologically conditioned. Regarding the verb, it depends on the (meaningless) inflectional class: it is /a/ if the verb has theme-vowel /a/; it is /i/ for the other conjugations.

As to the noun, its final vowel is /a/, /o/, /e/ or /i/.<sup>2</sup> Its choice is in relation with, but not entirely determined by the noun’s inflectional class and its Gender, both features being inherent properties of the noun. In addition, the vowel needs to realize a Number feature, Singular or Plural. The choice of the final vowel of the noun is not determined by phonological and morphological conditions alone. Since the features involved in the inflection of the noun are not meaningless, their choice also is steered by the conceptual structure accessible via lexical semantics (see Sect. 4). Since each Italian noun has inherent Gender, the compound, as a whole, also has a Gender feature, which may be different from the involved noun’s Gender. Thus *parabrezza* is Masculine, whereas *brezza* ‘breeze’ is Feminine. Some VNCs have Gender variation; examples are *portalettere* ‘mailman’ and *tritacarne* ‘meat grinder’, which can be either Masculine or Feminine. When the compound denotes a human being, the

<sup>1</sup>Regarding the French examples, Plural *-s* is not phonologically realized. In traditional orthography, still permitted, that *-s* is the Plural marker of the nominal constituent, like the noun’s endings in Italian. Thus one has *un mille-pattes* ‘a centipede’, *des mille-pattes* ‘centipedes’, *un chasse-neige* ‘a snowplow’ *des chasse-neige* ‘snowplows’. A recent spelling reform, however, licenses *-s* as a Plural marker for the compound as a whole. Thus one gets *un mille-patte* ‘a centipede’, *des mille-pattes* ‘centipedes’, *un chasse-neige* ‘a snowplow’, *des chasse-neiges* ‘snowplows’. We follow the reformed usage.

<sup>2</sup>Some It. nouns, such as *auto* ‘car’, *camion* ‘truck’, *film* ‘movie’, *gas* ‘gas’, do not have an inflectional ending. If they are monosyllabic, they seem to violate the footing condition for VNCs. However, the phonological well-formedness condition exceptionally tolerates cataleptic feet, if the noun is a borrowing. Actually, all It. nouns without inflectional ending are borrowings.

variation clearly is conceptually founded, Masculine being associated with ‘male’ and Feminine with ‘female’. When the compound denotes an artifact, as in the case of *tritacarne*, the variation, at first glance, seems to be unpredictable.

As opposed to the noun’s Number, the compound’s Number attribute has no value, hence the compound can combine with the Singular as well as with the Plural: *il tritacarne* ‘the meat grinder’, *i tritacarne* ‘the meat grinders’. The Number of the nominal constituent, which is overtly marked, is sort of a paradox. On the one hand, it is not projected to the compound, on the other, it seems to convey semantic information of the same kind that the Number inflection of nouns conveys elsewhere. The Plural *lettere* in *portalettere* seems to be justified by the fact that a mailman’s task is to bring letters, not just one letter, and the singular of *neve* in *spartineve* ‘snowplow’ is obviously motivated by the fact that *neve* ‘snow’ is a mass noun. Still the Number variation of the nominal constituent is not fully understood. This holds in particular for those VNCs whose base noun may have both Numbers, as *accendisigaro*, *accendisigari* ‘cigar lighter’, *apriscatola*, *apriscatole* ‘can opener’, *reggilibro*, *reggilibri* ‘bookend’.

The verb typically is transitive, and the noun realizes the verb’s Direct Object.<sup>3</sup> These compounds also are used as modifiers of nouns, as in *una vista mozzafiato* ‘a breath-taking view’, or *una rotella tagliapasta* ‘a pasta cutter’. These N+V compounds may be considered either as being adjectives that have been derived from nouns by conversion or as the second noun in N+N compounds such as *treno merci* ‘freight train’. In our context, what counts is that they are nouns, at least at some stage of the derivation.

The analysis of Romance VNCs is one of the central research issues in word formation. So the literature is extremely abundant, and we cannot even attempt to give a summary of this research. But see Gather (2001) for a comprehensive overview including other Romance languages, Rainer (1993), Val Álvaro (1999) for Spanish, Fradin (2005, 2009), Villoing (2009) for French, and Masini and Scalise (2012) for Italian. The literature on the Italian VNCs has mainly focused on two problems: i. Which is the morphological status of the verb’s vocalic ending? ii. How can the exocentricity of VNCs be accounted for? (see Scalise 1984, 1994; Bisetto 1994, 2004; Scalise et al. 2005; Floricic 2008). We will rather focus on the role played by inflectional features (the Number of the nominal constituent and the Gender of the compound) and on the semantic variation of VNCs. In order to better understand the lexical semantics of VNCs, we compare them with derivations in *-or-* as in *annotatore* ‘annotator’. This comparison provides evidence that VNCs refer to event types, whose identification depends on the conceptual knowledge of speaker and hearer. Thus we will investigate the following four questions: i. How do the VNCs compare to overtly suffixed Agent or Instrument nouns? ii. What are the morphological, semantic and conceptual parameters that determine the choice of Singular or Plural for the inflectional feature Number of the nominal constituent? iii. How does the Gen-

<sup>3</sup>In some cases the verb is intransitive. The noun then realizes the verb’s Subject *corrimano* ‘handrail’, *giracapo* ‘dizziness’, *marciapiede* ‘platform, side walk’. A more fine-grained semantic typology of Romance VNCs is given by Scholz (2012). We assume that canonical VNCs, which refer to kinds of Agents or Instruments, suffice to clarify the fundamental problems raised by the Italian VNCs.

der of the VNCs come about, and how is it interpreted? iv. How is the Agent vs. Instrument ambiguity of VNCs resolved?

We will argue that different principles interact in assigning Number and Gender to the nominal constituent and the whole compound: lexical semantics of the base expressions, conceptual knowledge about a typical situation for the compound, and contextual information. We will claim that the Number of the base noun is Singular by default and that the default Singular is a merely morphological, i.e. a meaningless feature, whereas Plural is the marked choice, with a plural interpretation at the conceptual level. Regarding the Gender of the compound, we will propose an analogous analysis, with a competition between the default solution (the Masculine is default) and conceptually based noun classification: Feminine is strongly associated with ‘female’ and loosely associated with ‘machine’. Here again, the competition may create variation; thus the data contain *il tritacarne*, with default Masculine, and *la tritacarne*, with concept-based Feminine, since a meat grinder is a machine.

In conclusion, our general hypothesis is that word formation of the VNC-type can only be interpreted if we use different sources of information including lexical semantics, conceptual knowledge, and contextual information. We account for this complex interaction by an analysis in a Two-level Semantics. More precisely, we will extend the version of Two-level Semantics developed in von Heusinger and Schwarze (2006) to the analysis of the inflectional features of Italian VNCs.

Section 2 presents our data. Section 3 compares VNCs with overtly suffixed Agent nouns in *or-*. Section 4 presents our observations on the Number-marking of the base noun and the distribution of Singular and Plural. Evaluating our databases we can show the different principles determining the choice of the inflectional feature Number. Section 5 provides evidence that contextual information is additionally necessary for determining the choice of Gender of the whole compound. Section 6 provides further discussion on the assignment of the referential role Agent or Instrument to the whole compound. In Sect. 7 we discuss the interaction of lexical semantics, conceptual structure and morphological constraints for the general architecture of this morphological process, as well as for other morphological processes, and we sketch a formal analysis that brings the different aspects together, and in Sect. 8, we give a summary and define further research directions.

## 2 Our data

Our study rests upon a collection of data, organized and described in two databases,<sup>4</sup> one containing presumably lexicalized VNCs (database 1, see examples in Table 1), the other containing presumably non-lexicalized ones (database 2, see examples in Table 2). The databases were compiled with FileMaker©. Each VNC is described with respect to its semantic type, the meaning of the verb, the Thematic Role of the verb’s Subject, the Number variation of the nominal constituent, and the source where

<sup>4</sup>We want to thank Simone Kottmann and Eva Ronellenfisch (both formerly Konstanz) for compiling these databases.

**Table 1** Examples from database 1 (lexicalized VNCs)

Form	English	V's meaning	V's Subject	N's Number	Source	Remarks
<i>caricabatteria</i>	'battery charger'	'to load'	Agent	Sg, Pl	<i>DISC</i> , <i>Pl Wikipedia</i>	
<i>mangiapatate</i>	'potato eater'	'to eat'	Agent	Pl	<i>DISC</i>	
<i>paraolio</i>	'oil seal'	'to protect from'	Agent, Artifact	Sg	<i>DISC</i>	<i>para</i> + N is a pattern.
<i>portamatita</i>	'pencil holder'	'to carry'	Agent, Artifact	Sg, Pl	<i>DISC</i>	<i>portamatita</i> , <i>~e</i> is a borrowing from French <i>porte-crayon</i> . <i>Porta</i> + N is a pattern.
<i>reggilibro</i>	'bookend'	'to hold'	Agent, Artifact	Sg, Pl	<i>DISC</i>	
<i>rompicollo</i>	'daredevil'	'to break'	Agent	Sg	<i>DISC</i>	

**Table 2** Examples from database 2 (non-lexicalized VNCs)

Form	English	V's meaning	V's Subject	N's Number	Source	Remarks
<i>apricconcerto</i>	'opening (of a concert)', 'a support band'	'to open'	Agent	Sg, Pl	<i>Google</i> , <i>Wikipedia</i>	The Number depends on how many concerts are involved.
<i>creacasino</i>	'a messy person', 'a service that creates a mess'	'to create'	Agent	Sg	<i>Google</i>	Very few examples found.
<i>curaunghie</i>	'nail clipper, nail brush'	'to treat'	Agent	Pl	<i>Google</i>	
<i>prendicarta</i>	'paper feed'	'to take'	Agent	Sg	<i>Google</i>	
<i>trovagente</i>	'people finder'	'to find'	Experiencer, Agent	Sg	<i>Google</i>	
<i>vedifilm</i>	'film viewing'	'to see'	Experiencer, Agent	-	<i>Google</i>	

it was found. Database 1 is a collection of 1350 items extracted from the DISC and integrated with the *Morbo* database.<sup>5</sup> It is assumed that these compounds are lexicalized in the following sense: they are part of the mental lexicon of an ideal speaker; most of them are supported by a morphological rule contained in the mental grammar, but under normal conditions they are directly accessed as lexical entries. Lexicalization may restrict or change meanings defined by the process of morphological construal. Lexicalized items may form a lexical series, thus giving rise to a pattern of word formation. In this case, novel forms are derived, rather than by a morphological rule,

<sup>5</sup>We are grateful to Sergio Scalise for kindly making available to us unpublished material from the Morphology at Bologna Research Group.

by pattern imitation. Lexicalized complex forms may also undergo structural change, they may be reanalyzed, and they may even totally lose their internal structure.

Database 2 (see examples in Table 2) is a collection of 100 supposedly non-lexicalized items. Our method was to invent novel VNCs and make sure that they are not contained in database 1 and that they can be found by a search on the Internet, trying thus to find VNCs that are produced by the speakers' grammar, but not stored in their lexicon. We are aware that, lexicalization being a gradual diachronic process, it is not quite adequate to make a clear-cut distinction between lexicalized and non-lexicalized items. But we presume that the data contained in database 2 still may give an additional cue for the formulation of our hypotheses.

The items contained in database 2 are annotated in the same way as those in database 1, except for the column "Source". Although the databases do not specify the compounds' conceptual class, it can easily be inferred from the translations. Notice that the role of the verb's subject is not necessarily a cue to the compound's conceptual class.<sup>6</sup>

### 3 VNCs compared to overtly suffixed agent nouns

VNCs are typically translated in English by deverbal Agent nouns overtly suffixed with *-er*; cf. the following examples:

(3)	It.	Engl.
	<i>apriporta</i>	<i>door opener</i>
	<i>tergicristallo</i>	<i>windshield wiper</i>
	<i>tritacarne</i>	<i>meat grinder</i>

In accordance with this observation, it has been proposed to analyze Italian VNCs as containing a zero Agent suffix (Bisetto 1994, 2004). Regardless of how one evaluates this hypothesis, it raises a question of semantic description. In fact, Italian also has analogous nouns with an Agent suffix, *-or-*, 3rd inflectional class.<sup>7</sup> These derived *-or-*nouns show the same Agent vs. Instrument variation as the VNCs; cf. the Agent nouns in (4) and the Instrument nouns in (5):

(4)	It.	Engl.
	<i>annotatore</i>	<i>annotator</i>
	<i>applauditore</i>	<i>a person who applauds</i>
	<i>assicuratore</i>	<i>insurer</i>
	<i>bestemmiatore</i>	<i>blasphemer</i>
	<i>inventore</i>	<i>inventor</i>

<sup>6</sup>For the problem of choosing between using qualitative data, as in our approach, or rather large corpus searches, see Gaeta and Ricca (2003), Baroni et al. (2009), and Ricca (2010).

<sup>7</sup>In the literature, this suffix also is referred to as *-tor-*. In our analysis the suffix is *-or-*; it is attached to Participle stems, which mostly are build by adding *-t-* to the Present stem, as in [*lavora-t*]-*ore* 'worker'; but the Participle stem may be opaque and lacking *-t-*, as in *compress-ore* 'compressor'.

(5)	<i>atomizzatore</i>	<i>atomizer</i>
	<i>distributore di biglietti</i>	<i>ticket machine</i>
	<i>evaporatore</i>	<i>evaporator</i>
	<i>radiatore</i>	<i>radiator</i>
	<i>registratore</i>	<i>recorder</i>

The question is, do these nouns have the same kind of meaning as the VNCs? The answer is positive for the Instrument nouns: they denote artifacts from the perspective of their usage or function, regardless of whether they are involved in any actual event: a recorder is a recorder even when it has never been used to record anything. More precisely, their meaning involves implicit reference to an event type, but excludes reference to any instantiation of that type. This is why formulations such as *the recorder of that speech* are semantically ill-formed in the intended meaning. Notice that the disposition or habitual character of composed and derived Instrument nouns is not restricted to nouns that are created by morphological processes; it also holds for simple Instrument nouns such as *fork* or *knife* and seems to be founded in the conceptual framework underlying the lexicon. It is well known, in fact, that the lexical meanings of Instrument names imply reference to the kind of actions in which a particular kind of Instrument is intended to be used.

Let us now look at the morphologically derived Agent nouns. Some of them do have a meaning component similar to the “function”-component of Instrument nouns. Thus, the meaning of *insurer* rests upon the fact that the function of an insurer is to do business by insuring people. Similarly the meaning of *bestemmiatore* ‘blasphemer’ implies reference to the habit of swearing, rather than to a specific event of swearing, and a *portalettere* ‘mailman’ is not just a person who brings letters, but a person whose job is to bring letters. One could generalize over “function”, “habit” and similar notions to a more abstract semantic property that might be named “event-type relatedness”, as opposed to “event relatedness”. Now, VNCs and *-or-* nouns differ with regard to event-type relatedness. All VNCs are event-type related, they cannot relate to a specific event. On the contrary, the derived Agent nouns, although many of them are event-type related, do not necessarily have this property. Thus *annotatore* ‘annotator’ may be event-type related, e.g. when it refers to a person who has the habit of annotating, but it may also be related to a particular event; cf. (6a) and (6b), its paraphrase:

- (6) a. *L’annotatore del testo* ‘the annotator of the text’  
 b. *La persona che annotò il testo* ‘the person who annotated the text’

The definite article included in *del testo* in (6a) and the Perfect tense of *annotò* in (6b) clearly show that these expressions relate to some specific action of annotating a specific text at a specific time interval. Likewise, *applauditore* ‘a person who applauds’ may denote someone prone to applaud or someone who applauded in a given situation, and an *inventore* ‘inventor’ may make his living from regularly inventing novelties, or be the author of just one specific invention. Thus the alternative between event-type relatedness and event relatedness of derived Agent nouns is open at the word-level and is only induced via the context, whereas the event-type reference is a general property of all VNCs, including those that are Agent nouns.

The question now is how this property comes about and how it is represented. There seem to be two alternative answers. One is to assume that event-type relatedness of VNCs is stipulated by the morphological process as a property of its output. The other is to assume that it follows from a condition on the input, namely that one of the compound's major constituents or both must be unspecific. We are going to explore the second hypothesis, which predicts some crucial properties with respect to the motivation of assigning particular inflectional features, such as Number and Gender. We will see in the next section that Number-assignment to the nominal constituent depends on the conceptual knowledge speakers associate with the event type of the VNC.

#### 4 The number inflection of the nominal constituent of the VNCs

The nominal constituent of VNCs has to have a vowel that is restricted by the inflectional class of that noun. It may mark the Singular, as in (7), or the Plural, as in (8), or both, the Singular and the Plural marker, may alternatively be attached, as in (9). As mentioned above, the Number of the nominal constituent does not mark the Number of the whole compound, since it does not change in the compound's Plural, as illustrated in (7b–9b):

- (7) a. Arriva uno *spartineve* / \**spartinevi*.  
'A snowplow arrives.'  
b. Arrivano due *spartineve* / \**spartinevi*.  
'Two snowplows arrive.'
- (8) a. Arriva un \**portalettera* / *portalettere*.  
'A mailman arrives.'  
b. Arrivano due \**portalettera* / *portalettere*.  
'Two mailmen arrive.'
- (9) a. Hai un *reggilibro* / *reggilibri*?  
'Do you have a bookend?'  
b. Ho bisogno di alcuni *reggilibro* / *reggilibri*.  
'I need some bookends.'

In the remainder of this chapter, we will argue that the Number marking of the nominal constituent is not arbitrary, but determined by the conceptual structure of the event expressed by the verbal and nominal element of the VNC. Before we present more data and a motivation for our claim, we discuss cases where the final vowel of the nominal constituent, differently from what has been shown above, does realize the Number of the compound as a whole, and we briefly mention the Number marking of VNCs in Spanish and French.

In fact, the final vowel of the compound exceptionally is the exponent of the compound's Number, as in (9) (see Gather 2001, 140); cf.:<sup>8</sup>

<sup>8</sup>Scalise (1984, 226) distinguishes between internal or morphological inflection and syntactic inflection, and Booij (1996) between "inherent vs. contextual inflection". The morphological inflection is clearly

- (9) a. *asciugamano* ‘towel’ — *asciugamani* ‘towels’  
 b. *portacenera* ‘ashtray’ — *portaceneri* ‘ashtrays’  
 c. *spazzacamino* ‘chimney sweeper’ — *spazzacamini* ‘chimney sweepers’.

A reviewer kindly suggested to us that there is an informal grammatical rule for this set of VNCs. But such a rule would make many false predictions.<sup>9</sup> It seems more plausible to us to consider the plurals exemplified in (9) as being due to a diachronic process, rather than to a synchronic rule. This exceptional plural marking has clearly to be distinguished from the alternation we find with VNC in the Singular that we are accounting for. In order to exclude interference with such exceptional Plural markings, we focus henceforth on VNCs that do not receive a Number value from the embedded noun’s Number.

It is interesting to compare the Plural marking of the nominal constituent in Italian VNCs with the situation in Spanish and in French; we repeat (1) as (10):

- (10) *lanciafiamme, lanzallamas, lance-flamme(s)* ‘flame thrower’  
*apriscatola, abrelatas, ouvre-boîte(s)* ‘can opener’  
*spazzaneve, quitanieves, chasse-neige(s)* ‘snowplow’

European Spanish shows a clear preference for Plural marking for all nominal complements independent of their lexical semantics. Even mass nouns like *nieve* in *quitanieves* are marked by Plural *-s*. Rainer and Valera (1992, 139) assume that “final *-s*” may end up as an empty morpheme constitutive of the type as such, very much as “linking morphemes”.<sup>10</sup>

Italian VNCs, however, show an interesting alternation between the Singular and the Plural of the noun constituent. Consider the following examples from our corpus:

- (11) Singular only: *accendifuoco* ‘fire lighter’, *alzacristallo* ‘window winder’, *appoggiatesta* ‘head rest’, *battipalo* ‘pole rammer’, *bloccasterzo* ‘steering wheel lock’, *ficcanaso* ‘a nosy person’, *frangimare* ‘wave breaker’, *giramondo* ‘globetrotter’.
- (12) Plural only: *acchiappacani* ‘dog catcher’, *affittacamere* ‘a landlord letting rooms’, *attaccapanni* ‘hat stand’, *cacciabalene* ‘whaler’, *contagocce* ‘dropping bottle’, *fermacarte* ‘paper weight’, *fumasigari* ‘cigar smoker’, *giradischi* ‘record player’, *guastafeste* ‘spoil sport’.

restricted to the internal structure of the compound and cannot project to the syntax, while the syntactic inflection is independent of the internal one, as illustrated below. We cannot discuss here the consequences of inflectional features inside of compounds for the architecture of grammar in general.

<sup>9</sup>See the online grammatical rules of *Corriere della Sera* (<http://dizionari.corriere.it/dizionario-si-dice/Plurale-dei-nomi-composti.shtml>). The rule states that Plural formation by the final vowel is only possible for Masculine noun endings of the noun constituent since it matches with the Gender of the whole. It also states that the plural of *l’apriporta* (‘door opener’) is *gli apriporta* and not *gli apriporte* for the mismatch of *-e* with Masculine Plural. However, we found a considerable number (about 500) of this allegedly ungrammatical form in a simple Google search.

<sup>10</sup>See Rainer (1993, 271), Val Álvaro (1999, 4797) and Gather (2001, 139 fn. 139) for a discussion on contrary tendencies in some American varieties of Spanish, where a syntactic Singular triggers the loss of the *-s* of the original ‘morphological’ Plural, which is then reanalyzed as syntactic Plural. This is a striking similarity with the reformed Plural marking in French spelling, see fn. 1.

**Table 3** Number of the nominal constituent in database 1 and database 2

	Lexicalized VNCs ( <i>N</i> = 1350)	Novel VNCs ( <i>N</i> = 100)
Plural only	702(52 %)	36(36 %)
Singular only	580(43 %)	34(34 %)
Singular or Plural	48(3 %)	26(26 %)
No Number-suffix	20(1 %)	4(4 %)

- (13) Singular or Plural: *accendisigaro/~/i* ‘cigar lighter’, *bloccaruota/~/e* ‘wheel blocker’, *cambiacanale/~/i* ‘button to switch channels’, *guardaspiaggia/~/e* ‘beach watch’, *lucidascarpa/~/e* ‘shoe polish’, *portaasciugamano/~/i*, ‘towel rack’, *portaspazzolino/~/i* ‘tooth brush cup’, *portatessera/~/e* ‘card case’, *salvamuro/~/i* ‘base board’, *tagliacarta/~/e* ‘paper knife’.

We analyzed our two databases with respect to the Number marking of the nominal constituent, as summarized in Table 3.<sup>11</sup> There are striking differences between the lexicalized and the novel. The relevant chi-square test shows clear statistical significance ( $\chi^2 = 101.92$ ,  $df = 3$ ,  $p < 0.0001$ ). While the lexicalized VNCs have a clear preference to take either Singular or Plural, 26 % of the novel VNCs allow for both. We think that this shows that the Plural marking of the noun constituent is not grammaticalized as in Spanish or French VNCs, but open to variation and conceptual motivation. Of course, original variation may be blocked by lexicalization, and by subsequent pattern formation. This may explain the striking difference between the lexicalized and the novel VNCs. The literature suggests that the alternation is motivated by semantic and pragmatic considerations (see Scalise 1994 for Italian; Desmets and Villoing 2009 for French; Scholz 2012, 137–138 for Romance languages; Booij 1996 for Germanic languages). The comment we made above on the plural of *lettere* in *portlettere* and the Singular of *neve* in *spartineve* are in line with this assumption. Another telling example is the meaning contrast between *tagliacarta* ‘paper cutter’ and *tagliacarte* ‘letter opener’. This contrast is triggered by the different meanings of the nominal constituent *carta*: It can be a mass noun, referring to the physical matter, ‘paper’, or a count noun, referring to an artifact made of that matter, ‘letter’. The VNC that is based on ‘letter’ has Plural on the nominal constituent indicating that a letter opener may open more than one letter in a given situation.

We account for Number marking of the nominal constituent by the following three conditions:

- (14) Conditions for Number marking of the nominal constituent in VNCs in Italian:
1. If the noun constituent is a mass noun, the Number always is Singular.
  2. If the whole VNC refers to a unique object defined with respect to a group of objects denoted by the nominal constituent, the Number is Singular.

<sup>11</sup>The values for “Singular only” also comprise all mass-nouns that have a Number-suffix.

**Table 4** Singular of the nominal constituent in non-lexicalized VNCs

Condition	Nominal constituent	
1	<i>tutto</i>	<i>cancellatutto</i> ‘delete <sup>a</sup> all’, <i>chiuditutto</i> ‘close all’, <i>consumatutto</i> ‘a person who consumes just anything’, <i>controllatutto</i> ‘controlling everything’, <i>veditutto</i> ‘see everything, panopticon’, <i>prenditutto</i> ‘all-taking’, <i>risolvitutto</i> ‘all-solving’, <i>spiegatutto</i> ‘all-explaining’, <i>tienitutto</i> ‘all-holding’, <i>trovatutto</i> ‘a place where you find everything’, <i>insegnatutto</i> ‘all-teaching’
1	mass nouns	<i>consumatempo</i> ‘time-consuming’, <i>usatempo</i> ‘pastime’, <i>chiediaiuto</i> ‘request of help’, <i>prendivento</i> ‘wind vane’, <i>prendicarta</i> ‘paper feed’, <i>salvavista</i> ‘eyesight-protecting’, <i>sputasangue</i> ‘bloody-nosed beetle, blood spitting’, <i>trovalloggio</i> ‘accommodation finder’
2	uniques	<i>chiudigruppo</i> ‘the one of a group who leaves last’, <i>lavafaccia</i> ‘face washer’, <i>prendipizza</i> ‘an utensil for grasping a pizza’, <i>salvacuore</i> ‘heart-protecting’
4	other count nouns	<i>creaarticolo</i> ‘create article’, <i>creaquadrato</i> ‘create square’, <i>distruggicoppia</i> ‘couple-destroying’, <i>prendigiuro</i> ‘unreliable’, <i>vedimappa</i> ‘see map’, <i>vedipersona</i> ‘see person’, <i>usamano</i> ‘a quality of printing paper’

<sup>a</sup>The nominal constituent of some VNCs does not translate with an English noun. Such VNCs are either names of computer commands, or they are “used as adjectives”, i.e. they occur as adjuncts to some noun.

3. If the complement noun is a count noun and the typical event associated with the nominal and verbal meaning is such that it involves more than one object (at a time), the Number is Plural.
4. Elsewhere: the Number is Singular.

Condition (3) clearly implies that Plural marking is licensed by typical events that involve more than one object of type N. We come back to such cases below. First we illustrate the conditions described above with novel VNCs, as listed in Table 4. VNCs like *controllatutto* ‘controlling everything’, *veditutto* ‘see everything, panopticon’ are formed with *tutto* (‘all, everything’), which refers to a homogenous ensemble. It is similar to a mass noun, the difference is that *tutto* does not specify the quality of its referent. That difference not being relevant for Number, *tutto* falls under condition 1 for mass nouns. Mass nouns, including nouns for immaterial, non countable entities, form VNCs with Singular on the noun: *prendicarta* ‘paper feed’ or *consumatempo* ‘time-consuming’. According to condition 2, VNCs that refer to a unique object defined with respect to the nominal constituent only allow the Singular for the nominal constituent, as in *chiudigruppo* ‘the one of a group who leaves last’ or *prendipizza* ‘an utensil for grasping a pizza’. The rationale behind this condition is that the predicate associated with such VNCs can only take one object as its argument (i.e. there is only one person who leaves last or a single piece of pizza that is taken at a time). Condition 4 requires the Singular of the nominal constituent is a count noun and if the typical event involves only one object that falls under that noun: *creaarticolo* ‘create article’, *creaquadrato* ‘create square’ or *distruggicoppia* ‘couple-destroying’. This is obviously the least clear-cut condition, and therefore we find in this group of VNCs

the highest rate of variation, but also some interesting cases of different conceptualization: *creaalbero* ‘draw\_tree’ is such a case. It is the label of a software procedure that turns a bracketed expression into a tree graph; this procedure can be used to draw one or more trees. Therefore there is a variant, *creaalberi*, where *alberi* ‘trees’, is plural; cf. (15):

- (15) a. *creaalbero* [create\_tree<sub>NUM=SG</sub>] ‘draw\_tree’  
 b. *creaalberi* [create\_tree<sub>NUM=PL</sub>] ‘draw\_trees’

This kind of variation may also come about because competing conceptualizations are available. (16) is such a case:

- (16) a. *tagliabordo* [cut\_edge<sub>NUM=SG</sub>] ‘lawn edger’  
 b. *tagliabordi* [cut\_edge<sub>NUM=PL</sub>]

In fact, the edge of a quadrangular figure may be conceptualized as one broken line or as the addition of four straight lines; so I may refer to ‘the edge’ or ‘the edges’ of a lawn. These conditions combine lexical information with conceptual knowledge of the typical situation. Thus the Number marking of the nominal constituent strongly suggests an analysis in terms of Two-level Semantics, as developed in Sect. 7.

## 5 The gender of VNCs

All Italian nouns have one of the two Genders, Masculine or Feminine. Gender is a feature used in agreement and may semantically be interpreted, mainly, but not exclusively, in terms of the two sexes (for animate objects).<sup>12</sup> The Gender of lexicalized nouns is encoded as one of their grammatical properties. Novel nouns must receive Gender by some procedure. Morphologically construed nouns typically receive gender by inheritance. But this is excluded for exocentric words, such as VNCs. Two procedures are available then: Gender assignment on the basis (i) of a default Gender, and (ii) via some conceptual categorization, where (ii) may overwrite (i) (see Masini and Scalise 2012, 87 for different types of exocentric compounds). An Italian VNC is Masculine if its referent does not fall under one of the conceptual categories that motivate the Feminine. Examples are:

- (17) *un cacciavite* ‘a screw driver’  
*un marciapiede* ‘a sidewalk’  
*un passatempo* ‘a pastime’  
*un lavapiatti* ‘a male dishwasher’  
*uno scrivilettore* ‘a letter-writer’, when referring to a male  
*un vuotaborse* ‘a great spender’, when referred to a male

Notice that, if the referent is a male person, the Masculine is supported by both default Gender and categorization as a male.

<sup>12</sup>Thus motion from Feminine to Masculine derives tree names from fruit names; cf. *mela*<sub>FEM</sub> ‘apple’ vs. *melo*<sub>MAS</sub> ‘apple tree’, *arancia*<sub>FEM</sub> ‘orange’ vs. *arancio*<sub>MAS</sub> ‘orange tree’.

The conceptual categories that assign the Feminine are ‘a female person’ and ‘a machine’. If a VNC refers to a female person, it must be Feminine:

- (18) *una lavapiatti* ‘a female dishwasher’  
*una scrivillettere* ‘a letter-writer’, when referring to a woman  
*una vuotaborse* ‘a great spender’, when referring to a woman

This correlation is pervasive in the lexicon, even though there are exceptions; cf. *un donnone*<sub>MAS</sub> ‘a big woman’. If a VNC refers to a machine, it may be Feminine.<sup>13</sup> Examples are:

- (19) *una lavapiatti* ‘a dishwashing machine’  
*una lavapavimenti* ‘a machine for washing the floor’

To summarize, the gender of novel VNCs is determined by two different processes: First by the default rule that assigns Masculine to all exocentric compounds in Italian, and second by a rule that interacts with the contextual environment and the conceptual structure of the event expressed by the verb and the noun of the VNC.

## 6 Semantic structure and referential argument

Italian VNCs refer to either the Agent or the Instrument of an event type described by the verbal and nominal constituent of the VNC. In order to understand the choice for the Agent or Instrument reading, we focus on (i) different types of referential arguments of VNCs in Italian, (ii) the dispositional character of the underlying verbal activity and (iii) different theoretical approaches to account for the alternation between the Agent reading and the Instrument reading of an VNC. In addition to the prototypical referential arguments, Agent and Instrument, other types are possible, such as event readings (*alzabandiera* ‘flying a flag’), location readings (*marciapiede* ‘sidewalk’), etc. (see Sect. 2; and Scalise et al. 2005 for Italian; Rainer 1993 and Val Álvaro 1999 for Spanish; Fradin 2005; Villoing 2009 and Rosenberg 2011 for French; Gather 2001 and Scholz 2012 for Romance in general). However, those other types are rare and are not as systematic as the Agent and Instrument reading. We assume that the other readings can be analyzed as derived via metonymy from the type of event. A clear case of meaning shift can be stated for the very few names of natural kinds (e.g. *bucaneve* ‘snowdrop’, *girasole* ‘sunflower’, *pigliamosche* ‘flycatcher’). The Agent reading shifts towards a natural kind reading (proper name), which is partly motivated, but slowly moves away from

<sup>13</sup>As one reviewer suggested, the Feminine gender might come from a silent noun “machine”, thus these VNCs would primarily function as adjectives or as N+N compounds. In the adjective hypothesis the VNC’s gender would come about by agreement, and in the N+N hypotheses by inheritance. This explanation by ellipsis doubtlessly applies to the diachronic origin of this gender assignment. We do not think, however, that it is necessary to assume syntactic ellipsis as a synchronic process. Notice that, if we did, the question would arise why we do not extend the ellipsis analysis to other Feminine complex nouns whose gender is not inherited, such as *amante* ‘a female lover’, *cantante* ‘a female singer’, *stampante* ‘a printer’ or *telettrasmittente* ‘a television broadcasting station’.

the underlying semantics.<sup>14</sup> Thus we assume that the Agent reading and Instrument reading are the two central meaning of Italian VNCs.

As already discussed in Sect. 3 in comparison with the *-or*-derivation Italian, VNCs are always dispositional. An object may be called a can opener even if it has never opened a can. A person can be a mailman even though he or she has never delivered mails. Bierwisch (2009) describes this property by means of a habitual or dispositional predicate in the semantic representation. We extend this notion from animate referents to inanimate referents for terminological simplification. A more adequate description for inanimate objects might be that they are ‘designed for’ or ‘produced for’ a certain activity. The dispositional character of VNCs, as paraphrased in (20), is closely connected to the event type of a certain activity, rather than to an instance of an event. The event type is a central input for the conceptual structure, discussed in the next section.

- (20) *portabagagli*  
 a. ‘a person *with the disposition* to carry baggage’  
 b. ‘an Instrument *with the disposition* to carry baggage’

The referent of VNC is an Agent (21a), an Instrument (21b), or both (21c):

- (21) a. *portaparola* ‘spokesperson’  
 b. *portapenne* ‘pen holder’  
 c. *portabagagli* (i) ‘roof rack’; (ii) ‘carrier’

Italian VNCs correspond to Germanic N+V+*er* forms, which are generally categorized as synthetic compounds (Marchand 1969; Lieber 2009) or subordinate compounds (Scalise and Bisetto 2009). The observation is that the Italian VNCs have a nominal constituent that fills the Theme argument of the verb in the same way as the N fills the argument slot of the V in the Germanic N+V+*er* pattern. The literature on the referential type of Germanic *-er*-nominals or the corresponding Italian *-or*-forms or the French *-eur*-forms is vast. We can distinguish between a syntactic, a semantic and a cognitive approach to account for the variation. The syntactic approach assumes that the referential type always corresponds to the subject of the base verb. In this way one can explain the availability of other Thematic Roles such as Experiencer in English *-er*-forms, and the exclusion of object (*fryer*, *keeper*, *sinker*) or locational readings (*diner*, *sleeper*). The semantic approach assumes a restriction operated by the lexical semantics of the verb, while the cognitive approach accounts for the variation by embedding the choice into a cognitive model. While we cannot evaluate the complex situation with respect to simple Agent nominals in *-er* (see Booij 1986; Lieber 2004; Meibauer et al. 2004), we focus on VNCs in Italian.

Scalise et al. (2005, 140), following the lexical approach of Lieber (2004), represent Italian VNCs as in (22), analogously to the analysis of *truck driver* in English. See also Lieber (2009, 96) for the problems in determining the referential argument.

<sup>14</sup>A reviewer suggested that natural kinds are formed by an independent meaning of the VNC, but we think that it is a typical instance of a meaning shift.

- (22) *portalettere*  
 Thing [+com, -abst, +an]  $-\emptyset$ ([ x ], [ y ]),  
 [Event *portare* ( [ x ], [Thing [+com, -abst,  $\pm$ an] y ] ) ]  
 [Thing [+com, -abst, -an] *lettere* ]

The representation is meant to express that *portalettere* refers to an object, a “Thing” in Lieber’s technical terminology, and is a common noun, it is concrete and animate, and consists of two constituents: The first constituent is *portare*, which refers to an event and takes an argument of type Thing with the characterization of being a common noun, concrete and neutral with respect to animacy. The second constituent of the whole compound is *lettere*, a Thing characterized as common noun, concrete and inanimate. This representation addresses the binding relation between the underlying verb and the nominal complement. However, it cannot capture the referential argument of the whole VNC. Fradin (2005, 173, ex. (23)–(24)) provides a detailed discussion of VNCs in French and formulates the following conditions (compare the implementation into HPSG by Desmets and Villouing 2009):

- (23) Conditions on VN compounds
- I. The N must be interpreted as an argument of the verbal predicate
  - II. The VN nominal compound has to denote an entity, which is semantically correlated to the event described by the verbal predicate
- (24) The entity A is correlated to the event Ev if
- a. The linguistic expression denoting A is an argument of the verbal predicate which denotes Ev (equivalent: A is a participant in the causal structure the verb reflects) and
  - b. A constitutes the place where Ev takes place or
  - c. A is a causer of Ev.

Fradin (2005, 173) concludes: “Condition (II) is an interpretative condition, not a formal condition, which means that linguistic or pragmatical [sic] reasons may lead the hearer to choose the correlation that best fits the situation”. This observation confirms Scalise’s (1994, 139) remark that the choice of Number of the nominal complement seems to be motivated by some semantic or pragmatic consideration (see Sect. 4).

Regarding the variation between an Agent and an Instrument reading, we assume following Booij (2010, 51; and previous work)<sup>15</sup> that VNCs refer to either form, as in (25i–ii). Additionally we introduce a predicate *Disp(osition)* expressing that the semantics is related to a event type, rather than to a specific event.

- (25) A compound of the type V+N denotes
- (i) a person that has the disposition to do V involving N as a Theme
  - (ii) a thing that has the disposition to be used as to do V involving N as a Theme

<sup>15</sup>Booij (2010, 38) and Arcodia (2012, 386) express the Agent/Instrument alternative in the following way:  $[[V_k] [N_i]N_j] \longleftrightarrow [AGENT / INSTRUMENT_j \text{ OF } ACTION_k \text{ ON } OBJECT_i]_j$ .

For both alternatives we need additional information, which we derive from conceptual knowledge. This interaction is represented in a Two-level Semantics, which will be introduced in the next Sect. 7.

## 7 Conceptual structure and inflectional features

One of the theories about lexical semantics is the hypothesis of Two-level Semantics, which was first formulated by Bierwisch (1983). It claims that word meanings have two strata: the semantic stratum, which is part of the grammatical structure of the language, and the conceptual stratum, which belongs to the more general cognitive system of the speakers. The semantic representations of lexical meaning integrate lexical semantics into the compositional semantics of the sentence, and they are mapped onto syntactic structure via the lambda-calculus or some other device. At the conceptual level, the semantic representation is linked to a central concept. The crucial insight of Two-level Semantics is that lexical semantics needs additional information from conceptual knowledge, which by itself is not just “pragmatics” or “encyclopedic knowledge”, but a structured way of conceptualization of our world. The principles, processes and underlying schemata for conceptualization are differently described (see Jackendoff 2009, 2011; Heyvaert 2009; Bierwisch 2011).

In Two-level Semantics we distinguish between *Semantic Form* (SF) and *Conceptual Structure* (CS) as the central strata of analysis. We present three of the most important features that distinguish these two levels (Lang and Maienborn 2011, 711–712):

- (26) SF  $\subset$  CS  
In substance, SF representations may be conceived of as those subsets of CS representations that are systematically connected to, and hence covered by, lexical items and their combinatorial potential to form more complex expressions.
- (27) grammar-based vs. concept-based  
SF representations account for the fact that the meanings of linguistic expressions comes with grammatically determined kinds of packaging in terms of morpho-syntactic categories and semantic types, while the elements of CS representations, due to their mental source and intermodal homogeneity, lack grammar-based wrappings.
- (28) linguistic vs. non-linguistic origin  
SF representations form an integral part of the information cluster represented by the lexical entries of a given language  $L$ , whereas CS representations are taken to belong to, or at least to be rooted in, the non-linguistic mental systems based on which linguistic expressions are interpreted and related to their denotations.

Thus SF encodes the lexical information and provides the compositional properties of our forms. CS captures the structure that derives from our (systematic) conceptualization of non-linguistic features. In order to describe the VNCs we have to extend

**Table 5** Parameters for determining inflectional features

	Number-selection of the nominal constituent	Gender-selection of the VNC	Agent-Instrument alternation
Morphological constraints	singular as default	masculine as default	–
Semantic content	mass vs. count nouns	–	underspecified
Conceptual knowledge	about an event type, unique in the situation	in addition: ‘machine’	about an event type
Contextual information	–	determination by context expressed in syntactic form, sexus	restriction / disambiguation / meaning shift coercion

this two-level system. First, we assume that the SF provides explicit indices that allow a particular conceptual structure to elaborate a given semantic form (see von Heusinger and Schwarze 2006). Second, we have to include contextual information, i.e. information that is only available from the utterance situation and the actual linguistic environment. Third, we include a level of morphological constraints, i.e. types of restrictions that do not provide semantic information.

We have seen above that Italian VNCs differ from Agent-nominals in *-or-* in that the former always refer to an event type. This event type is related to a conceptualized situation involving the nominal constituent and the verbal constituent. The event type together with the other information determines the inflectional features Number of the nominal component, as well as the Gender and the referential argument of the whole compound. These features are determined in different ways and through different interactions by the three parameters mentioned before, as can be seen in Table 5.

The interaction of different parameters determines the inflectional features of the compounds and their nominal constituents. We assume the following incremental specification. Default values introduced by morphology have no semantic interpretation; they just meet the structural requirements. Semantic information may add new values to features or overwrite the default value. In a second step conceptual information determines underspecified semantic information; and in a last step, contextual information may shift specified features.

The Number selection for the nominal constituent depends on the semantic distinction between mass and count. It also needs conceptual information about the event type in which the V and N typically interact and whether the object denoted by the nominal constituent is unique in the typical situation. The additional context in the sentence, discourse or situation seems not to contribute to the Number selection of the nominal constituent, since it is driven by the event type and not by an instantiated event. The Gender selection of the VNC makes use of conceptual information such as that many Instrument-VNCs are machines and therefore may also get the same Gender marking as the linguistic expression *macchina*. The referential argument (Agent or Instrument) does not depend on the semantics of the constituents, but rather on the event type (what is the typical causer in an event described by the V and N?) and by additional contextual information that may force even other readings.

We account for the content by means of semantic representation or semantic form (SF), while we represent conceptual information by means of conceptual structure (CS), and we mark the interaction with designated indices in the semantic representations. The enrichment or specification of underspecified semantic form by conceptual information is pervasive in grammar, and in morphology in particular; cf. e.g. the relation between the modifier and the head in N+N compounds. In these compounds, the head projects its grammatical features  $\alpha F$  to the whole compound and the semantics of compounding determines that there is a relation R between the modifier and the head. However, the specific character of this relation must be given by our conceptualization of the world.

(29) Structure of N+N compounds

SF  $[[a]_X [b]_{Y_i}]_Y$  'Y with relation R to X'  
 $\quad \quad \quad | \quad |$   
 $\quad \quad \quad [\alpha F][\alpha F]$

CS R is a salient relation that holds in a typical event consisting of Y and X.

This structure describes endocentric compounds such as *windmill*, *mushroom soup*, *bookseller*, *street seller*, where the relation between the elements must be retrieved from our conceptualization of a situation in which both elements play a salient role. The VNCs differ from this in two respects: First the relation between the V and the N1 is semantically encoded: N1 is the Theme argument of the V; second the compound is exocentric, i.e. none of the components projects its features to the whole compound, but the lexical semantics of the two constituents still heavily constrains the semantics of the whole compound: The compound refers to an entity that is the Agent or Instrument in a event type consisting of the V and N1 as its Theme.

(30) SF  $[V N1]_{N2}$  'N2 is an entity that performs action V on N1'

We have now to account for the Number feature of the nominal constituent (N1), the Gender feature of the compound as a whole (N2) and the referential type of N2 (i.e. Agent or Instrument). The Number of N1, unless it is assigned by default, is assigned on the basis of the grammatical mass vs. count distinction and of the conceptual information about the event involving N1 and V, such that N1 prototypically is the Theme of V. We assume that the event type may contain one or more objects denoted by N1. In the latter case the conceptual information motivates the choice of Plural.

(31) SF  $[V N1_{NUM=\alpha}]_{N2}$  with  $\alpha = SG$  as default and  $\alpha = PL$  if N1 is a mass noun or expresses a unique concept

CS  $\alpha = PL$  if the typical event involving N1–V contains more than one N1,

(32) SF *portalettere* [*bring\_letter*]<sub>NUM= $\alpha$</sub>  'mailman'

CS  $\alpha = PL$  since the typical event involving letter-bringing contains more than one letter

(33) SF *apriporta* [*open door*]<sub>NUM= $\alpha$</sub>  'door opener'

CS  $\alpha = SG$  since the typical event involving N1–V contains no more than one N1

The general pattern (31) is applied to the two different VNCs in (32) and (33). The Singular is the default case. It is required by mass nouns, which actually never show Plural (unless they are recategorized as count nouns). It also is required by nouns expressing unique concepts, which are semantically not coherent with Plural. The noun *gruppo* ‘group’, in *aprigruppo* ‘group opener’, in the situation of a designed cyclist leading his group in a race, is such a unique concept. However conceptual information can overwrite the default Singular, as in (32) where the event type of professionally carrying letters involves more than one letter. The Singular in (33) can be explained either by the default Singular or by referring to the event type of opening a door. Such an event type typically involves only one door.

The inflectional feature Gender of the whole compound is assigned in a similar way: The default value is Masculine, but it can be overwritten by conceptual information. It is set to Feminine if the referent typically refers to a female person or if the object may be categorized as a machine. Additional constraints may be set by the direct linguistic environment. Thus we can account for (35a) by taking the default information, for (35b) by adding contextual information and by (35c) by adding the conceptual information about the dishwasher being a *macchina*.

- (34) SF [V N1]<sub>GEN= $\beta$</sub>  with  $\beta$  = MAS as default and  
 S  $\beta$  = FEM if the VNC refers to female person or, optionally, if it refers to a machine,
- (35) a. *un lavapiatti* ‘a male person that professionally washes dishes’  
 b. *una lavapiatti* ‘a female person that professionally washes dishes’  
 c. *una lavapiatti* ‘a dishwasher (machine)’

Note the difference between the Number and the Gender assignment. Number is assigned by conceptual information about the typical event, while gender is assigned by information about the referent of the VNC.

The alternation between an Agent or an Instrument role of the whole VNC also depends on conceptual information of the event type. But first we have to introduce an additional predicate into the semantic representation. As we pointed out above, VNCs express a disposition, i.e. the referent has a disposition to do V–N1, but need not have done it. Therefore we introduce the predicate DISP(osition), which is predicated of an individual if that individual possibly undertakes many of the described typical events of V–N1. E.g. a mailman has the disposition to undertake many mail-bringing events (see Bierwisch 2009). We can now represent the two readings in (36a–b) with the paraphrases (37a–b). The referent of a VNC has the disposition to be the Agent in an action V in which N1 is the Theme, or the Instrument.

- (36) SF [V N1]  
 (a)  $\lambda x$  [Disp[V(e) & Agent(e,x) &  $\exists y$  [Theme(e,y) & N1(y)]]]  
 (b)  $\lambda x$  [Disp[V(e) & Instr(e,x) &  $\exists y$  [Theme(e,y) & N1(y)]]]
- (37) Paraphrase of (36): The VNC’s referential argument x  
 (a) has the disposition to be the Agent in an event e with the predicate V of e and the property N1 of the Theme

- (b) has the disposition to be the Instrument in an event  $e$  with the predicate  $V$  of  $e$  and the property  $N1$  of the Theme

The choice between Agent and Instrument is determined by two conceptual properties of the event type that is typically associated with  $V$  and  $N1$ . The referent of the whole VNC must typically be involved in the action expressed by  $V+N1$ , and the referent must have the disposition to do the action. The latter condition has to do with our conceptualization of the function of objects or the profession of persons. We can now provide the two-level representation:

- (38) SF  $[V\ N1]_{[Role = \gamma]}$  with  $\lambda x \{Disp[V(e) \ \& \ \gamma(e,x) \ \& \ \exists y [Theme(e,y) \ \& \ N1(y)]]\}$   
 CS  $\gamma = \text{Agent}$  if  $x$  is a typical referent in the type event and if it is conceptualized as having a disposition to cause the event  
 $\gamma = \text{Instrument}$  if  $x$  is a typical referent in the type event and if it is conceptualized as having a disposition to cause the event

We hope to have shown in this section that the interaction of lexical semantics and conceptual information in a two level semantics allows us to predict the inflectional features and the referential argument of the VNC. It must be conceded, however, that such prediction only bears out up to a certain level. Due to the dynamicity of human conceptualization and other intervening factors such as expert vocabulary, lexicalization, blocking, etc., the predictions are not always met, but they show quite a high probability as the corpus analysis confirms.

## 8 Conclusion

VNCs in Italian such as *portalettere* ‘mailman’, *apriscatole* ‘can opener’ and *sparti-neve* ‘snow plow’ are particularly interesting word formations for various reasons. In our study we have focused on the assignment of their inflectional features: the Number of the nominal constituent, the Gender of the whole VNC and the Thematic Role of the referential argument (Agent or Instrument) of the whole VNC. We have argued that the assignment of these features is determined by the interaction of lexical semantics and conceptual structure. Our analysis is based on the collection and careful description of 1450 lexicalized and not-lexicalized VNCs. We argue that VNCs are associated with event types and that the conceptual information of the event types controls the assignment of their inflectional features. We model the interaction of lexical semantics and conceptual information taking as our point of departure Bierwisch’s Two-level Semantics and expanding it into a Two-level Semantics with indices. Originally Two-level Semantics was designed to account for the variation of lexical meaning. We hope to have shown with our study that it is also plays an important role in the assignment of inflectional features in compounds. Thus we propose an extension of Two-level Semantics from word meaning to the morphology of word formation.

## Appendix: VNCs mentioned in the text

Database 1 contains items that are lexicalized, i.e. presumed to be permanently stored in the mental lexicon (Table 6). Database 2 contains non-lexicalized or weakly lexicalized items (Table 7). The indications of meaning we give for items from database 2 are subject to caution, having been retrieved from the verbal contexts of the very few occurrences found. The proportion of items from database 1 and items from database 2 is not representative of the relative size of the two databases.

- Some VNCs represent partial concepts. A partial concept is a bit of information that needs another concept to merge with. A VNC that represents a partial concept behaves like an adjective. Syntactically, it is right-hand adjoined to some noun; semantically, it modifies that noun's meaning.
- “Unique” means “unique in the situation”, i.e. its value refers to the typical situation, not to some universe. Values are marked as “–” if the attribute does not apply.

**Table 6** Examples from database 1 quoted in the article (lexicalized VNCs)

The compound			The verb	The noun			
Form	Concept type	English	Meaning	Meaning	Mass noun	Unique	Number
<i>accendifuoco</i>	artifact	fire lighter	to light	fire	yes	–	sg
<i>accendigas</i>	artifact	gas lighter	to light	gas	yes	–	–
<i>acchiappacani</i>	person	dog catcher	to catch	dog	no	no	pl
<i>affittacamere</i>	person	a person who lets rooms	to rent	room	no	no	pl
<i>alzabandiera</i>	event	the flag-raising ceremony	to lift	flag	no	yes	sg
<i>alzacrystallo</i>	artifact	window winder	to lift	car window	no	no	sg pl
<i>appoggiatesta</i>	artifact	head rest	to lean	head	no	yes	sg
<i>apriporta</i>	person	door opener	to open	door	no	yes	sg
<i>asciugamano</i>	artifact	towel	to dry	hand	no	no	sg pl
<i>attaccapanni</i>	artifact	hat stand	to attach	clothes	no	no	pl
<i>battipalo</i>	artifact	pole rammer	to beat	pole	no	no	sg
<i>bloccaruota</i>	artifact	wheel clamp	to block	wheel	no	no	sg pl
<i>bloccasterzo</i>	artifact	anti-theft steering lock	to block	steering gear	no	yes	sg
<i>bucaneve</i>	natural kind	snowdrop	to bore a hole	snow	yes	–	sg
<i>cacciabalene</i>	artifact, person	whaler	to hunt	whale	no	no	pl
<i>cacciavite</i>	artifact	screw-driver	to drive	screw	no	no	sg
<i>cambiavalute</i>	person	currency exchanger	to change	currency	no	no	pl

**Table 6** (Continued)

The compound			The verb	The noun			
Form	Concept type	English	Meaning	Meaning	Mass noun	Unique	Number
<i>caricabatteria</i>	artifact	battery charger	to charge	battery	no	no	sg
<i>contagocce</i>	artifact	dropping bottle	to count	drop	no	no	pl
<i>falegname</i>	person	carpenter	to make	timber	yes	–	sg
<i>fermacarte</i>	artifact	paper weight	to stop	papers	no	no	pl
<i>ficcanaso</i>	person	a nosy person	to stick	nose	no	yes	sg
<i>frangimare</i>	artifact	wave breaker	to break	sea	no	yes	sg
<i>fumasigari</i>	person	cigar smoker	to smoke	cigar	no	no	pl
<i>giradischi</i>	artifact	record player	to turn	record	no	no	pl
<i>giramondo</i>	person	globe-trotter	to tour	world	no	yes	sg
<i>girasole</i>	natural kind	sun flower	to turn	sun	no	yes	sg
<i>guardaspiaggia</i>	person	beach watch	to watch	beach	no	yes	sg
<i>guastafeste</i>	person	spoilsport	to spoil	party	no	no	pl
<i>lanciafiamme</i>	artifact	flame thrower	to throw	flame	no	no	pl
<i>lavamoquette</i>	artifact	carpet cleaner	to wash	carpet	no	no	–
<i>lavapavimenti</i>	artifact	floor washer	to wash	floor	no	no	pl
<i>lavapiatti</i>	person, artifact	dish washer	to wash	plate	no	no	pl
<i>mangiapatate</i>	person	potato eater	to eat	potato	no	no	pl
<i>marciapiede</i>	artifact	sidewalk	to march	foot	no	no	sg pl
<i>paraolio</i>	artifact	oil guard	to secure	oil	yes	–	sg
<i>passamontagna</i>	artifact	balaclava	to pass	mountain	no	no	sg
<i>passaporto</i>	artifact	passport	to pass	port	no	no	sg
<i>passatempo</i>	?	pastime	to pass	time	yes	–	sg
<i>pigliamosche</i>	natural kind	flytrap, flycatcher	to catch	fly	no	no	pl
<i>porta-asciugamano</i>	artifact	towel rack	To carry	towel	no	no	sg pl
<i>portabagagli</i>	person, artifact	porter, carrier	to carry	bag	no	no	pl
<i>portabastoni</i>	artifact, person	stick rack, caddie	to carry	stick	no	no	pl
<i>portacenera</i>	artifact	ashtray	to carry	ashes	yes	–	sg pl
<i>portacolori</i>	artifact	color holder	to carry	color	no	no	pl
<i>porta-immondizie</i>	artifact	garbage can	to carry	garbage	no	no	pl
<i>portainsegna</i>	person	color sergeant	to carry	insignia	no	no	sg pl
<i>portalettere</i>	person	mailman, mailwoman	to carry	letter	no	no	pl
<i>portamatita</i>	artifact	pencilholder	to carry	pencil	no	no	sg
<i>portaombrelli</i>	artifact	umbrella stand	to carry	umbrella	no	no	pl

**Table 6** (Continued)

The compound			The verb	The noun			
Form	Concept type	English	Meaning	Meaning	Mass noun	Unique	Number
<i>portaparola</i>	person	spokesperson	to carry	word	no	no	sg
<i>portapenne</i>	artifact	pen holder	to carry	pen	no	no	pl
<i>portasci</i>	artifact	ski rag	to carry	ski	no	no	–
<i>portaspazzolino</i>	artifact	tooth brush cup	to carry	tooth brush	no	no	sg pl
<i>portatessera</i>	artifact	card case	to carry	card	no	no	sg pl
<i>portavoce</i>	person	spokesperson	to carry	voice	no	yes	sg
<i>reggilibro</i>	artifact	bookend	to hold	book	no	no	sg pl
<i>rompicollo</i>	person	daredevil	to break	neck	no	yes	sg
<i>salvamuro</i>	artifact	base board	to save, to protect	wall	no	no	sg pl
<i>spazzacamino</i>	person	chimney sweeper	to sweep	chimney	no	no	sg pl
<i>spazzaneve</i>	artifact	snow plow	to sweep	snow	yes	–	sg
<i>spazzacamino</i>	person	chimney sweeper	to sweep	chimney	no	no	sg pl
<i>spazzaneve</i>	artifact	snow plow	to sweep	snow	yes	–	sg
<i>tagliabordo</i>	artifact	lawn edger	to cut	edge	no	no	sg pl
<i>tagliacarta</i>	artifact	paper knife	to cut	paper	no	no	sg pl
<i>vuotaborse</i>	Person, partial concept	big spender, wasteful	to empty	briefcase	no	no	pl

**Table 7** Examples from database 2 quoted in the article (non-lexicalized VNCs)

The compound			The verb	The noun			
Form	Concept type	English	Meaning	Meaning	Mass noun	Unique	Number
<i>apricconcerto</i>	event	opening act	to open	concert	no	yes	sg
<i>aprigruppo</i>	person	group leader	to open	group	no	yes	sg
<i>cambiacanale</i>	artifact	a button to switch channels	to change	channel	no	no	sg
<i>cancellatutto</i>	partial concept	delete all	to cancel	all	–	–	sg
<i>chiediaiuuto</i>	artifact	ask for help (name of a mailing list)	ask	help	yes	no	sg
<i>chiudigruppo</i>	person	the one of a group who leaves last	to close	group	no	yes	sg
<i>chiuditutto</i>	artifact	close all	to close	all	no	yes	sg
<i>consumascarpe</i>	person, partial concept	shoe consumer, shoe consuming	to consume	shoe	no	no	pl

**Table 7** (Continued)

The compound		English	The verb	The noun			
Form	Concept type		Meaning	Meaning	Mass noun	Unique	Number
<i>consumatempo</i>	partial concept	time-consuming	to consume	time	–	–	sg
<i>consumatutto</i>	person	a person who consumes just anything	to consume	all	–	–	sg
<i>controllatutto</i>	partial concept	controlling everything	to control	all	–	–	sg
<i>creaarticolo</i>	artifact	create article	to create	article	no	no	sg
<i>creacasino</i>	person	a messy person	to create	disorder	no	no	sg
<i>creaquadrato</i>	artifact	create square	to create	square	no	no	sg
<i>curaunghie</i>	artifact	nail clipper	to cure	nail	no	no	pl
<i>distruggicoppia</i>	partial concept	couple-destroying	to destroy	couple	no	no	sg
<i>insegnatutto</i>	partial concept	all-teaching	to teach	all	–	–	sg
<i>lavafaccia</i>	person	face washer	to wash	face	no	yes	sg
<i>lucidascarpe</i>	person	shoe shine person	to polish	shoe	no	no	pl
<i>prendicarta</i>	artifact	paper feed	to take, to grasp	paper	yes	–	sg
<i>spiegatutto</i>	partial concept	all-explaining	to explain	all	–	–	sg
<i>sputasangue</i>	natural kind, person, partial concept	bloody-nosed beetle, blood spitting	to spit	blood	yes	–	sg
<i>tienitutto</i>	partial concept	all-holding	to hold	all	–	–	sg
<i>trovalloggio</i>	artifact	accommodation finder	to find	accommodation	no	no	sg
<i>trovapersona</i>	artifact	person finder	to find	person	no	no	sg
<i>trovatutto</i>	place	a place where you find everything	to find	all	–	–	sg
<i>usamano</i>	partial concept	a kind of printing paper	to use	hand	–	yes	sg
<i>usatempo</i>	activity	pastime	to use	time	yes	–	sg
<i>vedimappa</i>	artifact	see map	to see	map	no	?	sg
<i>vedipersona</i>	artifact	see person	see	person	no	no	sg
<i>veditutto</i>	artifact	see everything, panopticon	to see	all	–	–	sg

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