On Vocabulary Insertion[1]

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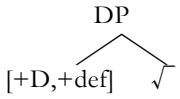
1. Introduction: terminal nodes and vocabulary items

The term Vocabulary Insertion (henceforth VocIns) refers to the mechanism through which vocabulary items such as *the* or *book* are inserted into the syntactic derivation. The amount of attention devoted to this concept as well as the theoretical questions raised by it vary greatly depending on the theoretical framework one adopts. For example, in a strictly lexicalist theory such as that of Chomsky (1995), VocIns reduces to the fairly straightforward operation of Select, which takes an element from the numeration and introduces it into the derivation (Chomsky 1995:226). With the advent of Distributed Morphology (DM, Halle & Marantz 1993), however, the complexity of VocIns as an operation has been substantially increased and the attention it has garnered has grown accordingly. In this paper we re-examine VocIns from the point of view of DM and argue that it is in need of revision.

One of the central innovations of DM is the claim that VocIns happens post-syntactically (i.e. so-called Late Insertion). The narrow syntactic derivation does not deal with lexical items directly (as was the case in the lexicalist model of Chomsky 1995), but rather manipulates abstract morphosyntactic features such as [plural] or [past]. From this perspective, the operation of VocIns is not so much about *insertion* as it is about *matching* the structures created by syntax with the elements found in the post-syntactic inventory of lexical items, the Vocabulary. An example can help clarify this issue. Consider the tree structure in (1).

(1)



Recall that the only atoms of the syntactic derivation are (possibly bundles of) morphosyntactic features. In this particular case, there are two such atoms: on the one hand the feature bundle consisting of a categorial D-feature and a feature expressing definiteness, and on the other a special placeholder feature for lexical roots (see below and De Belder & Van Craenenbroeck 2011 for detailed discussion). When the syntactic derivation is completed, this structure is handed over to the post-syntactic component responsible for spelling it out/pronouncing it. It is at this stage that VocIns takes place: the terminal nodes in the syntactic structure in (1) need to be matched up with appropriate lexical exponents. This means that the post-syntactic Vocabulary will contain correspondence rules such as the ones in (2).[2]

(2) a. [+D,+def] ↔ /ðə/
b. √ ↔ /buk/

Given that the left-hand side of these rules matches up perfectly with the terminal nodes of the tree in (1), the phonetic forms on the right-hand side can be inserted into these positions and the DP in (1) can be spelled out as *the book*.[3] It is important to note that the system just described introduces a fundamental dichotomy into the operation of VocIns: on the one hand there are terminal nodes and on other vocabulary items, and VocIns is primarily about finding the right pairing between the two. Moreover, both in the set of possible terminal nodes and in Vocabulary, there is a second, additional dichotomy. Recall that in the structure in (1), the feature dominated by the right-hand daughter of DP is but a placeholder (represented as √ in (1)) indicating that a lexical root needs to be inserted into this position.[4] As such, this node differs from its sister, which contains contentful morphosyntactic features. In other words, from the point of view of syntax, we can make a distinction between root terminal nodes (RTNs) on the one hand and functional terminal nodes (FTNs) on the other. The former contain a mere placeholder that plays no active role in the syntactic derivation (see Halle & Marantz 1993, De Belder & Van Craenenbroeck 2011), while the latter contains (sometimes bundles of) actual morphosyntactic features.

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[2] Note that rules such as those in (2) are what DM calls 'vocabulary items'.

[3] For the sake of exposition we are simplifying matters here, as insertion of a vocabulary item into a terminal node is also licensed when the former contains but a subset of the features present in the latter. This is an issue we return to in detail below.

[4] This placeholder feature is sometimes simply called [Root], see Halle & Marantz (1993), Harley & Noyer (1998, 1999).

A parallel dichotomy can be found in the post-syntactic Vocabulary. Consider the two vocabulary items in (2). The former indicates that the phonetic string corresponding to *the* can only be inserted in a terminal node containing the feature bundle [+D,+def], while the latter has no such stringent requirements: it can be filled in whenever a root placeholder is detected in the syntactic structure. As such, there is no difference in the morphosyntactic specification of this vocabulary item and that of other vocabulary items realizing a root such as *dog* or *hat*:

(3) a. $\sqrt{}$ ↔ /dɔg/
b. $\sqrt{}$ ↔ /hæt/

In other words, Vocabulary contains a dichotomy that completely mirrors the one found in syntax: there are functional vocabulary items (FVIs) such as *the* and lexical vocabulary items (LVIs) such as *book*, *dog* or *hat*. The former are characterized by a specification of contentful morphosyntactic features, while the latter's only distinguishing mark is the placeholder root feature.

As should be clear from the preceding discussion, the DM system of VocIns is set up such that LVIs are inserted into RTNs and FVIs are inserted into FTNs. Generally speaking, though, if there are two types of terminal nodes and two types of vocabulary items and if VocIns is characterized as the pairing of a terminal node with a vocabulary item, there should in principle be four types of pairings. They are listed in (4).

(4) a. FVIs in FTNs
b. LVIs in RTNs
c. FVIs in RTNs
d. LVIs in FTNs

The options in (4)a and (4)b are the ones that are allowed by the analysis just outlined, while (4)c-d are ruled out. However, whether or not these final two patterns occur is ultimately an empirical question, one which is rarely taken up in the DM-literature on VocIns, if at all. The present paper aims to fill this void. We examine cases where FVIs show up in RTNs as well as instances of LVIs occurring in FTNs. We argue that while the former pattern is real (and thus constitutes evidence against the standard DM-approach to VocIns), the latter is only apparent. We present a modified theory of VocIns from which this asymmetric picture follows.

This paper is organized as follows. In section 2 we discuss the occurrence of FVIs in RTNs. We argue that this phenomenon is real by discarding an alternative analysis for these facts, namely one in terms of self-reference. Section three examines the opposite pattern, i.e. LVIs in FTNs. We argue that these cases are only apparent, in that the vocabulary items showing up in these contexts have contentful morphosyntactic features as part of their lexical specification and as such represent FVIs rather than LVIs. In section four we propose a new mechanism of VocIns that correctly predicts the attested patterns. Section five sums up and concludes.

2. Functional vocabulary items in root terminal nodes

This section focuses on the first of the two non-canonical pairings in (4), i.e. the occurrence of FVIs in RTNs. We proceed as follows. In subsection 2.1 we present a set of data illustrating the use of FVIs in RTNs, and in subsection 2.2 we introduce and discard an alternative analysis for these facts. Subsection 2.3 sums up.

2.1 The data

Consider the following examples. They are from Dutch ((5)-(10)), Spanish ((11)-(14)), Romanian (15), Slovenian (16), Russian ((17)-(20)) and Lebanese Arabic (21).[5]

(5) Ik heb het **waarom** van de zaak nooit begrepen.
I have the why of the case never understood
'I have never understood the motivation behind the case.'

(6) In een krantenartikel komt het **wat/hoe/waar**
in a newspaper.article comes the what/how/where
altijd voor het **waarom**.
always before the why
'In a newspaper the what/how/who/where always precedes the why.'

(7) De studenten **jij**-en onderling.
the students you-3.PL amongst.one.another
'The students are on a first-name basis with each other.'

[5] We would like to thank an anonymous reviewer, Luis Vicente, Ileana Grama, Marko Hladnik, Pavel Rudnev, Anna Volkova, Nadya Goldberg and Sarah Ouwayda for these data.

(8) Martha is mijn tweede **ik**.
Martha is my second I
'Martha is my best friend.'

(9) Niets te **maar**-en!
nothing to but-INFINITIVE
'Don't but me!'

(10) Paard is een **het**-woord.
horse is a the$_{NEUTER.DEF}$-word
'*Paard* is a neuter noun.'

(11) No entiendo el **porqué** del caso.
Not understand.1SG the why of.the case
'I do not understand the motivation behind the case.'

(12) Martha es mi segundo **yo**.
Martha is my second I
'Martha is my best friend.'

(13) Fomento seguirá **ningun-eando** a Cornellà en sus paneles viarios.[6]
MPWC will.continue nobody-ing DOM Cornellà in their signs roadside
'The Ministry of Public Works and Constructions will continue to use roadside signs that ignore Cornellà.'

(14) % **vos-**ear
you.2PL-INFINITIVE
'to address someone politely.'

(15) Studenţii îl **tu**tuiesc pe profesor
student.PL.DEF him.CL you$_{INFORMAL}$.3PL on professor
'The students are on a first name basis with the professor.'

(16) Ucenci **vikajo** ucitelja. Ucitelj **tika** ucence.
student.NOM.PL you$_{FORMAL}$.3PL teacher.ACC. teacher.NOM.SG you$_{INFORMAL}$.3SG student.ACC.PL
'The students addres the teacher politely. The teacher is on a first name basis with the students.'

(17) **ty-**kat'
you$_{INFORMAL}$-INFINITIVE
'to be on a first name basis'

(18) pod**-da-**kiva[7]-t'
ITERATIVE-yes-ITERATIVE-INFINITIVE
'to say yes/to echo whatever is being said'

(19) ot-**ne-**kiva-t'-sya
PREFIX-NEGATION-REPETITIVE-INFINITIVE-REFLEXIVE[8]
'to deny/to make excuses'

(20) **oj**-kat'
oy-INFINITIVE
'to express dismay'

(21) lemt-uh am ballash y-**bass**-biss[9]-l-i
blame.PVF.1S-him so start.PFV.3MS but.IPFV.3MS-to-me
'I blamed him so he started saying "but" to me in a defensive way.'

Each of these sentences exemplifies the use of an FVI in a root position, i.e. inserted in an RTN. In (5) and (6) a Dutch *wh*-pronoun is merged under a nominal structure, while in (8) the Dutch personal pronoun *ik* 'I' is. Examples (11) and (12) are similar data from Spanish. Examples (7), (9) and (13)-(20) show that personal pronouns, particles and conjunctions can be inserted under a verbal structure in various languages. Example (10) illustrates the use of a definite article as the left-hand part of a compound.

One could of course argue that these examples are exceptions, and that what is inserted in root position in (5)-(21) is not an FVI, but rather a root which is homophonous with an FVI. As it turns out, however, the use of FVIs in root position can be productive.[10] Consider first the data from Dutch in (22). They show that Dutch has a derivational word-formation process of *ge*-prefixation to form nouns referring to a pluractional event.

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[6] Example taken from elPeriódico.com, April 4, 2012 (http://www.elperiodico.com/es/noticias/barcelona/fomento-seguira-ninguneando-cornella-sus-paneles-viarios-1621511). The gloss DOM stands for differential object marker.

[7] *pod-iva* is a circumfix.

[8] The prefix *ot-* combined with the reflexive has the meaning of avoiding something.

[9] The Lebanese Arabic conjunction/adverb *bass* 'but/enough/only' is followed by a reduplication with a vowel change (*biss*).

[10] It is not the case that any FVI can be used as a root in any context in any language. For example, an anonymous reviewer points out that the counterpart of the Dutch example in (9) is not attested in Spanish. We do not think, however, that this restriction is particularly telling when it comes to the use of FVIs as roots, and suspect it is part of the more general problem that root-based models overgeneralize as they predict that any root can be used in any syntactic context, a prediction which is clearly false. To the best of our knowledge, an overall solution to this problem has not yet been found, though see Borer (2005b: chapter 11 and 2013:chapter 13) and De Belder (to appear) for suggestions.

(22) a. het getik van de klok
the GE-tick of the clock
'the ticking of the clock.'
b. het gefluit van de vogels
the GE-whistle of the birds
'the whistling of the birds.'

As is illustrated in (23), this type of word-formation productively allows FVIs to occur in root position.[11]

(23) a. Ik hoef al dat ge-**maar** niet.
I need all that GE-but not
'I don't like those constant objections.'
b. Ik hoef al dat ge-**alhoewel** niet.
I need all that GE-although not
'I don't like those constant considerations.'
c. Ik hoef al dat ge-**of** niet.
I need all that ge-or not
'I don't like those constant alternatives.'
d. Ik hoef al dat ge-**hé** niet.[12]
I need all that GE-PRT not
'I don't like this constant need for confirmation.'
e. Ik hoef al dat ge-**waarom** niet
I need all that GE-why not
'I don't like the constant need for justification.'
f. Ik hoef al dat ge-**nooit** niet
I need all that GE-never not
'I don't like the constant unwillingness.'
g. Ik hoef al dat ge-**ik** niet
I need all that GE-I not
'I don't like all this egocentricity.'

We take the data in (5)-(23) to show that FVIs can be used as roots. In the next subsection we introduce and argue against a possible alternative analysis of such facts.

2.2 Against an analysis in terms of self-reference

As is well-known, native speakers—of any language, as far as we know—are able to take any string of sounds and (re)list it in their lexicon as a root. Two particularly clear examples of this process are given in (24)-(25).

(24) *Jardin* is the French word for 'garden'.
(25) The 'the' you have written on the board is a little too big.

Both of these sentences are perfectly grammatical utterances of English. That said, however, the first contains a word (*jardin*) which is not a part of the regular vocabulary (or even sound system) of this language, while the second one contains a word which is not used in its regular structural position or grammatical function. What we have illustrated here is the possibility of English (just like any other language) to take a string, regardless of whether it is already part of the language or not, and to (re)list it as part of its lexicon. To the best of our knowledge, this possibility is universally available. (26) shows an example from Lebanese Arabic (Sarah Ouwayda p.c.).

(26) L-**ennou** yalli b-ha-l-masal ma-na daruuriyyeh.
the-**that** that in-this-the-example not-it necessary
'The **that** that is in this example is not necessary.'

This phenomenon goes by various names, ranging from supposition materialis (Mill 1843) over hypostasis (Sørensen 1961) to pure quotation (Geurts and Maier 2005), but we will henceforth refer to it as self-reference, in that these (re)listed vocabulary items are used to refer to themselves. From the point of view of this paper, it is important to note that the phenomena in (24) and (in particular) (25) are *not* instances of FVIs occurring in RTNs. In particular,

[11] The translations given here are only indicative. The precise interpretation of these examples may vary according to the context.
[12] We follow Munaro & Poletto (2003) (among many others) in assuming that sentential particles are FVIs that realize a functional head in the clausal left periphery.

the second occurrence of the word *the* in (25) is not a definite article, but rather a root with the same phonetic exponence and with a meaning roughly corresponding to 'the word *the*' (see also below). As such, examples of self-reference might pose a threat to the conclusion reached in the previous subsection, i.e. that natural language contains instances of FVIs occurring in RTNs (and that the mechanism of VocIns should be adapted accordingly). In the remainder of this subsection, we show that the type of data discussed in the previous subsection are distinct from self-reference facts and hence warrant a different analysis. While the latter might involve vocabulary items or strings being (re)listed as roots in the lexicon, the former are a genuine instantiation of a vocabulary item that is intrinsically functional being used in a context where it typically does not belong.

We now discuss five differences between the data from the previous subsection and self-reference. The first concerns the quotative nature of the self-reference data. Consider the example in (27) in the context indicated.

(27) [context: you are proofreading a Dutch text in which the first occurrence of the definite article (spelled *de*) on p.23 is in the wrong font]
a. # The first 'the' on p.23 is in the wrong font.
b. ✓ The first 'de' on p.23 is in the wrong font.

As the infelicity of example (27)a in the given context makes clear, the use of self-reference is only licensed in contexts where the actual phonetic form of the relisted item is at stake. Replacing it with a functionally identical but phonetically different alternative (as we are doing in (27)) is not allowed. As such, these data contrast with the facts introduced above. Consider again the example in (7), but this time in the context indicated in (28).

(28) [context: you are describing (in Dutch) the communication style of a group of French-speaking students]
De studenten **jij**-en onderling.
the students you-3.PL amongst.one.another
'The students are on a first-name basis with each other.'

Even though none of the French-speaking students arguably uses the actual Dutch word *jij* 'you' in their communication with one another, the Dutch sentence in (28) is a perfectly felicitous description of their intra-group communication style. Another example concerns the compound in (10). Consider a variation on this sentence in (29).

(29) In deze tekst wordt *paard* als een de-woord gebruikt.
in this text becomes horse as a the$_{\text{NON-NEUTER.DEF}}$-word used
'In this text *paard* is used as a non-neuter noun.'

This sentence would be felicitous (and true) even if the text under discussion did not contain a single instance of the definite article *de* 'the'. As long as the non-neuter gender of the noun *paard* 'horse' can be successfully read off the inflection of adjectives and demonstratives, this noun can be characterized as a *de-woord* 'the$_{\text{NON-NEUTER.DEF}}$-word'. The examples in (28)/(29) thus show that unlike in the case of self-reference, the data from the previous subsection are not dependent on the actual phonetic form of the vocabulary item that occurs in root position.

A second difference concerns gender. Nouns formed through self-reference all carry the default non-neuter (i.e. common) gender in Dutch, while the nouns illustrated in the previous subsection can have different genders.[13] Consider the following data.

(30) De {waarom / ik / gemaar} op de eerste regel staat in een verkeerd lettertype.
the$_{\text{non-neuter}}$ why I GE-but on the first line stands in a wrong font
'The word 'waarom'/'ik'/'gemaar' on the first line is in the wrong font.'

(31) Ik heb het **waarom** van de zaak nooit begrepen.
I have the$_{\text{NEUTER}}$ why of the case never understood
'I have never understood the motivation behind the case.'

(32) Zij is de ik die ik zoek.
she is the$_{\text{NON-NEUTER}}$ I REL I look.for
'She's the soulmate I'm looking for.'

(33) Ik hoef al het ge-**maar** niet.
I need all the$_{\text{NEUTER}}$ GE-but not

[13] The judgments reported here are those of the authors of this paper. A quick informal survey reveals that there is considerable variation concerning the gender of self-referential nouns. As this variation does not affect the strength of the argumentation in any substantial way, we leave a further exploration of it as a topic for further research.

'I don't like the constant objections.'

The example in (30) shows that regardless of which word or string is used in a self-reference context, it is always treated as a non-neuter noun in Dutch. This is not all too surprising as this is the default gender in this language. The nouns under discussion here, however, are not limited in this way and are assigned gender on the basis of their meaning (person in (32) vs. thing in (31)) or their morphological makeup (prefixation with *ge-* always creates neuter nouns, cf. (33)). This once again shows that the phenomena we have identified as FVIs in RTNs are fundamentally different from self-reference.

The third difference concerns the category of the newly-created words. As was pointed out by Sørensen (1961), self-referring expressions are always nouns syntactically, even if the string or word used to create the self-referring expression is itself not a noun. Consider in this respect again the example in (25), repeated below as (34).

(34) The 'the' you have written on the board is a little too big.

The word *the* is a determiner, not a noun, but the self-referring expression based on this word is a noun, as is witnessed by the fact that it is preceded by a definite determiner in (34) with which it forms a nominal constituent that serves as subject of the sentence. In this respect, self-referring expressions differ from the data discussed in the previous subsection, where we have shown that FVIs can be used in root position not only in a nominal context, but also in a verbal one:

(35) De studenten **jij**-en onderling.
the students you-3.PL amongst.one.another
'The students are on a first-name basis with each other.'
(36) Niets te **maar**-en!
nothing to but-INFINITIVE
'Don't object!'

Fourthly, self-referring nouns differ from the facts under discussion in the previous subsection in that they display the typical behavior of proper names. Consider for example the use of the definite determiner in (37)/(38), and compare it to the parallel examples in (39)/(40).

(37) (*The) 'why' is an adverb.
(38) *(The) 'why' you have written on the board is a little too big.
(39) (*The) Paris is a great city.
(40) *(The) Paris that I used to know is a great city.

The examples in (39) and (40) illustrate that proper names in English typically occur without a determiner, unless they are modified (in this case by the relative clause *that I used to know*), in which case the determiner is obligatory. As shown in (37)/(38), the exact same pattern can be found in the case of self-reference. In this respect, they differ, however, from the use of FVIs in RTNs. Consider the following example.

(41) *(Het **waarom** (van de zaak) wordt in de eerste alinea beschreven.
the$_{\text{NEUTER}}$ why of the case becomes in the first paragraph described
'The motivation behind the case is discussed in the first paragraph.'

What this sentence shows is that the use of the functional vocabulary item *waarom* 'why' in root position bears none of the characteristics of proper names: the definite determiner is obligatory, regardless of whether *waarom* is modified or not.

Fifthly and finally, Sørensen (1961) points out that a self-referring expression X is synonymous with paraphrases such as *the sound/word/phrase/… X*. Again, this does not hold for the data we are focusing on in this paper. Consider in this respect the following contrast.

(42) (Het woord) 'waarom' is een bijwoord.
the word why is an adverb
'(The word) 'why' is an adverb.'
(43) Het (# woord) **waarom** van de zaak wordt in de eerste alinea beschreven.
the word why of the case becomes in the first paragraph described
'The motivation behind the case is discussed in the first paragraph.'

In (42) the vocabulary item *waarom* 'why' is used as a self-referring expression, while in (43) we present a variation on the example given in the previous subsection. As is clear from the judgments, the former case allows for a paraphrase by means of *het woord* 'the word', while in the latter this leads to a complete loss of the intended meaning.

Summing up, there is substantial evidence against analyzing the data introduced in subsection 2.1 as cases of self-reference. To the extent that self-reference is to be analyzed as the (re)listing of a particular word or string as a vocabulary item in the lexicon (see Harley 2009 for an analysis along these lines for quotative parts of compounds), this analysis is not available for our data. What we propose instead is that our examples involve the use of FVIs in root position (i.e. in RTNs).

2.3 Conclusion

In this section we have looked at the first of the two non-canonical pairings of terminal nodes and vocabulary items listed in (4), i.e. FVIs that are inserted into RTNs. We have argued that such data do indeed exist and as a result that the traditional DM-view on VocIns is flawed. In the next section we turn to the second non-canonical pairing: LVIs that are inserted into FTNs.

3. Lexical vocabulary items in functional terminal nodes

In section 2.1 we discussed FVIs which realize an RTN. In this section we present examples that seem to mirror the previous ones, i.e. in which LVIs seem to occur in FTNs. The section is structured as follows. In subsection 3.1 we present data which at first sight instantiate this scenario. In subsection 3.2, however, we argue that what looks like LVIs in these constructions are in fact FVIs. Subsection 3.3 concludes.

3.1 The data

Vocabulary items that typically realize an RTN can sometimes realize an FTN as well. They are known in the literature as semi-lexical items (see Emonds 1985,[14] Van Riemsdijk 1998 and Corver & Van Riemsdijk 2001). An example of a semi-lexical vocabulary item is the Dutch word *heel* (see Zwarts 1992, Den Dikken 2002, De Belder 2011 for detailed discussion). Example (44) shows *heel* realizing an RTN in an AP, while (45) illustrates its use as a universal quantifier.

(44) Het **heel-e**[15] bord is veel waard, het kapot-e bord niet.
the whole-INFL plate is much worth the broken-INFL plate not
'The intact plate is worth a lot, the broken one isn't.'

(45) Ik heb heel het huis gepoetst.
I have whole the house cleaned
'I have cleaned the entire house.'

We first present some arguments for the adjectival status of *heel* in (44), and then argue that it functions as a universal quantifier in (45) (see De Belder 2011 for further discussion).

As (44) shows, when used as an adjective *heel* can be translated as 'whole, unbroken, intact'. When used as such, it has all the properties of garden-variety adjectives. Firstly, just like other adjectives it can be modified by degree modifiers, as shown in the examples below.[16]

(46) Het bord was nog volledig **heel**.
the plate was still completely whole
'The plate was still completely intact.'

(47) Het bord was al volledig **leeg**.
the plate was already completely empty
'The plate was already completely empty.'

Example (47) shows the combination of the degree modifier *volledig* 'completely' and the adjective *leeg* 'empty', while (46) shows that the same degree modifier can combine with *heel* when it is used as an adjective.

Secondly, *heel* shows adjectival inflection, as can be seen in (44). In this example *heel* takes the same inflection as *kapot* 'broken'. Furthermore, when used as an adjective, *heel* 'whole' surfaces in the adjectival domain in the DP. The examples in (48) illustrate this. Note that the adjectival modifier *volledig* 'completely' ensures that we are dealing with the adjectival use of *heel* in these examples.

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[14] Emonds (1985) calls semi-lexical items 'grammatical nouns/verbs/…'.
[15] Note that the spelling of this form is *hele*. We have preserved the spelling of the individual morphemes for expository purposes. Similarly, *kapot-e* is spelled *kapotte*.
[16] *Heel* is an absolute adjective and as a result combines with modifiers that are typically associated with this type of adjectives (see Kennedy & McNally 2005, Kennedy 2007, Winter & Rotstein 2004, Barbiers 1995, Vanden Wyngaerd 2001).

(48) a. de **mooi-e,** **volledig** **heel-e,** **antiek-e** borden
the nice.INFL completely whole. INFL antique.INFL plates
'the nice, completely intact, antique plates'

b. de **volledig** **heel-e,** **mooi-e,** **antiek-e** borden
the completely whole.INFL pretty.INFL antique.INFL plates
'the completely intact, pretty, antique plates'

c. de **mooi-e,** **antiek-e,** **volledig** **heel-e** borden
the pretty.INFL antique.INFL completely whole.INFL plates
'the pretty, antique, completely intact plates'

The examples in (48) show that *heel* can precede, follow or be placed in between other adjectives. Moreover, it can not only be used attributively, but also predicatively, as in (49).

(49) Die antiek-e borden zijn nog volledig **heel**.
those antique-INFL plates are still completely intact
'Those antique plates are still completely intact.'

It can also be coordinated with other adjectives, as in (50). As coordination most regularly combines constituents of the same category (Chomsky's 1959 Coordination of Likes Constraint), this again suggests that *heel* realizes an RTN under an adjectival functional projection in these contexts.

(50) Die antieke borden zijn nog volledig **heel** **en** **gaaf**.
those antique plates are still completely whole and intact
'Those antique plates are still completely intact and undamaged.'

Although the Coordination of Likes Constraint allows for counterexamples (see Sag et al. 1985), adjectives and universal quantifiers cannot be coordinated, as (51) illustrates. As such, we can conclude that *heel* in (50) is not used as a quantifier.

(51) * **Alle** **en** **mooie** meisjes zijn welkom.
all and pretty girls are welcome

Finally, *heel* when used as an adjective can occur as a comparative or a superlative.[17]

(52) Deze borden zijn nog net een beetje
these plates are yet just a little.bit
heel-er dan de andere.
intact-COMPARATIVE than the others.
'These plates are just a little bit more intact than the others.'

(53) Dit bord is nog het **heel-st** van allemaal.
this plate is yet the intact-SUPERLATIVE of all
'This plate is the most intact of all.'

Summing up, when interpreted as 'intact', *heel* has all the characteristics of an adjective. We conclude that the vocabulary item *heel* can realize an adjectival RTN.

Heel can also be used as a universal quantifier. As a quantifier, it does not occupy the adjectival domain. Rather, it occurs to the left of the determiner, as shown in (54).

(54) heel het boek
whole the book
'the entire book'

It is not the only universal quantifier that can occupy this position. *Al* 'all' can do so too, as can be seen in (55).

[17] This use is slightly marked, presumably because *heel* is an absolute adjective. In (i) we give an attested example (http://www2.worldservants.nl/meetingpoint.php?tid=1452&page=28&print=1):

(i) de eertse tas die ik 3 jaar geleden gekregen heb is nog het heelst
the first bag that I 3 years ago received have is still the intact.SUPERLATIVE
'The first bag I got three years ago is still the most intact one.'

(55) al de chocolade
all the chocolate
'all the chocolate'

Zwarts (1992) observes that the two quantifiers which occur to the left of the determiner are both universal. They are in complementary distribution: the first one, *al* 'all', occurs with definite mass nouns (56)a and definite plural DPs (56)b, whereas the second one, *heel* 'whole', is restricted to definite singulars (56)c.

(56) a. {al / *heel} de chocolade
all/whole the chocolate
'all the chocolate'

b. {al / *heel} de regio's
all / whole the regions
'all the regions'

c. {*al / heel} de regio
all /whole the region
'all the region'

We conclude that *heel* in (56) is used as a universal quantifier (see Zwarts 1992, De Belder 2011). More generally, the vocabulary item *heel* can occur both as an adjective and a universal quantifier.

It is important to note that this property is specific to this one particular vocabulary item, i.e. semi-lexicality is not productive. Dutch has more VIs which can express completeness or intactness:

(57) Deze antieke commode is nog {volledig / compleet / intact / gaaf}.
this antique commode is still complete / complete / intact / intact
'This antique commode is still complete/intact.'

However, none of these words can be used as a universal quantifier. The examples in (58) in which the abovementioned VIs occupy the position of a universal quantifier are sharply ungrammatical.

(58) * { volledig / compleet / intact / gaaf} de antieke commode
complete / complete / intact / intact the antique commode

Semi-lexicality is thus a particular property of a particular vocabulary item, not the result of a productive mechanism.

Although semi-lexicality is not productive, *heel* is far from the only semi-lexical VI in Dutch. Consider a second example. The VI *paar* 'pair' can express both an RTN and a quantifier (example (60) is adapted from Van Riemsdijk 2005:8, see also Vos 1999).

(59) Het gelukkige paar wandelde langs de Seine.
the happy couple walked along the Seine
'The happy couple walked along the Seine.'

(60) de paar vrienden die hij nog heeft
the few friends that he still has
'the few friends he still has'

In (59) *paar* 'pair' realizes an RTN, which functions as the head noun in the DP. It selects the neuter definite article *het*. In (60) on the other hand, *paar* 'pair' does not head a DP. Instead, it modifies the noun *vrienden* 'friends'. This can be deduced from the fact that the non-neuter definite article *de* in (60) agrees with *vrienden* 'friends', rather than with *paar*, which cannot select this article, as can be seen in (61).

(61) * de paar
the pair

Furthermore, *paar* 'pair' has lost its lexical meaning and has acquired the denotation of a quantifier, expressing a small quantity. We conclude that *paar* realizes a quantifier in (60), which is an FTN in the DP (see Borer 2005a).[18]

[18] While the quantifier *heel* 'whole' surfaces to the left of the determiner, *paar* 'pair' in its use as a quantifier follows the determiner. This is due to the fact that *heel* is a universal quantifier, whereas *paar* is not (see Zwarts 1992).

Just as was the case with *heel*, however, the process illustrated here is not productive. (62) shows a couple of synonyms for *paar*.

(62) het { koppel / stel / duo}
the couple / twosome / duo
'the couple/twosome/duo'

None of these VIs can realize a quantifier, as shown in (63). Note that the non-neuter definite article *de* 'the' can once again only agree with *vrienden* 'friends'.

(63) * de { koppel / stel / duo} vrienden die hij nog heeft
the couple / twosome / duo friends that he still has

These examples again show that semi-lexicality, although common, is far from productive. Consider a final example. First note that the vocabulary items *jaar* 'year', *maand* 'month', *week* 'week' and *dag* 'day' may realize an RTN, as in (64).

(64) De { jaren / maanden / weken / dagen} vliegen voorbij.
the years / months / weeks / days fly over
'The years/months/weeks/days are passing by quickly.'

Now consider the measure phrase below. It contains the vocabulary item *jaar* 'year' used as a classifier expressing duration. The classifier status of the measure word can be deduced from the fact that it does not take a plural marker in spite of being preceded by the numeral *drie* 'three'.

(65) drie jaar gevangenis
three year prison
'three years of prison'

As classifiers realize functional heads (Borer 2005a), the vocabulary item *jaar* 'year' realizes an FTN in these examples. Interestingly, the acceptability of such examples varies greatly. Whereas (65) is fully acceptable and (66) is acceptable in Belgian Dutch, examples such as (67) and (68) are simply impossible.[19]

(66) % drie maand gevangenis [Belgian Dutch]
three month prison
'three months of prison'

(67) * drie week gevangenis
three week prison

(68) * drie dag gevangenis
three day prison

The examples show that some time-denoting vocabulary items can function as classifiers in Dutch, whereas others cannot. Moreover, these examples also illustrate some further properties of such semi-lexical items. Example (66) indicates that the status of a vocabulary item may vary across dialects. Whereas *maand* 'month' can realize a classifier in Belgian Dutch, it cannot take this role in the standard language. We come back to this kind of variation in the next subsection. Secondly, multiple semi-lexical items can compete for the same position. In Belgian Dutch, for example, *jaar* 'year' and *maand* 'month' are equally suitable to express a classifier of duration. The fact that several semi-lexical items are equally likely candidates for spelling out a given terminal node should follow from VocIns. We come back to this property in section 4. To conclude this subsection, we have shown that semi-lexicality is not a productive phenomenon, but an individual property of specific vocabulary items. We have further observed that several semi-lexical items may be equally likely candidates to realize a certain syntactic position.

3.2 The analysis: semi-lexical items are not LVIs

In the previous subsection we have seen that semi-lexical items can realize both an RTN and an FTN. As such, they seem to instantiate the second non-canonical pairing listed in (4), i.e. the occurrence of LVIs in RTNs. In this subsection, however, we argue that this conclusion is not warranted. Despite their at first sight 'lexical appearance',

[19] Note that the corresponding binominal measure phrases, for example *drie weken gevangenis* 'three week.PLURAL prison' (three weeks of prison), are grammatical.

semi-lexical items such as *heel*, *paar*, or *jaar* are in fact FVIs. We conclude that LVIs realizing FTNs is not a regular option in natural language.

In principle, it should be possible for an LVI to realize an FTN. Consider the following scenario. Suppose a functional terminal node in a given language characterized by the feature [F] is merged. In order to realize this FTN VocIns will search for a vocabulary item which is marked for this feature (see the discussion surrounding (1) and (2)). Now assume this language does not contain a single vocabulary item which is marked for this feature. DM stipulates that VocIns will then search for a closest match according to the Subset Principle, which is formulated in (69) (Halle 1997, Kiparsky 1973, Anderson 1986).

(69) **The Subset Principle**
The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen (Halle 1997:428).[20]

VocIns will thus search for a VI which is marked for a subset of the feature set [F]. Given that LVIs are not marked for any features, their feature set is the empty set,[21] and as such a subset of the feature set [F]. As a result, all LVIs are eligible candidates for realizing this FTN. The question that now arises is whether this is the correct analysis for what we have been calling semi-lexicality.

Let us reconstruct this hypothetical situation using an actual semi-lexical item, for example *heel*. We first have to assume that the FTN of the universal quantifier is characterized by a specific feature set for which there is no matching FVI. For the sake of the argument, we propose the feature set in (70) (see De Belder 2011 for detailed discussion of the precise features of this universal quantifier).

(70) [universal, Q, F]

As VocIns (by hypothesis) fails to find a closest match amongst its FVIs, it will search its LVIs, which, in principle, can be inserted as their empty feature set is a subset of the set in (70). Let us further assume that semi-lexical items such as *heel* are indeed LVIs. The vocabulary item *heel* 'whole' can then be characterized as in (71)a in Vocabulary, on a par with other LVIs such as *gaaf* 'intact' (see (71)b).

(71) a. $\sqrt{}$ ↔ /hel/
b. $\sqrt{}$ ↔ /ɣaf/

Given that all LVIs are identical, VocIns can select any LVI to realize this head. As a consequence, *heel* 'whole' and *gaaf* 'intact' are both candidates. In this scenario we thus predict that all LVIs should be able to realize the FTN associated with the universal quantifier. In other words, we expect semi-lexicality to be a fully productive mechanism. As we have shown extensively in the previous subsection, however, this prediction is not borne out—quite the contrary: there seems to be a unique relation between the vocabulary item *heel* on the one hand and the universal quantifier it realizes on the other. The straightforward solution to this problem is to assume that semi-lexical vocabulary items are FVIs. If they are, the link between them and the functional head of which they are the exponent can be formulated without any additional assumptions. This is demonstrated in (72).

(72) a. [universal, Q, F] ↔ /hel/
b. $\sqrt{}$ ↔ /ɣaf/

If semi-lexical items are FVIs, as in (72), the preference of VocIns for *heel* 'whole' over *gaaf* 'intact' follows immediately. In other words, the lack of productivity of semi-lexical items leads us to the conclusion that these vocabulary items are FVIs, not LVIs. Given that in section 2 we have argued that FVIs can be legitimate exponents of RTNs it now follows that semi-lexical items such as *heel* can realize both types of terminal nodes, viz. FTNs and RTNs.

3.3 Conclusion

[20] Note that Halle uses the term '(terminal) morpheme' for what we have been calling—and will continue to call—'(syntactic) terminal node'.

[21] Note that the line of reasoning developed here crucially assumes that the root feature (i.e. $\sqrt{}$) does not count for determining the degree of similarity between (the features of) a terminal node and (those of) a vocabulary item. See De Belder & Van Craenenbroeck 2011 and below, section 4, for detailed discussion.

In this section we have discussed semi-lexical items. At first sight, they seem to be LVIs that sporadically realize an FTN. We have pointed out, however, that this cannot be the case. Under the assumption that semi-lexical items are LVIs, one would predict that all LVIs can behave as semi-lexical items, given that all LVIs are created equal in Vocabulary. Given that semi-lexicality does not constitute a productive mechanism, however, and that it is a specific property of individual vocabulary items, we concluded that in spite of first appearances, semi-lexical items such as *heel* 'whole', *paar* 'pair', and *jaar* 'year' are in fact FVIs, i.e. lexical items endowed with specific morphosyntactic features. More generally, we conclude that FTNs are invariably realized by means of an FVI. [22]

When taken together, sections 2 and 3 paint a mixed picture, as one of the non-canonical pairings of vocabulary items and terminal nodes is attested, while the other is not. In the next section we make clear that the traditional DM-view on VocIns is not well suited to handle this asymmetry and we propose an alternative that is.

4. Revising the Subset Principle

This section is organized as follows. In subsection 4.1 we outline the VocIns-mechanism of standard DM and show why it is ill-suited to describe the facts presented in the first part of this paper. In subsection 4.2 we present our alternative. Subsection 4.3 illustrates how the alternative can be used to successfully derive our central data. Subsection 4.4 sums up and concludes.

4.1 Vocabulary Insertion in Distributed Morphology

DM assumes different modes of insertion for FVIs and LVIs. The insertion of FVIs is regulated by competition. More specifically, they are inserted into FTNs along the lines of the Subset Principle in (69) (repeated below as (73)) (Halle 1997, Kiparsky 1973, Anderson 1986).

(73) **The Subset Principle**
The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen (Halle 1997:428).

This procedure ensures that the VI whose feature specification matches that of the terminal node most closely will be the winner, essentially via an implementation of the Elsewhere Principle (see Caha 2009 for detailed discussion as well as an alternative in terms of supersets).

LVIs on the other hand do not compete. Their insertion is based on free choice (Harley and Noyer 1998), although the precise way in which this free choice is implemented tends to vary. For example, Harley and Noyer (1997) propose that LVIs carry selectional features or at least a specification of the context in which they can be inserted. They may further be endowed with the feature [Root] or with an index (Harley and Noyer 1999, Harley to appear). What these options have in common, however, is that all LVIs have some sort of marking that they share with RTNs, and that it is this marking that allows all of them to be inserted freely in such positions.

From the point of view of the current paper, this two-sided insertion mechanism is problematic for three reasons. First of all, we have shown, based on the data in (5)-(23), that FVIs can be inserted in root terminal nodes. This implies that the diacritic that allows LVIs to be inserted in such positions—say, a [Root]-feature—should be present on FVIs as well. Such a move, however, would render this diacritic meaningless, as it would now be present on *all* vocabulary items and as such would no longer distinguish roots from non-roots. Secondly, the use of FVIs as roots also considerably complicates the insertion mechanism itself. Note that the feature specification of an FVI—even if it were endowed with a [Root]-feature or other such diacritic—would never be a subset of the set of features present on root terminal nodes, as these positions do not contain any grammatical features.[23] Thirdly, if FVIs were endowed with a [Root]-feature, then by the Subset Principle this feature should be present on FTNs as well, thus further hollowing out the concept of a [Root]-feature. This would imply that LVIs should be able to be (freely) inserted in functional terminal nodes as well, contrary to fact (see section 3).

Summing up, while the DM-approach to VocIns works well in a world where the functional and the lexical realm are strictly separate, it faces considerable problems in light of data such as (5)-(23), where a functional element shows

[22] One option we want to leave open, though, is that LVIs can realize FTNs in situations of language change, in particular grammaticalization. As shown by De Belder, Faust and Lampitelli 2009, to appear, Mauritian Creole has a morpheme *ti* which synchronically clearly expresses the morphosyntactic feature [affect] (and as such instantiates an FVI that is inserted into an FTN), but diachronically derives from an adjectivce meaning 'small'. This means that there must have been a transitional stage of the language during which the LVI corresponding to this morpheme was inserted into the FTN characterized by the feature [affect].

[23] It is worth pointing out that Caha's (2009) Superset Principle does not fare any better in this respect. This principle chooses the insertion candidate from those VIs whose feature set is a *super*set of the set of features present on the terminal node. In the hypothetical situation discussed in the main text, this would mean all VIs are possible candidates for insertion in root terminal nodes. However, given that LVIs by definition are a closer match for RTNs than FVIs (neither LVIs nor RTNs contain grammatical features), the latter will never surface in root position, contrary to fact.

up in a typically lexical context. The next section shows how a unified insertion mechanism based on competition can overcome these problems.

4.2 Unified vocabulary insertion through competition

This section introduces a mechanism of VocIns that applies both to FVIs and to LVIs. The key ingredient will be the assumption that all insertion—whether it be in functional or root terminal nodes—is driven by competition. In order to achieve this goal, we will take a close look at the inner workings of the traditional Subset Principle and propose a reformulation of the way in which it selects (winning) candidates. The net effect of this modification will be that in FTNS, VocIns proceeds much as proposed in DM, while for RTNs, all vocabulary items (both FVIs and LVIs) prove to be an equally close match, thus creating the illusion of free choice.

Let us take as our starting point the Subset Principle in (73) and see how it fares when applied to all cases of Vocabulary Insertion (rather than just the insertion of FVIs in functional terminal nodes). The Subset Principle proceeds in two steps. First, it selects all possible candidates, i.e. all VIs whose feature specification forms a subset of the set of features on the terminal node. Second, the optimal candidate is selected from this group: the VI that provides the closest match for the features on the terminal node.

As far as insertion in functional terminal nodes is concerned, this mechanism yields the correct results, even if we include LVIs in the list of possible insertion candidates. A concrete example can serve to illustrate this. Suppose a functional terminal node F bears the feature specification in (74).

(74) F = [+3rd, +sg, +past, +predicative].

Under the reasoning outlined above, not only FVIs such as the ones in (75)a-c are possible insertion candidates, but also featureless LVIs such as *book* in (75)d. In fact, given that all LVIs are featureless, they are all potential realizations of F. When it comes to selecting the actual vocabulary item to spell out F, however, all FVIs in the candidate set will be closer matches for F's feature set than the featureless LVIs. As a result, no LVIs are (correctly, cf. section three) predicted to surface in functional terminal nodes.

(75)	a.	/wɔz/	↔	[+3rd, +sg, +past, +predicative]	(FVI)
	b.	/s/	↔	[+3rd, +sg]	(FVI)
	c.	/t/	↔	[+past][24]	(FVI)
	d.	/buk/	↔	Ø	(LVI)

In short, the Subset Principle as outlined in (73) straightforwardly yields the correct result for Vocabulary Insertion in functional terminal nodes, even if both FVIs and LVIs are taken to be potential insertion candidates. In root terminal nodes, however, the principle is less successful. Recall that such positions are not marked for any functional features (see De Belder and van Craenenbroeck 2011 for detailed discussion). This means that the only insertion candidates allowed by the Subset Principle are featureless LVIs, such as the one in (74)d (only the empty set is a subset of the empty set). As such, the principle incorrectly predicts data such as those in (5)-(23) to be ill-formed.

What we need, then, is an insertion mechanism that retains the effects of the Subset Principle for functional terminal nodes, but yields different results in the case of root terminal nodes. More specifically, the (possibly empty) set of features present on a terminal node should act as a *filter* for the VIs that can be inserted into that position: if the terminal node contains features (i.e. in the case of functional terminal nodes), only VIs matching those features are retained, while if the terminal is featureless (i.e. is a root terminal node), it imposes no restrictions on the VI that can be inserted there—the filter is vacuous—and any VI is a possible insertion candidate. The Revised Subset Principle in (76) has precisely this effect:

(76) **The Revised Subset Principle**

Given a terminal node A with feature set F_0 and vocabulary items (VIs) $/B_{1,2,\ldots,n}/ \leftrightarrow F_{1,2,\ldots,n}$:
$/B_i/$ is inserted in A if $F_0 \times F_0 \subseteq F_0 \times F_i$. When several VIs meet this condition, the one for which $F_0 \times F_i$ most closely matches $F_0 \times F_0$ is chosen.

This principle states that the phonological exponent of a VI is inserted into a terminal node if the Cartesian product of the feature set of the VI and the feature set of the terminal node matches all or a subset of the ordered pairs of the Cartesian product of the feature set of the terminal node with itself. Insertion does not take place if the Cartesian product of the feature set of the VI and the terminal node contains ordered pairs not present in the Cartesian

[24] Intended here is the past tense suffix *-ed*.

product of the feature set of the terminal node with itself. Where several VIs meet the conditions for insertion, the VI that yields the greatest number of matching pairs must be chosen.

As we will now illustrate, this principle selects the same VI in the case of functional terminal nodes, but leads to a universal tie in the case of root terminal nodes. Suppose F is a functional terminal node with the (abstract) feature specification in (77).

(77) $F_0 = \{a, b\}$

Suppose furthermore that the lexicon of this hypothetical language contains only the four VIs listed in (78). As is clear from their feature specification, the first is an LVI, while the latter three are FVIs.

(78)	a.	/bik/	↔	Ø	(LVI)
	b.	/ta/	↔	{a}	(FVI)
	c.	/plo/	↔	{a, b}	(FVI)
	d.	/stu/	↔	{a, b, c}	(FVI)

The traditional Subset Principle in (73) would select /plo/ as the VI that realizes the functional terminal node F_0, as this is the VI the feature set of which is the most closely matching subset of the feature set of F. The Revised Subset Principle behaves identically. Given that it involves not just first-order sets, but Cartesian products of such sets, let us first make explicit what the terms of the comparison are. They are listed in (79) and (80).

(79) $F_0 \times F_0 = \{a, b\} \times \{a, b\} = \{\langle a,a\rangle, \langle a,b\rangle, \langle b,a\rangle, \langle b,b\rangle\}$

(80)	a.	$F_0 \times F_{/bik/}$	$= \{a, b\} \times \emptyset$	$=$	$\emptyset$
	b.	$F_0 \times F_{/ta/}$	$= \{a, b\} \times \{a\}$	$=$	$\{\langle a,a\rangle, \langle b,a\rangle\}$
	c.	$F_0 \times F_{/plo/}$	$= \{a, b\} \times \{a, b\}$	$=$	$\{\langle a,a\rangle, \langle a,b\rangle, \langle b,a\rangle, \langle b,b\rangle\}$
	d.	$F_0 \times F_{/stu/}$	$= \{a, b\} \times \{a, b, c\}$	$=$	$\{\langle a,a\rangle, \langle a,b\rangle, \langle b,a\rangle, \langle b,b\rangle, \langle a,c\rangle, b,c\rangle\}$

The sets in (80) each have to be compared with the one in (79). In a first step, only those that form a subset of $F_0 \times F_0$ are retained as possible insertion candidates. This procedure eliminates set $F_0 \times F_{/stu/}$ in (80)d. Secondly, the set matching $F_0 \times F_0$ most closely is chosen as the actual realization of F. Given that $F_0 \times F_0$ is identical to $F_0 \times F_{/plo/}$ in (80)c, this VI wins the competition. More generally, in the case of Vocabulary Insertion in functional terminal nodes the Subset Principle and the Revised Subset Principle yield the same output for cases with a perfect match. Even if there is no perfect match, though, the two principles are still notational variants of one another when it comes to Vocabulary Insertion into functional nodes. Let us consider the same functional node as in (77) (repeated below as (81)), but this time without there being a perfectly matching VI. In particular, assume Vocabulary now only contains the VIs in (82).

(81) $F_0 = \{a, b\}$

(82)	a.	/bik/	↔	Ø	(LVI)
	b.	/ta/	↔	{a}	(FVI)
	c.	/stu/	↔	{a, b, c}	(FVI)

The feature sets of both /bik/ and /ta/ are subsets of the feature set of F, but given that the features of /ta/ are the closest match, this VI is selected by the Subset Principle. In order to see which VI is selected by the Revised Subset Principle, we have to compare Cartesian products. The relevant sets are given in (83) and (84).

(83) $F_0 \times F_0 = \{a, b\} \times \{a, b\} = \{\langle a,a\rangle, \langle a,b\rangle, \langle b,a\rangle, \langle b,b\rangle\}$

(84)	a.	$F_0 \times F_{/bik/}$	$= \{a, b\} \times \emptyset$	$=$	$\emptyset$
	b.	$F_0 \times F_{/ta/}$	$= \{a, b\} \times \{a\}$	$=$	$\{\langle a,a\rangle, \langle b,a\rangle\}$
	c.	$F_0 \times F_{/stu/}$	$= \{a, b\} \times \{a, b, c\}$	$=$	$\{\langle a,a\rangle, \langle a,b\rangle, \langle b,a\rangle, \langle b,b\rangle, \langle a,c\rangle, b,c\rangle\}$

Both (84)a and (84)b are subsets of (83), but given that (84)b is the closest match, this VI is chosen. When it comes to functional terminal nodes, then the Revised Subset Principle and the original Subset Principle yield exactly the same results.

Root terminal nodes are a different story. Recall that they are radically featureless. This means that in this case F_0 is identical to the empty set Ø. The sets that are being compared by the Revised Subset Principle are listed in (86).

(85) $F_0 \times F_0 = Ø \times Ø = Ø$

(86) a. $F_0 \times F_{/bik/} = Ø \times ∅ = Ø$
b. $F_0 \times F_{/ta/} = Ø \times \{a\} = Ø$
c. $F_0 \times F_{/plo/} = Ø \times \{a, b\} = Ø$
d. $F_0 \times F_{/stu/} = Ø \times \{a, b, c\} = Ø$

Given that the Cartesian product of any set with the empty set yields the empty set, all sets in (85)/(86) are identical and more importantly, all sets in (86) are not only (trivially) subsets of the one in (85), they are also all the most closely matching subset. In other words, the Revised Subset Principle predicts that in the case of root terminal nodes there is a universal tie between VIs, and all of them—LVIs and FVIs alike—are potential candidates for insertion, exactly as required.

Summing up, we have proposed a unified insertion mechanism for both LVIs and FVIs that is based on competition. In the case of functional terminal nodes this mechanism works exactly like the traditional Subset Principle, but for root terminal nodes it leads to a universal tie, thus allowing all VIs—i.e. not only LVIs but also FVIs—to be inserted into that position, thus essentially creating free choice. Our Revised Subset Principle thus captures the intuition that the feature specification of a terminal node acts as a filter on the type of VI that can be inserted there. If the filter is vacuous, all VIs meet the requirement. The next subsection shows how the Revised Subset Principle straightforwardly derives the VocIns asymmetry we uncovered in the first half of this paper.

4.3 Back to the cases at hand

In this article we have made two central claims regarding VocIns. First, we argued that FVIs can occupy a root position. Second, we claimed that semi-lexical items are instances of FVIs which are regularly inserted into both RTNs and FTNs. In this section we illustrate that the Revised Subset Principle in (76) successfully derives these data.

Let us first consider the insertion of an FVI in a root position, as in (87).

(87) Martha is mijn tweede **ik**.
Martha is my second I
'Martha is my best friend.'

We have shown that FVIs occupying a root position, such as the pronoun in (87), are not to be confused with cases of self-reference. Whereas self-reference arguably involves (re)listing an FVI as an LVI, examples such as the one in (87) involve an FVI which is directly inserted in a root position.

The RTN into which the pronoun is inserted is by definition devoid of any morphosyntactic features, as in (88) (see De Belder & Van Craenenbroeck 2011 for extensive discussion). Let us further assume that the Dutch personal pronoun is marked for the features in (89)a. Given that it in (87) it realizes an RTN, its main competitors are LVIs, such as *kat* 'cat' in (89)b.

(88) $F_0 = ∅$
(89) a. / ɪk/ ↔ {1, sg, nom}
b. /kat/ ↔ ∅

The challenge now is to show that the pronoun in (89)a is as good a match for the RTN in (88) as the LVI in (89)b. The Revised Subset Principle derives this result. Recall that according to the principle the benchmark for comparison is the Cartesian product $F_0 \times F_0$. The sets to be compared are given in (90) and (91).

(90) $F_0 \times F_0 = Ø \times Ø = Ø$
(91) a. $F_0 \times F_{/ɪk/} = ∅ \times \{1, sg, nom\} = ∅$
b. $F_0 \times F_{/kat/} = ∅ \times ∅ = ∅$

Both Cartesian products in (91) yield the empty set. As such, they are both a subset of the benchmark empty set in (90) and moreover, they are an equally close match. In other words, the competition between the pronoun *ik* 'I' and

the LVI *kat* 'kat' ends in a tie. When several VIs are equally close matches, VocIns is essentially subject to free choice. As such, the speaker may choose to insert the pronoun, yielding (87). In short, we have now successfully derived this example.

Our second main claim revolved around so-called semi-lexical items. We have shown that they are FVIs, which can be inserted both into an RTN, as in (92) and into an FTN, as in (93). We have further pointed out that semi-lexicality is not productive. Only those VIs which are marked as being semi-lexical can realize both positions. Hence, the VI *gaaf* 'intact' is a licit substitute for *heel* 'whole' in a root position, see (94), but not in the relevant functional position, as shown in (95).

(92) Het **heel-e** bord is veel waard, het kapot-e bord niet.
the whole-INFL plate is much worth the broken-INFL plate not
'The intact plate is worth a lot, the broken one isn't.'

(93) Ik heb **heel** het huis gepoetst.
I have whole the house cleaned
'I have cleaned the entire house.'

(94) Het **gaav-e** bord is veel waard, het kapot-e bord niet.
the intact-INFLplate is much worth the broken-INFL plate not
'The intact plate is worth a lot, the broken one isn't.'

(95) * Ik heb gaaf het huis gepoetst.
I have intact the house cleaned
'I have cleaned the entire house.'

This means that in order for the proposal to successfully handle semi-lexical vocabulary items, it should be able to insert such an item both in a functional position and in a root position. Furthermore, it should follow that semi-lexicality is not productive.

First consider the competition for a functional position. We have pointed out that the VI *heel* 'whole' realizes the functional node in (96).

(96) F_{UQ} = [universal, Q, F]

We have proposed that semi-lexical VIs are FVIs. In other words, they are marked for certain morphosyntactic features. This is illustrated for *heel* in (97). By contrast, the LVI *gaaf* 'intact' does not realize any features by virtue of being an LVI.

(97) a. /hel/ ↔ [universal, Q, F]
b. /ɣaf/ ↔ ∅

The Revised Subset Principle should now derive the fact that (97)a is a suitable realization of the FTN in (96), whereas (97)b is not. Consider first the benchmark set given in (98). It is computed from the features of the functional terminal node.

(98) $F_{UQ} \times F_{UQ}$
$= \{U, Q, F\} \times \{U,Q,F\}$
$= \{<U,U>, <U,Q>, <U,F>, <Q,U>, <Q,Q>, <Q,F>, <F,U>, <F,Q>, <F,F>\}$

The Cartesian products of the features of the candidates for insertion and the features of the FTN are given in (99) and (100).

(99) $F_{UQ} \times F_{/hel/}$
$= \{U, Q, F\} \times \{U,Q,F\}$
$= \{<U,U>, <U,Q>, <U,F>, <Q,U>, <Q,Q>, <Q,F>, <F,U>, <F,Q>, <F,F>\}$

(100) $F_{UQ} \times F_{/ɣaf/}$
$= \{U, Q, F\} \times \emptyset$
$= \emptyset$

The sets in both (99) and (100) are subsets of the set in (98). As such, they both meet the first criterion of the Revised Subset Principle. However, only the closest matching subset will be eligible for insertion. This means that *heel* 'whole' will realize the universal quantifier at the expense of *gaaf* 'undamaged' (and all other LVIs). We have now derived the fact that a semi-lexical item can realize an FTN if it is marked for the appropriate features. By contrast, an LVI will invariably loose the competition. As a result, semi-lexicality is not productive.

Let us now turn to the competition between a semi-lexical item such as *heel* 'whole' and an LVI such as *gaaf* 'intact' for insertion into a root position. As is illustrated in (101), we expect them to be equal candidates. We now demonstrate that the Revised Subset Principle successfully derives this result.

(101) Het **gaav-e/heel-e** bord is veel waard, het kapot-e bord niet.
the undamaged- INFL/whole-INFL plate is much worth the broken-INFL plate not
'The intact plate is worth a lot, the broken one isn't.'

The benchmark set of the RTN is given in (102). The sets to be compared to this benchmark are given in (103).

(102) $F_0 \times F_0 = \varnothing \times \varnothing = \varnothing$

(103) a. $F_0 \times F_{/hel/} = \varnothing \times \{U, Q, F\} = \varnothing$
b. $F_0 \times F_{/ɣaf/} = \varnothing \times \varnothing = \varnothing$

Given that the results of the Cartesian products of the semi-lexical VI and the LVI are identical in this case, both are equally close matches. In sum, the Revised Subset Principle successfully derives the fact that FVIs realize both RTNs and FTNs, whereas LVIs cannot realize an FTN. As such, it captures the data under discussion in this paper.

4.4 Conclusion

In this section we have argued for a single Vocabulary Insertion mechanism based on competition that allows FVIs to be inserted in root positions, but not the other way around.

5. Conclusion

This paper focused on Vocabulary Insertion, a PF-operation that deals with the interaction between syntactic terminal nodes on the one hand and vocabulary items on the other. We have shown that syntax yields two different types of terminal nodes, viz. root terminal nodes and functional terminal nodes. Analogously, Vocabulary contains two types of vocabulary items, viz. lexical vocabulary items and functional vocabulary items. Lexical vocabulary items typically realize root terminal nodes, functional vocabulary items are exponents of functional terminal nodes.

This paper explored whether it is possible for vocabulary items to be matched with terminal nodes chiastically, i.e. whether functional vocabulary items can express root terminal nodes and whether lexical vocabulary items can express functional terminal nodes. The results turned out to be mixed: whereas functional vocabulary items can be inserted across the board, lexical vocabulary items are restricted to root terminal nodes. First, we have presented examples of functional vocabulary items occupying root terminal nodes. We have shown that this process is productive and concluded that VocIns can freely match functional vocabulary items with root positions. We have set this phenomenon apart from cases of self-reference, which should arguably be analyzed as instances of (re)listing in Vocabulary.

Secondly, we examined whether it is possible for lexical vocabulary items to realize functional terminal nodes. The answer was negative. We discussed the best candidates to represent this state of affairs, viz. semi-lexical items. We pointed out that semi-lexicality is far from productive, indicating that there is no productive mechanism which matches lexical vocabulary items with functional terminal nodes. We concluded that semi-lexical items are simply functional vocabulary items.

In the final section we have discussed the fact that the traditional DM way of defining Vocabulary Insertion is too conservative. It does not allow for functional vocabulary items to realize root terminal nodes. We have proposed a unified insertion mechanism according to which all vocabulary items (lexical and functional alike) are inserted via competition. The observed asymmetry between functional and lexical vocabulary items followed straightforwardly from this revised principle.

6. References

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